

**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**ODD TERM END EXAM NOV./DEC.-2018****EXAM SEAT NO.**

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**LEVEL :- THIRD****PROGRAM : IE & E & TC****COURSE CODE :- IEE/ETE309/IX209/EJ209****COURSE NAME MICROPROCESSOR & INTERFACING****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 20/12/2018****Instruction :-**

1) Answers of two sections must be written in separate section answer book provided.

2) Figure to the right indicate marks.

3) Illustrate your answers with sketches wherever necessary.

4) Use of non-programmable pocket calculator is permissible. *WZ register pair.*

5) Mathematical and other tables shall be made available on request.

6) Assume additional suitable data necessary.

7) Use of Mobile is strictly prohibited.

| QN  |    | S   | Section- I                                                                                                                                                                                                                                                                       | Ma<br>rks |
|-----|----|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|     |    | Q N |                                                                                                                                                                                                                                                                                  |           |
| Q.1 |    |     | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                        | <b>08</b> |
|     | a) |     | State the function of following control signals.<br>i) $\overline{MEMW}$ ii) $\overline{MEMR}$ iii) $\overline{IOR}$ iv) $\overline{IOW}$                                                                                                                                        |           |
|     | b) |     | Give function of XRA M & CMC instruction.                                                                                                                                                                                                                                        |           |
|     | c) |     | Enlist four features of 8085.                                                                                                                                                                                                                                                    |           |
|     | d) |     | Name the any two instructions that uses W & Z register for their operations.                                                                                                                                                                                                     |           |
|     | e) |     | Name the all software interrupts.                                                                                                                                                                                                                                                |           |
|     | f) |     | Give the number of T states & number of machine cycles used for CALL 16 bit adder ( if condition is true)                                                                                                                                                                        |           |
| Q.2 |    |     | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                        | <b>16</b> |
|     | a) |     | Draw timing diagram for OUT 90H.                                                                                                                                                                                                                                                 |           |
|     | b) |     | Explain the following instructions.<br>i) DAD R <sub>p</sub> ii) DAA                                                                                                                                                                                                             |           |
|     | c) |     | State the size and function of each.<br>i) Accumulator ii) PC iii) SP iv) WZ register pair.                                                                                                                                                                                      |           |
|     | d) |     | Explain with neat diagram instruction decoding and execution.                                                                                                                                                                                                                    |           |
|     | e) |     | Draw overall interrupt structure.                                                                                                                                                                                                                                                |           |
|     | f) |     | Draw the format and explain SIM instruction.                                                                                                                                                                                                                                     |           |
| Q.3 |    |     | Attempt any <b>TWO</b> :                                                                                                                                                                                                                                                         | <b>16</b> |
|     | a) |     | Draw timing diagram for RET if condition is true.                                                                                                                                                                                                                                |           |
|     | b) |     | Write a program to transfer a block of data stored in memory location 9050H to 9055H, and data is to be stored from location 6550 H to 6555 H in reverse order.<br>Draw flow chart also.                                                                                         |           |
|     | c) |     | 1) Give the function of pins. i) Ready ii) $\overline{IO/\overline{M}}$ iii) $\overline{INTA}$ iv) $S_0S_1$ .<br>2) WAP to find evens parity number from an array of 10 numbers stored from memory locations 7050 H onwards.Store even parity number at location 6050 H onwards. |           |

| Q.N | S<br>Q<br>N | Section- II                                                                                                                                                                           | Ma<br>rks |
|-----|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Q.4 |             | Attempt any <b>FOUR</b> :                                                                                                                                                             | <b>08</b> |
|     | a)          | How many address lines of 8085 microprocessor will be required to interface memory chips of following size? i) 1K x 8 ii) 2K x 4.                                                     |           |
|     | b)          | Write the control word format of 8255 for BSR mode to set PC0, PC1 & PC5.                                                                                                             |           |
|     | c)          | State any two features of 8255 ( Programmable Peripheral Interface)                                                                                                                   |           |
|     | d)          | State any two features of 8259 ( Programmable Interrupt controller)                                                                                                                   |           |
|     | e)          | State the operating modes related with 0CW2 ( Operational command word) of 8259.                                                                                                      |           |
|     | f)          | Write the function of following pins of 8255. i) $\overline{CS}$ ii) A0 – A1                                                                                                          |           |
| Q.5 |             | Attempt any <b>FOUR</b> :                                                                                                                                                             | <b>16</b> |
|     | a)          | Differentiate between I/O mapped I/O and memory mapped I/O. ( any 4 points)                                                                                                           |           |
|     | b)          | With the help of timing waveforms. Explain the operation of mode 0 of I/O operating mode of 8255.                                                                                     |           |
|     | c)          | Draw and explain the control word format of I/O modes for 8255.                                                                                                                       |           |
|     | d)          | Draw a timing diagram of IN instruction of 8085 microprocessor.                                                                                                                       |           |
|     | e)          | Draw and explain the ICW2 ( Initialization Command Word) of 8259.                                                                                                                     |           |
|     | f)          | Draw the interfacing diagram of 8259 with 8085 microprocessor.                                                                                                                        |           |
| Q.6 |             | Attempt any <b>TWO</b> :                                                                                                                                                              | <b>16</b> |
|     | a)          | With the help of neat labelled diagram, explain functional block diagram of 8259.                                                                                                     |           |
|     | b)          | Interface two LEDs using common anode technique. Draw the interfacing diagram. Write an assembly language program to blink them alternately. Assume port addresses in I/O mapped I/O. |           |
|     | c)          | Interface a 2K x 8 memory chip to 8085 microprocessor with starting memory address 8000H. ( Draw complete interfacing diagram and decoding logic design)                              |           |

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LEVEL :- FIFTH PROGRAM : IE & E&TC

COURSE CODE IEE/ETE508/IX404/EJ404

COURSE NAME :- INDUSTRIAL ORGANIZATION & MANAGEMENT

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 30/ 11 / 2018

Instruction :-

- 1) Answer of two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

| QN  |    | S | Section- I                                                              |  |  | Mar |
|-----|----|---|-------------------------------------------------------------------------|--|--|-----|
|     |    | Q |                                                                         |  |  | ks  |
|     |    | N |                                                                         |  |  |     |
| Q.1 |    |   | Attempt any <b>FOUR</b> :                                               |  |  | 08  |
|     | a) |   | Enlist types of business.                                               |  |  |     |
|     | b) |   | State products from engineering industry.                               |  |  |     |
|     | c) |   | Define the term 'Management'.                                           |  |  |     |
|     | d) |   | Enlist various levels of management.                                    |  |  |     |
|     | e) |   | Define the term 'Authority'.                                            |  |  |     |
|     | f) |   | Show line organization.                                                 |  |  |     |
| Q.2 |    |   | Attempt any <b>FOUR</b> :                                               |  |  | 16  |
|     | a) |   | Enlist various steps in organization and describe them.                 |  |  |     |
|     | b) |   | What is departmentation?                                                |  |  |     |
|     | c) |   | Write about partnership deed.                                           |  |  |     |
|     | d) |   | State advantages of cooperative society.                                |  |  |     |
|     | e) |   | Describe functional organization with suitable example.                 |  |  |     |
|     | f) |   | What is globalization? Enlist its advantages.                           |  |  |     |
| Q.3 |    |   | Attempt any <b>FOUR</b> :                                               |  |  | 16  |
|     | a) |   | What you know about process and textile industry? Give example of each. |  |  |     |
|     | b) |   | State the importance of agro industry.                                  |  |  |     |
|     | c) |   | Discuss about scientific management of F.W. Taylor.                     |  |  |     |
|     | d) |   | Describe controlling as management function.                            |  |  |     |
|     | e) |   | Differentiate between administration and management.                    |  |  |     |
|     | f) |   | Describe various steps in planning.                                     |  |  |     |

P.T.O.

| QN  | S<br>Q<br>N | Section- II                                                                  | Mar<br>ks |
|-----|-------------|------------------------------------------------------------------------------|-----------|
| Q.4 |             | Attempt any <b>FOUR</b> :                                                    | <b>08</b> |
|     | a)          | What is personnel management?                                                |           |
|     | b)          | List types of training.                                                      |           |
|     | c)          | What is profit?                                                              |           |
|     | d)          | What are functions of financial management?                                  |           |
|     | e)          | Why inventory managements necessary?                                         |           |
|     | f)          | Define quality circle.                                                       |           |
| Q.5 |             | Attempt any <b>FOUR</b> :                                                    | <b>16</b> |
|     | a)          | What is industrial dispute act and what are governing points?                |           |
|     | b)          | Explain Maslow's theory of motivation.                                       |           |
|     | c)          | How workmen compensation act is implemented and what are governing points?   |           |
|     | d)          | What is accident? And list causes of accidents.                              |           |
|     | e)          | What is GST? List Benefits of GST.                                           |           |
|     | f)          | List types of Budgets and explain any one.                                   |           |
| Q.6 |             | Attempt any <b>FOUR</b> :                                                    | <b>16</b> |
|     | a)          | What is capital? And how it can be raised from market.                       |           |
|     | b)          | What is role of TQM in project management?                                   |           |
|     | c)          | List functions of purchase department.                                       |           |
|     | d)          | What is Economic Order quantity? Explain assumption made while deriving EOQ. |           |
|     | e)          | How JIT is implemented in organization and list advantages of JIT.           |           |
|     | f)          | What is concept of Break even analysis?                                      |           |

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**LEVEL: THIRD****PROGRAM: INDUSTRIAL ELECTRONICS/ETC.****COURSE CODE: EIF309/IEE402/IX302 COURSE NAME: 8051 MICROCONTROLLER****ETE402/EJ302****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 29/11/2018****Instruction:-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application

| QN  | S. Q. N | Question Text                                                                                                                                        | Cognition Level R/U/A | Co Code EIF 309 | Marks |
|-----|---------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------|-------|
| Q.1 |         | Attempt any <b>FOUR</b>                                                                                                                              |                       |                 | (08)  |
|     | a)      | State the function of Address Bus and data bus.                                                                                                      | R                     | 1               |       |
|     | b)      | What is function of $\overline{EA}$ and RESET pin of 8051 ?                                                                                          | U                     | 2               |       |
|     | c)      | List different 8051 family members.                                                                                                                  | R                     | 1               |       |
|     | d)      | Give any 4 features of 8051 Microcontroller.                                                                                                         | R                     | 2               |       |
|     | e)      | Write an ALP to find 2's complement of a number stored in register R0. Store result in R2                                                            | A                     | 3               |       |
|     | f)      | State function of MOVX A, @ A+DPTR and SWAP A instruction of 8051.                                                                                   | U                     | 3               |       |
| Q.2 |         | Attempt any <b>FOUR</b>                                                                                                                              |                       |                 | (16)  |
|     | a)      | Write an ALP to arrange in descending order a block of 10 data bytes stored in external memory location address 7000H. Mention comments in program.  | A                     | 3               |       |
|     | b)      | Differentiate Harvard & Von-neuman architecture with diagram. (Any four point)                                                                       | U                     | 1               |       |
|     | c)      | State & explain the alternate functions of port 3 pins of 8051.                                                                                      | U                     | 2               |       |
|     | d)      | Explain function of following instruction,<br>i) RRA, ii) XCH A,R1, iii) XCHD, iv) RET.                                                              | U                     | 3               |       |
|     | e)      | Draw the format of IE Register. Explain significance of each bit.                                                                                    | U                     | 2               |       |
|     | f)      | Write an ALP to add two 8 bit BCD numbers stored in external memory location 3000H and 3001H. Store the result at 3002H. Draw flowchart for program. | A                     | 3               |       |

**P.T.O.**

| Q.3 | Attempt any <b>FOUR</b>                                                                                                                                            |   |   | (16) |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
| a)  | Enlist & explain any 4 selection factors of microcontroller.                                                                                                       | U | 1 |      |
| b)  | Explain power saving option of 8051 with diagram.                                                                                                                  | U | 2 |      |
| c)  | State and explain use of SCON & SBUF register of 8051.                                                                                                             | U | 2 |      |
| d)  | Write an ALP to transfer block of ten data bytes stored in internal RAM location 20H onwards to 50H onwards memory location.                                       | A | 3 |      |
| e)  | Draw an Internal RAM memory organization with their Ranges.                                                                                                        | U | 2 |      |
| f)  | Identify the addressing modes of following instructions,<br>i) MOVX A, @ DPTR, ii) DIV A B, iii) SETB C, iv) SJMP addr.                                            | A | 3 |      |
| Q.4 | Attempt any <b>FOUR</b>                                                                                                                                            |   |   | (08) |
| a)  | If a motor takes 90 steps to make one complete revolution (360°). What is the step angle of this motor ?                                                           | U | 6 |      |
| b)  | Draw the pin diagram of DAC 0808.                                                                                                                                  | R | 6 |      |
| c)  | Find the value of TH1, TL1 to be loaded if the time delay is 10ms.                                                                                                 | A | 4 |      |
| d)  | State the function of $\overline{RD}$ and $\overline{WR}$ pins of RAM.                                                                                             | R | 5 |      |
| e)  | Draw interfacing diagram of an LED connected to port pin P1.0 and a switch connected to port pin P3.4.                                                             | U | 5 |      |
| f)  | Find the value of SCON register, if mode 1 is chosen for transmission.                                                                                             | U | 4 |      |
| Q.5 | Attempt any <b>FOUR</b>                                                                                                                                            |   |   | (16) |
| a)  | Write an ALP & for transferring letter "Y" to serial port of 8051 at baud rate 9600 continuously. Assume XTAL frequency = 11.0952 MHz. Write comments for program. | A | 4 |      |
| b)  | Draw the interfacing diagram of 8K x 8 program ROM to 8051 microcontroller. Also draw memory map.                                                                  | U | 5 |      |
| c)  | Write an ALP to check bit P1.5. If it is high send 33H to port 0 (P0) otherwise send cc to port 2 (P2). Draw the flowchart.                                        | A | 4 |      |
| d)  | Draw neat labeled pin diagram of 16 x 2 LCD. Explain function of each pin.                                                                                         | U | 6 |      |
| e)  | Explain any two operating modes of timer/counter of 8051 microcontroller, with necessary diagram.                                                                  | U | 4 |      |
| f)  | Compare between absolute decoding and linear decoding (with four points).                                                                                          | Y | 5 |      |

| Q.6 | Attempt any TWO                                                                                                                                                                                                                                      |            |            | (16) |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|------|
| a)  | Draw the interfacing diagram of stepper motor with 8051 microcontroller. Write an assembly language program to rotate motor in clockwise direction with step angle of $2^\circ$ . Also write the step sequence used and comments for program.        | A          | 6          |      |
| b)  | i) Write an ALP to generate continuous square wave of 2KHz on P2.1 using mode 2 of timer. The crystal frequency is 11.0592 MHz. Write the comment for program.<br>ii) Explain mode 0 and mode 1 of serial port in 8051 used in serial communication. | A<br><br>U | 4<br><br>4 |      |
| c)  | Draw the interfacing diagram of seven segment display with 8051 microcontroller. Write an assembly language program with comments to display values sequentially from 0 to 9 on seven segment display.                                               | A          | 5          |      |

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**LEVEL: THIRD****PROGRAM: Industrial Electronics / E & TC****COURSE CODE: EIF308/ETE308/IEE308 COURSE NAME: CIRCUIT & NETWORK****MAX. MARKS: 80****TIME: 3 HRS.****DATE:28/11/2018****Instruction:-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) **QN**>Question No, **SON**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application

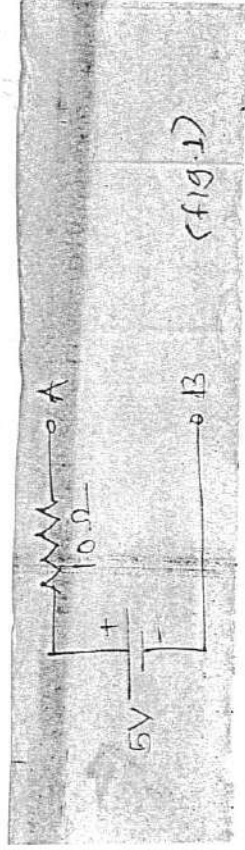
| QN  | S. Q. N | Question Text                                                                                                                                           | Cognition Level R/U/A | Co Code EIF-308 | Marks |
|-----|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------|-------|
| Q.1 |         | Attempt any <b>FOUR</b>                                                                                                                                 |                       |                 | (08)  |
|     | a)      | Define : (i) Current, (ii) Voltage.                                                                                                                     | R                     | 1               |       |
|     | b)      | State Thevenin's theorem.                                                                                                                               | R                     | 2               |       |
|     | c)      | A certain soldering iron has a resistance of $600\Omega$ when operated from a 230 volts power line. How much current does it take from the power line ? | A                     | 3               |       |
|     | d)      | Define the term mesh and node related to electric circuit.                                                                                              | R                     | 2               |       |
|     | e)      | State maximum power transfer theorem.                                                                                                                   | R                     | 3               |       |
|     | f)      | Convert voltage source shown in diagram (Fig.1) to equivalent current source.                                                                           | A                     | 2               |       |
| Q.2 |         | Attempt any <b>FOUR</b>                                                                                                                                 |                       |                 | (16)  |
|     | a)      | State Kirchhoff's current law and voltage law with diagram & equation.                                                                                  | R                     | 1               |       |
|     | b)      | Using nodal voltage analysis, find current through each branch in (fig.2).                                                                              | A                     | 2               |       |
|     | c)      | State and verify superposition theorem using any one example.                                                                                           | U                     | 3               |       |
|     | d)      | Distinguish between short circuit and open circuit (Any 4 points)                                                                                       | U                     | 1               |       |
|     | e)      | Find equivalent resistance for following circuit shown in (fig.3).                                                                                      | A                     | 2               |       |
|     | f)      | Determine load resistance value to receive maximum power from source, also find maximum power delivered to load in circuit. (fig.4)                     | A                     | 3               |       |

| Q.3 | Attempt any <b>FOUR</b>                                                                                                                                                                                                 |   |   | (16) |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
| a)  | Explain the concept of grounding in electronic circuit.                                                                                                                                                                 | U | 2 |      |
| b)  | State and explain Norton's theorem.                                                                                                                                                                                     | U | 3 |      |
| c)  | Fig. 5 Shows a voltage divider circuit with resistance $R_1$ , $R_2$ and $R_3$ connected across a 30v battery. Determine : (i) The voltage drop across $R_1$ , $R_2$ and $R_3$ . (ii) The voltage at each node. (Fig.5) | A | 1 |      |
| d)  | Explain the steps to solve examples of mesh analysis.                                                                                                                                                                   | U | 2 |      |
| e)  | Find the current through $4\Omega$ using Thevenin's theorem in (fig.6).                                                                                                                                                 | A | 3 |      |
| f)  | Calculate the energy used (in kwh) to run twelve 150 w light bulbs for ten hours.                                                                                                                                       | A | 1 |      |
| Q.4 | Attempt any <b>FOUR</b>                                                                                                                                                                                                 |   |   | (08) |
| a)  | Define inductive and capacitive reactance with equation.                                                                                                                                                                | R | 4 |      |
| b)  | Draw charging and discharging curve of Capacitor.                                                                                                                                                                       | R | 4 |      |
| c)  | For series RLC circuit if $R=1K\Omega$ , $L=1mH$ , $C=1\mu f$ determine value of resonant frequency (fr)                                                                                                                | A | 5 |      |
| d)  | List any two application of RLC circuit.                                                                                                                                                                                | U | 5 |      |
| e)  | Draw a circuit diagram and Frequency response of R.C. high pass filter.                                                                                                                                                 | R | 6 |      |
| f)  | Compare high pass and low pass filter. (any two points)                                                                                                                                                                 | U | 6 |      |
| Q.5 | Attempt any <b>FOUR</b>                                                                                                                                                                                                 |   |   | (16) |
| a)  | Explain with waveform phase relation between voltage & current in capacitor.                                                                                                                                            | U | 4 |      |
| b)  | A series RC circuit has a resistance of $1 M\Omega$ & capacitance of $5 \mu f$ calculate time constant reactance (rc)                                                                                                   | A | 4 |      |
| c)  | Find impedance in polar form for $f=1KHZ$ & $F=2 KHZ$ (fig.7).                                                                                                                                                          | A | 4 |      |
| d)  | Explain series RLC circuit frequency response with diagram.                                                                                                                                                             | U | 5 |      |
| e)  | Explain with diagram & frequency response series resonant band stop filter.                                                                                                                                             | U | 6 |      |
| f)  | Draw a circuit diagram & frequency response of series resonant band pass filter & define concept of decibel with equation.                                                                                              | R | 6 |      |

| Q.6 | Attempt any <b>FOUR</b>                                                                                                  |   |   | (16) |
|-----|--------------------------------------------------------------------------------------------------------------------------|---|---|------|
| a)  | Calculate impedance & current of give RL circuit. (fig.8)                                                                | A | 4 |      |
| b)  | Calculate admittance of given circuit in polar form. (fig.9)                                                             | A | 4 |      |
| c)  | Explain parallel resonance circuit with frequency response.                                                              | U | 5 |      |
| d)  | Compare parallel resonant band pass filter and parallel resonant band stop filter. (any 4 points)                        | U | 6 |      |
| e)  | Explain R.L. low pass filter with circuit diagram & Frequency response.                                                  | R | 6 |      |
| f)  | i) Define Roll off rate.<br>ii) Define pass band and stop band.<br>iii) Draw a circuit diagram of R.L. high pass filter. | R | 6 |      |

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Q-1 (f)



(fig.1)

Q-2 (b)

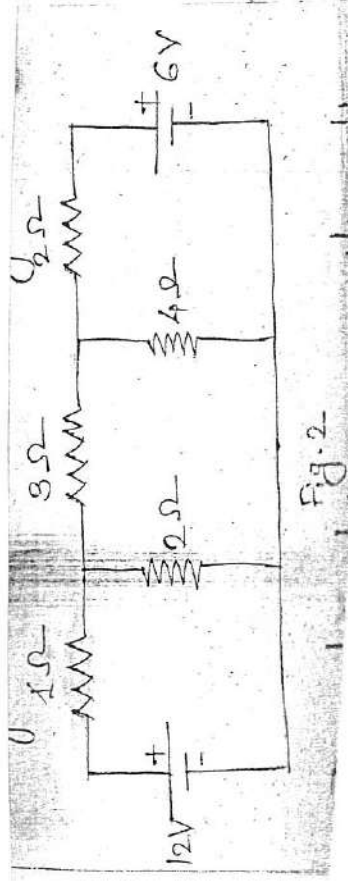


Fig. 2

Q-2 (c)

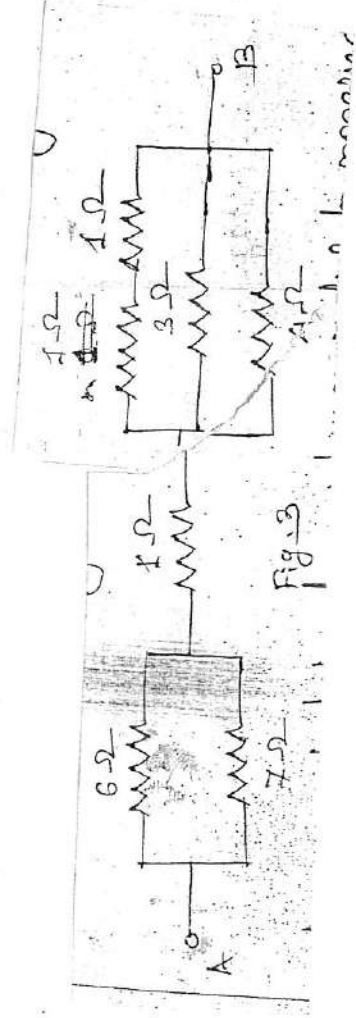


Fig. 3

Q-2 (f)

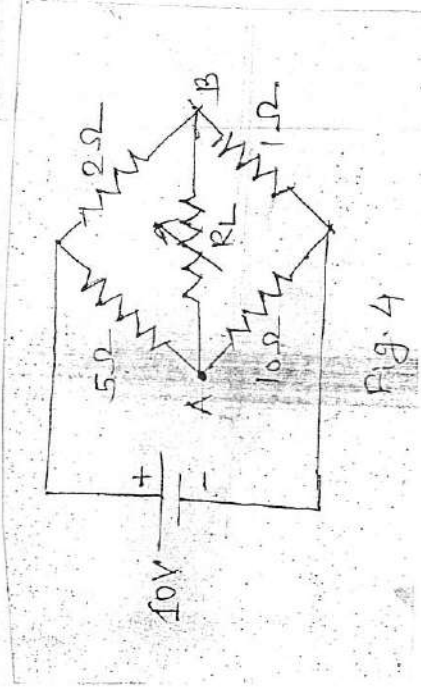


Fig. 4

Q-3 (c)

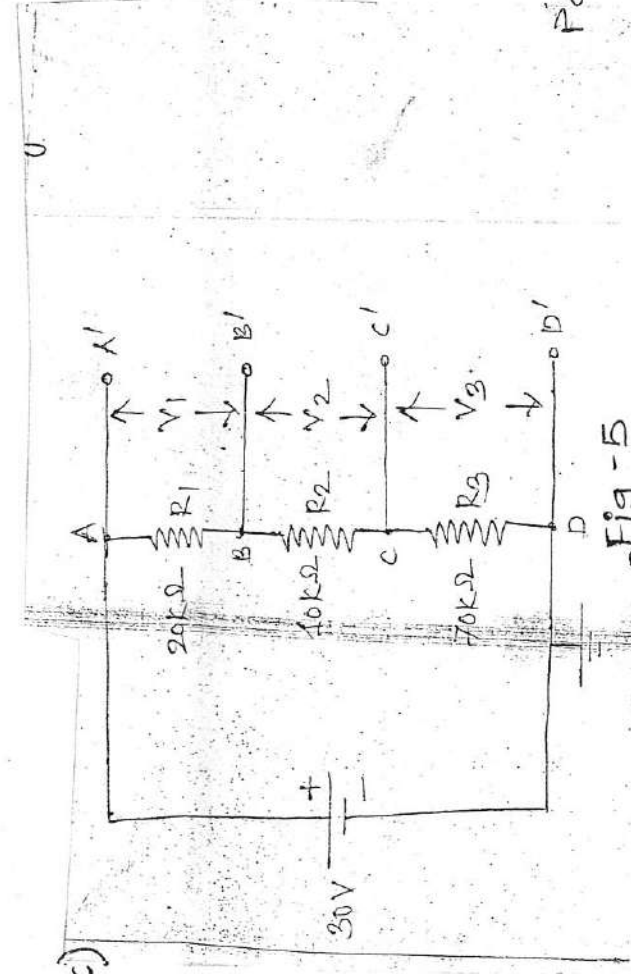


Fig. 5

Q-3 (c)

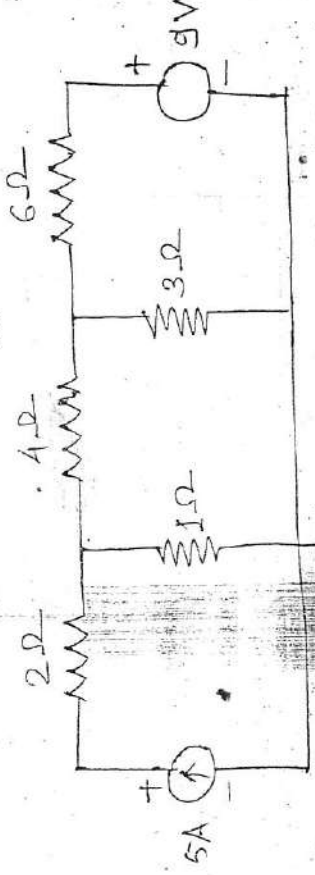


Fig. 6

Q-5 (c)

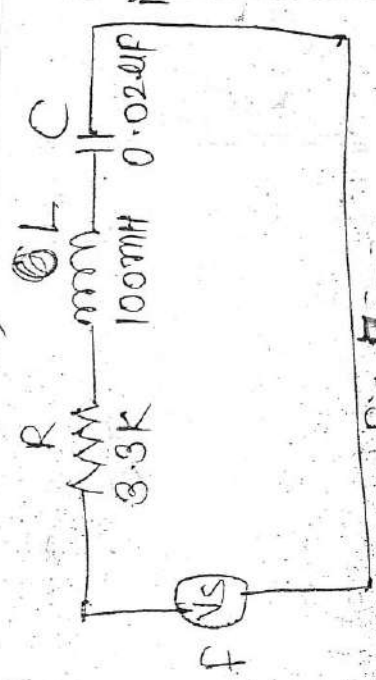


Fig. 7

Q-6 (a)

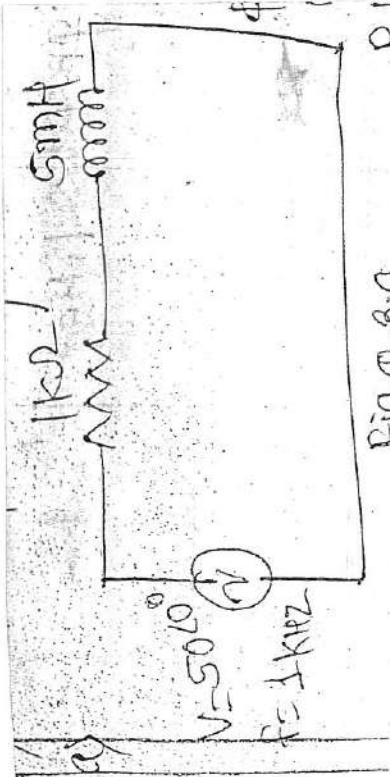


Fig. 8-a

(Fig. 8)

Q-6 (b)

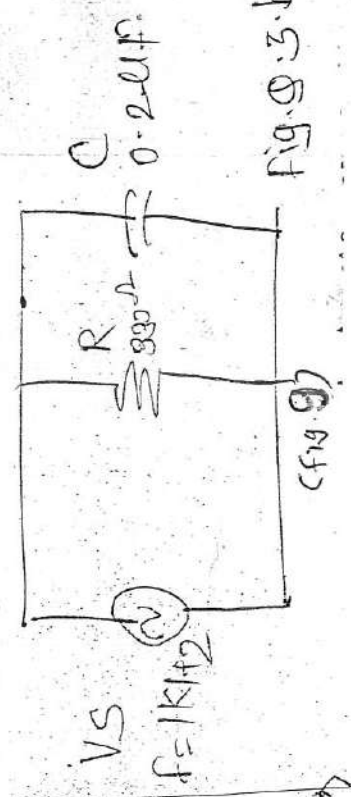


Fig. 8-b





# GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM END EXAM NOV./DEC.-2018 -2018

EXAM SEAT NO.

LEVEL :- **FIFTH** PROGRAM : **ELECTRONICS & TELECOMMUNICATION**

COURSE CODE **ETE501/EJ401**

COURSE NAME :- **MOBILE COMMUNICATION**

MAX. MARKS : **100** TIME : **3 HRS.** DATE :- **28 / 11/ 2018**

Instruction :-

1) Answer of two sections must be written in separate section answer book provided.

2) Figure to the right indicate marks.

3) Illustrate your answers with sketches wherever necessary.

4) Use of non-programmable pocket calculator is permissible.

5) Mathematical and other tables shall be made available on request.

6) Assume additional suitable data necessary.

7) Use of Mobile is strictly prohibited.

| QN  | S  | Section-I                                                                                                                                  | Mar<br>ks |
|-----|----|--------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Q.1 | N  | Attempt any <b>FOUR</b> :                                                                                                                  | <b>08</b> |
|     | a) | Define control channel.                                                                                                                    |           |
|     | b) | State the function of frequency synthesizer in mobile unit.                                                                                |           |
|     | c) | Draw block diagram of control unit of mobile.                                                                                              |           |
|     | d) | Define delayed handoff.                                                                                                                    |           |
|     | e) | Draw diagram of $120^\circ$ and $60^\circ$ sectoring.                                                                                      |           |
|     | f) | State any two advantages of cell splitting.                                                                                                |           |
| Q.2 |    | Attempt any <b>FOUR</b> :                                                                                                                  | <b>16</b> |
|     | a) | Explain with diagram, cordless telephone systems.                                                                                          |           |
|     | b) | Describe how cellular telephone cell is made.                                                                                              |           |
|     | c) | Draw block diagram of logic unit and explain it.                                                                                           |           |
|     | d) | Explain with block diagram, transmitter of mobile handset.                                                                                 |           |
|     | e) | Describe with neat diagram microcell zone concept.                                                                                         |           |
|     | f) | Illustrate a handoff scenario at cell boundary with neat diagram.                                                                          |           |
| Q.3 |    | Attempt any <b>FOUR</b> :                                                                                                                  | <b>16</b> |
|     | a) | Define i) Page ii) Roamer iii) Transceiver iv) Subscriber.                                                                                 |           |
|     | b) | Compare between AMPS & IS-95 with following points<br>i) Multiple access<br>ii) Frequency band<br>iii) Modulation<br>iv) Channel bandwidth |           |
|     | c) | Draw and explain block diagram of receiver unit of mobile.                                                                                 |           |
|     | d) | Explain soft and hard handoff.                                                                                                             |           |
|     | e) | Describe power control for reducing interference.                                                                                          |           |
|     | f) | Explain with diagram frequency reuse concept.                                                                                              |           |

P.T.O.

| QN  | S<br>Q<br>N | Section- II                                                                                            | Marks     |
|-----|-------------|--------------------------------------------------------------------------------------------------------|-----------|
| Q.4 |             | Attempt any <b>FOUR</b> :                                                                              | <b>08</b> |
|     | a)          | List any two features of GSM system.                                                                   |           |
|     | b)          | List the various traffic channel types in GSM.                                                         |           |
|     | c)          | State function of VLR & HLR in GSM system.                                                             |           |
|     | d)          | Write channel specifications of IS-95.                                                                 |           |
|     | e)          | List two feature of IS-95.                                                                             |           |
|     | f)          | What is WLL?                                                                                           |           |
| Q.5 |             | Attempt any <b>TWO</b> :                                                                               | <b>16</b> |
|     | a)          | Draw architecture of GSM and explain each block in detail.                                             |           |
|     | b)          | Describe the call processing in IS-95 CDMA.                                                            |           |
|     | c)          | Draw SSY protocol architecture and explain working of different levels.                                |           |
| Q.6 |             | Attempt any <b>TWO</b> :                                                                               | <b>16</b> |
|     | a)          | Explain GSM radio subsystem and lists GSM air interface specification.                                 |           |
|     | b)          | Draw system architecture of IS-95. Explain its working.                                                |           |
|     | c)          | i) Describe 3G W-CDMA with necessary diagram.( 4 Marks)<br>ii) List the vision for IMT-2000. (4 Marks) |           |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**ODD TERM END EXAM NOV./DEC.-2018****EXAM SEAT NO.**

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**LEVEL :- FOURTH      PROGRAM : ELECTRONICS & TELECOMMUNICATION****COURSE CODE ETE403/EJ409****COURSE NAME :- DATA COMMUNICATION AND NETWORKING****MAX. MARKS : 80    TIME : 3 HRS.    DATE :- 27 / 11 / 2018****Instruction :-**

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

| QN  |    | S | Section-I                                                                                  |  |  |  | Mar       |
|-----|----|---|--------------------------------------------------------------------------------------------|--|--|--|-----------|
|     |    | Q |                                                                                            |  |  |  | ks        |
|     |    | N |                                                                                            |  |  |  |           |
| Q.1 |    |   | Attempt any <b>FOUR</b> :                                                                  |  |  |  | <b>08</b> |
|     | a) |   | Define protocol and standards.                                                             |  |  |  |           |
|     | b) |   | What is network topology? State various types of network topology.                         |  |  |  |           |
|     | c) |   | Define switching. Give classification of switching.                                        |  |  |  |           |
|     | d) |   | Draw structure of TCP/IP reference model.                                                  |  |  |  |           |
|     | e) |   | State various standard organizations in data communication.                                |  |  |  |           |
|     | f) |   | State the types of services with example.                                                  |  |  |  |           |
| Q.2 |    |   | Attempt any <b>FOUR</b> :                                                                  |  |  |  | <b>16</b> |
|     | a) |   | Draw OSI reference model. Explain the function of data link layer and physical layer.      |  |  |  |           |
|     | b) |   | With neat diagram explain the concept of Asynchronous transfer mode. ( ATM)                |  |  |  |           |
|     | c) |   | Explain MAN with example.                                                                  |  |  |  |           |
|     | d) |   | Explain datagram approach of packet switching with neat diagram.                           |  |  |  |           |
|     | e) |   | Compare TDM and FDM. ( any four points)                                                    |  |  |  |           |
|     | f) |   | What is IP addressing? Explain types of addressing.                                        |  |  |  |           |
| Q.3 |    |   | Attempt any <b>FOUR</b> :                                                                  |  |  |  | <b>16</b> |
|     | a) |   | Draw and explain frame relay frame format.                                                 |  |  |  |           |
|     | b) |   | Explain functional block diagram of MODEM.                                                 |  |  |  |           |
|     | c) |   | Explain the following transmission modes.<br>i) Asynchronous ii) Synchronous transmission. |  |  |  |           |
|     | d) |   | Explain message switching with diagram and delay.                                          |  |  |  |           |
|     | e) |   | Explain any two guided media with neat diagram.                                            |  |  |  |           |
|     | f) |   | Explain the relationship between data transmission rate and bandwidth.                     |  |  |  |           |

P.T.O.

| QN  | S<br>Q<br>N | Section- II                                                                        | Marks     |
|-----|-------------|------------------------------------------------------------------------------------|-----------|
| Q.4 |             | Attempt any <b>FOUR</b> :                                                          | <b>08</b> |
|     | a)          | List any two methods of error detection.                                           |           |
|     | b)          | Define piggybacking.                                                               |           |
|     | c)          | Define bit error and burst error.                                                  |           |
|     | d)          | List any two applications of SMTP.                                                 |           |
|     | e)          | Give any two examples of URL.                                                      |           |
|     | f)          | State any two disadvantages of wireless LAN.                                       |           |
| Q.5 |             | Attempt any <b>FOUR</b> :                                                          | <b>16</b> |
|     | a)          | Explain the operation of selective repeat ARQ protocol with suitable diagram.      |           |
|     | b)          | Explain the concept of IP version 6 protocol.                                      |           |
|     | c)          | Draw and explain stop-N-wait ARQ protocol.                                         |           |
|     | d)          | Explain the concept of world wide web with one example.                            |           |
|     | e)          | Explain OFDM with respect to IEEE 802.11 standard.                                 |           |
|     | f)          | Draw and explain proxy firewall with suitable diagram.                             |           |
| Q.6 |             | Attempt any <b>FOUR</b> :                                                          | <b>16</b> |
|     | a)          | Explain vertical redundancy check method for error detection.                      |           |
|     | b)          | Draw the diagram of go back N ARQ protocol. Also write any two applications of it. |           |
|     | c)          | Explain any four commands used in SMTP.                                            |           |
|     | d)          | Explain the concept of domain name system.                                         |           |
|     | e)          | Draw and explain the operation of PCF MAC layer.                                   |           |
|     | f)          | With neat diagram explain the architecture of IEEE 802.11 standard.                |           |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

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**ODD TERM END EXAM NOV/DEC -2018****EXAM SEAT NO.**

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**LEVEL: THIRD****PROGRAM: ELECTRONICS AND TELECOMMUNICATION****COURSE CODE: ETF310/EJ208/ETE310 COURSE NAME: DIGITAL COMMUNICATION****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 30/11/2018****Instruction:-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application **CO**>Course outcome

| <b>S</b>     | <b>Q</b> | <b>Question Text</b>                                                   | <b>R</b> | <b>CO</b>    | <b>Mar</b>  |
|--------------|----------|------------------------------------------------------------------------|----------|--------------|-------------|
| <b>QN</b>    | <b>N</b> |                                                                        | <b>U</b> | <b>ETF</b>   | <b>ks</b>   |
| <b>Q.1</b>   |          | Attempt any <b>FOUR</b>                                                |          | <b>A 310</b> | <b>(08)</b> |
|              | a)       | State the advantages of digital communication (any four)               | R        | 1            |             |
|              | b)       | Define digital communication.                                          | R        | 1            |             |
|              | c)       | Define pulse modulation. Give the types of pulse modulation.           | R        | 2            |             |
|              | d)       | State quantizing noise                                                 | R        | 2            |             |
|              | e)       | State the advantages of QPSK system (any two)                          | R        | 3            |             |
|              | f)       | State the BW requirement of QAM.                                       | A        | 3            |             |
| <b>Q.2</b>   |          | Attempt any <b>FOUR</b>                                                |          |              | <b>(16)</b> |
|              | a)       | Explain why digital communication is suitable for long distance.       | A        | 1            |             |
|              | b)       | Explain the ADM transmitter.                                           | U        | 2            |             |
|              | c)       | Explain the delta modulation on transmitter system with block diagram. | R        | 2            |             |
|              | d)       | Explain different techniques of practical sampling.                    | U        | 2            |             |
|              | e)       | State merits & demerits of BASK.                                       | R        | 3            |             |
|              | f)       | Compare ASK and FSK. (any four points)                                 | U        | 3            |             |
| <b>Q.3</b>   |          | Attempt any <b>FOUR</b>                                                |          |              | <b>(16)</b> |
|              | a)       | Draw & explain the digital communication system.                       | U        | 1            |             |
|              | b)       | Compare PCM, and DPCM (any two points)                                 | U        | 2            |             |
|              | c)       | Explain what is granular noise. How to reduce granular noise?          | A        | 2            |             |
|              | d)       | Draw the block diagram of binary PSK system and explain.               | U        | 3            |             |
|              | e)       | State an expression for the BFSK and explain the BFSK receiver.        | A        | 3            |             |
|              | f)       | State advantages & disadvantages of BPSK.(any two each)                | R        | 3            |             |
| <b>Q.4</b>   |          | Attempt any <b>FOUR</b>                                                |          |              | <b>(08)</b> |
|              | a)       | Define baud rate.                                                      | R        | 4            |             |
| <b>P.T.O</b> |          |                                                                        |          |              |             |

|            |       |                                                                                                                                                                                                                                                                                                                          |         |       |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|-------|-------|-------|-------|------------|--------|------|------|------|------|------|------|---|---|--|--|---|---|--|
|            | b)    | Draw NRZ unipolar binary format for data 0011.                                                                                                                                                                                                                                                                           | A       | 4     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | c)    | Define frequency division multiplexing.                                                                                                                                                                                                                                                                                  | R       | 5     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | d)    | State the need of multiplexing.                                                                                                                                                                                                                                                                                          | R       | 5     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | e)    | Define PN sequence.                                                                                                                                                                                                                                                                                                      | R       | 6     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | f)    | Draw block diagram of direct sequence spread spectrum transmitter.                                                                                                                                                                                                                                                       | R       | 6     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
| Q.5        |       | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                                  |         |       | (16)  |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | a)    | Explain with example, how parity checking fails to detect errors.                                                                                                                                                                                                                                                        | A       | 4     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | b)    | Construct Shanon-Fano code for 'X'                                                                                                                                                                                                                                                                                       |         |       |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            |       | <table><tr><td><math>x_i</math></td><td><math>X_1</math></td><td><math>X_2</math></td><td><math>X_3</math></td><td><math>X_4</math></td><td><math>X_5</math></td><td><math>X_6</math></td></tr><tr><td><math>px_i</math></td><td>0.30</td><td>0.25</td><td>0.20</td><td>0.12</td><td>0.08</td><td>0.05</td></tr></table> | $x_i$   | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | $X_6$      | $px_i$ | 0.30 | 0.25 | 0.20 | 0.12 | 0.08 | 0.05 | A | 4 |  |  |   |   |  |
| $x_i$      | $X_1$ | $X_2$                                                                                                                                                                                                                                                                                                                    | $X_3$   | $X_4$ | $X_5$ | $X_6$ |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
| $px_i$     | 0.30  | 0.25                                                                                                                                                                                                                                                                                                                     | 0.20    | 0.12  | 0.08  | 0.05  |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | c)    | If received codeword is 1100101011011 & divisor is 10101, check whether there are errors in received codeword.                                                                                                                                                                                                           | A       | 4     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | d)    | Explain any four advantages of TDMA over FDMA.                                                                                                                                                                                                                                                                           | U       | 5     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | e)    | Explain concept of FDM.                                                                                                                                                                                                                                                                                                  | U       | 5     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | f)    | Describe model of spread spectrum with block diagram.                                                                                                                                                                                                                                                                    | U       | 6     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
| Q.6        |       | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                                  |         |       | (16)  |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | a)    | Using Huffman's algorithm find code words for each message.<br><table><tr><td>Message</td><td>M1</td><td>M2</td><td>M3</td><td>M4</td><td>M5</td></tr><tr><td>Probabilit</td><td>0.4</td><td>0.2</td><td>0.2</td><td>0.1</td><td>0.1</td></tr><tr><td>y</td><td></td><td></td><td></td><td></td><td></td></tr></table>   | Message | M1    | M2    | M3    | M4    | M5    | Probabilit | 0.4    | 0.2  | 0.2  | 0.1  | 0.1  | y    |      |   |   |  |  | A | 4 |  |
| Message    | M1    | M2                                                                                                                                                                                                                                                                                                                       | M3      | M4    | M5    |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
| Probabilit | 0.4   | 0.2                                                                                                                                                                                                                                                                                                                      | 0.2     | 0.1   | 0.1   |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
| y          |       |                                                                                                                                                                                                                                                                                                                          |         |       |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | b)    | A seven bit hamming code is received as 1110101, what is the correct code? Assume the parity to be even.                                                                                                                                                                                                                 | A       | 4     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | c)    | Explain block diagram of synchronous TDM system.                                                                                                                                                                                                                                                                         | U       | 5     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | d)    | Describe the principle of OFDM.                                                                                                                                                                                                                                                                                          | U       | 5     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | e)    | Explain any four applications of spread spectrum modulation.                                                                                                                                                                                                                                                             | A       | 6     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | f)    | Distinguish between slow frequency hopping & fast frequency hopping. (any four points)                                                                                                                                                                                                                                   | U       | 6     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

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**ODD TERM END EXAM NOV/DEC -2018****EXAM SEAT NO.**

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**LEVEL: THIRD****PROGRAM: ELECTRONICS AND TELECOMMUNICATION****COURSE CODE: ETF310/EJ208/ETE310 COURSE NAME: DIGITAL COMMUNICATION****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 30/11/2018****Instruction:-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application **CO**>Course outcome

| <b>QN</b>  | <b>S</b> | <b>Question Text</b>                                                   | <b>R</b> | <b>CO</b>    | <b>Mar</b>  |
|------------|----------|------------------------------------------------------------------------|----------|--------------|-------------|
| <b>Q.1</b> |          | Attempt any <b>FOUR</b>                                                |          | <b>A 310</b> | <b>(08)</b> |
|            | a)       | State the advantages of digital communication (any four)               | R        | 1            |             |
|            | b)       | Define digital communication.                                          | R        | 1            |             |
|            | c)       | Define pulse modulation. Give the types of pulse modulation.           | R        | 2            |             |
|            | d)       | State quantizing noise                                                 | R        | 2            |             |
|            | e)       | State the advantages of QPSK system (any two)                          | R        | 3            |             |
|            | f)       | State the BW requirement of QAM.                                       | A        | 3            |             |
| <b>Q.2</b> |          | Attempt any <b>FOUR</b>                                                |          |              | <b>(16)</b> |
|            | a)       | Explain why digital communication is suitable for long distance.       | A        | 1            |             |
|            | b)       | Explain the ADM transmitter.                                           | U        | 2            |             |
|            | c)       | Explain the delta modulation on transmitter system with block diagram. | R        | 2            |             |
|            | d)       | Explain different techniques of practical sampling.                    | U        | 2            |             |
|            | e)       | State merits & demerits of BASK.                                       | R        | 3            |             |
|            | f)       | Compare ASK and FSK. (any four points)                                 | U        | 3            |             |
| <b>Q.3</b> |          | Attempt any <b>FOUR</b>                                                |          |              | <b>(16)</b> |
|            | a)       | Draw & explain the digital communication system.                       | U        | 1            |             |
|            | b)       | Compare PCM, and DPCM (any two points)                                 | U        | 2            |             |
|            | c)       | Explain what is granular noise. How to reduce granular noise?          | A        | 2            |             |
|            | d)       | Draw the block diagram of binary PSK system and explain.               | U        | 3            |             |
|            | e)       | State an expression for the BFSK and explain the BFSK receiver.        | A        | 3            |             |
|            | f)       | State advantages & disadvantages of BPSK.(any two each)                | R        | 3            |             |
| <b>Q.4</b> |          | Attempt any <b>FOUR</b>                                                |          |              | <b>(08)</b> |
|            | a)       | Define baud rate.                                                      | R        | 4            |             |

|            |       |                                                                                                                                                                                                                                                                                                                          |         |       |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|-------|-------|-------|-------|------------|--------|------|------|------|------|------|------|---|---|--|--|---|---|--|
|            | b)    | Draw NRZ unipolar binary format for data 0011.                                                                                                                                                                                                                                                                           | A       | 4     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | c)    | Define frequency division multiplexing.                                                                                                                                                                                                                                                                                  | R       | 5     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | d)    | State the need of multiplexing.                                                                                                                                                                                                                                                                                          | R       | 5     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | e)    | Define PN sequence.                                                                                                                                                                                                                                                                                                      | R       | 6     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | f)    | Draw block diagram of direct sequence spread spectrum transmitter.                                                                                                                                                                                                                                                       | R       | 6     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
| Q.5        |       | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                                  |         |       | (16)  |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | a)    | Explain with example, how parity checking fails to detect errors.                                                                                                                                                                                                                                                        | A       | 4     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | b)    | Construct Shanon-Fano code for 'X'                                                                                                                                                                                                                                                                                       |         |       |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            |       | <table><tr><td><math>x_i</math></td><td><math>X_1</math></td><td><math>X_2</math></td><td><math>X_3</math></td><td><math>X_4</math></td><td><math>X_5</math></td><td><math>X_6</math></td></tr><tr><td><math>px_i</math></td><td>0.30</td><td>0.25</td><td>0.20</td><td>0.12</td><td>0.08</td><td>0.05</td></tr></table> | $x_i$   | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | $X_6$      | $px_i$ | 0.30 | 0.25 | 0.20 | 0.12 | 0.08 | 0.05 | A | 4 |  |  |   |   |  |
| $x_i$      | $X_1$ | $X_2$                                                                                                                                                                                                                                                                                                                    | $X_3$   | $X_4$ | $X_5$ | $X_6$ |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
| $px_i$     | 0.30  | 0.25                                                                                                                                                                                                                                                                                                                     | 0.20    | 0.12  | 0.08  | 0.05  |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | c)    | If received codeword is 1100101011011 & divisor is 10101, check whether there are errors in received codeword.                                                                                                                                                                                                           | A       | 4     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | d)    | Explain any four advantages of TDMA over FDMA.                                                                                                                                                                                                                                                                           | U       | 5     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | e)    | Explain concept of FDM.                                                                                                                                                                                                                                                                                                  | U       | 5     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | f)    | Describe model of spread spectrum with block diagram.                                                                                                                                                                                                                                                                    | U       | 6     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
| Q.6        |       | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                                  |         |       | (16)  |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | a)    | Using Huffman's algorithm find code words for each message. <table><tr><td>Message</td><td>M1</td><td>M2</td><td>M3</td><td>M4</td><td>M5</td></tr><tr><td>Probabilit</td><td>0.4</td><td>0.2</td><td>0.2</td><td>0.1</td><td>0.1</td></tr><tr><td>y</td><td></td><td></td><td></td><td></td><td></td></tr></table>      | Message | M1    | M2    | M3    | M4    | M5    | Probabilit | 0.4    | 0.2  | 0.2  | 0.1  | 0.1  | y    |      |   |   |  |  | A | 4 |  |
| Message    | M1    | M2                                                                                                                                                                                                                                                                                                                       | M3      | M4    | M5    |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
| Probabilit | 0.4   | 0.2                                                                                                                                                                                                                                                                                                                      | 0.2     | 0.1   | 0.1   |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
| y          |       |                                                                                                                                                                                                                                                                                                                          |         |       |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | b)    | A seven bit hamming code is received as 1110101, what is the correct code? Assume the parity to be even.                                                                                                                                                                                                                 | A       | 4     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | c)    | Explain block diagram of synchronous TDM system.                                                                                                                                                                                                                                                                         | U       | 5     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | d)    | Describe the principle of OFDM.                                                                                                                                                                                                                                                                                          | U       | 5     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | e)    | Explain any four applications of spread spectrum modulation.                                                                                                                                                                                                                                                             | A       | 6     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |
|            | f)    | Distinguish between slow frequency hopping & fast frequency hopping. (any four points)                                                                                                                                                                                                                                   | U       | 6     |       |       |       |       |            |        |      |      |      |      |      |      |   |   |  |  |   |   |  |

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# GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM END EXAM NOV./DEC-2018

EXAM SEAT NO. 

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LEVEL :- FIRST PROGRAM : IE & ET

COURSE CODE :- IEF/ETF107/ETE107

COURSE NAME :- BASIC ELECTRICAL ENGINEERING

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 01/12/2018

Instruction :-

- 1) Answers must be written in the main answer book provided.( and supplements if required)
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

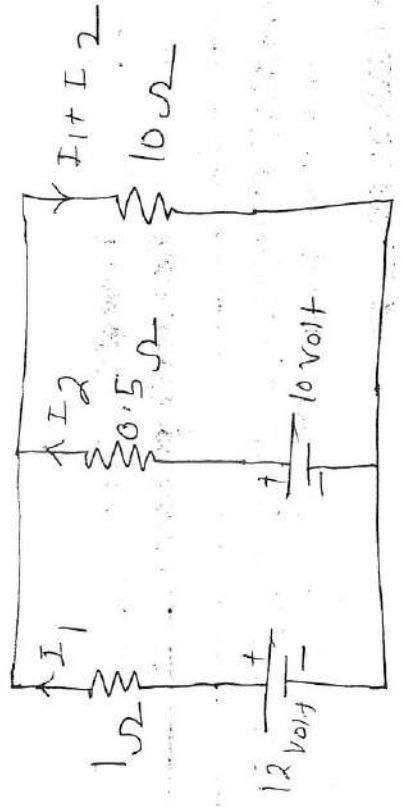
| QN  | S  | Question Text                                                                                                                                                                                                                                       | R/<br>U/<br>A | Co<br>IEF/<br>ETF<br>107 | Ma<br>rks |
|-----|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------|-----------|
| Q.1 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                           |               |                          | <b>08</b> |
|     | a) | Define the terms resistance and conductance of a material. State their units.                                                                                                                                                                       | U             | 1                        |           |
|     | b) | State Kirchhoff's voltage Law.                                                                                                                                                                                                                      | R             | 1                        |           |
|     | c) | Define the terms permeance & MMF.                                                                                                                                                                                                                   | R             | 2                        |           |
|     | d) | What is Magnetic circuit?                                                                                                                                                                                                                           | U             | 2                        |           |
|     | e) | State Faraday's Laws of Electromagnetic Induction.                                                                                                                                                                                                  | R             | 3                        |           |
|     | f) | Define self inductance.                                                                                                                                                                                                                             | R             | 3                        |           |
| Q.2 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                           |               |                          | <b>16</b> |
|     | a) | Define statically and dynamically induced emf in coils and give an example of their occurrence in applications.                                                                                                                                     | A             | 3                        |           |
|     | b) | Derive the equivalent resistance of circuit when two resistances are connected in series.                                                                                                                                                           | U             | 1                        |           |
|     | c) | Applying Kirchhoff's Laws to the circuit showing in Fig. 1 and find the currents $I_1$ , $I_2$ and $(I_1+I_2)$ .                                                                                                                                    | A             | 1                        |           |
|     | d) | Draw a hysteresis loop and label it. What is hysteresis loss?                                                                                                                                                                                       | U             | 2                        |           |
|     | e) | Compare electric circuit and Magnetic circuit.                                                                                                                                                                                                      | U             | 2                        |           |
|     | f) | Write a note on useful flux and fringing.                                                                                                                                                                                                           | U             | 2                        |           |
| Q.3 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                           |               |                          | <b>16</b> |
|     | a) | Discuss any two practical applications of electromagnets.                                                                                                                                                                                           | A             | 2                        |           |
|     | b) | Draw a typical B-H curve and label it.                                                                                                                                                                                                              | U             | 2                        |           |
|     | c) | An iron ring of mean circumference 1.5m is uniformly wound with 400 turns of wire. When a current of 1.5A is passed through a coil of flux density 1.2 Tesla is produced in the iron. Find<br>i) Magnetic field strength ii) Absolute permeability. | A             | 1                        |           |
|     | d) | Two resistances 8Ω and 12Ω are in parallel across a 20V, 2Ω emf source. Determine the current in each of these resistances.                                                                                                                         | A             | 1                        |           |
|     | e) | Write a note on energy stored in Magnetic field                                                                                                                                                                                                     | R             | 2                        |           |
|     | f) | Explain with the help of suitable diagram, concept of self and mutual induction.                                                                                                                                                                    | U             | 3                        |           |

| QN  | S<br>Q<br>N | Question Text                                                                                                                                                                                                                                                                                       | R/<br>U/<br>A | Co<br>IEF/<br>ETF<br>107 | Ma<br>rks |
|-----|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------|-----------|
| Q.4 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                           |               |                          | <b>08</b> |
|     | a)          | Define terms of alternating quantity<br>i) Cycle ii) time Period.                                                                                                                                                                                                                                   | R             | 4                        |           |
|     | b)          | What is meant by form factor give application?                                                                                                                                                                                                                                                      | U             | 4                        |           |
|     | c)          | Convert given rectangular quantity vector $3+j4$ into polar form.                                                                                                                                                                                                                                   | A             | 5                        |           |
|     | d)          | State "phase angle difference" with labeled sketch for inductive circuit.                                                                                                                                                                                                                           | U             | 5                        |           |
|     | e)          | What is meaning of "phase sequence" in polyphase supply system?                                                                                                                                                                                                                                     | U             | 6                        |           |
|     | f)          | State the principle of working of Transformer.                                                                                                                                                                                                                                                      | R             | 6                        |           |
| Q.5 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                           |               |                          | <b>16</b> |
|     | a)          | Draw vector diagram and waveform of voltage and current for R-L-C series circuit along with equations for voltage drop, current and active power.                                                                                                                                                   | U             | 5                        |           |
|     | b)          | What is meant by reactive power in case R-L series circuit and R-C series circuit?                                                                                                                                                                                                                  | U             | 5                        |           |
|     | c)          | Explain and draw labeled diagram of types of three phase load and their industrial applications.                                                                                                                                                                                                    | U             | 6                        |           |
|     | d)          | State types of transformers and their applications.                                                                                                                                                                                                                                                 | U             | 6                        |           |
|     | e)          | Define and explain "Root mean square" value of sinusoidal current or voltage.                                                                                                                                                                                                                       | U             | 4                        |           |
|     | f)          | Solve the following for three vectors.<br>$A = 20+j20$ , $B = 30\angle -120^\circ$ , $C = 10+j0$<br>i) $\frac{A \times B}{C}$ ii) $\frac{B \times C}{A}$                                                                                                                                            | A             | 4                        |           |
| Q.6 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                           |               |                          | <b>16</b> |
|     | a)          | Explain with suitable sketch how ac emf can be generated.                                                                                                                                                                                                                                           | U             | 4                        |           |
|     | b)          | Draw suitable vector diagrams and explain concept of lagging, leading and In phase ac quantities.                                                                                                                                                                                                   | U             | 4                        |           |
|     | c)          | State various type of three phase supply system, loads in three phase circuits, and explain in brief.                                                                                                                                                                                               | U             | 6                        |           |
|     | d)          | Draw and explain construction of transformer and their applications in electronic field.                                                                                                                                                                                                            | U             | 6                        |           |
|     | e)          | State types of earthing and explain any one with suitable labeled sketch.                                                                                                                                                                                                                           | U             | 6                        |           |
|     | f)          | A voltage $e(t) = 100 \sin 314t$ volts is applied to series circuit of $10\Omega$ resistance and $0.0318$ henry inductance and capacitor $63.6\mu F$ . Calculate i) Current as function of time $i(t)$ expression. ii) Phase angle between voltage and current. iii) Power factor iv) Active power. | A             | 5                        |           |



(23)

~~Q.2c)~~



Q.2c) fig no. 1



**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

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**ODD TERM END EXAM NOV./DEC.-2018****EXAM SEAT NO.**

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**LEVEL :- THIRD****PROGRAM : IE & E & TC****COURSE CODE :- IEE/ETE309/IX209/EJ209****COURSE NAME MICROPROCESSOR & INTERFACING****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 20/12/2018****Instruction :-**

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible ~~WZ~~ register pair.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

| QN  | S<br>Q<br>N | Section- I                                                                                                                                                                                                                                                                        | Ma<br>rks |
|-----|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Q.1 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                         | <b>08</b> |
|     | a)          | State the function of following control signals.<br>i) $\overline{MEMR}$ ii) $\overline{MEMW}$ iii) $\overline{IOR}$ iv) $\overline{IOW}$                                                                                                                                         |           |
|     | b)          | Give function of XRA M & CMC instruction.                                                                                                                                                                                                                                         |           |
|     | c)          | Enlist four features of 8085.                                                                                                                                                                                                                                                     |           |
|     | d)          | Name the any two instructions that uses W & Z register for their operations.                                                                                                                                                                                                      |           |
|     | e)          | Name the all software interrupts.                                                                                                                                                                                                                                                 |           |
|     | f)          | Give the number of T states & number of machine cycles used for CALL 16 bit adder ( if condition is true)                                                                                                                                                                         |           |
| Q.2 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                         | <b>16</b> |
|     | a)          | Draw timing diagram for OUT 90H.                                                                                                                                                                                                                                                  |           |
|     | b)          | Explain the following instructions.<br>i) DAD R <sub>p</sub> ii) DAA                                                                                                                                                                                                              |           |
|     | c)          | State the size and function of each.<br>i) Accumulator ii) PC iii) SP iv) WZ register pair.                                                                                                                                                                                       |           |
|     | d)          | Explain with neat diagram instruction decoding and execution.                                                                                                                                                                                                                     |           |
|     | e)          | Draw overall interrupt structure.                                                                                                                                                                                                                                                 |           |
|     | f)          | Draw the format and explain SIM instruction.                                                                                                                                                                                                                                      |           |
| Q.3 |             | Attempt any <b>TWO</b> :                                                                                                                                                                                                                                                          | <b>16</b> |
|     | a)          | Draw timing diagram for RET if condition is true.                                                                                                                                                                                                                                 |           |
|     | b)          | Write a program to transfer a block of data stored in memory location 9050H to 9055H, and data is to be stored from location 6550 H to 6555 H in reverse order.<br>Draw flow chart also.                                                                                          |           |
|     | c)          | 1) Give the function of pins. i) Ready ii) $\overline{IO/\overline{M}}$ iii) $\overline{INTA}$ iv) $S_0S_1$ .<br>2) WAP to find evens parity number from an array of 10 numbers stored from memory locations 7050 H onwards. Store even parity number at location 6050 H onwards. |           |

**P.T.O.**

| Q.N | S<br>Q<br>N | Section- II                                                                                                                                                                           | Ma<br>rks |
|-----|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Q.4 |             | Attempt any <b>FOUR</b> :                                                                                                                                                             | <b>08</b> |
|     | a)          | How many address lines of 8085 microprocessor will be required to interface memory chips of following size? i) 1K x 8 ii) 2K x 4.                                                     |           |
|     | b)          | Write the control word format of 8255 for BSR mode to set PC0, PC1 & PC5.                                                                                                             |           |
|     | c)          | State any two features of 8255 ( Programmable Peripheral Interface)                                                                                                                   |           |
|     | d)          | State any two features of 8259 ( Programmable Interrupt controller)                                                                                                                   |           |
|     | e)          | State the operating modes related with 0CW2 ( Operational command word) of 8259.                                                                                                      |           |
|     | f)          | Write the function of following pins of 8255. i) $\overline{CS}$ ii) A0 – A1                                                                                                          |           |
| Q.5 |             | Attempt any <b>FOUR</b> :                                                                                                                                                             | <b>16</b> |
|     | a)          | Differentiate between I/O mapped I/O and memory mapped I/O. ( any 4 points)                                                                                                           |           |
|     | b)          | With the help of timing waveforms. Explain the operation of mode 0 of I/O operating mode of 8255.                                                                                     |           |
|     | c)          | Draw and explain the control word format of I/O modes for 8255.                                                                                                                       |           |
|     | d)          | Draw a timing diagram of IN instruction of 8085 microprocessor.                                                                                                                       |           |
|     | e)          | Draw and explain the ICW2 ( Initialization Command Word) of 8259.                                                                                                                     |           |
|     | f)          | Draw the interfacing diagram of 8259 with 8085 microprocessor.                                                                                                                        |           |
| Q.6 |             | Attempt any <b>TWO</b> :                                                                                                                                                              | <b>16</b> |
|     | a)          | With the help of neat labelled diagram, explain functional block diagram of 8259.                                                                                                     |           |
|     | b)          | Interface two LEDs using common anode technique. Draw the interfacing diagram. Write an assembly language program to blink them alternately. Assume port addresses in I/O mapped I/O. |           |
|     | c)          | Interface a 2K x 8 memory chip to 8085 microprocessor with starting memory address 8000H. ( Draw complete interfacing diagram and decoding logic design)                              |           |

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**EXAM SEAT NO.**

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**LEVEL :- FIFTH PROGRAM : IE & E&TC**

**COURSE CODE IEE/ETE508/IX404/EJ404**

**COURSE NAME :- INDUSTRIAL ORGANIZATION & MANAGEMENT**

**MAX. MARKS : 80 TIME : 3 HRS. DATE :- 30/ 11 / 2018**

**Instruction :-**

- 1) Answer of two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

| QN  |    | S | Section-I                                                               |  |  |  |  | Marks     |
|-----|----|---|-------------------------------------------------------------------------|--|--|--|--|-----------|
| Q.1 |    |   | Attempt any <b>FOUR</b> :                                               |  |  |  |  | <b>08</b> |
|     | a) |   | Enlist types of business.                                               |  |  |  |  |           |
|     | b) |   | State products from engineering industry.                               |  |  |  |  |           |
|     | c) |   | Define the term 'Management'.                                           |  |  |  |  |           |
|     | d) |   | Enlist various levels of management.                                    |  |  |  |  |           |
|     | e) |   | Define the term 'Authority'.                                            |  |  |  |  |           |
|     | f) |   | Show line organization.                                                 |  |  |  |  |           |
| Q.2 |    |   | Attempt any <b>FOUR</b> :                                               |  |  |  |  | <b>16</b> |
|     | a) |   | Enlist various steps in organization and describe them.                 |  |  |  |  |           |
|     | b) |   | What is departmentation?                                                |  |  |  |  |           |
|     | c) |   | Write about partnership deed.                                           |  |  |  |  |           |
|     | d) |   | State advantages of cooperative society.                                |  |  |  |  |           |
|     | e) |   | Describe functional organization with suitable example.                 |  |  |  |  |           |
|     | f) |   | What is globalization? Enlist its advantages.                           |  |  |  |  |           |
| Q.3 |    |   | Attempt any <b>FOUR</b> :                                               |  |  |  |  | <b>16</b> |
|     | a) |   | What you know about process and textile industry? Give example of each. |  |  |  |  |           |
|     | b) |   | State the importance of agro industry.                                  |  |  |  |  |           |
|     | c) |   | Discuss about scientific management of F.W. Taylor.                     |  |  |  |  |           |
|     | d) |   | Describe controlling as management function.                            |  |  |  |  |           |
|     | e) |   | Differentiate between administration and management.                    |  |  |  |  |           |
|     | f) |   | Describe various steps in planning.                                     |  |  |  |  |           |

P.T.O.



| QN  |    | Section- II                                                                  |  | Marks     |
|-----|----|------------------------------------------------------------------------------|--|-----------|
| S   | Q  |                                                                              |  |           |
| N   |    |                                                                              |  |           |
| Q.4 |    | Attempt any <b>FOUR</b> :                                                    |  | <b>08</b> |
|     | a) | What is personnel management?                                                |  |           |
|     | b) | List types of training.                                                      |  |           |
|     | c) | What is profit?                                                              |  |           |
|     | d) | What are functions of financial management?                                  |  |           |
|     | e) | Why inventory managements necessary?                                         |  |           |
|     | f) | Define quality circle.                                                       |  |           |
| Q.5 |    | Attempt any <b>FOUR</b> :                                                    |  | <b>16</b> |
|     | a) | What is industrial dispute act and what are governing points?                |  |           |
|     | b) | Explain Maslow's theory of motivation.                                       |  |           |
|     | c) | How workmen compensation act is implemented and what are governing points?   |  |           |
|     | d) | What is accident? And list causes of accidents.                              |  |           |
|     | e) | What is GST? List Benefits of GST.                                           |  |           |
|     | f) | List types of Budgets and explain any one.                                   |  |           |
| Q.6 |    | Attempt any <b>FOUR</b> :                                                    |  | <b>16</b> |
|     | a) | What is capital? And how it can be raised from market.                       |  |           |
|     | b) | What is role of TQM in project management?                                   |  |           |
|     | c) | List functions of purchase department.                                       |  |           |
|     | d) | What is Economic Order quantity? Explain assumption made while deriving EOQ. |  |           |
|     | e) | How JIT is implemented in organization and list advantages of JIT.           |  |           |
|     | f) | What is concept of Break even analysis?                                      |  |           |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

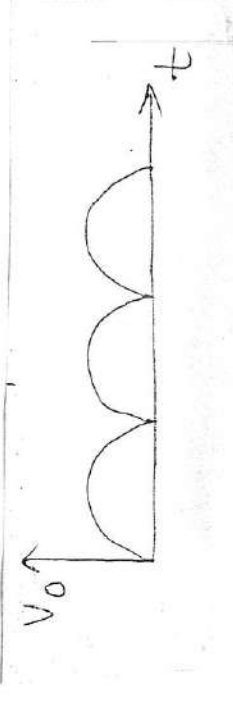
(An Autonomous Institute of Govt. of Maharashtra)

**ODD TERM END EXAM NOV/DEC -2018****EXAM SEAT NO.**

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**LEVEL: FIRST****PROGRAM: IE / ET****COURSE CODE: ETF103/EJ111/ETE103/ETF103 COURSE NAME: BASIC ELECTRONICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 30/11/2018****Instruction:-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) **QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application**

| QN         | S. Q. N | Question Text                                                                                                                                                                                       | Cognition Level<br>R/U/A | Co Code<br>ETF<br>103 | Marks       |
|------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------------------|-------------|
| <b>Q.1</b> |         | Attempt any <b>FOUR</b>                                                                                                                                                                             |                          |                       | <b>(08)</b> |
|            | a)      | Define :<br>i) Doping process.<br>ii) Extrinsic Semiconductor.                                                                                                                                      | R                        | 1                     |             |
|            | b)      | i) If $\beta=50$ then calculate $\alpha$ .<br>ii) If $\alpha = 0.96$ then calculate $\beta$ .                                                                                                       | A                        | 3                     |             |
|            | c)      | Draw VI characteristics of PN junction diode.                                                                                                                                                       | R                        | 1                     |             |
|            | d)      | What is the need of filter ? List any two types of it.                                                                                                                                              | U                        | 2                     |             |
|            | e)      | Draw circuit diagram of CB configuration and label it.                                                                                                                                              | R                        | 3                     |             |
|            | f)      | Draw energy band diagram for,<br>i) Conductor, ii) Semiconductor.                                                                                                                                   | U                        | 1                     |             |
| <b>Q.2</b> |         | Attempt any <b>FOUR</b>                                                                                                                                                                             |                          |                       | <b>(16)</b> |
|            | a)      | Identify the name of circuit whose output waveform is shown below and explain the operation of the circuit.<br> | A                        | 2                     |             |
|            | b)      | Explain the formation of P-type semiconductor with diagram.                                                                                                                                         | U                        | 1                     |             |
|            | c)      | Identify the circuit shown in <b>fig(1)</b> and draw and explain its output characteristics.                                                                                                        | A                        | 3                     |             |

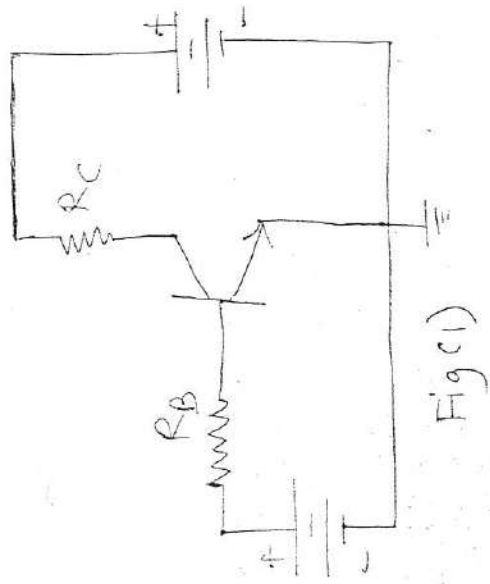
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|            |    |                                                                                                                                           |   |   |      |
|------------|----|-------------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
|            | d) | Draw circuit of half wave rectifier with CLC filter and explain its working.                                                              | U | 2 |      |
|            | e) | Explain with diagram working of PNP transistor.                                                                                           | U | 3 |      |
|            | f) | Identify the circuit shown in <b>fig(2)</b> . Draw and explain the characteristics of identified circuit.                                 | A | 1 |      |
| <b>Q.3</b> |    | Attempt any <b>FOUR</b>                                                                                                                   |   |   | (16) |
|            | a) | Explain the working of LC filter with any one type of rectifier.                                                                          | U | 2 |      |
|            | b) | Compare conductor and insulators on the basis of following points,<br>i) Conductivity, ii) Resistivity, iii) Forbidden gap, iv) Example.  | U | 1 |      |
|            | c) | A transistor has $\beta=90$ . If collector current is 15mA, Calculate,<br>i) Base current, ii) $\alpha$ , iii) emitter current.           | A | 3 |      |
|            | d) | Identify the diagram shown in <b>fig.(3)</b> and explain its working. Also draw its characteristics.                                      | A | 1 |      |
|            | e) | Derive the relation between $\alpha$ and $\beta$ of transistor.                                                                           | A | 3 |      |
|            | f) | For circuit diagram shown in <b>fig.(4)</b> . Draw the waveforms at points,<br>i) A, ii) B, iii) Voltage across $D_1$ . iv) Load voltage. | A | 2 |      |
| <b>Q.4</b> |    | Attempt any <b>FOUR</b>                                                                                                                   |   |   | (08) |
|            | a) | Define Q point & state application of transistor if Q point is in saturation region.                                                      | U | 4 |      |
|            | b) | State the function of bypass capacitor.                                                                                                   | R | 4 |      |
|            | c) | Draw symbol for both types of MOSFET (enhancement).                                                                                       | R | 5 |      |
|            | d) | State why JFET is known as field effect transistor?                                                                                       | R | 5 |      |
|            | e) | Draw pin out for IC 723 & IC LM 317.                                                                                                      | R | 6 |      |
|            | f) | What are the advantages of IC voltage regulator over conventional voltage regulators (list any two).                                      | R | 6 |      |
| <b>Q.5</b> |    | Attempt any <b>FOUR</b>                                                                                                                   |   |   | (16) |
|            | a) | Draw & explain fixed bias circuit with emitter register.                                                                                  | U | 4 |      |
|            | b) | Draw circuit of single stage amplifier & its input output wave forms. (stage wise).                                                       | U | 4 |      |
|            | c) | Draw & explain working of P channel JFET.                                                                                                 | U | 5 |      |
|            | d) | With circuit explain output characteristics of n-channel JFET.                                                                            | U | 5 |      |

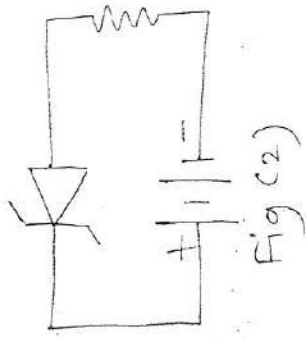
|            |    |                                                                               |   |   |             |
|------------|----|-------------------------------------------------------------------------------|---|---|-------------|
|            | e) | State need of voltage regulator . Explain block diagram of voltage regulator. | U | 6 |             |
|            | f) | Explain zener diode as a voltage regulator.                                   | U | 6 |             |
| <b>Q.6</b> |    | Attempt any <b>FOUR</b>                                                       |   |   | <b>(16)</b> |
|            | a) | Draw voltage divider bias & give its two advantages.                          | U | 4 |             |
|            | b) | With circuit explain collector to base bias.                                  | U | 4 |             |
|            | c) | Compare between enhancement & depletion MOSFET. (any four)                    | U | 5 |             |
|            | d) | Explain constructional diagram of P channel enhancement MOSFET.               | U | 5 |             |
|            | e) | Explain circuit for transistor shunt voltage regulator.                       | U | 6 |             |
|            | f) | Define : i) Line regulation, ii) Load regulation.                             | R | 6 |             |

P.T.O.

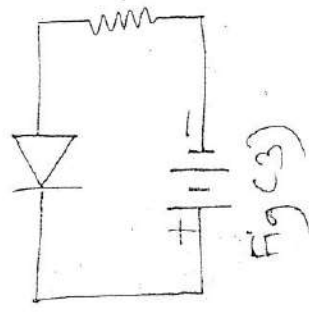
Q-2(c)



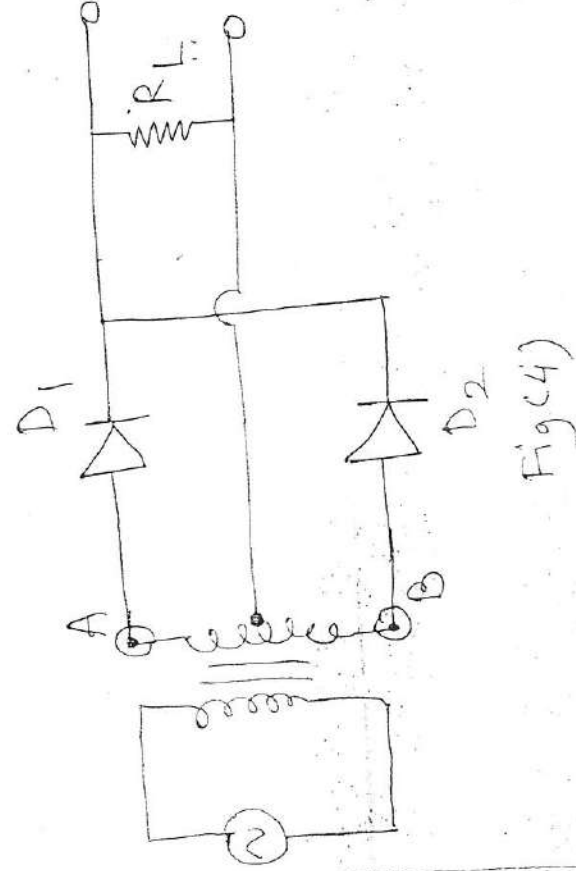
Q-2(f)



Q-3(d)



Q-3(f) (b,f)



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## ODD TERM END EXAM NOV/DEC -2018

EXAM SEAT NO.

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LEVEL: **FIFTH**

PROGRAM: **IE / E&TC**

COURSE CODE: **ETES12/IEE512**

COURSE NAME: **PIC MICROCONTROLLER.**

MAX. MARKS: **80**

TIME: **3 HRS.**

DATE: **10/12/2018**

Instruction:-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

|            | Section – I             | Marks<br>(08) |
|------------|-------------------------|---------------|
| <b>Q.1</b> | Attempt any <b>FOUR</b> |               |

- a) State any two differences among any two PIC microcontrollers from PIC18f family.
- b) List any four features of RISC architecture.
- c) State the significance of Barak select Register (BSR) and explain.
- d) Which of the following instructions are 2 byte-instructions ?
  - i) BZ, ii) BNC, iii) GOTO, iv) BRA.
- e) Assume that XTAL=10MHz. find the TMR0H, TMR0L values needed to generate a time delay of 100  $\mu$ sec. Use 16 bit mode.
- f) Find the TICON value for 16 bit mode, no prescaler, timer oscillator off, with clock coming from PIC18's crystal.

|            |                         |      |
|------------|-------------------------|------|
| <b>Q.2</b> | Attempt any <b>FOUR</b> | (16) |
|------------|-------------------------|------|

- a) Give various steps involving assembly language programming on Assembler like MPLAB.
- b) Explain the RISC architecture in PIC.
- c) For PIC18 system of 8MHz. Find how long it takes to execute each of the following instructions :
  - i) ADDLW, ii) NOP, iii) GOTO, iv) BNC.
- d) Explain the working of instructions :
  - i) CPFSEQ, ii) CPFSGT.
- e) Write a program to generate a square wave of 66% duty cycle on bit 3 of port C.
- f) Program Timer 1 to be an event counter, Use 16 bit mode and display the binary count on port B and port D continuously. Set the initial count to 20,000 d.

(P.T.O.)

(16)

**Q.3 Attempt any FOUR**

- Draw the format of PIC18 status register and explain.
- Illustrate bank switching in PIC18 with suitable example.
- Write a program to implement nested loop to program an action 1000 times.
- Write a program to multiply the following numbers and save the result in a file register locations : 0X20, 0X50,
- Explain the dual role of port C and port B of PIC18f458.
- Write a program to generate square wave of 50% duty cycle on PORTB.5 bit using Timer 0 to generate time delay.

**Marks**

(08)

**Section – II**

**Q.4 Attempt any FOUR**

- Define software interrupt for PIC microcontroller.
- State the name of dc motor driver IC and list any two features.
- State the uses of CCP modules in PIC microcontroller.
- Give advantages of DS RTC 1306 chip.
- State the use of D to A interfacing with PIC microcontroller.
- How much interrupt sources are present for PIC microcontroller ?

(16)

**Q.5 Attempt any FOUR**

- Draw and explain capture mode operational block diagram.
- Draw a LCD interfacing with PIC microcontroller.
- Explain the format of ADCON0 register for PIC microcontroller in detail.
- How Relay can be interfaced with PIC18 microcontroller ? Draw neat interfacing diagram.
- Draw and explain compare mode operational block diagram.
- How speed of DC motor can be controlled when it is connected to PIC18 microcontroller. Write its program.

(16)

**Q.6 Attempt any FOUR**

- Write all important steps used for making serial port programming with PIC microcontroller.
- Write a program to display "GPKP" on LCT by using PIC18 microcontroller.
- Draw an interfacing diagram of stepper motor with PIC18.
- Differentiate standard and enhance CCP module and write a note on each.
- State the significance of H-Bridge circuit while interfacing DC motor with PIC18 microcontroller.
- Draw an interfacing diagram of DS1306 with PIC microcontroller.

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**ODD TERM END EXAM NOV/DEC -2018****EXAM SEAT NO.**

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LEVEL: **THIRD**PROGRAM: **INDUSTRIAL ELECTRONICS/ETC.**COURSE CODE: **EIF309/IEE402/IX302**COURSE NAME: **8051 MICROCONTROLLER****ETE402/EJ302**MAX. MARKS: **80**TIME: **3 HRS.**DATE: **29/11/2018**

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application

| QN         | S. Q. N | Question Text                                                                                                                                        | Cognition Level R/U/A | Co Code EIF 309 | Marks       |
|------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------|-------------|
| <b>Q.1</b> |         | Attempt any <b>FOUR</b>                                                                                                                              |                       |                 | <b>(08)</b> |
|            | a)      | State the function of Address Bus and data bus.                                                                                                      | <b>R</b>              | <b>1</b>        |             |
|            | b)      | What is function of $\overline{EA}$ and RESET pin of 8051 ?                                                                                          | <b>U</b>              | <b>2</b>        |             |
|            | c)      | List different 8051 family members.                                                                                                                  | <b>R</b>              | <b>1</b>        |             |
|            | d)      | Give any 4 features of 8051 Microcontroller.                                                                                                         | <b>R</b>              | <b>2</b>        |             |
|            | e)      | Write on ALP to find 2's complement of a number stored in register R0. Store result in R2                                                            | <b>A</b>              | <b>3</b>        |             |
|            | f)      | State function of MOVX A, @ A+DPTR and SWAP A instruction of 8051.                                                                                   | <b>U</b>              | <b>3</b>        |             |
| <b>Q.2</b> |         | Attempt any <b>FOUR</b>                                                                                                                              |                       |                 | <b>(16)</b> |
|            | a)      | Write an ALP to arrange in descending order a block of 10 data bytes stored in external memory location address 7000H. Mention comments in program.  | <b>A</b>              | <b>3</b>        |             |
|            | b)      | Differentiate Harvard & Von-neuman architecture with diagram. (Any four point)                                                                       | <b>U</b>              | <b>1</b>        |             |
|            | c)      | State & explain the alternate functions of port 3 pins of 8051.                                                                                      | <b>U</b>              | <b>2</b>        |             |
|            | d)      | Explain function of following instruction,<br>i) RRA, ii) XCH A,R1, iii) XCHD, iv) RET.                                                              | <b>U</b>              | <b>3</b>        |             |
|            | e)      | Draw the format of IE Register. Explain significance of each bit.                                                                                    | <b>U</b>              | <b>2</b>        |             |
|            | f)      | Write an ALP to add two 8 bit BCD numbers stored in external memory location 3000H and 3001H. Store the result at 3002H. Draw flowchart for program. | <b>A</b>              | <b>3</b>        |             |

**P.T.O.**

| Q.3 | Attempt any <b>FOUR</b>                                                                                                                                            |   |   | (16) |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
| a)  | Enlist & explain any 4 selection factors of microcontroller.                                                                                                       | U | 1 |      |
| b)  | Explain power saving option of 8051 with diagram.                                                                                                                  | U | 2 |      |
| c)  | State and explain use of SCON & SBUF register of 8051.                                                                                                             | U | 2 |      |
| d)  | Write an ALP to transfer block of ten data bytes stored in internal RAM location 20H onwards to 50H onwards memory location.                                       | A | 3 |      |
| e)  | Draw an Internal RAM memory organization with their Ranges.                                                                                                        | U | 2 |      |
| f)  | Identify the addressing modes of following instructions,<br>i) MOVX A, @DPTR, ii) DIV A B, iii) SETB C, iv) SJMP addr.                                             | A | 3 |      |
| Q.4 | Attempt any <b>FOUR</b>                                                                                                                                            |   |   | (08) |
| a)  | If a motor takes 90 steps to make one complete revolution ( $360^\circ$ ). What is the step angle of this motor?                                                   | U | 6 |      |
| b)  | Draw the pin diagram of DAC 0808.                                                                                                                                  | R | 6 |      |
| c)  | Find the value of TH1, TL1 to be loaded if the time delay is 10ms.                                                                                                 | A | 4 |      |
| d)  | State the function of $\overline{RD}$ and $\overline{WR}$ pins of RAM.                                                                                             | R | 5 |      |
| e)  | Draw interfacing diagram of an LED connected to port pin P1.0 and a switch connected to port pin P3.4.                                                             | U | 5 |      |
| f)  | Find the value of SCON register, if mode 1 is chosen for transmission.                                                                                             | U | 4 |      |
| Q.5 | Attempt any <b>FOUR</b>                                                                                                                                            |   |   | (16) |
| a)  | Write an ALP & for transferring letter "Y" to serial port of 8051 at baud rate 9600 continuously. Assume XTAL frequency = 11.0952 MHz. Write comments for program. | A | 4 |      |
| b)  | Draw the interfacing diagram of 8K x 8 program ROM to 8051 microcontroller. Also draw memory map.                                                                  | U | 5 |      |
| c)  | Write an ALP to check bit P1.5. If it is high send 33H to port 0 (P0) otherwise send cc to port 2 (P2). Draw the flowchart.                                        | A | 4 |      |
| d)  | Draw neat labeled pin diagram of 16 x 2 LCD. Explain function of each pin.                                                                                         | U | 6 |      |
| e)  | Explain any two operating modes of timer/counter of 8051 microcontroller, with necessary diagram.                                                                  | U | 4 |      |
| f)  | Compare between absolute decoding and linear decoding (with four points).                                                                                          | Y | 5 |      |

| Q.6 | Attempt any TWO                                                                                                                                                                                                                                      |        |        | (16) |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|------|
| a)  | Draw the interfacing diagram of stepper motor with 8051 microcontroller. Write an assembly language program to rotate motor in clockwise direction with step angle of $2^\circ$ . Also write the step sequence used and comments for program.        | A      | 6      |      |
| b)  | i) Write an ALP to generate continuous square wave of 2KHz on P2.1 using mode 2 of timer. The crystal frequency is 11.0592 MHz. Write the comment for program.<br>ii) Explain mode 0 and mode 1 of serial port in 8051 used in serial communication. | A<br>U | 4<br>4 |      |
| c)  | Draw the interfacing diagram of seven segment display with 8051 microcontroller. Write an assembly language program with comments to display values sequentially from 0 to 9 on seven segment display.                                               | A      | 5      |      |

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LEVEL :- **FOURTH** PROGRAM : **IE & E & TC**

COURSE CODE **IEE/ETE404/EJ303**

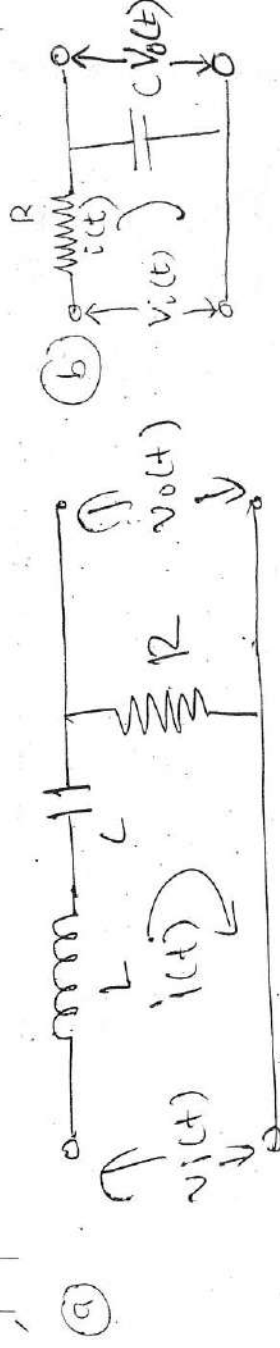
COURSE NAME :- **PRINCIPLES OF CONTROL SYSTEM**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **29 / 11 / 2018**

Instruction :-

- 1) Answer of two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

| QN  | S  | Section- I                                                     | Mar<br>ks |
|-----|----|----------------------------------------------------------------|-----------|
| Q.1 |    | Attempt any <b>FOUR</b> :                                      | <b>08</b> |
|     | a) | Draw block diagram of open loop system.                        |           |
|     | b) | Define transfer function. Give its equation.                   |           |
|     | c) | What is a control system? Give example of it.                  |           |
|     | d) | Define peak overshoot and delay time.                          |           |
|     | e) | What is meant by transient response and steady state response? |           |
|     | f) | List two disadvantages of frequency response analysis.         |           |
| Q.2 |    | Attempt any <b>FOUR</b> :                                      | <b>16</b> |
|     | a) | Derive the transfer function of given circuit                  |           |



|  |    |                                                                                                                                                                                                                             |  |
|--|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  | b) | What is linear time varying and linear time in varying system? Give examples of each.                                                                                                                                       |  |
|  | c) | What is the need of test signal in control system? Draw the standard test signals used in time domain.                                                                                                                      |  |
|  | d) | A second order system has $\frac{C(s)}{R(s)} = \frac{25}{s^2 + 6s + 25}$ for unit step input determined.<br>i) Natural and damped frequency of oscillations.<br>ii) Rise time.<br>iii) Peak overshoot.<br>iv) Setting time. |  |
|  | e) | Derive correlation between time and frequency domain specifications.                                                                                                                                                        |  |
|  | f) | Explain the procedure in obtain bode plot.                                                                                                                                                                                  |  |

|     |                                                                                                                            |           |
|-----|----------------------------------------------------------------------------------------------------------------------------|-----------|
| Q.3 | Attempt any <b>FOUR</b> :                                                                                                  | 16        |
| a)  | Derive the transfer function of closed loop control system.                                                                |           |
| b)  | Reduce the block diagram and obtain its transfer function                                                                  |           |
|     |                                                                                                                            |           |
| c)  | Derive the unit step response of second order under damped control system. Draw the response curve.                        |           |
| d)  | Define the terms i) Pole ii) Zero iii) Characteristic equation iv) Order of system.                                        |           |
| e)  | State and explain any four frequency response specifications.                                                              |           |
| f)  | Draw only magnitude ( bode) plot for $G(s)H(s) = \frac{200}{s(s+10)(s+2)}$                                                 |           |
| QN  | Section- II                                                                                                                | Mar<br>ks |
| Q.4 | Attempt any <b>FOUR</b> :                                                                                                  | 08        |
| a)  | What do you mean by critically stable and conditionally stable system?                                                     |           |
| b)  | State advantages of Routh's criterion ( any two points)                                                                    |           |
| c)  | Define stability.                                                                                                          |           |
| d)  | What is synchro? Give types of synchro systems.                                                                            |           |
| e)  | List types of stepper motor.                                                                                               |           |
| f)  | Define i) Proportional Band ii) Neutral zone.                                                                              |           |
| Q.5 | Attempt any <b>FOUR</b> :                                                                                                  | 16        |
| a)  | Check the stability using Routh stability criterion.<br>$s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16$                     |           |
| b)  | Explain the procedure of root Locus technique.                                                                             |           |
| c)  | Compare P,I & D control action on the basis of<br>i) Nature of output ii) Response of error iii) Equation iv) Application. |           |
| d)  | Draw neat diagram of process control system. State function of each element.                                               |           |
| e)  | Explain the principle of operation of variable reluctance type stepper motor.                                              |           |
| f)  | Draw neat diagram of rotary encoder. Explain it.                                                                           |           |

|     |                                                                                                                                                                             |           |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Q.6 | Attempt any <b>TWO</b> :                                                                                                                                                    | <b>16</b> |
| a)  | A system has $G(s)H(s) = \frac{K(s+13)}{s(s+3)(s+7)}$ Where 'K' is positive . Determine the range of 'K' values for system stability.                                       |           |
| b)  | i) Compare AC servo system and DC servo system ( any four points)<br>ii) Compare field controlled Dc servo motor and Armature controlled DC servo motor. ( any four points) |           |
| c)  | Explain with neat circuit diagram of ON/OFF ( two position) controller using op-amp. Also draw characteristic of ON/OFF controller.                                         |           |



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**ODD TERM END EXAM NOV./DEC-2018****EXAM SEAT NO.**

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**LEVEL :- FIRST****PROGRAM : EE/IE/IT/E&TC****COURSE CODE :- CCF104/CCE104****COURSE NAME :- CHEMISTRY OF ENGINEERING MATERIALS****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 28/11/2018****Instruction :-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.

7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application

| QN  | S<br>Q<br>N | Question Text                                                                             | R/<br>U/<br>A | Co<br>CCF<br>104 | Ma<br>rks |
|-----|-------------|-------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.1 |             | Attempt any <b>FOUR</b> :                                                                 |               |                  | <b>08</b> |
|     | a)          | Give two points of comparison between p,n, and 'e'.                                       | U             | 1                |           |
|     | b)          | Define electro chemical corrosion.                                                        | R             | 3                |           |
|     | c)          | Explain why Galvanized containers are not used for storing food stuff?                    | A             | 3                |           |
|     | d)          | State Hund's rule of maximum multiplicity.                                                | R             | 1                |           |
|     | e)          | Give the disadvantages of hard water for paper industries.                                | U             | 4                |           |
|     | f)          | Name salts present in boiler scale. Give formula.                                         | R             | 4                |           |
| Q.2 |             | Attempt any <b>FOUR</b> :                                                                 |               |                  | <b>16</b> |
|     | a)          | Explain formation of CO <sub>2</sub> molecule. What is valency of 'C' and 'O'?            | A             | 1                |           |
|     | b)          | What is orbital configuration of ${}_{11}^{Na^{23}} {}_{24}^{Cr^{50}} {}_{19}^{K^{40}}$ . | A             | 1                |           |
|     | c)          | Explain with neat labelled diagram electroplating of silver on Iron plate.                | A             | 2                |           |
|     | d)          | Give the disadvantages of scale and sludge formation in boiler.                           | U             | 4                |           |
|     | e)          | What is formula of soap? Give the reactions of soap with salts in hard water.             | A             | 4                |           |
|     | f)          | Define pH. Draw pH scale. Give importance of pH control in boiler and sewage water.       | U             | 4                |           |
| Q.3 |             | Attempt any <b>FOUR</b> :                                                                 |               |                  | <b>16</b> |
|     | a)          | Explain electrolysis of CuSO <sub>4</sub> copper sulphate by using 'Cu' electrode.        | U             | 2                |           |
|     | b)          | Define degree of ionization. Explain factors affecting degree of ionization.              | U             | 2                |           |
|     | c)          | Give the difference between metallic conductance and electrolytic conductance.            | U             | 2                |           |
|     | d)          | Explain with neat labelled diagram Tinning method.                                        | A             | 3                |           |
|     | e)          | How chlorination is carried out by using bleaching powder? State its disadvantages.       | A             | 4                |           |
|     | f)          | Give the reactions in Cation exchange Resin and Anion exchange Resin cylinders.           | U             | 4                |           |

**P.T.O.**

| QN  | S<br>Q<br>N | SECTION -II                                                                                            | R/<br>U/<br>A | Co<br>CCF<br>104 | Ma<br>rks |
|-----|-------------|--------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.4 |             | Attempt any <b>FOUR</b> :                                                                              |               |                  | <b>08</b> |
|     | a)          | Classify the batteries with examples.                                                                  | U             | 5                |           |
|     | b)          | Draw a neat labelled diagram of froth Floatation method.                                               | U             | 6                |           |
|     | c)          | Distinguish between mineral and ores ( 2 points)                                                       | U             | 6                |           |
|     | d)          | Give composition of Rose metal.                                                                        | U             | 6                |           |
|     | e)          | Write two applications of silicon as a semiconductor.                                                  | R             | 6                |           |
|     | f)          | Define i) Adhesive ii) composite materials.                                                            | R             | 7                |           |
| Q.5 |             | Attempt any <b>FOUR</b> :                                                                              |               |                  | <b>16</b> |
|     | a)          | Write charging and discharging reactions of lead acid storage cell.                                    | A             | 5                |           |
|     | b)          | Distinguish between calcination and roasting.                                                          | U             | 6                |           |
|     | c)          | Draw a neat labelled diagram of blast furnace of copper. Explain in detail.                            | U             | 6                |           |
|     | d)          | Give composition, properties and applications of Tinmann's solder.                                     | R             | 6                |           |
|     | e)          | Write properties and application of silicon carbide.                                                   | R             | 6                |           |
|     | f)          | Give preparation of glass wool and explain properties and application.                                 | U             | 7                |           |
| Q.6 |             | Attempt any <b>FOUR</b> :                                                                              |               |                  | <b>16</b> |
|     | a)          | Draw diagram and explain construction, working of solar cell                                           | R             | 5                |           |
|     | b)          | Explain with diagram electromagnetic separation method.                                                | U             | 6                |           |
|     | c)          | Draw the flow chart showing the different processes used for the extraction of metals from their ores. | U             | 6                |           |
|     | d)          | State and explain purposes of making an alloy with example.                                            | U             | 6                |           |
|     | e)          | Distinguish between addition and condensation polymerization. ( four points each)                      | R             | 7                |           |
|     | f)          | Write four properties and four applications of Bakelite.                                               | R             | 7                |           |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**ODD TERM END EXAM NOV./DEC.-2018****EXAM SEAT NO.**

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**LEVEL :- FIFTH**      **PROGRAM : INDUSTRIAL ELECTRONICS**  
**COURSE CODE IEE501/IX301****COURSE NAME :- POWER ELECTRONICS -II****MAX. MARKS : 80**   **TIME : 3 HRS.**   **DATE :- 28/ 11 / 2018****Instruction :-**

- 1) Answer of two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

| QN  | S  | Section-I                                                                                                                                          | Marks     |
|-----|----|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Q.1 |    | Attempt any <b>FOUR</b> :                                                                                                                          | <b>08</b> |
|     | a) | Draw and explain V-I characteristics of MOSFET.                                                                                                    |           |
|     | b) | Draw a neat circuit diagram of three phases to three phase cycloconverter.                                                                         |           |
|     | c) | Give the disadvantages of linear regulator.                                                                                                        |           |
|     | d) | Explain with neat diagram construction of GTO.                                                                                                     |           |
|     | e) | Draw basic block diagram of chopper.                                                                                                               |           |
|     | f) | Enlist different types of regulators.                                                                                                              |           |
| Q.2 |    | Attempt any <b>FOUR</b> :                                                                                                                          | <b>16</b> |
|     | a) | Compare MOSFET & GTO ( any four points)                                                                                                            |           |
|     | b) | Draw quadrant diagrams of chopper.                                                                                                                 |           |
|     | c) | Explain need of SMPS.                                                                                                                              |           |
|     | d) | Differentiate AC & DC voltage regulator ( any four points)                                                                                         |           |
|     | e) | List any four applications of IGBT.                                                                                                                |           |
|     | f) | Explain four quadrant operation of chopper.                                                                                                        |           |
| Q.3 |    | Attempt any <b>TWO</b> :                                                                                                                           | <b>16</b> |
|     | a) | i) Draw circuit diagram of Relay type regulator and write operating principle of it.<br>ii) List any four applications of resonant type regulator. |           |
|     | b) | Define commutation and explain series turn OFF and parallel turn OFF commutation.                                                                  |           |
|     | c) | With neat circuit diagram and waveforms of single phase to bridge cycloconverters.                                                                 |           |

P.T.O.

| QN  |     | Section- II                                                                                                                                |  | Marks     |
|-----|-----|--------------------------------------------------------------------------------------------------------------------------------------------|--|-----------|
| Q.4 | SQN | Attempt any <b>FOUR</b> :                                                                                                                  |  | <b>08</b> |
|     | a)  | Draw a circuit diagram of series inverter.                                                                                                 |  |           |
|     | b)  | Give any two specification of inverter.                                                                                                    |  |           |
|     | c)  | Draw a block diagram of online UPS.                                                                                                        |  |           |
|     | d)  | Explain zero voltage switching concept.                                                                                                    |  |           |
|     | e)  | Define specification of UPS transient response and response time.                                                                          |  |           |
|     | f)  | Draw a diagram of snubber circuit.                                                                                                         |  |           |
| Q.5 |     | Attempt any <b>FOUR</b> :                                                                                                                  |  | <b>16</b> |
|     | a)  | With circuit diagram explain Mc Murray bed ford bridge inverter.                                                                           |  |           |
|     | b)  | Explain series inverter with diagram.                                                                                                      |  |           |
|     | c)  | Explain induction heating application surface annealing and brazing.                                                                       |  |           |
|     | d)  | Draw and explain line interactive UPS.                                                                                                     |  |           |
|     | e)  | With diagram explain AC circuit breaker.                                                                                                   |  |           |
|     | f)  | Explain snubber circuit with function and operating principle.                                                                             |  |           |
| Q.6 |     | Attempt any <b>FOUR</b> :                                                                                                                  |  | <b>16</b> |
|     | a)  | Explain sinusoidal pulse modulation technique with waveform and block diagram.                                                             |  |           |
|     | b)  | Give any four difference between parallel and bridge inverter.                                                                             |  |           |
|     | c)  | Draw and explain parallel inverter with R load.                                                                                            |  |           |
|     | d)  | Explain UPS specification<br>i) DC voltage range.<br>ii) Total harmonic distortion.<br>iii) Transient recovery.<br>iv) Type of protection. |  |           |
|     | e)  | Draw and explain optoisolator circuit.                                                                                                     |  |           |
|     | f)  | Explain over current and over voltage protection.                                                                                          |  |           |

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# GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM END EXAM NOV./DEC.-2018

EXAM SEAT NO. 

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LEVEL :- **FIFTH** PROGRAM : **INDUSTRIAL ELECTRONICS**

COURSE CODE **IEE511**

COURSE NAME :- **PLC AND DRIVES**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **01/ 12 / 2018**

Instruction :-

- 1) Answer of two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

| Section- I |                                                                                                                                                            |  | Mar<br>ks |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------|
| QN         | S<br>Q<br>N                                                                                                                                                |  |           |
| Q.1        | Attempt any <b>FOUR</b> :                                                                                                                                  |  | <b>08</b> |
|            | a) What is an electric drive? List various types of electric drives.                                                                                       |  |           |
|            | b) State the requirements of an adjustable speed drive.                                                                                                    |  |           |
|            | c) Give the advantages of converter fed induction motor.                                                                                                   |  |           |
|            | d) Draw speed torque characteristics of induction motor.                                                                                                   |  |           |
|            | e) List various industrial applications in which electric motors are employed as drive motors.                                                             |  |           |
|            | f) Enlist various stages in textile mills.                                                                                                                 |  |           |
| Q.2        | Attempt any <b>FOUR</b> :                                                                                                                                  |  | <b>16</b> |
|            | a) Compare AC drive and DC drive. ( any four points)                                                                                                       |  |           |
|            | b) With the neat diagram. Explain speed control of single phase induction motor using stator voltage control.                                              |  |           |
|            | c) State the requirements that should be satisfied by paper making machine.                                                                                |  |           |
|            | d) Explain the stator current control method of speed control of induction motor.                                                                          |  |           |
|            | e) Explain various stages in cement production.                                                                                                            |  |           |
|            | f) Explain types of steel rolling mills.                                                                                                                   |  |           |
| Q.3        | Attempt any <b>TWO</b> :                                                                                                                                   |  | <b>16</b> |
|            | a) Explain functions of basic elements of an electric drive. Also explain stator voltage and frequency control method of speed control of induction motor. |  |           |
|            | b) With neat diagram, explain any one method of speed control using slip energy recovery schemes.                                                          |  |           |
|            | c) Draw and explain speed control of DC drives using microprocessor.                                                                                       |  |           |

P.T.O.

| QN  |             | Section- II                                                                                                                                                        |  | Mar<br>ks |
|-----|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------|
|     | S<br>Q<br>N |                                                                                                                                                                    |  |           |
| Q.4 |             | Attempt any <b>FOUR</b> :                                                                                                                                          |  | <b>08</b> |
|     | a)          | State the classification of PLC based on type and size.                                                                                                            |  |           |
|     | b)          | List out different input and output modules of PLC.                                                                                                                |  |           |
|     | c)          | State any four compare instructions used in PLC.                                                                                                                   |  |           |
|     | d)          | What is drum controller? Give its example.                                                                                                                         |  |           |
|     | e)          | Draw truth table and equivalent PLC ladder diagram of OR gate.                                                                                                     |  |           |
|     | f)          | Draw the ladder diagram for following Boolean expression $Y = (A+B)(C+D)$                                                                                          |  |           |
| Q.5 |             | Attempt any <b>FOUR</b> :                                                                                                                                          |  | <b>16</b> |
|     | a)          | With neat diagram explain the memory organization of PLC.                                                                                                          |  |           |
|     | b)          | Explain the Redundancy in PLC.                                                                                                                                     |  |           |
|     | c)          | Explain CTD instruction and also give the format of counter file.                                                                                                  |  |           |
|     | d)          | Draw and explain format of off delay timer ( Toff ) with waveform.                                                                                                 |  |           |
|     | e)          | Explain the high speed encoder with neat diagram.                                                                                                                  |  |           |
|     | f)          | Draw the ladder diagram for Boolean equation<br>$A + B + C\bar{D} + E = Y_1, (F.\bar{G}.H).I = Y_2, Y_1.Y_2 = Q$                                                   |  |           |
| Q.6 |             | Attempt any <b>FOUR</b> :                                                                                                                                          |  | <b>16</b> |
|     | a)          | Explain the following data handling instructions.<br>i) Move ii) Masked move.                                                                                      |  |           |
|     | b)          | List and explain arithmetic instructions used in PLC programming.                                                                                                  |  |           |
|     | c)          | Explain any two PLC sequencer instructions and give the parameters in PLC sequencer instructions.                                                                  |  |           |
|     | d)          | Explain in detail stepper motor control module.                                                                                                                    |  |           |
|     | e)          | Explain PLC operating cycle.                                                                                                                                       |  |           |
|     | f)          | Draw a ladder diagram for a two motor operation for a start switch starts motor 1 and motor 2. The stop switch stops motor 1 first after 15 seconds motor 2 stops. |  |           |

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**LEVEL :- FIFTH PROGRAM : INDUSTRIAL ELECTRONIC****COURSE CODE :- IEF505****COURSE NAME :- OPTOELECTRONICS****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 12/12/2018****Instruction :-**

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

| QN  |    | Section-I                                                                                                                                        |  | R/<br>U/<br>A | Co<br>IEF<br>505 | Mar<br>ks |
|-----|----|--------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------|------------------|-----------|
| Q.1 | a) | Attempt any <b>FOUR</b> :                                                                                                                        |  |               |                  | <b>08</b> |
|     |    | State Plank's Law.                                                                                                                               |  | R             | 1                |           |
|     |    | Define optical power and write its unit.                                                                                                         |  | R             | 1                |           |
|     |    | State the operating principle of LED. Write any two advantages of LED.                                                                           |  | U             | 2                |           |
|     |    | List any four advantages of laser.                                                                                                               |  | R             | 3                |           |
|     |    | Write any two semiconductor materials used for laser.                                                                                            |  | R             | 3                |           |
| Q.2 | b) | Define hetero-junction.                                                                                                                          |  | R             | 2                | <b>16</b> |
|     |    | Attempt any <b>FOUR</b> :                                                                                                                        |  |               |                  |           |
|     |    | Explain reflection and refraction with neat diagram.                                                                                             |  | U             | 1                |           |
|     |    | Draw and explain construction of semiconductor injection laser.                                                                                  |  | U             | 3                |           |
|     |    | Explain with diagram the following characteristics of LED.<br>i) Output power ii) Modulation bandwidth.                                          |  | U             | 2                |           |
|     |    | Draw and explain construction of planar LED. State any two disadvantages of it.                                                                  |  | U             | 2                |           |
| Q.3 | c) | Explain with diagram, stimulated emission process.                                                                                               |  | U             | 3                | <b>16</b> |
|     |    | Compare between LED and laser with following points.<br>i) Materials used ii) Spectral width iii) types iv) Application.                         |  | U             | 3                |           |
|     |    | Attempt any <b>FOUR</b> :                                                                                                                        |  |               |                  |           |
|     |    | Compare between homo-junction and hetero-junction LED with following points.<br>i) Definition ii) diagram iii) Efficiency iv) Emission of light. |  | U             | 2                |           |
|     |    | Draw and explain construction of edge emitting LED.                                                                                              |  | U             | 2                |           |
|     |    | Draw the spectrum of light and state the use of various frequency bands.                                                                         |  | U             | 1                |           |
|     | d) | Draw and explain construction of incandescent lamp.                                                                                              |  | U             | 2                |           |
|     |    | Explain with diagram population inversion and pumping process.                                                                                   |  | U             | 3                |           |
|     | f) | Explain construction and working of fabry perot resonant cavity laser with neat diagram.                                                         |  |               |                  |           |

P.T.O.



| QN  |    | Section- II                                                                                                                      |  | R/<br>U/<br>A | Co<br>IEF<br>505 | Mar<br>ks |
|-----|----|----------------------------------------------------------------------------------------------------------------------------------|--|---------------|------------------|-----------|
| Q.4 |    | Attempt any <b>FOUR</b> :                                                                                                        |  |               |                  | <b>08</b> |
|     | a) | Draw output spectrum of avalanche photodiode.                                                                                    |  | R             | 5                |           |
|     | b) | State the function of optocoupler. List types of it.                                                                             |  | R             | 6                |           |
|     | c) | Enlist any four applications of photoresistors.                                                                                  |  | R             | 4                |           |
|     | d) | Write advantages and disadvantages of phototransistor.                                                                           |  | R             | 5                |           |
|     | e) | State function of photodetector. Give classification of photo-detector.                                                          |  | R             | 4                |           |
|     | f) | Draw the equivalent circuit of solar-cell.                                                                                       |  | R             | 6                |           |
| Q.5 |    | Attempt any <b>FOUR</b> :                                                                                                        |  |               |                  | <b>16</b> |
|     | a) | Explain with neat diagram construction and working of photo-transistor.                                                          |  | U             | 5                |           |
|     | b) | Explain any four applications of solar cells. State its advantages and disadvantages.                                            |  | U             | 6                |           |
|     | c) | Draw and explain electrical characteristics of PIN photodiode. Give its two applications.                                        |  | U             | 5                |           |
|     | d) | Explain any four specifications of LCD displays.                                                                                 |  | U             | 6                |           |
|     | e) | Explain operation of photoresistor with suitable diagram.                                                                        |  | U             | 4                |           |
|     | f) | Explain working principle of avalanche photo diode with diagram.                                                                 |  | U             | 5                |           |
| Q.6 |    | Attempt any <b>FOUR</b> :                                                                                                        |  |               |                  | <b>16</b> |
|     | a) | Explain any four characteristics of photodetector.                                                                               |  | U             | 4                |           |
|     | b) | Compare LED and LCD display with respect to following points<br>i) Resolution ii) Power requirement iii) Switching time iv) Cost |  | A             | 6                |           |
|     | c) | Draw and explain electrical characteristics of solar cells.                                                                      |  | U             | 6                |           |
|     | d) | Explain the advantages of photodiodes over photoresistor. State drawback of photoresistor.                                       |  | U             | 4                |           |
|     | e) | Draw and explain constructional details of P-I-N photodiode.                                                                     |  | U             | 5                |           |
|     | f) | Compare between photodiode and phototransistor. ( any four points)                                                               |  | U             | 5                |           |

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**ODD TERM END EXAM NOV/DEC-2018****EXAM SEAT NO.**

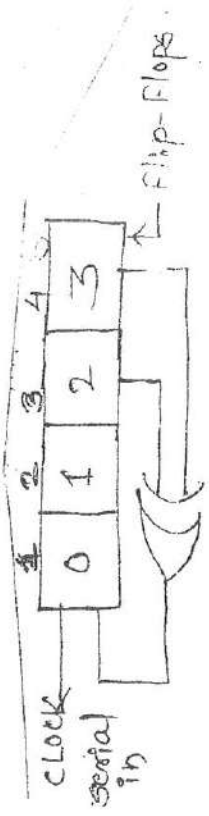
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**LEVEL :- THIRD****PROGRAM : IE & E & TC****COURSE CODE :- EIF306/IEE306/ETE306/EJ207****COURSE NAME :- DIGITAL TECHNIQUES AND APPLICATION****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 13/12/2018****Instruction :-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

| QN  | S  | Question Text                                                                                                              | R/<br>U/<br>A | Co<br>EIF<br>306 | Ma<br>rks |
|-----|----|----------------------------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.1 |    | Attempt any <b>FOUR</b> :                                                                                                  |               |                  | 08        |
|     | a) | Enlist 4 different number systems.                                                                                         | R             | 1                |           |
|     | b) | Define 'Maxterm'.                                                                                                          | R             | 2                |           |
|     | c) | Convert $(65535)_{10}$ to binary.                                                                                          | A             | 1                |           |
|     | d) | Give truth table and symbol of i) NAND Gate ii) Ex-OR Gate.                                                                | R             | 3                |           |
|     | e) | Explain 'Associative law'.                                                                                                 | U             | 2                |           |
|     | f) | Enlist ICs for i) AND ii) OR iii) NOT iv) NOR gates.                                                                       | R             | 3                |           |
| Q.2 |    | Attempt any <b>FOUR</b> :                                                                                                  |               |                  | 16        |
|     | a) | Convert $(27.125)_{10}$ to Hexadecimal number.                                                                             | A             | 1                |           |
|     | b) | Explain Duality theorem.                                                                                                   | U             | 2                |           |
|     | c) | Explain working of TTL NAND gate.                                                                                          | U             | 3                |           |
|     | d) | Subtract $(1010)_2$ from $(1111)_2$ using 2's complement.                                                                  | U             | 1                |           |
|     | e) | Show $AB = \overline{A}C + A\overline{B}C (AB+C)$                                                                          | A             | 2                |           |
|     | f) | Interface TTL to CMOS family.                                                                                              | A             | 3                |           |
| Q.3 |    | Attempt any <b>FOUR</b> :                                                                                                  |               |                  | 16        |
|     | a) | Subtract $(357-294)_{10}$ using 10's complement.                                                                           | A             | 1                |           |
|     | b) | State and prove DeMorgans first theorem ( for 3 variables)                                                                 | U             | 2                |           |
|     | c) | Compare TTL and CMOS on the basis of<br>i) Fan in            ii) Fan out<br>iii) Propagation delay. Iv) Power dissipation. | U             | 3                |           |
|     | d) | Subtract $(891-736)_{10}$ using 9's complement.                                                                            | A             | 1                |           |
|     | e) | Interface CMOS to TTL family.                                                                                              | A             | 3                |           |
|     | f) | Explain with circuit diagram, working of 3 input NOR/OR gate.                                                              | U             | 3                |           |

**P.T.O.**

|     |                                                                                                                                                                                            |   |   |    |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|----|
| Q.4 | Attempt any <b>FOUR</b> :                                                                                                                                                                  |   |   | 08 |
|     | a) Draw the circuit of a half subtractor.                                                                                                                                                  | R | 4 |    |
|     | b) List the types of triggering that can be used for clocking a flip-flop.                                                                                                                 | R | 5 |    |
|     | c) State any four applications of DAC.                                                                                                                                                     | R | 6 |    |
|     | d) Draw the symbol and write truth table of 1:2 DEMUX.                                                                                                                                     | R | 4 |    |
|     | e) List any four applications of shift registers.                                                                                                                                          | R | 5 |    |
|     | f) Classify semiconductor memories.                                                                                                                                                        | U | 6 |    |
| Q.5 | Attempt any <b>FOUR</b> :                                                                                                                                                                  |   |   | 16 |
|     | a) Draw pin and block diagram of IC 74181 (ALUIC).                                                                                                                                         | R | 4 |    |
|     | b) Describe working at clocked S-R flip-flop using NAND gate.                                                                                                                              | U | 5 |    |
|     | c) Explain successive approximation method of ADC with neat diagram.                                                                                                                       | U | 6 |    |
|     | d) Construct 16:1 MUX using 4:1 multiplexer.                                                                                                                                               | A | 4 |    |
|     | e) In the given fig. if the 4 bit serial in parallel out, right shift register has the initial contents 0110. After 3 clock pulses applied what will be the content of the shift register. | A | 5 |    |
|     |                                                                                                        |   |   |    |
|     | f) Explain half adder with truth table and logic diagram.                                                                                                                                  | U | 4 |    |
| Q.6 | Attempt any <b>FOUR</b> :                                                                                                                                                                  |   |   | 16 |
|     | a) Compare RAM and ROM on the basis of following points<br>i) Operations involved ii) types of storage iii) Types iv) Application                                                          | U | 6 |    |
|     | b) Draw the logical circuit diagram of a 3-bit asynchronous up counter and explain.                                                                                                        | U | 5 |    |
|     | c) Explain BCD to seven segment decoder with truth table and circuit diagram.                                                                                                              | U | 4 |    |
|     | d) For a 6-bit binary R-2R ladder, assume '0' = 0 volt and '1' = +10 volt. Find the output voltages for following digital input :<br>i) 101001 ii) 11001                                   | A | 6 |    |
|     | e) Explain master slave J-K flip-flop with circuit diagram and truth table.                                                                                                                | U | 5 |    |
|     | f) Draw and explain the block diagram of IC 74147 (Decimal to BCD encoder) write truth table.                                                                                              | U | 4 |    |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**ODD TERM END EXAM NOV/DEC -2018****EXAM SEAT NO.**

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LEVEL: **FIRST**PROGRAM: **IE/E&TC**COURSE CODE: **EIF101/ETE101** COURSE NAME: **ELECTRONIC COMPONENTS AND APPLICATIONS**MAX. MARKS: **80**TIME: **3 HRS.**DATE: **17/12/2018**

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

| S<br>QN | Q<br>N | Question Text                                                                                                                                                           | R<br>U<br>A | CO<br>EIF<br>101 | Mar<br>ks |
|---------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|-----------|
| Q.1     |        | Attempt any <b>FOUR</b>                                                                                                                                                 |             |                  | (08)      |
|         | a)     | List any four specifications of resistor.                                                                                                                               | R           | 1                |           |
|         | b)     | List the different types of capacitor. In which type of capacitor care should be taken for correct polarity in dc circuit.                                              | R           | 2                |           |
|         | c)     | Define the inductive reactance of inductor.                                                                                                                             | R           | 3                |           |
|         | d)     | State any four dielectric materials used in manufacturing the capacitor.                                                                                                | R           | 2                |           |
|         | e)     | List four non-linear resistors.                                                                                                                                         | R           | 1                |           |
|         | f)     | List types of an inductor.                                                                                                                                              | R           | 3                |           |
| Q.2     |        | Attempt any <b>FOUR</b>                                                                                                                                                 |             |                  | (16)      |
|         | a)     | Explain PVC gang capacitor with its constructional diagram.                                                                                                             | U           | 2                |           |
|         | b)     | Compare TDR and LDR on the basis of following points.<br>i) working principle<br>ii) Material used for construction<br>iii) Characteristics<br>iv) Applications.        | U           | 1                |           |
|         | c)     | Explain the constructional details of air core inductor.                                                                                                                | U           | 3                |           |
|         | d)     | Identify the colour code for the following resistor.<br>i) $100\Omega, \pm 10\%$<br>ii) $47k\Omega, \pm 5\%$<br>iii) $150\Omega, \pm 5\%$<br>iv) $2.7k\Omega, \pm 10\%$ | A           | 1                |           |
|         | e)     | Explain any four specification of capacitor.                                                                                                                            | U           | 2                |           |
|         | f)     | Define the following terms with respect to inductor.<br>i) Self inductance<br>ii) Mutual inductance<br>iii) Co-efficient of coupling<br>iv) Leakage inductance.         | R           | 3                |           |

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| Q.3 | Attempt any <b>FOUR</b>                                                                                                                |   |   | (16) |
|-----|----------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
| a)  | Draw and explain rheostats with specifications.                                                                                        | U | 1 |      |
| b)  | Draw construction of aluminum electrolytic capacitor and label different parts. State any two applications.                            | U | 2 |      |
| c)  | Compare iron core inductor and ferrite core inductor. (any four points)                                                                | U | 3 |      |
| d)  | Draw constructional details of carbon film resistor and give its two specifications.                                                   | U | 1 |      |
| e)  | Explain the Trimmer capacitor with constructional diagram and write its two applications.                                              | U | 2 |      |
| f)  | Find the value of an inductor having the following colour code.<br>i) Blue, Gray, Brown, Gold<br>ii) Silver, Blue, Gold, Gray, Silver. | A | 3 |      |
| Q.4 | Attempt any <b>FOUR</b>                                                                                                                |   |   | (08) |
| a)  | Draw the flowchart for preparation of PCB.                                                                                             | R | 6 |      |
| b)  | Compare between cables and connectors. (any two points)                                                                                | U | 4 |      |
| c)  | List any two applications of liquid crystal display (LCD).                                                                             | R | 5 |      |
| d)  | Draw the diagram of toggle switch.                                                                                                     | R | 5 |      |
| e)  | List any two general specifications of connectors.                                                                                     | R | 4 |      |
| f)  | List any two advantages of PCB.                                                                                                        | R | 6 |      |
| Q.5 | Attempt any <b>FOUR</b>                                                                                                                |   |   | (16) |
| a)  | Draw mercury wetted reed relay.                                                                                                        | U | 5 |      |
| b)  | Explain dip soldering technique of PCB.                                                                                                | U | 6 |      |
| c)  | Describe twin core cable.                                                                                                              | U | 4 |      |
| d)  | Draw DB-25 connector and DB-9 printer connector.                                                                                       | U | 4 |      |
| e)  | Illustrate LED display with neat constructional diagram.                                                                               | U | 5 |      |
| f)  | Explain with neat diagram rocker switch.                                                                                               | U | 5 |      |
| Q.6 | Attempt any <b>FOUR</b>                                                                                                                |   |   | (16) |
| a)  | Explain BNC connector with neat diagram.                                                                                               | U | 4 |      |
| b)  | Describe screen printing method of PCB.                                                                                                | U | 6 |      |
| c)  | Describe FRC cable with neat diagram.                                                                                                  | U | 4 |      |
| d)  | Draw slide switch and PUSH to ON switch.                                                                                               | U | 5 |      |
| e)  | Compare between switch and relay. (any four points)                                                                                    | U | 5 |      |
| f)  | Illustrate hand soldering technique of PCB with example.                                                                               | U | 6 |      |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**ODD TERM END EXAM NOV/DEC -2018****EXAM SEAT NO.**

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**LEVEL: FOURTH****PROGRAM: IE/E&TC****COURSE CODE: EIF406/IEE406/EJ308/ETE406** **COURSE NAME: ELECTRONIC CIRCUIT DESIGN****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 14/12/2018****Instruction:-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application **CO**>Course outcome

| QN  | S  | Q | Question Text                                                                                                                                  | R | CO | Mark<br>s |
|-----|----|---|------------------------------------------------------------------------------------------------------------------------------------------------|---|----|-----------|
| Q.1 |    |   | Attempt any <b>FOUR</b>                                                                                                                        |   |    | (08)      |
|     | a) |   | State any two disadvantages of two stage RC coupled amplifier.                                                                                 | R | 3  |           |
|     | b) |   | List any four specification of UJT.                                                                                                            | R | 1  |           |
|     | c) |   | Draw a circuit diagram of IC723 low voltage regulator.                                                                                         | U | 2  |           |
|     | d) |   | Give the two differences between zener diode and semiconductor diode.                                                                          | R | 1  |           |
|     | e) |   | State meaning of Darlington pair.                                                                                                              | R | 3  |           |
|     | f) |   | Draw circuit diagram of center tapped rectifier with L-section filter.                                                                         | U | 2  |           |
| Q.2 |    |   | Attempt any <b>FOUR</b>                                                                                                                        |   |    | (16)      |
|     | a) |   | Explain design steps with diagram in transistor series voltage regulator.                                                                      | U | 2  |           |
|     | b) |   | Give the difference between BJT and FET (any four points)                                                                                      | U | 1  |           |
|     | c) |   | Give the design steps for two stage RC- coupled common emitter amplifier for AC analysis.                                                      | U | 3  |           |
|     | d) |   | Design a full wave bridge rectifier using a capacitor filter to provide 100V dc at 50mA with a maximum ripple of 1%.                           | A | 2  |           |
|     | e) |   | Classify the transformers used in electronics circuit. State two specifications of any two transformers.                                       | R | 1  |           |
|     | f) |   | Explain design steps of source follower circuit.                                                                                               | U | 3  |           |
| Q.3 |    |   | Attempt any <b>TWO</b>                                                                                                                         |   |    | (16)      |
|     | a) |   | Design a single stage CE amplifier to give a voltage gain of 100 with stability factor 10 and output voltage of 2Vrms using transistor BC147A. | A | 3  |           |
|     | b) |   | Design a zener regulator to provide 12V output from 24V unregulated power supply. Also calculate line and load regulations.                    | A | 2  |           |

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|            |                                                                                                                                                                                                                                                                                                                                                                                                           |   |   |      |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
| c)         | Design emitter follower circuit to provided input impedance of $500k\Omega$ for lower 3dB frequency of 50Hz the output voltage required is of 3V with load resistance of $5k\Omega$ . The source resistance of generator is $600\Omega$ .                                                                                                                                                                 | A | 3 |      |
| <b>Q.4</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                                                                                                                   |   |   | (08) |
| a)         | Compare between voltages of power amplifier with following points.<br>i) Coupling used<br>ii) Current gain( $\beta$ )                                                                                                                                                                                                                                                                                     | U | 4 |      |
| b)         | Draw circuit diagram of class B push pull power amplifier.                                                                                                                                                                                                                                                                                                                                                | R | 4 |      |
| c)         | Write any two advantages of complementary symmetry power amplifier.                                                                                                                                                                                                                                                                                                                                       | R | 4 |      |
| d)         | Write the two requirements for oscillations.                                                                                                                                                                                                                                                                                                                                                              | U | 5 |      |
| e)         | Draw circuit diagram of colpitt's oscillator using opamp.                                                                                                                                                                                                                                                                                                                                                 | R | 5 |      |
| f)         | Define i) Monostable multivibrator. ii) Bistable multivibrator.                                                                                                                                                                                                                                                                                                                                           | R | 6 |      |
| <b>Q.5</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                                                                                                                   |   |   | (16) |
| a)         | Draw circuit diagram of class A power amplifier with resistive load. Also write its design steps.                                                                                                                                                                                                                                                                                                         | U | 4 |      |
| b)         | Draw circuit diagram of Wien bridge oscillator using transistor & explain its working.                                                                                                                                                                                                                                                                                                                    | U | 5 |      |
| c)         | Design an astable multivibrator using IC555 for maximum output frequency of 5KHz with duty cycle $\leq 25\%$ .                                                                                                                                                                                                                                                                                            | A | 6 |      |
| d)         | Design a Wien bridge oscillator using opamp for output frequency of 975Hz.                                                                                                                                                                                                                                                                                                                                | A | 5 |      |
| e)         | Design monostable multivibrator using IC741 for pulse duration of 120msec with reference voltage of 5V. Use $\pm V_{CC} = \pm 15V$ .                                                                                                                                                                                                                                                                      | A | 6 |      |
| f)         | Design phase shift oscillator using opamp for maximum frequency of oscillation of 2KHz. Use supply voltage of $\pm 12V$ .                                                                                                                                                                                                                                                                                 | A | 5 |      |
| <b>Q.6</b> | Attempt any <b>TWO</b>                                                                                                                                                                                                                                                                                                                                                                                    |   |   | (16) |
| a)         | Design a Hartley oscillator using transistor for $f_0 = 5MHz$ , $V_{0(p)} = 4V_{rms}$ , $R_L = 2.2k\Omega$                                                                                                                                                                                                                                                                                                | A | 5 |      |
| b)         | Design a transformer coupled class A power amplifier to meet the following requirements. $P_0 = 2w$ , $R_L = 4\Omega$ , $V_{CC} = 12V$ .                                                                                                                                                                                                                                                                  | A | 4 |      |
| c)         | i) Draw circuit diagram of monostable multivibrator using IC555 & explain its working.<br>ii) Design monostable multivibrator using IC555 that operates with 15V supply & turns ON LED for duration of 10msec every time it receives a negative trigger pulse. The LED required 20mA of current & forward voltage drop of 1.4V. The high output of timer is $V_0 = (V_{CC} - 2V_{BE} - V_{CE(sat)})$ Volt | U | 6 |      |



## Appendix - 1

ECD

Datasheet

## Appendix - 2

Table 1 : Standard Resistance Values  $\pm 1\%$ ,  $\pm 5\%$ ,  $\pm 10\%$ 

| Ohms ( $\Omega$ ) |     |    |     | Kilohms (K $\Omega$ ) |    |     | Megohms (M $\Omega$ ) |    |
|-------------------|-----|----|-----|-----------------------|----|-----|-----------------------|----|
| 0.10              | 1.0 | 10 | 100 | 1.0                   | 10 | 100 | 1.0                   | 10 |
| 0.11              | 1.1 | 11 | 110 | 1.1                   | 11 | 110 | 1.1                   | 11 |
| 0.12              | 1.2 | 12 | 120 | 1.2                   | 12 | 120 | 1.2                   | 12 |
| 0.13              | 1.3 | 13 | 130 | 1.3                   | 13 | 130 | 1.3                   | 13 |
| 0.15              | 1.5 | 15 | 150 | 1.5                   | 15 | 150 | 1.5                   | 15 |
| 0.16              | 1.6 | 16 | 160 | 1.6                   | 16 | 160 | 1.6                   | 16 |
| 0.18              | 1.8 | 18 | 180 | 1.8                   | 18 | 180 | 1.8                   | 18 |
| 0.20              | 2.0 | 20 | 200 | 2.0                   | 20 | 200 | 2.0                   | 20 |
| 0.22              | 2.2 | 22 | 220 | 2.2                   | 22 | 220 | 2.2                   | 22 |
| 0.24              | 2.4 | 24 | 240 | 2.4                   | 24 | 240 | 2.4                   |    |
| 0.27              | 2.7 | 27 | 270 | 2.7                   | 27 | 270 | 2.7                   |    |
| 0.30              | 3.0 | 30 | 300 | 3.0                   | 30 | 300 | 3.0                   |    |
| 0.33              | 3.3 | 33 | 330 | 3.3                   | 33 | 330 | 3.3                   |    |
| 0.36              | 3.6 | 36 | 360 | 3.6                   | 36 | 360 | 3.6                   |    |
| 0.39              | 3.9 | 39 | 390 | 3.9                   | 39 | 390 | 3.9                   |    |
| 0.43              | 4.3 | 43 | 430 | 4.3                   | 43 | 430 | 4.3                   |    |
| 0.47              | 4.7 | 47 | 470 | 4.7                   | 47 | 470 | 4.7                   |    |
| 0.51              | 5.1 | 51 | 510 | 5.1                   | 51 | 510 | 5.1                   |    |
| 0.56              | 5.6 | 56 | 560 | 5.6                   | 56 | 560 | 5.6                   |    |
| 0.62              | 6.2 | 62 | 620 | 6.2                   | 62 | 620 | 6.2                   |    |
| 0.68              | 6.8 | 68 | 680 | 6.8                   | 68 | 680 | 6.8                   |    |
| 0.75              | 7.5 | 75 | 750 | 7.5                   | 75 | 750 | 7.5                   |    |
| 0.82              | 8.2 | 82 | 820 | 8.2                   | 82 | 820 | 8.2                   |    |
| 0.91              | 9.1 | 91 | 910 | 9.1                   | 91 | 910 | 9.1                   |    |

Table 2 : Standard Capacitor Values

| Pico Farad (pF $\rightarrow 10^{-12}$ ) |     |      | Micro Farad ( $\mu$ F $\rightarrow 10^{-6}$ ) |      |     |    |     |      |
|-----------------------------------------|-----|------|-----------------------------------------------|------|-----|----|-----|------|
| 10                                      | 100 | 1000 | 0.01                                          | 0.1  | 1.0 | 10 | 100 | 1000 |
| 12                                      | 120 | 1200 | -                                             | -    | -   | -  | -   | -    |
| 15                                      | 150 | 1500 | 0.015                                         | 0.15 | 1.5 | 18 | 180 | 1800 |
| 22                                      | 220 | 2200 | 0.022                                         | 0.22 | 2.2 | 22 | 220 | 2200 |
| 27                                      | 270 | 2700 | -                                             | -    | -   | -  | -   | -    |
| 33                                      | 330 | 3300 | 0.033                                         | 0.33 | 3.3 | 33 | 330 | 3300 |
| 39                                      | 390 | 3900 | -                                             | -    | -   | -  | -   | -    |
| 47                                      | 470 | 4700 | 0.047                                         | 0.47 | 4.7 | 47 | 470 | 4700 |
| 56                                      | 560 | 5600 | -                                             | -    | -   | -  | -   | -    |
| 68                                      | 680 | 6800 | 0.068                                         | 0.68 | 6.8 | -  | -   | -    |
| 82                                      | 820 | 8200 | -                                             | -    | -   | -  | -   | -    |

Table 3 : Rectifier Diode Specification Sheet

| Type No.                        | Material (S/G) | $V_R$ (PIV) (V) | $I_F$ (A) | $V_F$ (V)  | $I_R$ ( $\mu$ A) |
|---------------------------------|----------------|-----------------|-----------|------------|------------------|
| 1N 4001                         | S              | 50              | 1.0       | 1.1        | 5                |
| 1N 4002                         | S              | 100             | 1.0       | 1.1        | 5                |
| 1N 4003                         | S              | 200             | 1.0       | 1.1        | 5                |
| 1N 4004                         | S              | 400             | 1.0       | 1.1        | 5                |
| 1N 4005                         | S              | 600             | 1.0       | 1.1        | 5                |
| 1N 4006                         | S              | 800             | 1.0       | 1.1        | 5                |
| 1N 4007                         | S              | 1000            | 1.0       | 1.1        | 10               |
| 1N 4148                         | S              | 75              | 0.1       | 1.0        | 25 (nA)          |
| 1N 5060                         | S              | 400             | 2.5       | 1.25       | 0.2              |
| 1N 5061                         | S              | 600             | 2.5       | 1.25       | 0.2              |
| 1N 5062                         | S              | 800             | 2.5       | 1.25       | 0.2              |
| 1N 5391                         | S              | 50              | 1.5       | 1.4        | 250              |
| 1N 5393                         | S              | 200             | 1.5       | 1.4        | 250              |
| 1N 5397                         | S              | 600             | 1.5       | 1.4        | 250              |
| 1N 5399                         | S              | 1000            | 1.5       | 1.4        | 250              |
| 1N 5402                         | S              | 200             | 3.0       | 1.0        | 10               |
| 1N 5408                         | S              | 1000            | 3.0       | 1.0        | 5                |
| 1N 5409                         | S              | 200             | 2.5       | 1.25       | 0.2              |
| OA 47                           | G              | 25              | 0.05      | 0.6        | 30               |
| OA 85                           | G              | 115             | 0.05      | 0.1        | 4.5              |
| OA 90                           | G              | 30              | 0.008     | 0.1        | 2.4              |
| OA 95                           | G              | 115             | 0.05      | 0.1        | 4.5              |
| BA 100                          | G              | 60              | 0.09      | -          | -                |
| BA 102                          | G              | 20              | 0.09      | -          | -                |
| BY 100                          | S              | 1250            | 1.0       | 1.5        | 10               |
| BY 125                          | S              | 150             | 1.0       | -          | 10               |
| BY 126                          | S              | 650             | 1.0       | 1.5        | 10               |
| BY 127                          | S              | 1250            | 1.0       | 1.5        | 10               |
| DR 25                           | G              | 25              | 0.25      | -          | -                |
| Switching and Detector Diodes : |                |                 | (mA)      |            |                  |
| 1N 914                          | S              | 75              | 10        | -          | 5                |
| 1N 915                          | S              | 50              | 10        | -          | 5                |
| OA 70                           | G              | 22.5            | 50        | 0.1        | 30               |
| OA 72                           | G              | 45              | 10        | 0.2        | 0.3              |
| OA 73                           | G              | 30              | 50        | 0.1 - 0.2  | 18               |
| OA 79                           | G              | 45              | 35        | 0.15 - 0.3 | 0.1 - 2.8        |

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| Table 4: Zener Diode Specification Sheet                                                                                                                                           |                                                  |                                                        |                                                    |                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------|
| Type No.                                                                                                                                                                           | Zener Voltage<br>(V <sub>Z</sub> ) <sub>10</sub> | Zener Test Current<br>(I <sub>FT</sub> ) <sub>mA</sub> | Zener Impedance<br>(Z <sub>10</sub> ) <sub>Ω</sub> | Max. Zener Current<br>(I <sub>ZM</sub> ) <sub>mA</sub> |
| 1N4370                                                                                                                                                                             | 2.4                                              | 20                                                     | 30                                                 | 150                                                    |
| 1N4371                                                                                                                                                                             | 2.7                                              | 20                                                     | 30                                                 | 135                                                    |
| 1N4372                                                                                                                                                                             | 3.0                                              | 20                                                     | 29                                                 | 120                                                    |
| 1N746                                                                                                                                                                              | 3.3                                              | 20                                                     | 28                                                 | 110                                                    |
| 1N747                                                                                                                                                                              | 3.6                                              | 20                                                     | 24                                                 | 100                                                    |
| 1N748                                                                                                                                                                              | 3.9                                              | 20                                                     | 23                                                 | 95                                                     |
| 1N749                                                                                                                                                                              | 4.3                                              | 20                                                     | 22                                                 | 85                                                     |
| 1N750                                                                                                                                                                              | 4.7                                              | 20                                                     | 19                                                 | 75                                                     |
| 1N751                                                                                                                                                                              | 5.1                                              | 20                                                     | 17                                                 | 70                                                     |
| 1N752                                                                                                                                                                              | 5.6                                              | 20                                                     | 11                                                 | 65                                                     |
| 1N753                                                                                                                                                                              | 6.2                                              | 20                                                     | 7                                                  | 60                                                     |
| 1N754                                                                                                                                                                              | 6.8                                              | 20                                                     | 5                                                  | 55                                                     |
| 1N755                                                                                                                                                                              | 7.5                                              | 20                                                     | 6                                                  | 50                                                     |
| 1N756                                                                                                                                                                              | 8.2                                              | 20                                                     | 8                                                  | 45                                                     |
| 1N757                                                                                                                                                                              | 9.1                                              | 20                                                     | 10                                                 | 40                                                     |
| 1N758                                                                                                                                                                              | 10                                               | 20                                                     | 17                                                 | 35                                                     |
| 1N759                                                                                                                                                                              | 12                                               | 20                                                     | 30                                                 | 30                                                     |
| 1N957A                                                                                                                                                                             | 6.8                                              | 18.5                                                   | 4.5                                                | 47                                                     |
| 1N960A                                                                                                                                                                             | 9.1                                              | 14                                                     | 7.5                                                | 35                                                     |
| 1N962A                                                                                                                                                                             | 11                                               | 11.5                                                   | 9.5                                                | 28                                                     |
| 1N964A                                                                                                                                                                             | 13                                               | 9.5                                                    | 13                                                 | 24                                                     |
| 1N965A                                                                                                                                                                             | 15                                               | 8.5                                                    | 16                                                 | 21                                                     |
| 1N966A                                                                                                                                                                             | 16                                               | 7.8                                                    | 17                                                 | 19                                                     |
| 1N968A                                                                                                                                                                             | 20                                               | 6.2                                                    | 25                                                 | 15                                                     |
| 1N972A                                                                                                                                                                             | 30                                               | 4.2                                                    | 49                                                 | 10                                                     |
| 1N980A                                                                                                                                                                             | 62                                               | 2.0                                                    | 185                                                | 4.9                                                    |
| 1N983A                                                                                                                                                                             | 82                                               | 1.5                                                    | 330                                                | 3.7                                                    |
| 1N985A                                                                                                                                                                             | 100                                              | 1.3                                                    | 500                                                | 3.0                                                    |
| 1N3993                                                                                                                                                                             | 3.9                                              | 640                                                    | 2                                                  | 2360                                                   |
| 1N3994                                                                                                                                                                             | 4.3                                              | 580                                                    | 1.5                                                | 2130                                                   |
| 1N3995                                                                                                                                                                             | 4.7                                              | 530                                                    | 1.2                                                | 1940                                                   |
| 1N3996                                                                                                                                                                             | 5.1                                              | 490                                                    | 1.1                                                | 1780                                                   |
| 1N3997                                                                                                                                                                             | 5.6                                              | 445                                                    | 1.0                                                | 1620                                                   |
| 1N3998                                                                                                                                                                             | 6.2                                              | 405                                                    | 1.1                                                | 1460                                                   |
| 1N3999                                                                                                                                                                             | 6.8                                              | 370                                                    | 1.2                                                | 1330                                                   |
| 1N4000                                                                                                                                                                             | 7.5                                              | 355                                                    | 1.3                                                | 1210                                                   |
| 1N4370 series: ± 10 %<br>1N746 series: ± 10 %<br>1N795 series: ± 10 %<br>suffix A for ± 5 % units, C for ± 2 %, D for ± 1 %<br>suffix A for ± 10 % units, C for ± 2 %, D for ± 1 % |                                                  |                                                        |                                                    |                                                        |

| Table 5: Transistor Data Sheet |                   |                     |                     |                     |                     |                     |                          |                     |                 |                      |  |  |
|--------------------------------|-------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--------------------------|---------------------|-----------------|----------------------|--|--|
| Transistor No                  | Material and Type | V <sub>CE</sub> (V) | V <sub>CE</sub> (V) | V <sub>CE</sub> (V) | V <sub>CE</sub> (V) | V <sub>CE</sub> (V) | I <sub>C(max)</sub> (mA) | P <sub>T</sub> (mW) | h <sub>FE</sub> | f <sub>T</sub> (MHz) |  |  |
| AC105                          | PG                | 40                  | 18                  | 10                  | 10                  | 10                  | 1 A                      | 400                 | 15              | 0.5                  |  |  |
| AC126                          | PG                | 32                  | 12                  | 10                  | 10                  | 10                  | 100                      | 500                 | 75              | 1                    |  |  |
| AC127                          | NG                | 32                  | 12                  | 10                  | 10                  | 10                  | 500                      | 500                 | 100             | 1.5                  |  |  |
| AC128                          | PG                | 32                  | 16                  | 10                  | 10                  | 10                  | 1 A                      | 340                 | 50              |                      |  |  |
| AC130                          | NG                | 20                  | 16                  | 10                  | 10                  | 10                  | 1 A                      | 67                  | 45/165          |                      |  |  |
| AC131                          | PG                | 45                  | 32                  | 10                  | 10                  | 10                  | 100                      | 145                 | 50              |                      |  |  |
| AC153                          | PG                | 45                  | 32                  | 10                  | 10                  | 10                  | 1 A                      | 75                  | 40/120          |                      |  |  |
| AC163                          | PG                | 52                  | 32                  | 24                  | 10                  | 10                  | 2 A                      | 1 W                 | 80              |                      |  |  |
| AC166                          | PG                | 52                  | 32                  | 24                  | 10                  | 10                  | 200                      | 900                 | 50              |                      |  |  |
| BC107                          | NS                | 50                  | 45                  | 20                  | 6                   | 6                   | 800                      | 200                 | 110             |                      |  |  |
| BC108                          | NS                | 50                  | 20                  | 100                 | 5                   | 5                   | 100                      | 300                 | 120             |                      |  |  |
| BC109                          | NS                | 50                  | 20                  | 100                 | 5                   | 5                   | 100                      | 300                 | 180             |                      |  |  |
| BC115                          | NS                | 40                  | 30                  | 100                 | 5                   | 5                   | 300                      | 300                 | 80              |                      |  |  |
| BC116                          | PS                | 40                  | 30                  | 100                 | 5                   | 5                   | 300                      | 300                 | 80              |                      |  |  |
| BC119                          | NS                | 60                  | 40                  | 100                 | 5                   | 5                   | 1 A                      | 800                 | 40              |                      |  |  |
| BC126                          | PS                | 35                  | 30                  | 600                 | 5                   | 5                   | 1 A                      | 800                 | 40              |                      |  |  |
| BC138                          | NS                | 60                  | 40                  | 500                 | 5                   | 5                   | 1 A                      | 800                 | 40              |                      |  |  |
| BC139                          | PS                | 80                  | 60                  | 800                 | 5                   | 5                   | 1 A                      | 800                 | 40              |                      |  |  |
| BC142                          | NS                | 80                  | 60                  | 800                 | 5                   | 5                   | 1 A                      | 800                 | 40              |                      |  |  |
| BC146                          | NS                | 20                  | 20                  | 250                 | 6                   | 6                   | 50                       | 110/220             | 150             |                      |  |  |
| BC147A                         | NS                | 50                  | 45                  | 200                 | 6                   | 6                   | 250                      | 200/300             | 150             |                      |  |  |
| BC148                          | NS                | 30                  | 20                  | 200                 | 5                   | 5                   | 200                      | 90/150              | 120             |                      |  |  |
| BC151                          | PS                | 25                  | 20                  | 100                 | 5                   | 5                   | 300                      | 70                  | 50              |                      |  |  |
| BC158                          | PS                | 30                  | 25                  | 100                 | 5                   | 5                   | 300                      | 70                  | 50              |                      |  |  |
| BC161                          | PS                | 60                  | 45                  | 100                 | 5                   | 5                   | 3.2 W                    | 40                  | 50              |                      |  |  |
| BC177                          | PS                | 60                  | 45                  | 100                 | 5                   | 5                   | 300                      | 40                  | 50              |                      |  |  |
| BC178B                         | PG                | 30                  | 25                  | 200                 | 5                   | 5                   | 300                      | 180                 | 100             |                      |  |  |
| BC179A                         | PS                | 30                  | 25                  | 500                 | 5                   | 5                   | 300                      | 100                 | 100             |                      |  |  |
| BC180                          | NS                | 30                  | 25                  | 800                 | 5                   | 5                   | 100                      | 40/250              | 250             |                      |  |  |
| BC194                          | NS                | 40                  | 25                  | 150                 | 12                  | 12                  | 60                       | 165                 | 65              |                      |  |  |
| 2N109                          | PG                | 35                  | 25                  | 150                 | 12                  | 12                  | 60                       | 165                 | 65              |                      |  |  |
| 2N244                          | NS                | 60                  | 60                  | 150                 | 12                  | 12                  | 60                       | 165                 | 65              |                      |  |  |
| 2N271                          | PG                | 30                  | 10                  | 200                 | 20                  | 20                  | 150                      | 750                 | 50              |                      |  |  |
| 2N312                          | MG                | 15                  | 15                  | 200                 | 15                  | 15                  | 150                      | 400                 | 50              |                      |  |  |
| 2N329B                         | PS                | 50                  | 30                  | 400                 | 20                  | 20                  | 150                      | 36/88               | 18/86           |                      |  |  |
| 2N344                          | NS                | 45                  | 30                  | 500                 | 25                  | 25                  | 500                      | 36/120              | 30/120          |                      |  |  |
| 2N914                          | NS                | 40                  | 30                  | 500                 | 30                  | 30                  | 360                      | 30/120              | 30/120          |                      |  |  |

| Transistor No | Material and Type | V <sub>CB</sub> (V) | V <sub>CE</sub> (V) | V <sub>EB</sub> (V) | I <sub>C(max)</sub> (mA) | PT (mW) | h <sub>FE</sub> | f <sub>T</sub> (MHz) |
|---------------|-------------------|---------------------|---------------------|---------------------|--------------------------|---------|-----------------|----------------------|
| 2N918         | NS                | 30                  | 15                  | 3                   | 50                       | 200     | 20              | 600                  |
| 2N930         | NS                | 45                  | 45                  | 5                   | 30                       | 300     | 100             | 30                   |
| 2N941         | PS                | 25                  | 8                   | 25                  | 50                       | 250     | 10              | 16                   |
| 2N1711        | NS                | 75                  | 50                  | 7                   | 600                      | 800     | 100             | 70                   |
| 2N1779        | NG                | 25                  | -                   | 15                  | 200                      | 100     | 20/60           | 3                    |
| 2N1893        | NS                | 120                 | 80                  | 7                   | 500                      | 800     | 40/120          | 50                   |
| 2N2219        | NS                | 60                  | 30                  | 5                   | 800                      | 800     | 100             | 250                  |
| 2N2396        | NS                | 60                  | 40                  | 5                   | 300                      | 450     | 40/120          | 40                   |
| 2N2903        | NS                | 60                  | 30                  | 7                   | 50                       | 300     | 125             | 60                   |
| 2N2905        | PS                | 60                  | 40                  | 5                   | 600                      | 600     | 100             | 200                  |
| 2N2909        | NS                | 60                  | 40                  | -                   | 1A                       | 400     | 40/120          | 50                   |
| 2N2927        | PS                | 25                  | 25                  | 4                   | 500                      | 400     | 30/130          | 100                  |
| 2N2997        | PG                | 30                  | 15                  | 0.3                 | 50                       | 75      | 40/500          | 400                  |
| 2N2976        | NS                | 45                  | 45                  | 60                  | 30                       | 250     | 60/240          | 60                   |
| 2N3015        | NS                | 60                  | 30                  | 5                   | 500                      | 800     | 30/120          | 30                   |
| 2N3903        | NS                | 60                  | 40                  | 6                   | 200                      | 300     | 50/150          | 250                  |
| 2N3905        | PS                | 40                  | 40                  | 5                   | 200                      | 300     | 50/150          | 200                  |
| 2N5837        | NS                | 10                  | 5                   | 3.5                 | 300                      | 2 W     | 25              | 1700                 |
| 2N5843        | PS                | 50                  | 40                  | 5                   | 50                       | 600     | 50/150          | 200                  |
| 2N5855        | PS                | 60                  | 60                  | 5                   | 1A                       | 750     | 50/300          | 15                   |
| 2N5856        | NS                | 60                  | 60                  | 5                   | 1A                       | 750     | 50/300          | 200                  |

## High frequency Transistors

|        |    |     |     |     |     |     |        |     |
|--------|----|-----|-----|-----|-----|-----|--------|-----|
| AF115  | PG | 32  | 15  | 2   | 10  | 75  | 50     | 75  |
| AF116  | PG | 32  | 15  | 2   | 10  | 75  | 50     | 75  |
| AF121  | PG | 25  | 25  | -   | 10  | 140 | 30     | 270 |
| AF181  | PG | 30  | 30  | -   | 20  | 155 | 20     | 105 |
| AF187  | PG | 18  | -   | 12  | 100 | 185 | 25     | 3   |
| AF194  | PG | 20  | -   | 0.5 | 10  | 80  | 60     | 50  |
| AF200  | PG | 25  | -   | 0.3 | 10  | 225 | 30     | 100 |
| AF202  | PG | 25  | -   | 0   | 30  | 225 | 20     | 100 |
| AF239S | PG | 15  | 15  | 0.3 | 10  | 60  | 10     | 450 |
| BF137  | NS | 160 | 160 | 5   | 100 | 600 | 25     | 50  |
| BF154  | NS | 30  | 20  | 4   | 50  | 300 | 25     | 200 |
| BF160  | NS | 30  | 12  | 2   | 50  | 200 | 20     | 400 |
| BF179B | NS | 220 | 115 | 5   | 50  | 600 | 20     | 60  |
| BF183  | NS | 25  | 20  | 3   | 15  | 150 | 10     | 400 |
| BF194  | NS | 30  | 20  | 5   | 30  | 250 | 67/220 | 130 |
| BF195  | NS | 30  | 20  | 5   | 30  | 250 | 56/125 | 100 |
| SF104  | PS | 20  | 18  | 4   | 50  | 250 | 50/250 | 250 |
| BF248  | NS | 30  | 25  | 3   | 600 | 400 | 30/300 | 180 |
| BF249  | PS | 30  | 25  | 3   | 600 | 400 | 30/300 | 180 |
| BF315  | PS | 20  | 20  | 4   | 100 | 360 | 60     | 300 |

| Transistor No     | Material and Type | V <sub>CB</sub> (V) | V <sub>CE</sub> (V) | V <sub>EB</sub> (V) | I <sub>C(max)</sub> (A) | PT (W) | h <sub>FE</sub> | f <sub>T</sub> (MHz) |
|-------------------|-------------------|---------------------|---------------------|---------------------|-------------------------|--------|-----------------|----------------------|
| Power transistors |                   |                     |                     |                     |                         |        |                 |                      |
| AD136/4           | PG                | 40                  | 30                  | 10                  | 10                      | 11     | 30              | 0.3                  |
| AD140             | PG                | 55                  | 55                  | -                   | 3                       | 35     | 30              | 0.2                  |
| AD143-5           | PG                | 45                  | 35                  | 10                  | 10                      | 30     | 50/110          | 0.45                 |
| AD156V            | PG                | 32                  | 16                  | 10                  | 2                       | 8      | 50/100          | 1                    |
| AD157V            | NG                | 32                  | 16                  | 10                  | 2                       | 8      | 50/100          | 1                    |
| AD161             | NG                | 32                  | 20                  | 10                  | 1                       | 4      | 80              | 1                    |
| AB162             | PG                | 32                  | 20                  | 10                  | 1                       | 6      | 50              | 1                    |
| AD165             | NG                | 25                  | 20                  | 10                  | 1                       | 5      | 60              | 0.5                  |
| AD262             | PG                | 35                  | 20                  | 10                  | 4                       | 10     | 30              | 0.45                 |
| ADY12             | PG                | 60                  | 45                  | 10                  | 0.6                     | 0.25   | 60/100          | 0.35                 |
| BD115             | NS                | 245                 | 180                 | 5                   | 0.15                    | 6      | 22              | 80                   |
| BD124             | NS                | 70                  | 45                  | -                   | 2                       | 15     | 35              | 60                   |
| BD131             | NS                | 70                  | 45                  | 6                   | 3                       | 11     | 40              | 60                   |
| BD132             | PS                | 45                  | 45                  | 4                   | 3                       | 11     | 40              | 60                   |
| BD135             | NS                | 45                  | 45                  | 5                   | 1                       | 12     | 40/250          | 50                   |
| BD136             | PS                | 45                  | 45                  | 5                   | 1                       | 12     | 40/250          | 50                   |
| BD137             | NS                | 60                  | 60                  | 5                   | 1                       | 12     | 40/160          | 50                   |
| BD138             | PS                | 60                  | 60                  | 5                   | 1                       | 12     | 40/180          | 50                   |
| BD141             | NS                | 140                 | 120                 | 7                   | 8                       | 117    | 20/70           | -                    |
| BD145             | NS                | 60                  | 60                  | 5                   | 5                       | 15     | 45              | 50                   |
| BD151             | PS                | 35                  | 30                  | 5                   | 3                       | 25     | 30/150          | -                    |
| BD152             | NS                | 50                  | 45                  | 5                   | 3                       | 25     | 30/150          | -                    |
| BD165             | NS                | 45                  | 45                  | 5                   | 1.5                     | 25     | 40              | 3                    |
| BD166             | PS                | 45                  | 45                  | 5                   | 1.5                     | 20     | 40              | 3                    |
| BD181             | NS                | 55                  | 40                  | 7                   | 10                      | 23     | 20/78           | -                    |
| BD182             | NS                | 70                  | 60                  | 7                   | 15                      | 117    | 20/70           | -                    |
| BD187             | NS                | 55                  | 45                  | 5                   | 4                       | 40     | 40              | 2                    |
| BD188             | PS                | 55                  | 45                  | 5                   | 4                       | 40     | 40              | 2                    |
| BD232             | NS                | 55                  | 500                 | 5                   | 0.25                    | 11     | 25/150          | 20                   |
| SL100             | NS                | 60                  | 50                  | 6                   | 0.5                     | 4      | 40/300          | -                    |
| SK100             | PS                | 60                  | 50                  | 6                   | 0.5                     | 4      | 40/300          | -                    |
| SL102             | NS                | 30                  | 30                  | 3.5                 | 1                       | 3      | 50/280          | -                    |
| SK102             | PS                | 30                  | 30                  | 3.5                 | 1                       | 3      | 50/280          | -                    |
| TIP29C            | NS                | 100                 | 100                 | 5                   | 1                       | 30     | 40/200          | 3                    |
| TIP30C            | PS                | 100                 | 100                 | 5                   | 1                       | 30     | 40/200          | 3                    |
| TIP31             | NS                | 40                  | 40                  | 5                   | 3                       | 40     | 20/100          | 3                    |
| TIP32             | PS                | 40                  | 40                  | 5                   | 3                       | 40     | 20/100          | 3                    |
| TIP33             | NS                | 40                  | 40                  | 5                   | 10                      | 80     | 20              | 3                    |
| TIP34             | PS                | 40                  | 40                  | 5                   | 10                      | 80     | 20              | 3                    |
| TIP41             | NS                | 40                  | 40                  | 5                   | 6                       | 2      | 15/75           | 3                    |
| TIP42             | PS                | 40                  | 40                  | 5                   | 6                       | 2      | 15/75           | 3                    |

Table 6: Field Effect Transistors

| Transistor | No. and Type | Material | $V_{GS}$ (V) | $V_{DS}$ (V) | $V_{GS}$ (V) | $V_{DS}$ (V) | $I_{DSS}$ (mA) | $I_{DSS}$ (mA) | $P_D$ (W) | $f_{max}$ (MHz) |
|------------|--------------|----------|--------------|--------------|--------------|--------------|----------------|----------------|-----------|-----------------|
| TIP62      | PS           | PS       | 40           | 40           | 5            | 5            | 2              | 40             | 15/100    | 3               |
| TIP120     | NS           | PS       | 60           | 60           | 5            | 5            | 5              | 60             | 1000      |                 |
| TIP125     | PS           | PS       | 60           | 60           | 5            | 5            | 5              | 60             | 1000      |                 |
| TIS45      | NS           | NS       | 40           | 40           | 5            | 5            | 5              | 60             | 1000      |                 |
| 2N1481     | NS           | NS       | 60           | 60           | 5            | 5            | 5              | 60             | 1000      |                 |
| 2N1721     | NS           | NS       | 150          | 150          | 100          | 100          | 1              | 35/100         | 300       |                 |
| 2N1722     | NS           | NS       | 120          | 120          | 80           | 80           | 7.5            | 40/120         | 16        |                 |
| 2N2067     | PG           | NS       | 40           | 25           | 20           | 20           | 3              | 20/90          | 10        |                 |
| 2N2033     | NS           | NS       | 80           | 80           | 60           | 60           | 5              | 20/60          | 80        |                 |
| 2N2017     | NS           | NS       | 60           | 60           | 60           | 60           | 1              | 50/200         | 1         |                 |
| 2N3053A    | NS           | NS       | 80           | 80           | 60           | 60           | 1              | 50/200         | 1         |                 |
| 2N3055     | NS           | NS       | 100          | 100          | 60           | 60           | 15             | 50             | 100       |                 |
| 2N3140     | NS           | NS       | 140          | 140          | 140          | 140          | 2              | 20/70          | 0.2       |                 |
| 2N3180     | PS           | PS       | 60           | 60           | 60           | 60           | 5              | 25             | 10        |                 |
| 2N3878     | NS           | NS       | 50           | 50           | 4            | 4            | 0.7            | 10/30          | 1         |                 |
| ECN100     | NS           | NS       | 60           | 60           | 5            | 5            | 5              | 85             | 10        |                 |
| ECN149     | NS           | NS       | 40           | 40           | 4            | 4            | 4              | 30             | 10        |                 |
| ECF149     | PS           | PS       | 50           | 50           | 6            | 6            | 4              | 30             | 10        |                 |

Table 7: Uni Junction Transistor

| Types  | Channel | $V_{DS}$ (V) | $I_G$ (mA) | $I_{GSS}$ (mA) | $V_{GS}$ (V) | $V_{GS}$ (V) | $V_{GS}$ (V) | $V_{GS}$ (V) | $V_{GS}$ (V) | $V_{GS}$ (V) |
|--------|---------|--------------|------------|----------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 2N3821 | NCH     | 50           | 10         | 0.1            | 2            | 2.5          | 1.5-4.5      | 10           | 0.8          | 0.3          |
| 2N3822 | "       | 50           | 10         | 0.1            | 6            | 2.1          | 3-6.5        | 20           | 0.3          | 0.3          |
| 2N4091 | "       | 40           | 10         | 0.2            | 5-10         | 30           | 2.5          | 20           | 0.3          | 0.3          |
| 2N4221 | "       | 30           | 15         | -0.1           | -6           | -            | 2.5          | 20           | 0.3          | 0.3          |
| 2N4422 | "       | 30           | 15         | -0.1           | -6           | -            | 2.5          | 20           | 0.3          | 0.3          |
| 2N4416 | "       | 30           | 10         | 0.1            | 6            | -            | 2.5-6        | 40           | 0.3          | 0.3          |
| 2N4856 | "       | 40           | 10         | -0.25          | -4-10        | 50           | 4.5-7.5      | 50           | 0.3          | 0.3          |
| 2N5457 | "       | 25           | 10         | -1.0           | -6           | 3            | 3000         | 10-50        | 0.3          | 0.3          |
| 2N5458 | "       | 25           | 10         | -1             | -7           | 6-9          | 4000         | 10-50        | 0.3          | 0.3          |
| BFV10  | "       | 15           | 15         | 0.1            | 8            | 820          | 3.2 mA/V     | 50           | 0.3          | 0.3          |
| BFV11  | "       | 15           | 15         | 0.1            | 6            | 810          | 3.2 mA/V     | 50           | 0.3          | 0.3          |

| Type   | $I_A$ (A) | $\eta$    | $I_F$ (mA) | $I_F$ (mA) | $V_{BE}$ (V) | $P_D$ (W) | $R_{th}$ (K $^{\circ}$ C) |
|--------|-----------|-----------|------------|------------|--------------|-----------|---------------------------|
| 2N2646 | 2         | 0.56-0.78 | 1.5        | 6          | 3.5          | 0.3       | 4.7-9.1                   |
| 2N3980 | 1.5       | 0.68-0.82 | 2          | 1-10       | 3            | 0.36      | 4-8                       |
| 2N4851 | 1.5       | 0.56-0.75 | 2          | 2          | 2.5          | 0.3       | 4-12                      |
| 2N4948 | 1         | 0.55-0.82 | 0.6        | 4          | 2.5          | 0.36      | 4-12                      |

78XX Voltage Regulator Datasheet

| Device type | Output Voltage (V) | Max. Input |
|-------------|--------------------|------------|
| 7802        | -2                 | -35        |
| 7905        | -5                 | -35        |
| 7905.2      | -5.2               | -35        |
| 7906        | -6                 | -35        |
| 7908        | -8                 | -35        |
| 7912        | -12                | -35        |
| 7915        | -15                | -35        |
| 7918        | -18                | -35        |
| 7924        | -24                | -40        |

79XX Voltage Regulator Datasheet

| Device type | Output Voltage (V) | Output Current (mA) | Quiescent Current (mA) | Load Regulation (mV) | Line Regulation (mV) | Temp. Coeff. (mV/°C) |
|-------------|--------------------|---------------------|------------------------|----------------------|----------------------|----------------------|
| 78XXC       | 5                  | 1A                  | 8                      | 25                   | 50                   | 80                   |
| 78XXC       | 12                 | 1A                  | 8                      | 60                   | 120                  | 72                   |
| 78XXC       | 15                 | 1A                  | 8                      | 75                   | 150                  | 70                   |
| 78LXXAC     | 5                  | 100mA               | 3 to 5                 | 10                   | 5                    | 62                   |
| 78LXXC      | 12                 | 100mA               | 3 to 5                 | 20                   | 10                   | 54                   |
| 78LXXC      | 15                 | 100mA               | 3 to 5                 | 25                   | 12                   | 51                   |
| 78LXXC      | 5                  | 100mA               | 3 to 6                 | 10                   | 5                    | 60                   |
| 78LXXC      | 12                 | 100mA               | 3 to 6.5               | 20                   | 10                   | 52                   |
| 78MXX       | 5                  | 0.5A                | 4 to 10                | 50                   | 100                  | 78                   |
| 78MXX       | 12                 | 0.5A                | 4 to 10                | 120                  | 240                  | 71                   |
| 78MXX       | 15                 | 0.5A                | 4 to 10                | 150                  | 300                  | 69                   |



**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

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**ODD TERM END EXAM NOV/DEC -2018****EXAM SEAT NO.**

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**LEVEL: FIRST****PROGRAM: EE/IE/E&TC/IT****COURSE CODE: CCF102/CCCE102****COURSE NAME: ENGINEERING PHYSICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 14/12/2018****Instruction:-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) **QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome**

| <b>S</b>     | <b>Q</b> | <b>Question Text</b>                                                                                           | <b>R</b> | <b>CO</b>  | <b>Mar</b>  |
|--------------|----------|----------------------------------------------------------------------------------------------------------------|----------|------------|-------------|
| <b>QN</b>    | <b>N</b> |                                                                                                                | <b>U</b> | <b>CCF</b> | <b>ks</b>   |
| <b>Q.1</b>   |          | Attempt any <b>FOUR</b>                                                                                        | <b>A</b> | <b>102</b> | <b>(08)</b> |
|              | a)       | Define stress and state its types.                                                                             | <b>R</b> | <b>1</b>   |             |
|              | b)       | Define compressibility of liquid and write its unit.                                                           | <b>R</b> | <b>1</b>   |             |
|              | c)       | Derive relation between SI and CGS units of coefficient of viscosity of liquid.                                | <b>A</b> | <b>1</b>   |             |
|              | d)       | State effect of impurity and temperature on surface tension of liquid.                                         | <b>U</b> | <b>1</b>   |             |
|              | e)       | Differentiate between free and forced oscillations(any two points)                                             | <b>U</b> | <b>2</b>   |             |
|              | f)       | State any two applications of nanotechnology in textile.                                                       | <b>R</b> | <b>3</b>   |             |
| <b>Q.2</b>   |          | Attempt any <b>FOUR</b>                                                                                        |          |            | <b>(16)</b> |
|              | a)       | State Hook's law. Define Young's modulus, Bulk modulus and modulus of rigidity.                                | <b>R</b> | <b>1</b>   |             |
|              | b)       | Write any four applications of viscosity.                                                                      | <b>R</b> | <b>1</b>   |             |
|              | c)       | Explain significance of angle of contact.                                                                      | <b>U</b> | <b>1</b>   |             |
|              | d)       | Derive an expression for surface tension by capillary rise method.                                             | <b>A</b> | <b>1</b>   |             |
|              | e)       | State any four characteristics of linear SHM.                                                                  | <b>R</b> | <b>2</b>   |             |
|              | f)       | Define the following terms<br>i) Nanometer<br>ii) Nanoscale<br>iii) Nanoparticle<br>iv) Nanostructure material | <b>R</b> | <b>3</b>   |             |
| <b>Q.3</b>   |          | Attempt any <b>FOUR</b>                                                                                        |          |            | <b>(16)</b> |
|              | a)       | Define following terms i) Viscosity ii) Viscous force iii) Velocity gradient iv) Coefficient of viscosity.     | <b>R</b> | <b>1</b>   |             |
| <b>P.T.O</b> |          |                                                                                                                |          |            |             |



|            |    |                                                                                                                                                                                                                                        |   |   |             |
|------------|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------------|
|            | b) | With a neat diagram, explain molecular theory of surface tension.                                                                                                                                                                      | U | 1 |             |
|            | c) | Differentiate between transverse wave and longitudinal wave (any four points)                                                                                                                                                          | U | 2 |             |
|            | d) | State any four applications of resonance.                                                                                                                                                                                              | R | 2 |             |
|            | e) | A wire of length 1 meter extends by 2 mm when stretched by a load of 4kg. Find the area of cross-section of wire if $Y=2 \times 10^{11} \text{ N/m}^2$                                                                                 | A | 1 |             |
|            | f) | State any four applications of nanotechnology in the field of automobile.                                                                                                                                                              | R | 3 |             |
| <b>Q.4</b> |    | Attempt any <b>FOUR</b>                                                                                                                                                                                                                |   |   | <b>(08)</b> |
|            | a) | The refractive index of a glass prism with respect to air is 1.51 and velocity of light in air is $3 \times 10^8 \text{ m/s}$ . Calculate velocity of light in glass.                                                                  | A | 4 |             |
|            | b) | State Ohm's law.                                                                                                                                                                                                                       | R | 4 |             |
|            | c) | State Plank's hypothesis.                                                                                                                                                                                                              | R | 5 |             |
|            | d) | Write the principle of production of x-rays.                                                                                                                                                                                           | R | 5 |             |
|            | e) | State any two applications of LASER.                                                                                                                                                                                                   | R | 5 |             |
|            | f) | State two advantages of optical fiber over conventional metal conductors.                                                                                                                                                              | U | 6 |             |
| <b>Q.5</b> |    | Attempt any <b>FOUR</b>                                                                                                                                                                                                                |   |   | <b>(16)</b> |
|            | a) | Define refraction of light. State Snell's law of refraction.                                                                                                                                                                           | R | 4 |             |
|            | b) | Four resistances in the Whetstone's network are $20\Omega$ , $30\Omega$ , $15\Omega$ , and $R_4 \Omega$ respectively in cyclic order. Calculate the value of $R_4$ to get null deflection in the galvanometer (To balance the network) | A | 4 |             |
|            | c) | Derive the expression for equivalent resistance, when three resistances are connected in series.                                                                                                                                       | A | 4 |             |
|            | d) | State principle of photoelectric cell & explain its construction.                                                                                                                                                                      | U | 5 |             |
|            | e) | Explain population inversion with the help of diagram.                                                                                                                                                                                 | U | 5 |             |
|            | f) | State four applications of optical fiber.                                                                                                                                                                                              | R | 6 |             |
| <b>Q.6</b> |    | Attempt any <b>FOUR</b>                                                                                                                                                                                                                |   |   | <b>(16)</b> |
|            | a) | State any four applications of photoelectric effect.                                                                                                                                                                                   | R | 5 |             |
|            | b) | With neat labelled diagram explain production of x-rays by Coolidge x-ray tube.                                                                                                                                                        | U | 5 |             |
|            | c) | i) Define dispersion of light.<br>ii) Define specific resistance with S.I unit.                                                                                                                                                        | R | 4 |             |
|            | d) | State and explain properties of LASER.                                                                                                                                                                                                 | U | 5 |             |
|            | e) | i) An accelerated electron emits a quantum of radiation with frequency $8 \times 10^8$ cycles per second. Calculate energy of electron ( $h=6.625 \times 10^{-34} \text{ Js}$ )<br>ii) Draw the structure of optical fiber.            | A | 5 |             |
|            | f) | Explain total internal reflection phenomenon.                                                                                                                                                                                          | R | 6 |             |
|            |    |                                                                                                                                                                                                                                        | U | 6 |             |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**  
(An Autonomous Institute of Govt. of Maharashtra)  
**ODD TERM END EXAM NOV/DEC -2018**

**EXAM SEAT NO.**

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**LEVEL: FIRST**

**PROGRAM: COMMON**

**COURSE CODE: CCF110/CCE110/X111/R112 COURSE NAME: APPLIED MECHANICS**

**MAX. MARKS: 80**

**TIME: 3 HRS.**

**DATE: 15/12/2018**

**Instruction:-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.

7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application **CO**>Course outcome

| QN         | S  | Q | N | Question Text                                                                                                                                                                                                                                                                   | R | CO | CCF | Marks |
|------------|----|---|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----|-----|-------|
|            |    |   |   | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                         |   |    | 110 | (08)  |
|            | a) |   |   | Differentiate between mass & weight.                                                                                                                                                                                                                                            | U | 1  |     |       |
|            | b) |   |   | State the principle of transmissibility of force.                                                                                                                                                                                                                               | R | 1  |     |       |
|            | c) |   |   | State the Varignon's theorem of moments & its use.                                                                                                                                                                                                                              | R | 2  |     |       |
|            | d) |   |   | State Lami's theorem & Draw a sketch to explain it with mathematical expression.                                                                                                                                                                                                | R | 2  |     |       |
|            | e) |   |   | State graphical conditions of equilibrium of force system.                                                                                                                                                                                                                      | R | 2  |     |       |
|            | f) |   |   | Define coefficient of friction.                                                                                                                                                                                                                                                 | R | 2  |     |       |
| <b>Q.2</b> |    |   |   | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                         |   |    |     | (16)  |
|            | a) |   |   | A man of mass 50 kg is standing on a roof having an inclination of $25^\circ$ to the horizontal. Determine the components of his weight along the roof & normal to the roof.                                                                                                    | A | 2  |     |       |
|            | b) |   |   | Determine the angle between two equal forces 'p' if their resultant is also equal to p.                                                                                                                                                                                         | U | 2  |     |       |
|            | c) |   |   | Six forces are acting along the lines joining toward the centre of a hexagon. Determine the equilibrant force which keep this hexagon in equilibrium. Refer fig.no.1.                                                                                                           | A | 2  |     |       |
|            | d) |   |   | A thread of load carrying capacity 102.2N. is used to hold a sphere of weight 100N, against a smooth, wall, radius of sphere is 100 mm & length of the thread is 200 mm. But it is found that thread fails By calculation find why thread fail. Refer fig.No.3.                 | U | 2  |     |       |
|            | e) |   |   | ABCD is weightless rod under the action of four forces as shown in figure no.2. Calculate the resultant & locate the position of resultant with respect to point 'A'. Use graphical method.                                                                                     | U | 3  |     |       |
|            | f) |   |   | A body of weight 400N is placed on an inclined plane at an angle $15^\circ$ to the horizontal. If the coefficient of friction is 0.14. Find the value of force to be applied parallel to the plane to just to move the body up the plane.                                       | A | 2  |     |       |
| <b>Q.3</b> |    |   |   | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                         |   |    |     | (16)  |
|            | a) |   |   | A concurrent force system is as shown in figure no.4. Determine resultant of the given force system & also position from horizontal axis. Use graphical method.                                                                                                                 | U | 3  |     |       |
|            | b) |   |   | A beam ABC is hinged at A & placed on roller at B. The distance between two support AB is 5m & the overhang BC is 1 m. The beam carries a u.d.l of 2 KN/m over its entire length ABC & a point load of 5 KN is acting at C. Calculate support reaction using analytical method. |   |    |     |       |

**P.T.O**

|            |                                                                                                                                                                                                                                                                                                                |        |        |             |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|-------------|
| c)         | A simply supported beam of span 4 m is loaded with an u.d.l of 5 KN/m for 2 m from left end support & a point load of 30KN at 1 m from right end. Determine support reactions using graphical method.                                                                                                          | A      | 2      |             |
| d)         | A wooden block is resting on a rough inclined plane whose inclination to the horizontal plane is $10^\circ$ . The push force 2 N is acting parallel to the inclined plane. The block is just moving down the plane. If coefficient of friction between block & plane is 0.32 estimate the weight of the block. | A      | 2      |             |
| e)         | A loader of weight 800 N of length 4.5 m is rest against a smooth wall & rough floor. The coefficient of friction between loader & floor is 0.33 will loader stand in $60^\circ$ positions with respect to the floor.                                                                                          | A      | 2      |             |
| f)         | i) Explain polygon law of forces with a neat sketch<br>ii) Calculate coefficient of friction if angle of repose is $30^\circ$                                                                                                                                                                                  | A<br>A | 3<br>2 |             |
| <b>Q.4</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                        |        |        | <b>(08)</b> |
| a)         | State the centroid of semicircle of radius R.                                                                                                                                                                                                                                                                  | R      | 4      |             |
| b)         | Define centroid and center of gravity.                                                                                                                                                                                                                                                                         | R      | 4      |             |
| c)         | State Newton's first law of motion.                                                                                                                                                                                                                                                                            | R      | 5      |             |
| d)         | State the equation of rectilinear motion & meaning of each.                                                                                                                                                                                                                                                    | R      | 5      |             |
| e)         | Calculate angular velocity of a shaft rotating at 130 rpm.                                                                                                                                                                                                                                                     | A      | 5      |             |
| f)         | State the law of conservation of energy.                                                                                                                                                                                                                                                                       | R      | 5      |             |
| <b>Q.5</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                        |        |        | <b>(10)</b> |
| a)         | Determine the centroid of T-section with respect to bottom having flange 120 x 10 mm and web 20 x 150 mm.                                                                                                                                                                                                      | A      | 4      |             |
| b)         | Locate center of gravity of frustum of solid circular cone as shown in fig. Refer fig.no.5. w.r.t to bottom.                                                                                                                                                                                                   | A      | 4      |             |
| c)         | A body starts from rest with a constant acceleration of $0.5 \text{ m/s}^2$ after what time its velocity be 2.5 m/s & How much distance it will be travelled during this time?                                                                                                                                 | A      | 5      |             |
| d)         | A body falling freely under gravity passes two points 9 m apart vertically in 0.2 sec. Find from what height above the upper point did it start to fall?                                                                                                                                                       | A      | 5      |             |
| e)         | The shaft of motor rotates at 1000 rpm at a particular instant in 10 sec. The speed uniformly decreases to 400 rpm. Find angular retardation.                                                                                                                                                                  | A      | 5      |             |
| f)         | A wheel 800 mm diameter starts from rest and accelerates uniformly. After 24 sec, it attains angular velocity of 120 rad/sec. Find the angular acceleration and total angle turned trough.                                                                                                                     | A      | 5      |             |
| <b>Q.6</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                        |        |        | <b>(16)</b> |
| a)         | How many litres of water can be lifted in 20 min to a height of 30 m by means of a pump of 100 KW?                                                                                                                                                                                                             | A      | 5      |             |
| b)         | A bollet weighing 3 N leaves the barrel of a ripple with muzzle velocity of 1000 m/s. If the length barrel in 800 mm, Find the impulse and impulsive force.                                                                                                                                                    | A      | 5      |             |
| c)         | Draw the nature of following graphs for a lifting machine.<br>i) Load vs Effort ii) Load vs Ideal effort iii) Load vs Mechanical Advantages iv) Load vs Effort lost in friction                                                                                                                                | U      | 6      |             |
| d)         | Calculate efficiency of a machine to lift a load of 1000 N, if the velocity ratio of the machine is 25 and law of machine is $p = (0.01W + 5) \text{ N}$ .                                                                                                                                                     | A      | 6      |             |
| e)         | Calculate the effort required to lift a load of 3 KN. If the machine can lift a load of 1 KN by an effort of 56 N. and 2 KN load by an effort of 96 N.                                                                                                                                                         | A      | 6      |             |
| f)         | In a differential axle & wheel, the diameter of effort wheel is 400 mm and the diameter of bigger axle is 100 mm and smaller axle is 80 mm. If an effort of 50 N can lift a load of 1500 N, find velocity ratio and efficiency of the machine.                                                                 | A      | 6      |             |

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Figure No. 1

Q.2) c)

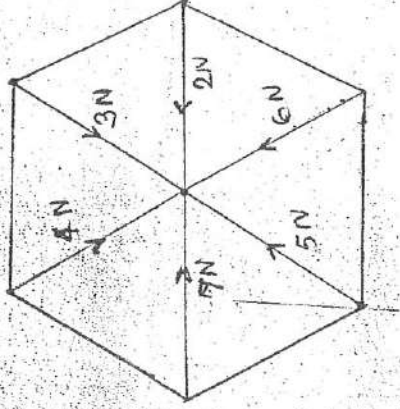


Figure No. 2

Q.2) e)

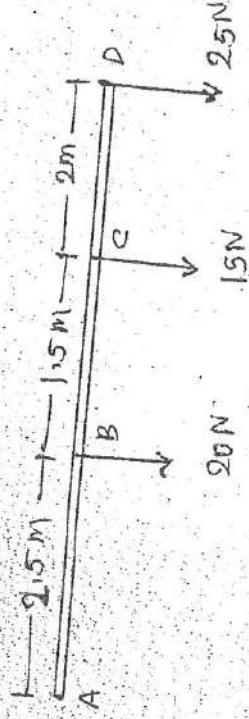


Fig No. 3

Q.2) d)

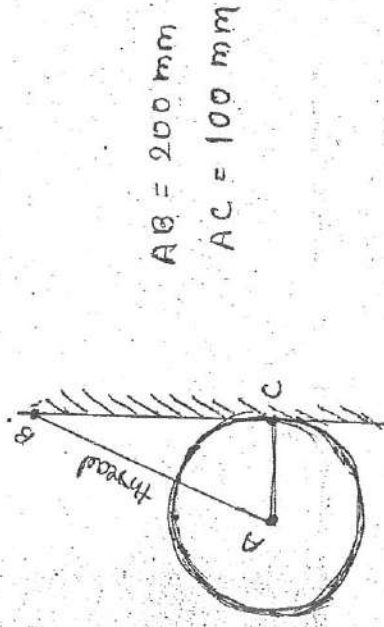
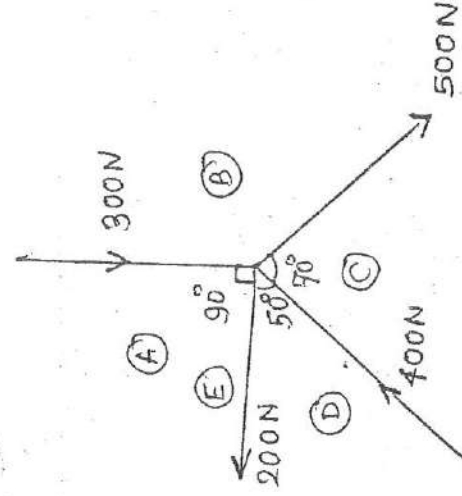


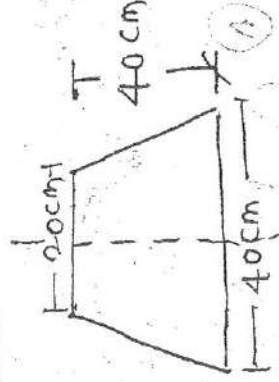
Fig No. 4

Q.8) a)



Refer Bow's notations given in figure.

Fig. No. 5  
Q.5 (b)







# GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

## ODD TERM END EXAM NOV/DEC -2018

EXAM SEAT NO.

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LEVEL: THRID

COURSE CODE: IX307

MAX. MARKS: 80

PROGRAM: INDUSTRIAL ENGINEERING

COURSE NAME: INDUSTRIAL DRIVES

TIME: 3 HRS.

DATE: 04/12/2018

Instruction:-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

| Section – I |                         | Marks       |
|-------------|-------------------------|-------------|
| <b>Q.1</b>  | Attempt any <b>FOUR</b> | <b>(08)</b> |

- a) Give requirements of adjustable speed drive.
- b) State any four advantages of electric drive.
- c) Draw neat circuit diagram of controlled rectifier fed AC motor.
- d) Give advantages of converter fed IM over line fed.
- e) Enlist the factors considered for selection of drives.
- f) Draw the load torque characteristics of DC shunt motor.

|            |                         |             |
|------------|-------------------------|-------------|
| <b>Q.2</b> | Attempt any <b>FOUR</b> | <b>(16)</b> |
|------------|-------------------------|-------------|

- a) Explain the concepts of dynamic braking of DC shunt motors.
- b) With the help of block diagram, explain the elements of electric drive.
- c) Explain load torque characteristics of DC series motor with proper diagram.
- d) Explain the concept of frequency control method for speed control of induction motor.
- e) Draw the neat labelled diagram of speed torque characteristics of induction motor. State any four applications of IM.
- f) Explain the concept of stability of drive.

|            |                        |             |
|------------|------------------------|-------------|
| <b>Q.3</b> | Attempt any <b>TWO</b> | <b>(16)</b> |
|------------|------------------------|-------------|

- a) With help of neat diagram slip power recovery using Kramer system. Also explain speed torque characteristics of statics Kramer drive.
- b) i) Draw and explain four quadrant operation of a hoist.  
ii) Draw the circuit diagram of star delta connection.
- c) i) Explain any four factors considered for drive selection.  
ii) Explain the concept of regenerative braking of DC shunt motors.

P.T.O

**Q.4 Attempt any FOUR****(08)**

- a) Draw the basic step down chopper circuit.
- b) Draw single phase half wave converter drive.
- c) Enlist factors on which DC drive performance is depending.
- d) Give any two differences between 1 $\phi$  & 3 $\phi$  full converter drive.
- e) What as the use of microcomputer in DC drives?
- f) Draw diagram of PLC controlled motor drive.

**Q.5 Attempt any FOUR****(16)**

- a) Draw and explain microprocessor based DC motor control.
- b) Explain with neat diagram working principle of phase locked loop in detail.
- c) Draw & explain power control class A method with its waveforms.
- d) Draw and explain 3 $\phi$  semiconductor drive.
- e) Explain 1 $\phi$  dual converter drive with neat diagram.
- f) Explain multiphase chopper drive in detail.

**Q.6 Attempt any FOUR****(16)**

- a) Draw and explain steel rolling mills where drives are used at various positions.
- b) Enlist various methods of single phase converter drive & explain one method in detail.
- c) Explain working principle of PLC controlled motor drive technique.
- d) Draw the circuit diagram of 3 $\phi$  dual converter drive and explain in detail.
- e) Explain speed-torque relation of DC motor with neat diagram.
- f) Draw and explain with neat diagram of micro-controller based stepper motor control.

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**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**ODD TERM END EXAM NOV/DEC -2018****EXAM SEAT NO.**

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**LEVEL: THIRD****PROGRAM: IE / E&TC****COURSE CODE: EIF307/IEE307/ETEF307** **COURSE NAME: LINER INTEGRATED CIRCUITS.****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 04/12/2018****Instruction:-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.

7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application

| QN         | S. Q. N | Question Text                                                                                                                                                                             | Cognition Level<br>R/U/A | Co Code<br>EIF<br>307 | Marks       |
|------------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------------------|-------------|
| <b>Q.1</b> |         | Attempt any <b>FOUR</b>                                                                                                                                                                   |                          |                       | <b>(08)</b> |
|            | a)      | State configuration of differential amplifier.                                                                                                                                            | R                        | 1                     |             |
|            | b)      | Calculate gain of inverting amplifier if $R_F=10K\Omega$ and $R_1=2K\Omega$ .                                                                                                             | A                        | 2                     |             |
|            | c)      | Draw the diagram of Dual input balanced output (DIBO) differential amplifier.                                                                                                             | R                        | 1                     |             |
|            | d)      | Draw transfer characteristic curve of Inverting comparator.                                                                                                                               | R                        | 3                     |             |
|            | e)      | Explain virtual short concept with help of circuit diagram.                                                                                                                               | U                        | 2                     |             |
|            | f)      | State two application of comparator.                                                                                                                                                      | R                        | 3                     |             |
| <b>Q.2</b> |         | Attempt any <b>FOUR</b>                                                                                                                                                                   |                          |                       | <b>(16)</b> |
|            | a)      | Explain block diagram of op-amp.                                                                                                                                                          | U                        | 1                     |             |
|            | b)      | Derive output expression of Integrator using circuit diagram                                                                                                                              | A                        | 2                     |             |
|            | c)      | Draw and explain equivalent circuit of op-amp.                                                                                                                                            | U                        | 1                     |             |
|            | d)      | Explain full wave precision rectifier with help of circuit diagram and wave form.                                                                                                         | A                        | 3                     |             |
|            | e)      | Derive output expression of 3-op-amp instrumentation amplifier.                                                                                                                           | A                        | 3                     |             |
|            | f)      | For non-inverting Summing amplifier having $V_1, V_2, V_3$ that $V_1=1V, V_2=2V$ and $V_3=5V$ , if $R_F=10K\Omega$ and $R_1=10K\Omega$ . Calculate o/p voltage and draw designed circuit. | A                        | 2                     |             |
| <b>Q.3</b> |         | Attempt any <b>FOUR</b>                                                                                                                                                                   |                          |                       | <b>(16)</b> |
|            | a)      | Derive o/p expression of V-I converter with floating load.                                                                                                                                | A                        | 3                     |             |

(P.T.O.)

|            |    |                                                                                                                                                     |   |   |             |
|------------|----|-----------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------------|
|            | b) | Define following parameter of op-amp :<br>i) Input offset voltage,      ii) Input offset current,<br>iii) SVRR,                      iv) Slew rate. | R | 1 |             |
|            | c) | Explain window detector with help of circuit diagram and o/p wave form.                                                                             | U | 3 |             |
|            | d) | Explain o/p stage of op-amp with circuit diagram.                                                                                                   | U | 1 |             |
|            | e) | Derive o/p expression of non-inverting closed loop amplifier.                                                                                       | A | 2 |             |
|            | f) | Explain subtractor with help of circuit diagram.                                                                                                    | U | 2 |             |
| <b>Q.4</b> |    | Attempt any <b>FOUR</b>                                                                                                                             |   |   | <b>(08)</b> |
|            | a) | Classify multivibrator.                                                                                                                             | U | 4 |             |
|            | b) | Draw pin diagram of IC 565.                                                                                                                         | R | 6 |             |
|            | c) | Define : i) Centre frequency of PLL,    ii) Lock range.                                                                                             | R | 6 |             |
|            | d) | Draw ideal frequency response curve of low pass filter.                                                                                             | R | 5 |             |
|            | e) | Compare active & passive filter (any two points).                                                                                                   | U | 5 |             |
|            | f) | List any two applications of bistable multivibrator.                                                                                                | R | 4 |             |
| <b>Q.5</b> |    | Attempt any <b>FOUR</b>                                                                                                                             |   |   | <b>(16)</b> |
|            | a) | Explain the design procedure to design a narrow band pass filter. Also draw the circuit diagram for the same.                                       | U | 5 |             |
|            | b) | Explain frequency synthesizer.                                                                                                                      | U | 6 |             |
|            | c) | Draw block diagram of PLL. Write operating principle of it.                                                                                         | U | 6 |             |
|            | d) | Explain how OPAMP works as table multivibrator ?                                                                                                    | U | 4 |             |
|            | e) | Design second order Butterworth high pass filter of cut off frequency of 10 KHz. Draw designed circuit and frequency response curve.                | A | 5 |             |
|            | f) | Draw a circuit diagram of triangular wave form generator and explain it's operation.                                                                | U | 4 |             |
| <b>Q.6</b> |    | Attempt any <b>FOUR</b>                                                                                                                             |   |   | <b>(16)</b> |
|            | a) | Describe with neat circuit diagram working of Quadrature oscillator.                                                                                | U | 4 |             |
|            | b) | Draw circuit diagram of wide band reject filter. Explain it's working.                                                                              | R | 5 |             |
|            | c) | Explain how IC555 works as bistable multivibrator.                                                                                                  | U | 6 |             |
|            | d) | Draw wien bridge oscillator using op-amp. Draw wave forms for it.                                                                                   | R | 4 |             |
|            | e) | Describe PLL transfer characteristics.                                                                                                              | U | 6 |             |
|            | f) | Define : i) Pass band,    ii) Stop band,    iii) Centre Frequency,    iv) Roll-off rate.                                                            | R | 5 |             |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**ODD TERM END EXAM NOV./DEC-2018****EXAM SEAT NO.**

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**LEVEL :- FOURTH**      **PROGRAM : INDUSTRIAL ELECTRONICS**  
**COURSE CODE :- IEF403/IEE403**  
**COURSE NAME :- INSTRUMENTATION**  
**MAX. MARKS : 80**    **TIME : 3 HRS.**    **DATE :- 10/12/2018**

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

| QN  | S  | Section- I                                                                                 | R/<br>U/<br>A | Co<br>IEF<br>403 | Mar<br>ks |
|-----|----|--------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.1 |    | Attempt any <b>FOUR</b> :                                                                  |               |                  | <b>08</b> |
|     | a) | Define the term transducer.                                                                | R             | 1                |           |
|     | b) | Give the classification of Thermistor.                                                     | U             | 2                |           |
|     | c) | State any two application of LVDT.                                                         | R             | 3                |           |
|     | d) | Enlist any four basic requirement for selection of transducer.                             | U             | 2                |           |
|     | e) | Explain the term pyrometer.                                                                | U             | 2                |           |
|     | f) | State any two application of ultrasonic level measurement method.                          | R             | 2                |           |
| Q.2 |    | Attempt any <b>FOUR</b> :                                                                  |               |                  | <b>16</b> |
|     | a) | Define the term active transducer & passive transducer give two example of each.           | R             | 1                |           |
|     | b) | Explain with neat sketch construction and working principle of LVDT.                       | U             | 3                |           |
|     | c) | Draw and describe working of total radiation pyrometer.                                    | U             | 2                |           |
|     | d) | Differentiate analog transducer and digital transducer.                                    | U             | 1                |           |
|     | e) | Draw and describe the construction of thermocouple and give its two applications.          | U             | 2                |           |
|     | f) | Explain with neat sketch diagram of resistive type level measurement.                      | U             | 3                |           |
| Q.3 |    | Attempt any <b>FOUR</b> :                                                                  |               |                  | <b>16</b> |
|     | a) | Define i) Resistive transducer. ii) Inductive transducer. iii) Photo sensitive transducer. | R             | 1                |           |
|     | b) | Draw and describe working principle of RTD.                                                | U             | 2                |           |
|     | c) | Explain with neat sketch construction diagram and working principle of RVDT.               | U             | 3                |           |
|     | d) | Draw and describe the construction of thermistor give its two applications.                | A             | 2                |           |
|     | e) | Draw and describe working of infrared pyrometer.                                           | U             | 2                |           |
|     | f) | Explain with neat sketch construction diagram of inductive type level measurement.         | U             | 3                |           |

P.T.O



| QN  |    | S | Section- II                                                                                                                        |  | R/<br>U/<br>A | Co<br>IEF<br>403 | Mar<br>ks |
|-----|----|---|------------------------------------------------------------------------------------------------------------------------------------|--|---------------|------------------|-----------|
| Q.4 |    |   | Attempt any <b>FOUR</b> :                                                                                                          |  |               |                  | <b>08</b> |
|     | a) |   | Define pressure and state its unit.                                                                                                |  | R             | 4                |           |
|     | b) |   | List any two applications of Bellows.                                                                                              |  | R             | 4                |           |
|     | c) |   | Draw the diagram of spiral type Bourdon tube.                                                                                      |  | R             | 4                |           |
|     | d) |   | State the different methods used for data transmission.                                                                            |  | R             | 5                |           |
|     | e) |   | Define single conditioning.                                                                                                        |  | R             | 6                |           |
|     | f) |   | State any two advantages of helical type Bourdon tube.                                                                             |  | R             | 6                |           |
| Q.5 |    |   | Attempt any <b>FOUR</b> :                                                                                                          |  |               |                  | <b>16</b> |
|     | a) |   | Explain the working of C type Bourdon tube with suitable diagram.                                                                  |  | U             | 4                |           |
|     | b) |   | With neat diagram explain hot wire anemometer.                                                                                     |  | U             | 4                |           |
|     | c) |   | Draw and explain the block diagram of telemetry system.                                                                            |  | U             | 5                |           |
|     | d) |   | Explain PCM telemetry with neat diagram.                                                                                           |  | U             | 5                |           |
|     | e) |   | Draw and explain the block diagram of single channel data acquisition system.                                                      |  | U             | 6                |           |
|     | f) |   | Explain different signal conditioning processes.                                                                                   |  | U             | 6                |           |
| Q.6 |    |   | Attempt any <b>FOUR</b> :                                                                                                          |  |               |                  | <b>16</b> |
|     | a) |   | Explain ultrasonic flow meter with suitable diagram.                                                                               |  | U             | 4                |           |
|     | b) |   | Compare between turbine meter and electromagnetic flow meter on the basis of construction, principle. Advantages and applications. |  | U             | 4                |           |
|     | c) |   | Explain Hydraulic data transmission method.                                                                                        |  | U             | 5                |           |
|     | d) |   | Explain amplitude modulation used in RF telemetry system.                                                                          |  | U             | 5                |           |
|     | e) |   | Explain wireline channels used for telemetry.                                                                                      |  | U             | 6                |           |
|     | f) |   | Explain Logarithmic compression with an example.                                                                                   |  | U             | 6                |           |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**ODD TERM END EXAM NOV./DEC-2018****EXAM SEAT NO.**

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**LEVEL :- THIRD**      **PROGRAM : IE & E & TC****COURSE CODE :- EIF305/IEE305/****COURSE NAME :- ANALOG COMMUNICATION****MAX. MARKS : 80**    **TIME : 3 HRS.**    **DATE :- 11/12/2018****Instruction :-**

- 1) Answers must be written in the main answer book provided.( and supplements if required)
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

| QN  | S<br>Q<br>N | Question Text                                                                                                                                                                                                                                                                         | R/<br>U/<br>A | Co<br>EIF<br>305 | Ma<br>rks |
|-----|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.1 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                             |               |                  | <b>08</b> |
|     | a)          | State mathematical expression for PM wave.                                                                                                                                                                                                                                            | R             | 3                |           |
|     | b)          | An amplifier operating over the frequency range from 18 to 20 MHz has $10K\Omega$ input output resistor. What is the rms noise voltage at the input to this amplifier if the ambient temperature is $27^{\circ}C$ ?                                                                   | A             | 1                |           |
|     | c)          | Classify types of noise.                                                                                                                                                                                                                                                              | U             | 1                |           |
|     | d)          | Draw the block diagram of low level AM transmitter.                                                                                                                                                                                                                                   | R             | 2                |           |
|     | e)          | Define the terms for FM wave<br>i) Deviation ratio ii) Percentage modulation.                                                                                                                                                                                                         | R             | 3                |           |
|     | f)          | The carrier amplitude after amplitude modulation varies between 4V and 1V. Calculate the depth of modulation.                                                                                                                                                                         | A             | 2                |           |
| Q.2 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                             |               |                  | <b>16</b> |
|     | a)          | Derive mathematical equation for FM wave.                                                                                                                                                                                                                                             | A             | 3                |           |
|     | b)          | Draw and explain electromagnetic spectrum.                                                                                                                                                                                                                                            | U             | 1                |           |
|     | c)          | Explain the concept of vestigial sideband with waveform.                                                                                                                                                                                                                              | U             | 2                |           |
|     | d)          | List types of electronic communication system. Explain any two in detail.                                                                                                                                                                                                             | R<br>U        | 1                |           |
|     | e)          | State the frequency ranges of<br>i) Audio frequency      ii) Voice frequency<br>iii) Microwave frequency      iv) fiber optic communication.                                                                                                                                          | A             | 1                |           |
|     | f)          | A frequency modulated signal is represented by the voltage equation $e_{FM} = 10\sin(6 \times 10^8 t + 5 \sin 1250 t)$ . Calculate<br>i) Carrier frequency      ii) Modulating frequency<br>iii) Maximum deviation.<br>iv) What power mill FM wave dissipates in $20\Omega$ resistor? | R<br>A        | 3                |           |
| Q.3 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                             |               |                  | <b>16</b> |
|     | a)          | Draw and explain how modulation index is measured using the Trapezoidal method.                                                                                                                                                                                                       | U             | 2                |           |
|     | b)          | Explain Armstrong method with the help of neat labelled block diagram.                                                                                                                                                                                                                | U             | 3                |           |

**P.T.O.**

|     |    |                                                                                                                                                                                                                                                                                                  |        |   |    |
|-----|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---|----|
|     | c) | A modulating signal $10\sin(2\pi \times 10^3 t)$ is used to modulate a carrier signal $20\sin(2\pi \times 10^4 t)$ . Find the<br>i) Modulation index.<br>ii) Percentage modulation.<br>iii) Frequency of the sideband components and their amplitudes.<br>iv) Bandwidth of the modulated signal. | A      | 2 |    |
|     | d) | State methods for FM generation. Explain any one in detail.                                                                                                                                                                                                                                      | U      | 3 |    |
|     | e) | Explain the working of phase shift method with block diagram and output equations of each block.                                                                                                                                                                                                 | U      | 2 |    |
|     | f) | State important sequential steps involved in generation of AM wave.                                                                                                                                                                                                                              | R      | 2 |    |
| Q.4 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                        |        |   | 08 |
|     | a) | Define i) Selectivity ii) Sensitivity, with reference to radio receiver.                                                                                                                                                                                                                         | R      | 4 |    |
|     | b) | A super heterodyne receiver with an IF of 450KHz is tuned to a signal at 1200KHz. Calculate the image frequency.                                                                                                                                                                                 | A      | 4 |    |
|     | c) | For an antenna, define i) Directive gain ii) Radiation resistance.                                                                                                                                                                                                                               | R      | 5 |    |
|     | d) | Draw the radiation patterns for antennas, having length $\ell = 3\lambda/2$ & $\ell = 3\lambda$ .                                                                                                                                                                                                | U      | 5 |    |
|     | e) | Determine the length of half wave dipole operating at a frequency of i) 540KHz and ii) 1650 KHz.                                                                                                                                                                                                 | A      | 5 |    |
|     | f) | Draw the diagram of transverse electromagnetic wave and label it.                                                                                                                                                                                                                                | U      | 6 |    |
|     |    |                                                                                                                                                                                                                                                                                                  |        |   | 16 |
| Q.5 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                        |        |   |    |
|     | a) | Draw and describe the block diagram of TRF receiver.                                                                                                                                                                                                                                             | U      | 4 |    |
|     | b) | Enlist major factors that influence the choice of IF in any particular communication system.                                                                                                                                                                                                     | R      | 4 |    |
|     | c) | Compare resonant and non-resonant antennas on the basis of<br>i) Definition ii) termination<br>iii) Standing wave existence iv) Examples.                                                                                                                                                        | U      | 5 |    |
|     | d) | Suggest antenna for following applications and describe any one of them<br>i) TV reception ii) Direction finding iii) Radio telemetry<br>iv) Radar.                                                                                                                                              | U      | 5 |    |
|     | e) | Write any two reasons of ground wave attenuation. (02 marks)<br>Write applications where ground wave propagation is used.                                                                                                                                                                        | R<br>A | 6 |    |
|     | f) | With the help of diagram, describe the following terms in sky wave propagation i) Virtual height ii) Skip distance.                                                                                                                                                                              | U      | 6 |    |
|     |    |                                                                                                                                                                                                                                                                                                  |        |   | 16 |
| Q.6 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                        |        |   |    |
|     | a) | Compare AM & FM receiver on the basis of<br>i) Frequency range ii) Demodulation methods iii) IF<br>iv) Common and un-common circuits used.                                                                                                                                                       | U      | 4 |    |
|     | b) | Draw the circuit diagram of practical diode detector. Describe its working principle.                                                                                                                                                                                                            | U      | 4 |    |
|     | c) | Describe the concept of fading with reference to sky wave propagation.                                                                                                                                                                                                                           | U      | 6 |    |
|     | d) | With the help of diagram, explain the effect of atmospheric duct on space wave propagation.                                                                                                                                                                                                      | U      | 6 |    |
|     | e) | Draw the neat labelled circuit diagram of<br>i) Transistorized RF amplifier. ii) Two stage IF amplifier.                                                                                                                                                                                         | R      | 4 |    |
|     | f) | Describe PLL as FM demodulator.                                                                                                                                                                                                                                                                  | U      | 4 |    |

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# GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM ENDE EXAM NOV./DEC-2018

EXAM SEAT NO.

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LEVEL :- FOURTH

PROGRAM : IE & E & TC

COURSE CODE :- EIF402/IEE502/

COURSE NAME :- EMBEDDED SYSTEM

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 06/12/2018

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

| QN  | S  | SECTION - I                                                                                                                             | R/<br>U/<br>A | Co<br>EIF<br>402 | Ma<br>rks |
|-----|----|-----------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.1 |    | Attempt any <b>FOUR</b> :                                                                                                               |               |                  | 08        |
|     | a) | Enlist any two 'C' data types related to integer with their value range.                                                                | R             | 1                |           |
|     | b) | Draw the format of TCON register.                                                                                                       | R             | 2                |           |
|     | c) | What memory address in interrupt vector table is assigned to Timer 0 & Timer 1?                                                         | R             | 3                |           |
|     | d) | How particular port can be declared as output PORT?                                                                                     | R             | 1                |           |
|     | e) | With single statement in C, how to disable all interrupts?                                                                              | R             | 3                |           |
|     | f) | State the steps to find the value to be loaded in timer registers TL and TH for a desired time delay.                                   | U             | 2                |           |
| Q.2 |    | Attempt any <b>FOUR</b> :                                                                                                               |               |                  | 16        |
|     | a) | Explain logical operators in 'C' for AND, NOT, OR & Ex-OR with one example each.                                                        | U             | 1                |           |
|     | b) | Write a 'C' program to generate square wave of 2 KHz of P2.4.                                                                           | A             | 2                |           |
|     | c) | Enlist steps to transfer character bytes serially while programming with 8051.                                                          | U             | 3                |           |
|     | d) | State the use of right shift and Left shift operators used in 'C' programs with one example of each.                                    | R             | 1                |           |
|     | e) | Draw the interfacing diagram of RSs-232 with 8051.                                                                                      | U             | 2                |           |
|     | f) | State the use of EX0, EX1, ET0 & ET1 bits from IE register.                                                                             | R             | 3                |           |
| Q.3 |    | Attempt any <b>FOUR</b> :                                                                                                               |               |                  | 16        |
|     | a) | Write a 'C' program to send message 'INDIA' serially at 4800 baud rate continuously. Assume XTAL = 11.0592 MHz                          | A             | 3                |           |
|     | b) | Draw the format of TMOD register and explain each bit in detail.                                                                        | U             | 2                |           |
|     | c) | Write a 'C' program to toggle bit P0.6 continuously without disturbing rest of bits.                                                    | A             | 1                |           |
|     | d) | Write a 'C' program to generate 1 KHz frequency on P2.4 using timer mode 2.                                                             | A             | 3                |           |
|     | e) | If timer 1 is programmed for interrupts in mode 0. Explain when interrupt will activate?                                                | U             | 3                |           |
|     | f) | With crystal frequency of 11.0592 MHz what value should be loaded in to TH1 to have bude rate 9600. Give answer in both Hex and Decimal | U             | 2                |           |

P.T.O.

| QN             | S<br>Q<br>N    | SECTION - II                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | R/<br>U/<br>A  | Co<br>SMF<br>403 | Ma<br>rks |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|----------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------|-----------|---|---|------------------------------------|---|---|------------------------------------|---|---|------------------------------------|---|---|-------------------------------------|---|---|--|
| Q.4            |                | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                  | <b>08</b> |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|                | a)             | For ADC 0804, if $V_{ref}$ 2 pin is applied with 1.28v, what will be the step size in mV?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | U              | 4                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|                | b)             | Define the functions of following pins of DS12887 RTC.<br>i) IRQ ii) MOT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | R              | 5                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|                | c)             | State any two advantages of LCD display over seven segment displays.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | R              | 4                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|                | d)             | Give the Half-step sequence for a Unipolar, stepper motor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | U              | 3                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|                | e)             | Find the MAX1112 control byte for i) CH0 ii) CH3. Assume single ended, Unipolar; internal clock and fully operational mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | U              | 4                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|                | f)             | Find out the full scale o/p voltage of DAC 0808 for following angles<br>i) $30^0$ ii) $60^0$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | U              | 4                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
| Q.5            |                | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                  | <b>16</b> |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|                | a)             | Draw the interfacing diagram of ADC 0809 with 8051 $\mu$ C for input connected to CH-1 and 10mV step size.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | A              | 4                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|                | b)             | Write a 'C' language program for 8051 $\mu$ C to display message "HELLO" on LCDS using busy flag method.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | A              | 4                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|                | c)             | Draw the interfacing diagram of unipolar stepper motor with part 1 of 8051 $\mu$ C and write the program to move the motor clockwise in 4 step sequence.                                                                                                                                                                                                                                                                                                                                                                                                                                                    | A              | 1                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|                | d)             | Give the memory Map ( RAM) of DS 12887 and write a program to set time to 16:58:55 & data to 29 NOV 2018 of RTC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | A              | 9                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|                | e)             | Explain in detail the selection criteria for sensor interfacing in 8051 $\mu$ C based system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | U              | 6                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|                | f)             | Consider ADC MAX1112 as interfaced with 8051. Write a 'C' code for sending a control byte to MAX 1112 ADC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | A              | 4                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
| Q.6            |                | Attempt any <b>TWO</b> :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                  | <b>16</b> |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|                | a)             | Draw the interfacing diagram of DAC 0808 with 8051 $\mu$ C. Assume a switch is connected to pin P.0.0. Write a 'C' program for 8051 to perform the following.<br>i) When SW=0, generate a staircase waveform of DAC output.<br>ii) When SW=1; generate a triangular waveform at DAC output.                                                                                                                                                                                                                                                                                                                 | A              | 4                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|                | b)             | Draw the interfacing diagram of DC motor to 8051 $\mu$ C, using ILQ 75 optoisolator. Also write a C program to monitor the status of two switches ( SW 1 & SW 2) connected to P2.0 and P2,1 and perform the following<br><table><tr><td>SW 2<br/>(P2.1)</td><td>SW 1<br/>(P2.0)</td><td></td></tr><tr><td>0</td><td>0</td><td>DC motor moves with 25% Duty cycle</td></tr><tr><td>0</td><td>1</td><td>DC motor moves with 50% Duty cycle</td></tr><tr><td>1</td><td>0</td><td>DC motor moves with 75% Duty cycle</td></tr><tr><td>1</td><td>1</td><td>DC motor moves with 100% Duty cycle</td></tr></table> | SW 2<br>(P2.1) | SW 1<br>(P2.0)   |           | 0 | 0 | DC motor moves with 25% Duty cycle | 0 | 1 | DC motor moves with 50% Duty cycle | 1 | 0 | DC motor moves with 75% Duty cycle | 1 | 1 | DC motor moves with 100% Duty cycle | A | 5 |  |
| SW 2<br>(P2.1) | SW 1<br>(P2.0) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |                  |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
| 0              | 0              | DC motor moves with 25% Duty cycle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                  |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
| 0              | 1              | DC motor moves with 50% Duty cycle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                  |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
| 1              | 0              | DC motor moves with 75% Duty cycle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                  |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
| 1              | 1              | DC motor moves with 100% Duty cycle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                  |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|                | c)             | Design a 8051 $\mu$ C based Data Acquisition System (DAS) which will collect the information from various sensors such as temperature, pressure etc and display it on LCD. Write the 'C' program for same with detailed H/W schematic.                                                                                                                                                                                                                                                                                                                                                                      | A              | 6                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**ODD TERM END EXAM NOV./DEC-2018****EXAM SEAT NO.**

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**LEVEL :- FOURTH PROGRAM : IE & E&TC****COURSE CODE :- EIF401/IX211/IEE401/EJ211/ETE401****COURSE NAME POWER ELECTRONICS -I****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 04/12/2018****Instruction :-**

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.

7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

| QN  | S<br>Q<br>N | Section- I                                                                                                                                                 |  |  |  | R/<br>U/<br>A | Co<br>EIF<br>401 | Mar<br>ks |
|-----|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|---------------|------------------|-----------|
|     |             |                                                                                                                                                            |  |  |  |               |                  |           |
| Q.1 |             | Attempt any <b>FOUR</b> :                                                                                                                                  |  |  |  |               |                  | <b>08</b> |
|     | a)          | Draw system of following devices i) UJT ii) PUT.                                                                                                           |  |  |  | R             | 1                |           |
|     | b)          | State any two advantages of gate triggering.                                                                                                               |  |  |  | R             | 2                |           |
|     | c)          | Define i) Latching current ii) Holding current.                                                                                                            |  |  |  | R             | 1                |           |
|     | d)          | List any two advantages of PUT over UJT.                                                                                                                   |  |  |  | R             | 2                |           |
|     | e)          | Define commutation and give the classification of commutation.                                                                                             |  |  |  | R             | 3                |           |
|     | f)          | State the need of high power semiconductor switches.                                                                                                       |  |  |  | R             | 1                |           |
| Q.2 |             | Attempt any <b>FOUR</b> :                                                                                                                                  |  |  |  |               |                  | <b>16</b> |
|     | a)          | Explain two transistor analogy of SCR with the help of diagram and derive equation for anode current.                                                      |  |  |  | A             | 1                |           |
|     | b)          | Explain $dv/dt$ triggering of thyristor.                                                                                                                   |  |  |  | U             | 2                |           |
|     | c)          | Compare natural and force commutation ( any 4 points)                                                                                                      |  |  |  | U             | 3                |           |
|     | d)          | Draw the symbol, constructional diagram and V-I characteristics of DIAC.                                                                                   |  |  |  | R             | 1                |           |
|     | e)          | Draw the circuit of PUT relaxation oscillator. With the related waveforms explain the operation of the circuit.                                            |  |  |  | U             | 2                |           |
|     | f)          | Draw the V-I characteristics of power transistor and show different operating regions in it, also state what is primary and secondary break down in it.    |  |  |  | U             | 1                |           |
| Q.3 |             | Attempt any <b>FOUR</b> :                                                                                                                                  |  |  |  |               |                  | <b>16</b> |
|     | a)          | Explain class C commutation with waveforms.                                                                                                                |  |  |  | U             | 3                |           |
|     | b)          | Explain triac triggering using DIAC.                                                                                                                       |  |  |  | U             | 2                |           |
|     | c)          | Describe four modes of operation of TRIAC.                                                                                                                 |  |  |  | U             | 1                |           |
|     | d)          | Draw and explain turn-off characteristics of SCR.                                                                                                          |  |  |  | U             | 3                |           |
|     | e)          | Compare UJT and PUT with the help of following points:<br>i) Layer diagram ii) Value of intrinsic standoff ratio.<br>iii) Characteristics iv) Application. |  |  |  | U             | 1                |           |
|     | f)          | State the requirements of gate pulse to trigger SCR successfully.<br>( any four)                                                                           |  |  |  | R             | 2                |           |

P.T.O.

| QN  | S<br>Q<br>N | Section- II                                                                                                                                        | R/<br>U/<br>A | Co<br>EIF<br>401 | Mar<br>ks |
|-----|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.4 |             | Attempt any <b>FOUR</b> :                                                                                                                          |               |                  | <b>08</b> |
|     | a)          | Give any two need of series and parallel connection of SCR.                                                                                        | R             | 4                |           |
|     | b)          | Show expression for average output voltage and rms output voltage of three phase half wave uncontrolled rectifier.                                 | U             | 5                |           |
|     | c)          | Draw a line voltage of 3 $\phi$ supply.                                                                                                            | R             | 5                |           |
|     | d)          | Define phase voltage and write down their properties.                                                                                              | R             | 5                |           |
|     | e)          | Explain regenerative action or power feedback.                                                                                                     | U             | 6                |           |
|     | f)          | Construct a waveform for $\alpha=90^\circ$ for single phase full wave ( Full converter) with inductive load. ( Fully controlled bridge rectifier.) | A             | 6                |           |
| Q.5 |             | Attempt any <b>FOUR</b> :                                                                                                                          |               |                  | <b>16</b> |
|     | a)          | Draw a diagram of static equalization network and derive equation for static resistance.                                                           | A             | 4                |           |
|     | b)          | Explain reasons of unequal current distribution.                                                                                                   | U             | 4                |           |
|     | c)          | Draw a diagram and waveform of three phases half wave uncontrolled rectifier.                                                                      | R             | 5                |           |
|     | d)          | Explain with diagram single phase half wave controlled rectifier with resistive load.                                                              | U             | 6                |           |
|     | e)          | Compare symmetrical and asymmetrical configuration of half controlled bridge rectifier.                                                            | U             | 6                |           |
|     | f)          | Draw a diagram and waveform of 1 $\phi$ fully controlled bridge rectifier with inductive load.                                                     | R             | 6                |           |
| Q.6 |             | Attempt any <b>TWO</b> :                                                                                                                           |               |                  | <b>16</b> |
|     | a)          | Explain current equalization in DC and AC supply                                                                                                   | U             | 4                |           |
|     | b)          | Draw a diagram and waveform of three phase uncontrolled bridge rectifier circuit and explain its operation.                                        | R             | 5                |           |
|     | c)          | Describe operation of single phase halfwave controlled rectifier with RL load and free wheeling diode, draw diagram and waveform.                  | U             | 5                |           |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**ODD TERM END EXAM NOV/DEC -2018****EXAM SEAT NO.**

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**LEVEL: THIRD****PROGRAM: IE/E&TC****COURSE CODE: EIF303/ /IX203/IEE303/ETE303****COURSE NAME: ELECTRONICS MEASURING INSTRUMENTS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 07/12/2018**

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

| QN  | S  | Q | N | Question Text                                                                                                                                                                                                                                                                                  | R | CO  | Mar  |
|-----|----|---|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----|------|
|     |    |   |   |                                                                                                                                                                                                                                                                                                | U | EIF | ks   |
|     |    |   |   |                                                                                                                                                                                                                                                                                                | A | 303 |      |
| Q.1 |    |   |   | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                        |   |     | (08) |
|     | a) |   |   | Define the terms i) Accuracy ii) Precision                                                                                                                                                                                                                                                     | R | 1   |      |
|     | b) |   |   | List different types of errors.                                                                                                                                                                                                                                                                | R | 1   |      |
|     | c) |   |   | Draw the circuit diagram of Hay bridge.                                                                                                                                                                                                                                                        | R | 2   |      |
|     | d) |   |   | State the balancing equation of a Whetstone's bridge.                                                                                                                                                                                                                                          | R | 2   |      |
|     | e) |   |   | Draw construction diagram of PMMC.                                                                                                                                                                                                                                                             | R | 3   |      |
|     | f) |   |   | State different type of DVM's.                                                                                                                                                                                                                                                                 | R | 3   |      |
| Q.2 |    |   |   | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                        |   |     | (16) |
|     | a) |   |   | Explain systematic errors in details & list methods to minimise it.                                                                                                                                                                                                                            | U | 1   |      |
|     | b) |   |   | Describe with diagram the operation the operation of Kelvin's bridge.                                                                                                                                                                                                                          | U | 2   |      |
|     | c) |   |   | Explain with a diagram the working the working of a Wagher's ground connection.                                                                                                                                                                                                                | U | 2   |      |
|     | d) |   |   | Illustrate with diagram how Schering's bridge can be used to measure unknown capacitance.                                                                                                                                                                                                      | A | 2   |      |
|     | e) |   |   | Explain with the help of diagram the working principle of dual slope type DVM.                                                                                                                                                                                                                 | U | 3   |      |
|     | f) |   |   | Explain with a diagram the basic principle of a successive approximation type DVM.                                                                                                                                                                                                             | U | 3   |      |
| Q.3 |    |   |   | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                        |   |     | (16) |
|     | a) |   |   | Explain secondary standards. State any two application of it.                                                                                                                                                                                                                                  | U | 1   |      |
|     | b) |   |   | A capacitance comparison bridge is used to measure a capacitive impedance at a frequency of 2KHz. The bridge constants at balance are $C_3=100\mu\text{f}$ , $R_1=10\text{k}\Omega$ , $R_2=50\text{k}\Omega$ , $R_3=100\text{k}\Omega$ . Calculate equivalent series of the unknown impedance. | A | 2   |      |
|     | c) |   |   | A Maxwell bridge is used to measure an inductive impedance. The bridge constants at balance are $C_1=0.01\mu\text{f}$ , $R_1=\Delta 70\text{k}\Omega$ , $R_2=5.1\text{k}\Omega$ , $R_3=100\text{k}\Omega$ . Find the series equivalent of the unknown impedance.                               | A | 2   |      |
|     | d) |   |   | Explain the working principle of a digital frequency meter.                                                                                                                                                                                                                                    | U | 3   |      |
|     | e) |   |   | State the functions and explain the operations of a gate control flip flop.                                                                                                                                                                                                                    | U | 3   |      |

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|            |                                                                                                                                                                                           |   |   |      |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
|            | f) Describe with the help of block diagram the operation of digital frequency meter.                                                                                                      | U | 3 |      |
| <b>Q.4</b> | Attempt any <b>FOUR</b>                                                                                                                                                                   |   |   | (08) |
|            | a) State uses of logic analyzer.                                                                                                                                                          | R | 5 |      |
|            | b) Draw block diagram of delay line.                                                                                                                                                      | R | 4 |      |
|            | c) State any two application of circular chart recorder.                                                                                                                                  | R | 5 |      |
|            | d) Write the names of blocks present in vertical deflection subsystem.                                                                                                                    | R | 4 |      |
|            | e) Define strip chart recorder.                                                                                                                                                           | R | 5 |      |
|            | f) State the function of CRO probe of list any two types of it.                                                                                                                           | R | 4 |      |
| <b>Q.5</b> | Attempt any <b>FOUR</b>                                                                                                                                                                   |   |   | (16) |
|            | a) Write any four specification of pulse generator.                                                                                                                                       | A | 5 |      |
|            | b) State the procedure for measurement of frequency using lissajous pattern. Also calculate vertical frequency (fv) for following lissajous patterns, where horizontal frequency fh=7KHz. | A | 4 |      |
|            | <div style="text-align: center;"> <p>i)       ii) </p> </div>                                                                                                                             |   |   |      |
|            | c) Draw & explain block diagram of logic analyzer.                                                                                                                                        | U | 5 |      |
|            | d) Identify the following diagram & explain its working.                                                                                                                                  |   |   |      |
|            | <div style="text-align: center;"> </div>                                                                                                                                                  | A | 4 |      |
|            | e) State any four applications of XY recorder.                                                                                                                                            | A | 5 |      |
|            | f) Explain with block diagram, dual beam CRO.                                                                                                                                             | U | 4 |      |
| <b>Q.6</b> | Attempt any <b>FOUR</b>                                                                                                                                                                   |   |   | (16) |
|            | a) Explain the concept of time domain & frequency domain.                                                                                                                                 | U | 5 |      |
|            | b) Write any four applications of strip chart recorder.                                                                                                                                   | U | 5 |      |
|            | c) Draw & explain block diagram of horizontal amplifier.                                                                                                                                  | U | 4 |      |
|            | d) Identify the following diagram & explain its working.                                                                                                                                  |   |   |      |
|            | <div style="text-align: center;"> </div>                                                                                                                                                  | A | 5 |      |
|            | e) Draw block diagram of digital storage oscilloscope.                                                                                                                                    | U | 4 |      |
|            | f) Write the procedure for measurement of phase angle using CRO. Sketch suitable diagrams for 0° & 90° phase angle.                                                                       | A | 4 |      |

# GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

ODD TERM END EXAM NOV/DEC -2018

EXAM SEAT NO.

LEVEL: THIRD

PROGRAM: IE/E&TC

COURSE CODE: EIF302/IEE302/EJ302/ETE302 COURSE NAME: APPLIED ELECTRONICS

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 05/12/2018

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

| QN  | S  | Q | Question Text                                                                                                                                                                                                                                                                         | R | CO | EIF | Marks |
|-----|----|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----|-----|-------|
| Q.1 |    |   | Attempt any FOUR                                                                                                                                                                                                                                                                      |   |    |     |       |
|     | a) |   | Define i) Positive feedback<br>ii) Negative feedback                                                                                                                                                                                                                                  | R | 1  |     | (08)  |
|     | b) |   | State Backhausen's criteria.                                                                                                                                                                                                                                                          | R | 2  |     |       |
|     | c) |   | Draw block diagram of oscillator.                                                                                                                                                                                                                                                     | R | 2  |     |       |
|     | d) |   | State classification of power amplifiers with their conduction angle.                                                                                                                                                                                                                 | R | 3  |     |       |
|     | e) |   | State any four advantages of negative feedback amplifier.                                                                                                                                                                                                                             | R | 1  |     |       |
|     | f) |   | State the need of tank circuit.                                                                                                                                                                                                                                                       | R | 3  |     |       |
| Q.2 |    |   | Attempt any FOUR                                                                                                                                                                                                                                                                      |   |    |     | (16)  |
|     | a) |   | Explain with diagram concept of cross over distortion in class -B power amplifier.                                                                                                                                                                                                    | U | 3  |     |       |
|     | b) |   | In a colpitt's oscillator $c_1=0.2\mu F$ , $c_2=0.02\mu F$ . If the frequency of oscillations is 10 KHz, Find the value of inductor. Also find required gain for the oscillation.                                                                                                     | A | 2  |     |       |
|     | c) |   | Draw the block diagram of<br>i) Current series feedback<br>ii) Current shunt feedback                                                                                                                                                                                                 | R | 1  |     |       |
|     | d) |   | With a neat circuit diagram explain operation of class-B push-pull amplifier.                                                                                                                                                                                                         | U | 3  |     |       |
|     | e) |   | Draw neat diagram of Darlington amplifier & state its characteristics.                                                                                                                                                                                                                | R | 1  |     |       |
|     | f) |   | With neat diagram explain the operations of RC phase shift oscillator.                                                                                                                                                                                                                | U | 2  |     |       |
| Q.3 |    |   | Attempt any FOUR                                                                                                                                                                                                                                                                      |   |    |     | (16)  |
|     | a) |   | When negative voltage feedback is applied to an amplifier of gain 100, the overall gain falls to 50.<br>i) Calculate the fraction of the output voltage feedback<br>ii) If the fraction is maintained. Calculate the value of the amplifier gain required if overall stage gain is 75 | A | 1  |     |       |
|     | b) |   | Compare LC & RC Oscillator. (any four points)                                                                                                                                                                                                                                         | U | 2  |     |       |
|     | c) |   | A Hartley oscillator circuit has a tank circuit inductance of $L_1=L_2=100\mu H$ . It is required to design the oscillator to produce oscillations at 50KHz. Obtain value of capacitor & also required gain for sustained oscillation.                                                | A | 2  |     |       |

P.T.O



|            |    |                                                                                                                                                                                                 |   |   |      |
|------------|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
|            | d) | With neat circuit diagram describe operation of single tuned amplifier.                                                                                                                         | U | 3 |      |
|            | e) | Describe with neat circuit diagram operation of transformer coupled class-A power amplifier.                                                                                                    | U | 3 |      |
|            | f) | Compare class 'A' class 'B' & class 'C' power amplifier. (any four points)                                                                                                                      | U | 3 |      |
| <b>Q.4</b> |    | Attempt any <b>FOUR</b>                                                                                                                                                                         |   |   | (08) |
|            | a) | Draw switching waveforms of bistable multivibrator.                                                                                                                                             | R | 2 |      |
|            | b) | Explain Delay time and rise time in transistor switching circuit.                                                                                                                               | U | 2 |      |
|            | c) | Define term sweep-error.                                                                                                                                                                        | R | 5 |      |
|            | d) | Draw basic diagram of exponential sweep generation.                                                                                                                                             | R | 5 |      |
|            | e) | List any two applications of a differentiating circuit.                                                                                                                                         | R | 6 |      |
|            | f) | Draw response of low pass RC network to a square wave.                                                                                                                                          | R | 6 |      |
| <b>Q.5</b> |    | Attempt any <b>FOUR</b>                                                                                                                                                                         |   |   | (16) |
|            | a) | Draw the circuit of Schmitt trigger and explain its principle of operation.                                                                                                                     | U | 4 |      |
|            | b) | Determine the period and frequency of oscillation for an astable multivibrator with component values of $R_1=R_2=5\ \Omega$ and $C_1=C_2=300\ \mu\text{f}$                                      | A | 4 |      |
|            | c) | Explain with diagram Bootstrap sweep generator.                                                                                                                                                 | U | 5 |      |
|            | d) | Construct and explain sweep circuit using unijunction transistor switch.                                                                                                                        | A | 5 |      |
|            | e) | Explain combinational clipper with circuit diagram and waveforms.                                                                                                                               | U | 6 |      |
|            | f) | Sinusoidal waveform of 20V peak-to-peak is applied to the circuit shown in fig (a). Sketch the waveform at the circuit output.                                                                  | A | 6 |      |
| <b>Q.6</b> |    | Attempt any <b>FOUR</b>                                                                                                                                                                         |   |   | (16) |
|            | a) | The input signal with waveform shown in fig. (b) is applied to the clamper circuit shown in fig.(c). Sketch the waveform of the output voltage.                                                 | A | 6 |      |
|            | b) | A sinusoidal waveform of 20 V peak-to-peak is applied to the circuit shown in fig. (d). Sketch the waveform at the circuit output.                                                              | A | 6 |      |
|            | c) | Explain with diagram miller sweep generator.                                                                                                                                                    | U | 5 |      |
|            | d) | Explain with circuit diagram transistorized constant current /sweep generator.                                                                                                                  | U | 5 |      |
|            | e) | A monostable multivibrator is required to convert a 100KHz, 30% duty cycle square wave to a 100KHz, 50% duty cycle square wave. Find the values of $R_3$ if $C_1=1\ \mu\text{f}$ .              | A | 4 |      |
|            | f) | Determine the value of capacitors to be used in an astable multivibrator to provide a train of pulse 1 $\mu\text{sec}$ wide at a repetition rate of 100 KHz. Given $R_1=R_2=10\text{k}\Omega$ . | A | 4 |      |

Q5) a)

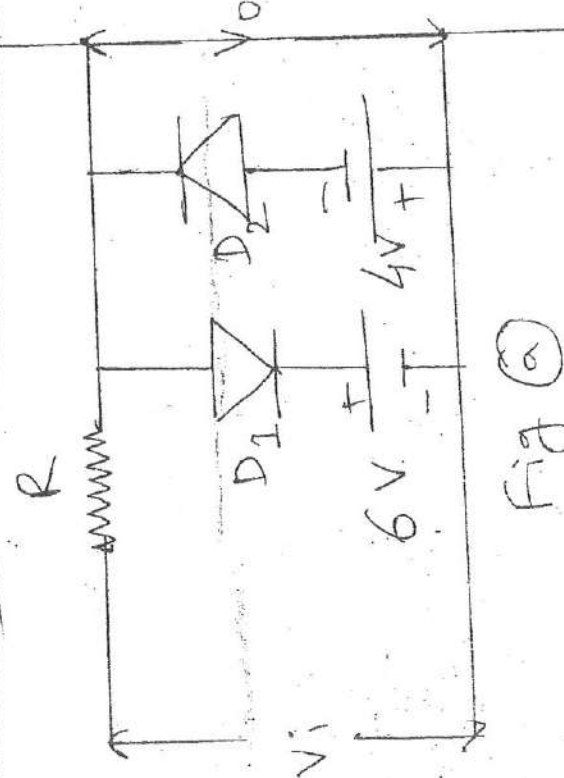
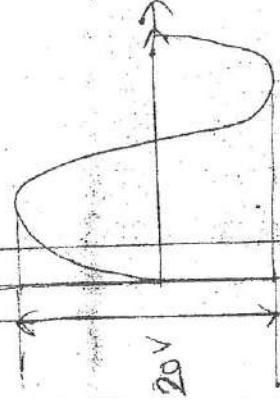


Fig a)

Q6) a)

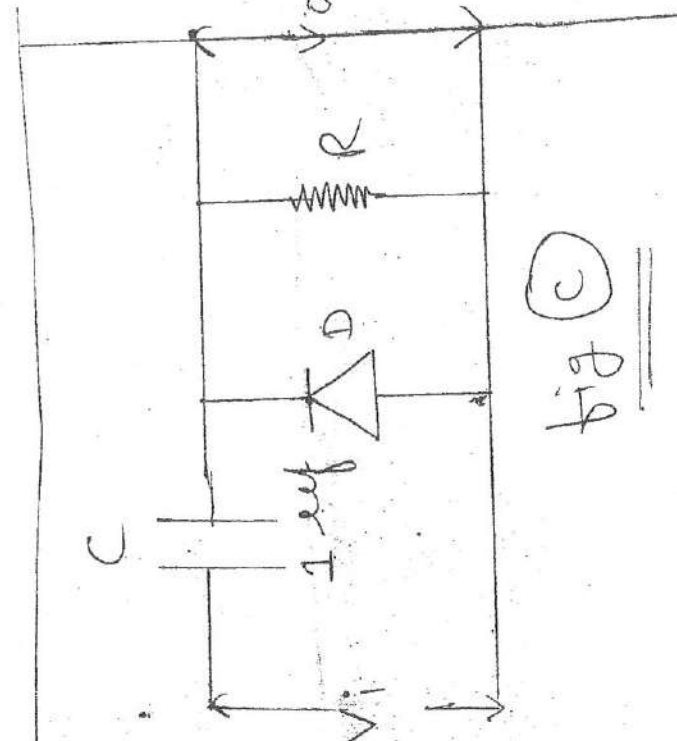
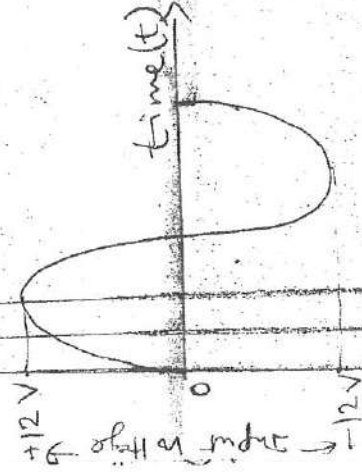


Fig c)

Fig b)

Q6) b)

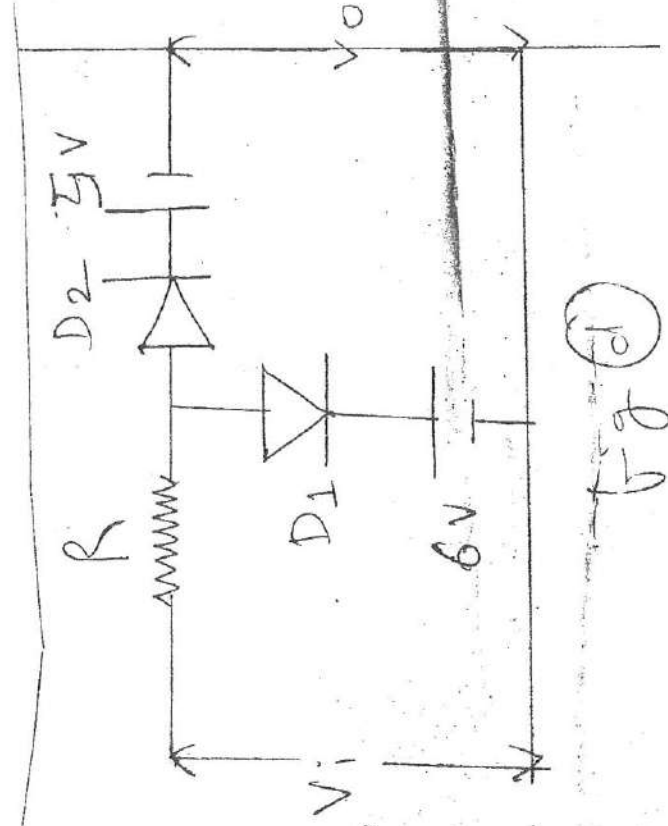
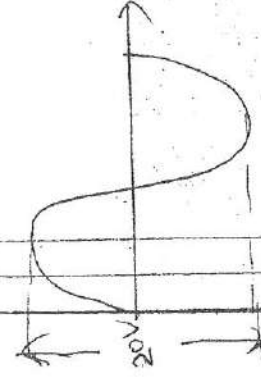


Fig d)



26

**ODD TERM END EXAM NOV/DEC -2018**

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DATE: 03/12/2018

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.

7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

**P.T.O.**

|     |    |                                                                                                                                                                                                                                             |   |   |      |
|-----|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
|     | d) | Find the area of the region lying between the parabolas $y^2=4ax$ and $x^2=4ay$ ( $a>0$ )                                                                                                                                                   | A | 1 |      |
|     | e) | If $v_1=3\cos wt$ and $v_2=4\sin wt$ , express $v_1+v_2$ in the form $r\sin(\omega t+\alpha)$ and calculate its mean value over the range from $t=0$ to $t=\frac{\pi}{\omega}$                                                              | A | 1 |      |
|     | f) | Find the R.M.S value of $i=\sin 3t$ over the complete period.                                                                                                                                                                               | A | 1 |      |
| Q.4 |    | Attempt any <b>FOUR</b>                                                                                                                                                                                                                     |   |   | (08) |
|     | a) | Find order and degree of differential equation $\sqrt{\frac{dy}{dx}} = \sqrt[4]{\frac{d^2y}{dx^2}}$                                                                                                                                         | U | 2 |      |
|     | b) | State the condition for exact differential equation.                                                                                                                                                                                        | R | 2 |      |
|     | c) | Verify that $y = \log x$ is solution of the D.E $x \frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$                                                                                                                                                   | U | 2 |      |
|     | d) | The particle starts from rest. Its velocity at any time $t$ is given by $3t^2 - 3t + 2$ Find the distance covered by particle at 3 sec.                                                                                                     | A | 3 |      |
|     | e) | If $z_1 = 2 - 3i$ and $z_2 = 4 + 6i$ then find $z_1 + z_2$                                                                                                                                                                                  | A | 3 |      |
|     | f) | Define modulus and amplitude of complex number.                                                                                                                                                                                             | R | 3 |      |
| Q.5 |    | Attempt any <b>FOUR</b>                                                                                                                                                                                                                     |   |   | (16) |
|     | a) | Solve $\frac{dy}{dx} = e^{2x-3y} + 4x^2 e^{-3y}$                                                                                                                                                                                            | A | 2 |      |
|     | b) | Show that $y^2 = ax^2$ is a solution of $x(\frac{dy}{dx})^2 - 2y\frac{dy}{dx} + ax = 0$                                                                                                                                                     | U | 2 |      |
|     | c) | Solve $x \log x \frac{dy}{dx} + y = 2 \log x$                                                                                                                                                                                               | A | 2 |      |
|     | d) | Solve $(2x+3\cos y)dx + (2y-3x\sin y)dy = 0$                                                                                                                                                                                                | A | 2 |      |
|     | e) | Simplify using De-Moivre's theorem.<br>$\frac{(\cos 3\theta + i \sin 3\theta)^4 (\cos 5\theta - i \sin 5\theta)^{4/5}}{(\cos \frac{9}{2}\theta + i \sin \frac{9}{2}\theta)^{2/5} (\cos \frac{4}{5}\theta - i \sin \frac{4}{5}\theta)^{10}}$ | A | 3 |      |
|     | f) | Using Euler's exponential formulae prove that.<br>i) $\sin^2 \theta + \cos^2 \theta = 1$<br>ii) $\cosh^2 \theta - \sinh^2 \theta = 1$                                                                                                       | U | 3 |      |
| Q.6 |    | Attempt any <b>FOUR</b>                                                                                                                                                                                                                     |   |   | (16) |
|     | a) | Solve $\frac{dy}{dx} = \frac{x^2 + y^2}{2xy}$                                                                                                                                                                                               | A | 2 |      |
|     | b) | Find the equation of curve whose slope is $(x-4)$ and which passes through the point $(3, 0)$                                                                                                                                               | A | 3 |      |
|     | c) | Find cube root of unity.                                                                                                                                                                                                                    | A | 3 |      |
|     | d) | Find modulus and amplitude of $z = \frac{(1+i)^2}{1-i}$                                                                                                                                                                                     | A | 3 |      |
|     | e) | Separate into real and imaginary part of $\sin(x+iy)$ .                                                                                                                                                                                     | A | 3 |      |
|     | f) | Show that $(1+i)^8 + (1-i)^8 = 32$                                                                                                                                                                                                          | U | 3 |      |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**ODD TERM END EXAM NOV./DEC-2018****EXAM SEAT NO.**

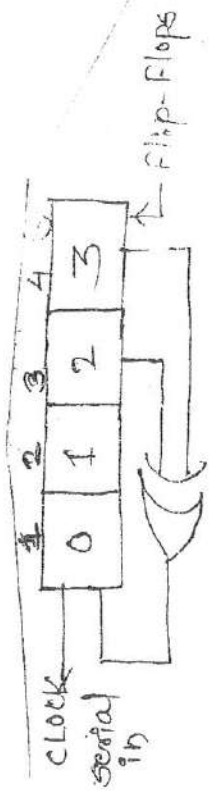
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**LEVEL :- THIRD****PROGRAM : IE & E & TC****COURSE CODE :- EIF306/IEE306/ETE306/EJ207****COURSE NAME :- DIGITAL TECHNIQUES AND APPLICATION****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 13/12/2018****Instruction :-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

| QN  | S  | Question Text                                                                                                      | R/<br>U/<br>A | Co<br>EIF<br>306 | Ma<br>rks |
|-----|----|--------------------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.1 |    | Attempt any <b>FOUR</b> :                                                                                          |               |                  | 08        |
|     | a) | Enlist 4 different number systems.                                                                                 | R             | 1                |           |
|     | b) | Define 'Maxterm'.                                                                                                  | R             | 2                |           |
|     | c) | Convert ( 65535) <sub>10</sub> to binary.                                                                          | A             | 1                |           |
|     | d) | Give truth table and symbol of i) NAND Gate ii) Ex-OR Gate.                                                        | R             | 3                |           |
|     | e) | Explain 'Associative law'.                                                                                         | U             | 2                |           |
|     | f) | Enlist ICs for i) AND ii) OR iii) NOT iv) NOR gates.                                                               | R             | 3                |           |
| Q.2 |    | Attempt any <b>FOUR</b> :                                                                                          |               |                  | 16        |
|     | a) | Convert ( 27.125) <sub>10</sub> to Hexadecimal number.                                                             | A             | 1                |           |
|     | b) | Explain Duality theorem.                                                                                           | U             | 2                |           |
|     | c) | Explain working of TTL NAND gate.                                                                                  | U             | 3                |           |
|     | d) | Subtract ( 1010) <sub>2</sub> from ( 1111) <sub>2</sub> using 2's complement.                                      | U             | 1                |           |
|     | e) | Show $AB = \bar{A}C + A\bar{B}C(AB+C)$                                                                             | A             | 2                |           |
|     | f) | Interface TTL to CMOS family.                                                                                      | A             | 3                |           |
| Q.3 |    | Attempt any <b>FOUR</b> :                                                                                          |               |                  | 16        |
|     | a) | Subtract ( 357-294) <sub>10</sub> using 10's complement.                                                           | A             | 1                |           |
|     | b) | State and prove DeMorgans first theorem ( for 3 variables)                                                         | U             | 2                |           |
|     | c) | Compare TTL and CMOS on the basis of<br>i) Fan in<br>ii) Fan out<br>iii) Propagation delay. Iv) Power dissipation. | U             | 3                |           |
|     | d) | Subtract (891-736) <sub>10</sub> using 9's complement.                                                             | A             | 1                |           |
|     | e) | Interface CMOS to TTL family.                                                                                      | A             | 3                |           |
|     | f) | Explain with circuit diagram, working of 3 input NOR/OR gate.                                                      | U             | 3                |           |

**P.T.O.**

|     |                                                                                                                                                                                            |   |   |    |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|----|
| Q.4 | Attempt any <b>FOUR</b> :                                                                                                                                                                  |   |   | 08 |
|     | a) Draw the circuit of a half subtractor.                                                                                                                                                  | R | 4 |    |
|     | b) List the types of triggering that can be used for clocking a flip-flop.                                                                                                                 | R | 5 |    |
|     | c) State any four applications of DAC.                                                                                                                                                     | R | 6 |    |
|     | d) Draw the symbol and write truth table of 1:2 DEMUX.                                                                                                                                     | R | 4 |    |
|     | e) List any four applications of shift registers.                                                                                                                                          | R | 5 |    |
|     | f) Classify semiconductor memories.                                                                                                                                                        | U | 6 |    |
| Q.5 | Attempt any <b>FOUR</b> :                                                                                                                                                                  |   |   | 16 |
|     | a) Draw pin and block diagram of IC 74181 (ALUIC).                                                                                                                                         | R | 4 |    |
|     | b) Describe working at clocked S-R flip-flop using NAND gate.                                                                                                                              | U | 5 |    |
|     | c) Explain successive approximation method of ADC with neat diagram.                                                                                                                       | U | 6 |    |
|     | d) Construct 16:1 MUX using 4:1 multiplexer.                                                                                                                                               | A | 4 |    |
|     | e) In the given fig. if the 4 bit serial in parallel out, right shift register has the initial contents 0110. After 3 clock pulses applied what will be the content of the shift register. | A | 5 |    |
|     |                                                                                                        |   |   |    |
|     | f) Explain half adder with truth table and logic diagram.                                                                                                                                  | U | 4 |    |
| Q.6 | Attempt any <b>FOUR</b> :                                                                                                                                                                  |   |   | 16 |
|     | a) Compare RAM and ROM on the basis of following points<br>i) Operations involved ii) types of storage iii) Types iv) Application                                                          | U | 6 |    |
|     | b) Draw the logical circuit diagram of a 3-bit asynchronous up counter and explain.                                                                                                        | U | 5 |    |
|     | c) Explain BCD to seven segment decoder with truth table and circuit diagram.                                                                                                              | U | 4 |    |
|     | d) For a 6-bit binary R-2R ladder, assume '0' = 0 volt and '1' = +10 volt. Find the output voltages for following digital input :<br>i) 101001 ii) 11001                                   | A | 6 |    |
|     | e) Explain master slave J-K flip-flop with circuit diagram and truth table.                                                                                                                | U | 5 |    |
|     | f) Draw and explain the block diagram of IC 74147 (Decimal to BCD encoder) write truth table.                                                                                              | U | 4 |    |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

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**ODD TERM END EXAM NOV/DEC -2018****EXAM SEAT NO.**

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**LEVEL: FIRST****PROGRAM: IE/E&TC****COURSE CODE: EIF101/ETE101 COURSE NAME: ELECTRONIC COMPONENTS AND APPLICATIONS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 17/12/2018****Instruction:-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)  
 2) Illustrate your answers with sketches where ever necessary.  
 3) Use of non-programmable pocket calculator is permissible.  
 4) Mathematical and other tables will be made available on request.  
 5) Assume and mention suitable additional data necessary.  
 6) Use of Mobile is strictly prohibited.  
 7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application **CO**>Course outcome

| <b>S</b>   | <b>Q</b> | <b>Question Text</b>                                                                                                                                                    | <b>R</b> | <b>CO</b>    | <b>Mar</b>  |
|------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|-------------|
| <b>QN</b>  | <b>N</b> |                                                                                                                                                                         | <b>U</b> | <b>EIF</b>   | <b>ks</b>   |
| <b>Q.1</b> |          | Attempt any <b>FOUR</b>                                                                                                                                                 |          | <b>A 101</b> | <b>(08)</b> |
|            | a)       | List any four specifications of resistor.                                                                                                                               | R        | 1            |             |
|            | b)       | List the different types of capacitor. In which type of capacitor care should be taken for correct polarity in dc circuit.                                              | R        | 2            |             |
|            | c)       | Define the inductive reactance of inductor.                                                                                                                             | R        | 3            |             |
|            | d)       | State any four dielectric materials used in manufacturing the capacitor.                                                                                                | R        | 2            |             |
|            | e)       | List four non-linear resistors.                                                                                                                                         | R        | 1            |             |
|            | f)       | List types of an inductor.                                                                                                                                              | R        | 3            |             |
| <b>Q.2</b> |          | Attempt any <b>FOUR</b>                                                                                                                                                 |          |              | <b>(16)</b> |
|            | a)       | Explain PVC gang capacitor with its constructional diagram.                                                                                                             | U        | 2            |             |
|            | b)       | Compare TDR and LDR on the basis of following points.<br>i) working principle<br>ii) Material used for construction<br>iii) Characteristics<br>iv) Applications.        | U        | 1            |             |
|            | c)       | Explain the constructional details of air core inductor.                                                                                                                | U        | 3            |             |
|            | d)       | Identify the colour code for the following resistor.<br>i) $100\Omega, \pm 10\%$<br>ii) $47k\Omega, \pm 5\%$<br>iii) $150\Omega, \pm 5\%$<br>iv) $2.7k\Omega, \pm 10\%$ | A        | 1            |             |
|            | e)       | Explain any four specification of capacitor.                                                                                                                            | U        | 2            |             |
|            | f)       | Define the following terms with respect to inductor.<br>i) Self inductance<br>ii) Mutual inductance<br>iii) Co-efficient of coupling<br>iv) Leakage inductance.         | R        | 3            |             |

**P.T.O**

| Q.3 | Attempt any <b>FOUR</b>                                                                                                                |   |   | (16) |
|-----|----------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
| a)  | Draw and explain rheostats with specifications.                                                                                        | U | 1 |      |
| b)  | Draw construction of aluminum electrolytic capacitor and label different parts. State any two applications.                            | U | 2 |      |
| c)  | Compare iron core inductor and ferrite core inductor. (any four points)                                                                | U | 3 |      |
| d)  | Draw constructional details of carbon film resistor and give its two specifications.                                                   | U | 1 |      |
| e)  | Explain the Trimmer capacitor with constructional diagram and write its two applications.                                              | U | 2 |      |
| f)  | Find the value of an inductor having the following colour code.<br>i) Blue, Gray, Brown, Gold<br>ii) Silver, Blue, Gold, Gray, Silver. | A | 3 |      |
| Q.4 | Attempt any <b>FOUR</b>                                                                                                                |   |   | (08) |
| a)  | Draw the flowchart for preparation of PCB.                                                                                             | R | 6 |      |
| b)  | Compare between cables and connectors. (any two points)                                                                                | U | 4 |      |
| c)  | List any two applications of liquid crystal display (LCD).                                                                             | R | 5 |      |
| d)  | Draw the diagram of toggle switch.                                                                                                     | R | 5 |      |
| e)  | List any two general specifications of connectors.                                                                                     | R | 4 |      |
| f)  | List any two advantages of PCB.                                                                                                        | R | 6 |      |
| Q.5 | Attempt any <b>FOUR</b>                                                                                                                |   |   | (16) |
| a)  | Draw mercury wetted reed relay.                                                                                                        | U | 5 |      |
| b)  | Explain dip soldering technique of PCB.                                                                                                | U | 6 |      |
| c)  | Describe twin core cable.                                                                                                              | U | 4 |      |
| d)  | Draw DB-25 connector and DB-9 printer connector.                                                                                       | U | 4 |      |
| e)  | Illustrate LED display with neat constructional diagram.                                                                               | U | 5 |      |
| f)  | Explain with neat diagram rocker switch.                                                                                               | U | 5 |      |
| Q.6 | Attempt any <b>FOUR</b>                                                                                                                |   |   | (16) |
| a)  | Explain BNC connector with neat diagram.                                                                                               | U | 4 |      |
| b)  | Describe screen printing method of PCB.                                                                                                | U | 6 |      |
| c)  | Describe FRC cable with neat diagram.                                                                                                  | U | 4 |      |
| d)  | Draw slide switch and PUSH to ON switch.                                                                                               | U | 5 |      |
| e)  | Compare between switch and relay. (any four points)                                                                                    | U | 5 |      |
| f)  | Illustrate hand soldering technique of PCB with example.                                                                               | U | 6 |      |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**ODD TERM END EXAM NOV/DEC -2018****EXAM SEAT NO.**

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**LEVEL: FOURTH****PROGRAM: IE/E&TC****COURSE CODE: EIF406/IEE406/EJ308/ETE406 COURSE NAME: ELECTRONIC CIRCUIT DESIGN****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 14/12/2018****Instruction:-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) **QN>**Question No, **SQN>**Sub-Question No, **R>** Remembering, **U>**Understanding, **A>**Application **CO>**Course outcome

| QN         | S  | Question Text                                                                                                                                  | R | CO | Mark<br>s    |
|------------|----|------------------------------------------------------------------------------------------------------------------------------------------------|---|----|--------------|
| <b>Q.1</b> |    | Attempt any <b>FOUR</b>                                                                                                                        |   |    | <b>(08)</b>  |
|            | a) | State any two disadvantages of two stage RC coupled amplifier.                                                                                 | R | 3  |              |
|            | b) | List any four specification of UJT.                                                                                                            | R | 1  |              |
|            | c) | Draw a circuit diagram of IC723 low voltage regulator.                                                                                         | U | 2  |              |
|            | d) | Give the two differences between zener diode and semiconductor diode.                                                                          | R | 1  |              |
|            | e) | State meaning of Darlington pair.                                                                                                              | R | 3  |              |
|            | f) | Draw circuit diagram of center tapped rectifier with L-section filter.                                                                         | U | 2  |              |
| <b>Q.2</b> |    | Attempt any <b>FOUR</b>                                                                                                                        |   |    | <b>(16)</b>  |
|            | a) | Explain design steps with diagram in transistor series voltage regulator.                                                                      | U | 2  |              |
|            | b) | Give the difference between BJT and FET (any four points)                                                                                      | U | 1  |              |
|            | c) | Give the design steps for two stage RC- coupled common emitter amplifier for AC analysis.                                                      | U | 3  |              |
|            | d) | Design a full wave bridge rectifier using a capacitor filter to provide 100V dc at 50mA with a maximum ripple of 1%.                           | A | 2  |              |
|            | e) | Classify the transformers used in electronics circuit. State two specifications of any two transformers.                                       | R | 1  |              |
|            | f) | Explain design steps of source follower circuit.                                                                                               | U | 3  |              |
| <b>Q.3</b> |    | Attempt any <b>TWO</b>                                                                                                                         |   |    | <b>(16)</b>  |
|            | a) | Design a single stage CE amplifier to give a voltage gain of 100 with stability factor 10 and output voltage of 2Vrms using transistor BC147A. | A | 3  |              |
|            | b) | Design a zener regulator to provide 12V output from 24V unregulated power supply. Also calculate line and load regulations.                    | A | 2  |              |
|            |    |                                                                                                                                                |   |    | <b>P.T.O</b> |



|            |                                                                                                                                                                                                                                                                                                                                                                                                           |   |   |      |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
| c)         | Design emitter follower circuit to provided input impedance of $500k\Omega$ for lower 3dB frequency of 50Hz the output voltage required is of 3V with load resistance of $5k\Omega$ . The source resistance of generator is $600\Omega$ .                                                                                                                                                                 | A | 3 |      |
| <b>Q.4</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                                                                                                                   |   |   | (08) |
| a)         | Compare between voltages of power amplifier with following points.<br><i>A &amp; B</i><br>i) Coupling-used <i>Q' point (operating point)</i><br>ii) Current gain( $\beta$ ) <i>conduction angle.</i>                                                                                                                                                                                                      | U | 4 |      |
| b)         | Draw circuit diagram of class B push pull power amplifier.                                                                                                                                                                                                                                                                                                                                                | R | 4 |      |
| c)         | Write any two advantages of complementary symmetry power amplifier.                                                                                                                                                                                                                                                                                                                                       | R | 4 |      |
| d)         | Write the two requirements for oscillations.                                                                                                                                                                                                                                                                                                                                                              | U | 5 |      |
| e)         | Draw circuit diagram of colpitt's oscillator using opamp.                                                                                                                                                                                                                                                                                                                                                 | R | 5 |      |
| f)         | Define i) Monostable multivibrator. ii) Bistable multivibrator.                                                                                                                                                                                                                                                                                                                                           | R | 6 |      |
| <b>Q.5</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                                                                                                                   |   |   | (16) |
| a)         | Draw circuit diagram of class A power amplifier with resistive load. Also write its design steps.                                                                                                                                                                                                                                                                                                         | U | 4 |      |
| b)         | Draw circuit diagram of Wien bridge oscillator using transistor & <i>write explain its working- design steps.</i>                                                                                                                                                                                                                                                                                         | U | 5 |      |
| c)         | Design an astable multivibrator using IC555 for maximum output frequency of 5KHz with duty cycle $\leq 25\%$ .                                                                                                                                                                                                                                                                                            | A | 6 |      |
| d)         | Design a Wien bridge oscillator using opamp for output frequency of 975Hz.                                                                                                                                                                                                                                                                                                                                | A | 5 |      |
| e)         | Design monostable multivibrator using IC741 for pulse duration of 120msec with reference voltage of 5V. Use $\pm V_{CC} = \pm 15V$ .                                                                                                                                                                                                                                                                      | A | 6 |      |
| f)         | Design phase shift oscillator using opamp for maximum frequency of oscillation of 2KHz. Use supply voltage of $\pm 12V$ .                                                                                                                                                                                                                                                                                 | A | 5 |      |
| <b>Q.6</b> | Attempt any <b>TWO</b>                                                                                                                                                                                                                                                                                                                                                                                    |   |   | (16) |
| a)         | Design a Hartley oscillator using transistor for $f_0 = 5MHz$ , $V_{0(p)} = 4V_{rms}$ , $R_L = 2.2k\Omega$                                                                                                                                                                                                                                                                                                | A | 5 |      |
| b)         | Design a transformer coupled class A power amplifier to meet the following requirements. $P_0 = 2W$ , $R_L = 4\Omega$ , $V_{CC} = 12V$ .                                                                                                                                                                                                                                                                  | A | 4 |      |
| c)         | i) Draw circuit diagram of monostable multivibrator using IC555 & explain its working.<br>ii) Design monostable multivibrator using IC555 that operates with 15V supply & turns ON LED for duration of 10msec every time it receives a negative trigger pulse. The LED required 20mA of current & forward voltage drop of 1.4V. The high output of timer is $V_0 = (V_{CC} - 2V_{BE} - V_{CE(sat)})$ Volt | U | 6 |      |

ECB  
Dr. Thushet

Table 1: Standard Resistance Values  $\pm 1\%$ ,  $\pm 5\%$ ,  $\pm 10\%$ 

| Ohms (Ω) |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | Kilohms (KΩ) |     |     |     |     |     |     |     |     |     |     |     | Megohms (MΩ) |     |     |     |     |     |     |     |     |     |     |     |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 10       | 11  | 12  | 13  | 15  | 16  | 18  | 20  | 22  | 24  | 27  | 30  | 33  | 36  | 39  | 43  | 47  | 51  | 56  | 62  | 68  | 75  | 82  | 91  | 100          | 110 | 120 | 130 | 150 | 160 | 180 | 200 | 220 | 240 | 270 | 300 | 330          | 360 | 390 | 430 | 470 | 510 | 560 | 620 | 680 | 750 | 820 | 910 |
| 1.0      | 1.1 | 1.2 | 1.3 | 1.5 | 1.6 | 1.8 | 2.0 | 2.2 | 2.4 | 2.7 | 3.0 | 3.3 | 3.6 | 3.9 | 4.3 | 4.7 | 5.1 | 5.6 | 6.2 | 6.8 | 7.5 | 8.2 | 9.1 | 10           | 11  | 12  | 13  | 15  | 16  | 18  | 20  | 22  | 24  | 27  | 30  | 33           | 36  | 39  | 43  | 47  | 51  | 56  | 62  | 68  | 75  | 82  | 91  |

Table 2: Standard Capacitor Values

| Ecko Farad (pF $\rightarrow 10^{-12}$ ) |     | Micro Farad (pF $\rightarrow 10^{-6}$ ) |     |
|-----------------------------------------|-----|-----------------------------------------|-----|
| 10                                      | 100 | 1.0                                     | 10  |
| 12                                      | 120 | -                                       | -   |
| 15                                      | 150 | 0.15                                    | 18  |
| 22                                      | 220 | 0.22                                    | 22  |
| 27                                      | 270 | -                                       | -   |
| 33                                      | 330 | 0.33                                    | 33  |
| 39                                      | 390 | -                                       | -   |
| 47                                      | 470 | 0.47                                    | 47  |
| 56                                      | 560 | -                                       | -   |
| 68                                      | 680 | 0.68                                    | 6.8 |
| 82                                      | 820 | -                                       | -   |

Table 3: Rectifier Diode Specification Sheet

| Type No. | Material (S/C) | $V_R$ (FIV) (V) | $I_F$ (A) | $V_F$ (V) | $I_R$ ( $\mu$ A) |
|----------|----------------|-----------------|-----------|-----------|------------------|
| IN 4001  | S              | 50              | 1.0       | 1.1       | 5                |
| IN 4002  | S              | 100             | 1.0       | 1.1       | 5                |
| IN 4003  | S              | 200             | 1.0       | 1.1       | 5                |
| IN 4004  | S              | 400             | 1.0       | 1.1       | 5                |
| IN 4005  | S              | 600             | 1.0       | 1.1       | 5                |
| IN 4006  | S              | 800             | 1.0       | 1.1       | 5                |
| IN 4007  | S              | 1000            | 1.0       | 1.1       | 10               |
| IN 4148  | S              | 75              | 0.1       | 1.0       | 25 (mA)          |
| IN 5060  | S              | 400             | 2.5       | 1.25      | 0.2              |
| IN 5061  | S              | 600             | 2.5       | 1.25      | 0.2              |
| IN 5062  | S              | 800             | 2.5       | 1.25      | 0.2              |
| IN 5391  | S              | 50              | 1.5       | 1.4       | 250              |
| IN 5393  | S              | 200             | 1.5       | 1.4       | 250              |
| IN 5397  | S              | 600             | 1.5       | 1.4       | 250              |
| IN 5399  | S              | 1000            | 1.5       | 1.4       | 250              |
| IN 5402  | S              | 200             | 3.0       | 1.0       | 10               |
| IN 5408  | S              | 1000            | 3.0       | 1.0       | 5                |
| IN 5409  | S              | 200             | 2.5       | 1.25      | 0.2              |
| OA 47    | G              | 25              | 0.05      | 0.6       | 30               |
| OA 85    | G              | 115             | 0.05      | 0.1       | 4.5              |
| OA 90    | G              | 30              | 0.008     | 0.1       | 2.4              |
| OA 95    | G              | 115             | 0.05      | 0.1       | 4.5              |
| BA 100   | G              | 60              | 0.09      | -         | -                |
| BA 102   | G              | 20              | 0.09      | -         | -                |
| BY 100   | S              | 1250            | 1.0       | 1.5       | 10               |
| BY 125   | S              | 150             | 1.0       | -         | 10               |
| BY 126   | S              | 650             | 1.0       | 1.5       | 10               |
| BY 127   | S              | 1250            | 1.0       | 1.5       | 10               |
| DR 25    | G              | 25              | 0.25      | -         | -                |

### Appendix - 3

Table 4 : Zener Diode Specification Sheet

| Type No. | Zener Voltage<br>( $V_Z$ ) at $I_{ZT}$ | Zener Test Current<br>( $I_{ZT}$ ) mA | Zener Impedance<br>( $Z_{ZT}$ ) $\Omega$ | Max. Zener Current<br>( $I_{ZM}$ ) mA |
|----------|----------------------------------------|---------------------------------------|------------------------------------------|---------------------------------------|
| 1N 4370  | 2.4                                    | 20                                    | 30                                       | 150                                   |
| 1N 4371  | 2.7                                    | 20                                    | 30                                       | 135                                   |
| 1N 4372  | 3.0                                    | 20                                    | 29                                       | 120                                   |
| 1N 746   | 3.3                                    | 20                                    | 28                                       | 110                                   |
| 1N 747   | 3.6                                    | 20                                    | 24                                       | 100                                   |
| 1N 748   | 3.9                                    | 20                                    | 23                                       | 95                                    |
| 1N 749   | 4.3                                    | 20                                    | 22                                       | 85                                    |
| 1N 750   | 4.7                                    | 20                                    | 19                                       | 75                                    |
| 1N 751   | 5.1                                    | 20                                    | 17                                       | 70                                    |
| 1N 752   | 5.6                                    | 20                                    | 11                                       | 65                                    |
| 1N 753   | 6.2                                    | 20                                    | 7                                        | 60                                    |
| 1N 754   | 6.8                                    | 20                                    | 5                                        | 55                                    |
| 1N 755   | 7.5                                    | 20                                    | 6                                        | 50                                    |
| 1N 756   | 8.2                                    | 20                                    | 8                                        | 45                                    |
| 1N 757   | 9.1                                    | 20                                    | 10                                       | 40                                    |
| 1N 758   | 10                                     | 20                                    | 17                                       | 35                                    |
| 1N 759   | 12                                     | 20                                    | 30                                       | 30                                    |
| 1N 957A  | 6.8                                    | 18.5                                  | 4.5                                      | 47                                    |
| 1N 960A  | 9.1                                    | 14                                    | 7.5                                      | 35                                    |
| 1N 962A  | 11                                     | 11.5                                  | 9.5                                      | 28                                    |
| 1N 964A  | 13                                     | 9.5                                   | 13                                       | 24                                    |
| 1N 965A  | 15                                     | 8.5                                   | 16                                       | 21                                    |
| 1N 966A  | 16                                     | 7.8                                   | 17                                       | 19                                    |
| 1N 968A  | 20                                     | 6.2                                   | 25                                       | 15                                    |
| 1N 972A  | 30                                     | 4.2                                   | 49                                       | 10                                    |
| 1N 980A  | 62                                     | 2.0                                   | 185                                      | 4.9                                   |
| 1N 983A  | 82                                     | 1.5                                   | 330                                      | 3.7                                   |
| 1N 985A  | 100                                    | 1.3                                   | 500                                      | 3.0                                   |
| 1N 3993  | 3.9                                    | 640                                   | 2                                        | 2360                                  |
| 1N 3994  | 4.3                                    | 580                                   | 1.5                                      | 2130                                  |
| 1N 3995  | 4.7                                    | 530                                   | 1.2                                      | 1940                                  |
| 1N 3996  | 5.1                                    | 490                                   | 1.1                                      | 1780                                  |
| 1N 3397  | 5.6                                    | 445                                   | 1.0                                      | 1620                                  |
| 1N 3998  | 6.2                                    | 405                                   | 1.1                                      | 1460                                  |
| 1N 3999  | 6.8                                    | 370                                   | 1.2                                      | 1330                                  |
| 1N 4000  | 7.5                                    | 355                                   | 1.3                                      | 1210                                  |

1N 4370 series :  $\pm 10\%$  suffix A for  $\pm 5\%$  units, C for  $\pm 2\%$ , D for  $\pm 1\%$   
 1N 746 series :  $\pm 10\%$  suffix A for  $\pm 5\%$  units, C for  $\pm 2\%$ , D for  $\pm 1\%$   
 1N 795 series :  $\pm 10\%$  suffix A for  $\pm 10\%$  units, C for  $\pm 2\%$ , D for  $\pm 1\%$

### Appendix - 4

Table 5 : Transistor Data Sheet

| Transistor No | Material and Type | $V_{CE}$ (V) | $V_{CE}$ (V) | $V_{EB}$ (V) | $I_{C(max)}$ (mA) | PT (mW) | $h_{FE}$ | $f_T$ (MHz) |
|---------------|-------------------|--------------|--------------|--------------|-------------------|---------|----------|-------------|
| AC105         | PG                | 40           | 18           | 10           | 1 A               | 400     | 15       | -           |
| AC110         | PG                | 20           | 15           | 10           | 50                | 30      | 75       | 0.5         |
| AC126         | PG                | 32           | 12           | 10           | 100               | 500     | 100      | 1           |
| AC127         | NG                | 32           | 12           | 10           | 500               | 340     | 50       | 1.5         |
| AC128         | PG                | 32           | 16           | 10           | 1 A               | 67      | 45/165   | 1           |
| AC130         | NG                | 20           | 15           | 10           | 100               | 145     | 50       | 2           |
| AC131         | PG                | 45           | 32           | 10           | 1 A               | 75      | 40/120   | -           |
| AC153         | PG                | 32           | 18           | 10           | 2 A               | 1 W     | 50       | 1           |
| AC163         | PG                | 32           | 24           | 10           | 200               | 900     | 80       | 1           |
| AC166         | PG                | 32           | 20           | 6            | 800               | 200     | 45       | 0.8         |
| BC107         | NS                | 50           | 45           | 6            | 100               | 300     | 110      | 150         |
| BC108         | NS                | 50           | 20           | 5            | 100               | 300     | 120      | 150         |
| BC109         | NS                | 30           | 20           | 5            | 100               | 300     | 180      | 150         |
| BC115         | NS                | 40           | 30           | 5            | 100               | 300     | 80       | 40          |
| BC116         | PS                | 45           | 40           | 5            | 100               | 300     | 35       | 150         |
| BC119         | NS                | 60           | 30           | 5            | 1 A               | 800     | 40       | 40          |
| BC126         | PS                | 35           | 30           | 5            | 600               | 300     | 40       | 100         |
| BC138         | NS                | 60           | 40           | 5            | 1 A               | 800     | 35       | 40          |
| BC139         | PS                | 40           | 40           | 5            | 500               | 700     | 40       | 100         |
| BC142         | NS                | 80           | 60           | 5            | 1 A               | 800     | 20       | 40          |
| BC146         | NS                | 20           | 20           | 4            | 50                | 50      | 80       | 150         |
| BC147A        | NS                | 50           | 45           | 6            | 200               | 250     | 110/220  | 150         |
| BC147B        | NS                | 50           | 45           | 6            | 200               | 250     | 200/330  | 150         |
| BC148         | NS                | 30           | 20           | 5            | 200               | 250     | 110      | 150         |
| BC151         | PS                | 25           | 20           | -            | 100               | 200     | 90/150   | 120         |
| BC158         | PS                | 30           | 25           | 5            | 100               | 300     | 70       | 100         |
| BC161         | PS                | 60           | 60           | 5            | 1 A               | 3.2 W   | 40       | 50          |
| BC177         | PS                | 45           | 45           | 5            | 100               | 300     | 70       | 150         |
| BC178B        | PG                | 30           | 25           | 5            | 200               | 300     | 180      | 100         |
| BC179A        | PS                | 25           | 20           | 5            | 50                | 300     | 120      | 100         |
| BC180         | NS                | 30           | 30           | -            | 500               | 300     | 100      | 150         |
| BC194         | NS                | 40           | 25           | 5            | 800               | 100     | 40/250   | 250         |
| 2N109         | PG                | 35           | 25           | 12           | 150               | 165     | 65       | 0.15        |
| 2N244         | NS                | 60           | 60           | -            | 60                | 750     | 59       | -           |
| 2N271         | PG                | 30           | 10           | 20           | 200               | 150     | 45       | 4           |
| 2N312         | NG                | 15           | 15           | 15           | 200               | 150     | 50       | -           |
| 2N329B        | PS                | 50           | 30           | 20           | 100               | 400     | 36/88    | 2           |
| 2N334A        | NS                | 45           | 45           | 4            | 25                | 500     | 18/86    | 5           |
| 2N914         | NS                | 40           | 15           | 5            | 200               | 360     | 30/120   | 300         |



| Transistor No. and Type | Material | $V_{CE}$ (V) | $V_{BE}$ (V) | $I_C$ (mA) | $P_T$ (mW) | $f_T$ (MHz) | High Frequency Transistors |          |       |       |       |          |                |
|-------------------------|----------|--------------|--------------|------------|------------|-------------|----------------------------|----------|-------|-------|-------|----------|----------------|
|                         |          |              |              |            |            |             | $V_{CE}$                   | $V_{BE}$ | $I_C$ | $P_T$ | $f_T$ | Material | Transistor No. |
| 2N918                   | NS       | 30           | 15           | 3          | 50         | 20          | 200                        | 200      | 20    | 200   | 600   | NS       | 2N918          |
| 2N930                   | NS       | 45           | 45           | 5          | 30         | 100         | 300                        | 300      | 100   | 30    | 100   | NS       | 2N930          |
| 2N941                   | PS       | 25           | 8            | 25         | 50         | 250         | 250                        | 250      | 10    | 10    | 16    | PS       | 2N941          |
| 2N1711                  | NS       | 75           | 50           | 7          | 600        | 800         | 800                        | 800      | 100   | 100   | 70    | NS       | 2N1711         |
| 2N1779                  | NG       | 25           | 15           | 15         | 200        | 200         | 200                        | 200      | 100   | 100   | 3     | NG       | 2N1779         |
| 2N1893                  | NS       | 120          | 80           | 7          | 500        | 800         | 800                        | 800      | 400   | 400   | 250   | NS       | 2N1893         |
| 2N2219                  | NS       | 60           | 30           | 5          | 300        | 450         | 450                        | 450      | 100   | 100   | 40    | NS       | 2N2219         |
| 2N2396                  | NS       | 60           | 40           | 7          | 50         | 300         | 300                        | 300      | 125   | 125   | 60    | NS       | 2N2396         |
| 2N2903                  | NS       | 60           | 30           | 7          | 600        | 600         | 600                        | 600      | 100   | 100   | 200   | NS       | 2N2903         |
| 2N2905                  | PS       | 60           | 40           | 5          | 400        | 400         | 400                        | 400      | 400   | 400   | 50    | PS       | 2N2905         |
| 2N2909                  | NS       | 60           | 40           | 4          | 500        | 400         | 400                        | 400      | 300   | 300   | 100   | NS       | 2N2909         |
| 2N2927                  | PS       | 25           | 15           | 0.3        | 50         | 75          | 75                         | 75       | 400   | 400   | 400   | PS       | 2N2927         |
| 2N2976                  | NS       | 45           | 45           | 60         | 30         | 250         | 250                        | 250      | 60    | 60    | 60    | NS       | 2N2976         |
| 2N3015                  | NS       | 60           | 30           | 5          | 500        | 800         | 800                        | 800      | 300   | 300   | 30    | NS       | 2N3015         |
| 2N3903                  | NS       | 60           | 40           | 6          | 200        | 300         | 300                        | 300      | 200   | 200   | 250   | NS       | 2N3903         |
| 2N5837                  | NS       | 10           | 5            | 3.5        | 300        | 2 W         | 2 W                        | 2 W      | 25    | 25    | 1700  | NS       | 2N5837         |
| 2N5843                  | PS       | 50           | 40           | 5          | 50         | 500         | 500                        | 500      | 500   | 500   | 20    | PS       | 2N5843         |
| 2N5855                  | PS       | 60           | 60           | 5          | 1 A        | 750         | 750                        | 750      | 500   | 500   | 15    | PS       | 2N5855         |
| 2N5856                  | NS       | 60           | 60           | 5          | 1 A        | 750         | 750                        | 750      | 500   | 500   | 200   | NS       | 2N5856         |

Appendix A-5

(5)

| Transistor No. and Type | Material | $V_{CE}$ (V) | $V_{BE}$ (V) | $I_C$ (mA) | $P_T$ (W) | $f_T$ (MHz) | Power Transistors |          |       |       |       |          |                |
|-------------------------|----------|--------------|--------------|------------|-----------|-------------|-------------------|----------|-------|-------|-------|----------|----------------|
|                         |          |              |              |            |           |             | $V_{CE}$          | $V_{BE}$ | $I_C$ | $P_T$ | $f_T$ | Material | Transistor No. |
| AD1364                  | PG       | 40           | 55           | 30         | 40        | 0.3         | 30                | 35       | 11    | 30    | 0.3   | PG       | AD1364         |
| AD140                   | PG       | 55           | 55           | 55         | 30        | 0.2         | 30                | 30       | 35    | 30    | 0.45  | PG       | AD140          |
| AD143-5                 | PG       | 45           | 35           | 10         | 10        | 0.45        | 10                | 10       | 10    | 30    | 0.45  | PG       | AD143-5        |
| AD156V                  | PG       | 32           | 16           | 10         | 10        | 0.45        | 10                | 10       | 2     | 8     | 0.45  | PG       | AD156V         |
| AD157V                  | NG       | 32           | 16           | 10         | 10        | 0.45        | 10                | 10       | 2     | 8     | 0.45  | NG       | AD157V         |
| AD161                   | NG       | 32           | 20           | 10         | 10        | 0.45        | 10                | 10       | 1     | 4     | 0.45  | NG       | AD161          |
| AB162                   | PG       | 32           | 20           | 10         | 10        | 0.45        | 10                | 10       | 1     | 5     | 0.45  | PG       | AB162          |
| AD165                   | NG       | 25           | 20           | 10         | 10        | 0.45        | 10                | 10       | 1     | 10    | 0.45  | NG       | AD165          |
| AD262                   | PG       | 35           | 20           | 10         | 10        | 0.45        | 10                | 10       | 0.6   | 0.25  | 0.45  | PG       | AD262          |
| ADY12                   | PG       | 60           | 45           | 180        | 245       | 0.15        | 180               | 180      | 6     | 6     | 0.15  | PG       | ADY12          |
| BD115                   | NS       | 70           | 45           | 45         | 70        | 60          | 70                | 70       | 2     | 15    | 60    | NS       | BD115          |
| BD124                   | NS       | 70           | 45           | 45         | 70        | 60          | 70                | 70       | 3     | 11    | 60    | NS       | BD124          |
| BD131                   | NS       | 70           | 45           | 45         | 70        | 60          | 70                | 70       | 3     | 11    | 60    | NS       | BD131          |
| BD132                   | PS       | 45           | 45           | 45         | 45        | 60          | 45                | 45       | 3     | 11    | 60    | PS       | BD132          |
| BD136                   | NS       | 45           | 45           | 45         | 45        | 60          | 45                | 45       | 1     | 12    | 60    | NS       | BD136          |
| BD137                   | NS       | 60           | 60           | 60         | 60        | 110         | 60                | 60       | 1     | 12    | 110   | NS       | BD137          |
| BD141                   | NS       | 140          | 60           | 120        | 60        | 110         | 60                | 60       | 8     | 15    | 110   | NS       | BD141          |
| BD145                   | NS       | 60           | 30           | 60         | 30        | 25          | 30                | 30       | 3     | 25    | 25    | NS       | BD145          |
| BD151                   | PS       | 50           | 45           | 45         | 50        | 45          | 45                | 45       | 3     | 25    | 45    | PS       | BD151          |
| BD152                   | NS       | 45           | 45           | 45         | 45        | 60          | 45                | 45       | 3     | 25    | 60    | NS       | BD152          |
| BD166                   | PS       | 45           | 45           | 45         | 45        | 60          | 45                | 45       | 1.5   | 20    | 60    | PS       | BD166          |
| BD181                   | NS       | 55           | 70           | 55         | 70        | 117         | 55                | 55       | 10    | 28    | 117   | NS       | BD181          |
| BD182                   | NS       | 55           | 70           | 55         | 70        | 117         | 55                | 55       | 15    | 40    | 117   | NS       | BD182          |
| BD187                   | NS       | 55           | 55           | 55         | 55        | 4           | 55                | 55       | 4     | 40    | 4     | NS       | BD187          |
| BD188                   | PS       | 55           | 55           | 55         | 55        | 4           | 55                | 55       | 4     | 40    | 4     | PS       | BD188          |
| BD232                   | NS       | 55           | 55           | 55         | 55        | 0.25        | 55                | 55       | 0.25  | 11    | 0.25  | NS       | BD232          |
| SL100                   | NS       | 60           | 50           | 50         | 50        | 0.5         | 50                | 50       | 0.5   | 4     | 0.5   | NS       | SL100          |
| SK100                   | PS       | 60           | 50           | 50         | 50        | 0.5         | 50                | 50       | 0.5   | 4     | 0.5   | PS       | SK100          |
| SL102                   | NS       | 30           | 30           | 30         | 30        | 1           | 30                | 30       | 1     | 3     | 1     | NS       | SL102          |
| SK102                   | PS       | 30           | 30           | 30         | 30        | 1           | 30                | 30       | 1     | 3     | 1     | PS       | SK102          |
| TP290C                  | NS       | 100          | 100          | 100        | 100       | 1           | 100               | 100      | 1     | 30    | 1     | NS       | TP290C         |
| TP31                    | NS       | 40           | 40           | 40         | 40        | 3           | 40                | 40       | 3     | 40    | 3     | NS       | TP31           |
| TP32                    | PS       | 40           | 40           | 40         | 40        | 3           | 40                | 40       | 3     | 40    | 3     | PS       | TP32           |
| TP33                    | NS       | 40           | 40           | 40         | 40        | 3           | 40                | 40       | 3     | 40    | 3     | NS       | TP33           |
| TP34                    | PS       | 40           | 40           | 40         | 40        | 3           | 40                | 40       | 3     | 40    | 3     | PS       | TP34           |
| TP42                    | PS       | 40           | 40           | 40         | 40        | 3           | 40                | 40       | 3     | 40    | 3     | PS       | TP42           |

A-5 A Practical Approach to Electronic Circuit Design

(6)

P.T.O.

| Transistor No | Material and Type | V <sub>CE</sub> (V) | V <sub>CE</sub> (V) | V <sub>EB</sub> (V) | I <sub>C(max)</sub> (A) | P <sub>T</sub> (W) | f <sub>T</sub> (MHz) |
|---------------|-------------------|---------------------|---------------------|---------------------|-------------------------|--------------------|----------------------|
| TIP62         | PS                | 40                  | 40                  | 5                   | 2                       | 40                 | 15/100               |
| TIP120        | NS                | 60                  | 60                  | 5                   | 5                       | 60                 | 1000                 |
| TIP125        | PS                | 60                  | 60                  | 5                   | 5                       | 60                 | 1000                 |
| TIS45         | NS                | 40                  | 15                  | 5                   | 0.2                     | 250                | 30/120               |
| 2N1481        | NS                | 60                  | 40                  | 12                  | 1.5                     | 5                  | 35/100               |
| 2N1721        | NS                | 150                 | 100                 | -                   | 1                       | 15                 | 40/120               |
| 2N1722        | NS                | 120                 | 80                  | 10                  | 7.5                     | 50                 | 20/90                |
| 2N2067        | PG                | 40                  | 25                  | 20                  | 3                       | 10                 | 20                   |
| 2N2033        | NS                | 80                  | 60                  | -                   | 3                       | 5                  | 20/60                |
| 2N2017        | NS                | 60                  | 60                  | 8                   | 1                       | 1                  | 50/200               |
| 2N3053A       | NS                | 80                  | 60                  | 5                   | 700 mA                  | 5                  | 50                   |
| 2N3055        | NS                | 100                 | 60                  | 7                   | 15                      | 115                | 20/70                |
| 2N3140        | NS                | 140                 | 140                 | 1                   | 2                       | 25                 | 10                   |
| 2N3180        | PS                | 60                  | 60                  | -                   | 5                       | 85                 | 10/30                |
| 2N3878        | NS                | 120                 | 50                  | 7                   | 4                       | 35                 | 20                   |
| ECN100        | NS                | -                   | 60                  | -                   | 0.7                     | 5                  | 50                   |
| ECN149        | NS                | 50                  | 40                  | 6                   | 4                       | 30                 | 10                   |
| ECP149        | PS                | 50                  | 40                  | 6                   | 4                       | 30                 | 10                   |

Table 6: Field Effect Transistors

| Type   | Channel | V <sub>DS</sub> (V) | I <sub>D</sub> (mA) | I <sub>CS</sub> (mA) | V <sub>GS(on)</sub> (V) | I <sub>DSS</sub> (mA) | V <sub>RS</sub> (μΩ) | V <sub>CS</sub> (μΩ) | P <sub>D</sub> (W) |
|--------|---------|---------------------|---------------------|----------------------|-------------------------|-----------------------|----------------------|----------------------|--------------------|
| 2N3821 | N.CH    | 50                  | 10                  | 0.1                  | 4                       | 2.5                   | 1.5-4.5              | 10                   | 0.3                |
| 2N3822 | "       | 50                  | 10                  | 0.1                  | 6                       | 2.1                   | 3-6.5                | 20                   | 0.3                |
| 2N4091 | "       | 40                  | 10                  | 0.2                  | 5-10                    | 30                    | -                    | -                    | 0.3                |
| 2N4221 | "       | 30                  | 15                  | -0.1                 | -6                      | -                     | 2.5                  | 20                   | 0.3                |
| 2N4422 | "       | 30                  | 15                  | -0.1                 | -8                      | -                     | 2.5-6                | 40                   | 0.3                |
| 2N4416 | "       | 30                  | 10                  | 0.1                  | 6                       | -                     | 4.5-7.5              | 50                   | 0.3                |
| 2N4856 | "       | 40                  | -                   | -0.25                | -4, -10                 | 50                    | -                    | -                    | 0.36               |
| 2N5457 | "       | 25                  | 10                  | -1.0                 | -6                      | 3                     | 3000                 | 10-50                | 0.3                |
| 2N5458 | "       | 25                  | 10                  | -1                   | -7                      | 6-9                   | 4000                 | 10-50                | 0.3                |
| BFW10  | "       | 15                  | -                   | 0.1                  | 8                       | 820                   | 3.2 mA/V             | 50                   | 0.3                |
| BFW11  | "       | 15                  | -                   | 0.1                  | 6                       | 810                   | 3.2 mA/V             | -                    | 0.3                |

Table 7: Uni Junction Transistor

| Type   | I <sub>F</sub> (A) | η         | I <sub>r</sub> (μA) | I <sub>s</sub> (mA) | V <sub>BE</sub> (V) | P <sub>D</sub> (W) | R <sub>th</sub> (KΩ) |
|--------|--------------------|-----------|---------------------|---------------------|---------------------|--------------------|----------------------|
| 2N2646 | 2                  | 0.56-0.78 | 1.5                 | 6                   | 3.5                 | 0.3                | 4.7-9.1              |
| 2N3980 | 1.5                | 0.68-0.82 | 2                   | 1-10                | 3                   | 0.36               | 4-8                  |
| 2N4851 | 1.5                | 0.56-0.75 | 2                   | 2                   | 2.5                 | 0.3                | -                    |
| 2N4948 | 1                  | 0.55-0.82 | 0.6                 | 4                   | 2.5                 | 0.36               | 4-12                 |

78XX Voltage Regulator Datasheet :-

| Device type with Input Voltage | Output Voltage (V) | Output Current | Quiescent Current (mA) | Line regulation (mV) | Load regulation (mV) | Ripple rejection (dB) |
|--------------------------------|--------------------|----------------|------------------------|----------------------|----------------------|-----------------------|
| 78XXC (35)                     | 5                  | 1A             | 8                      | 25                   | 50                   | 80                    |
|                                | 12                 | 1A             | 8                      | 60                   | 120                  | 72                    |
|                                | 15                 | 1A             | 8                      | 75                   | 150                  | 70                    |
| 78LXXAC (35)                   | 5                  | 100 mA         | 3 to 5                 | 10                   | 5                    | 62                    |
|                                | 12                 | 100 mA         | 3 to 5                 | 20                   | 10                   | 54                    |
|                                | 15                 | 100 mA         | 3 to 5                 | 25                   | 12                   | 51                    |
| 78LXXC (35)                    | 5                  | 100 mA         | 3 to 6                 | 10                   | 5                    | 60                    |
|                                | 12                 | 100 mA         | 3 to 6.5               | 20                   | 10                   | 52                    |
|                                | 15                 | 100 mA         | 3 to 6.5               | 25                   | 12                   | 48                    |
| 78MXX (35)                     | 5                  | 0.5A           | 4.2 mA                 | 50                   | 100                  | 78                    |
|                                | 12                 | 0.5A           | 4 to 10                | 120                  | 240                  | 71                    |
|                                | 15                 | 0.5A           | 4 to 10                | 150                  | 300                  | 69                    |

79XX Voltage Regulator sheet:-

| Device type | Output Voltage (V) | Max. Input vol |
|-------------|--------------------|----------------|
| 7902        | -2                 | -35            |
| 7905        | -5                 | -35            |
| 7905.2      | -5.2               | -35            |
| 7906        | -6                 | -35            |
| 7908        | -8                 | -35            |
| 7912        | -12                | -35            |
| 7915        | -15                | -35            |
| 7918        | -18                | -35            |
| 7924        | -24                | -40            |



**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**ODD TERM END EXAM NOV/DEC -2018****EXAM SEAT NO.**

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**LEVEL: FIRST****PROGRAM: EE/IE/E&TC/IT****COURSE CODE: CCF102/CCCE102****COURSE NAME: ENGINEERING PHYSICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 14/12/2018****Instruction:-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

| S<br>QN      | Q<br>N | Question Text                                                                                                  | R<br>U<br>A | CO<br>CCF<br>102 | Mar<br>ks |
|--------------|--------|----------------------------------------------------------------------------------------------------------------|-------------|------------------|-----------|
| Q.1          |        | Attempt any <b>FOUR</b>                                                                                        |             |                  | (08)      |
|              | a)     | Define stress and state its types.                                                                             | R           | 1                |           |
|              | b)     | Define compressibility of liquid and write its unit.                                                           | R           | 1                |           |
|              | c)     | Derive relation between SI and CGS units of coefficient of viscosity of liquid.                                | A           | 1                |           |
|              | d)     | State effect of impurity and temperature on surface tension of liquid.                                         | U           | 1                |           |
|              | e)     | Differentiate between free and forced oscillations(any two points)                                             | U           | 2                |           |
|              | f)     | State any two applications of nanotechnology in textile.                                                       | R           | 3                |           |
| Q.2          |        | Attempt any <b>FOUR</b>                                                                                        |             |                  | (16)      |
|              | a)     | State Hook's law. Define Young's modulus, Bulk modulus and modulus of rigidity.                                | R           | 1                |           |
|              | b)     | Write any four applications of viscosity.                                                                      | R           | 1                |           |
|              | c)     | Explain significance of angle of contact.                                                                      | U           | 1                |           |
|              | d)     | Derive an expression for surface tension by capillary rise method.                                             | A           | 1                |           |
|              | e)     | State any four characteristics of linear SHM.                                                                  | R           | 2                |           |
|              | f)     | Define the following terms<br>i) Nanometer<br>ii) Nanoscale<br>iii) Nanoparticle<br>iv) Nanostructure material | R           | 3                |           |
| Q.3          |        | Attempt any <b>FOUR</b>                                                                                        |             |                  | (16)      |
|              | a)     | Define following terms i) Viscosity ii) Viscous force iii) Velocity gradient iv) Coefficient of viscosity.     | R           | 1                |           |
| <b>P.T.O</b> |        |                                                                                                                |             |                  |           |

|            |                                                                                                                                                                                                                                         |   |   |             |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------------|
| b)         | With a neat diagram, explain molecular theory of surface tension.                                                                                                                                                                       | U | 1 |             |
| c)         | Differentiate between transverse wave and longitudinal wave (any four points)                                                                                                                                                           | U | 2 |             |
| d)         | State any four applications of resonance.                                                                                                                                                                                               | R | 2 |             |
| e)         | A wire of length 1 meter extends by 2 mm when stretched by a load of 4kg. Find the area of cross-section of wire if $Y=2 \times 10^{11} \text{ N/m}^2$                                                                                  | A | 1 |             |
| f)         | State any four applications of nanotechnology in the field of automobile.                                                                                                                                                               | R | 3 |             |
| <b>Q.4</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                 |   |   | <b>(08)</b> |
| a)         | The refractive index of a glass prism with respect to air is 1.51 and velocity of light in air is $3 \times 10^8 \text{ m/s}$ . Calculate velocity of light in glass.                                                                   | A | 4 |             |
| b)         | State Ohm's law.                                                                                                                                                                                                                        | R | 4 |             |
| c)         | State Plank's hypothesis.                                                                                                                                                                                                               | R | 5 |             |
| d)         | Write the principle of production of x-rays.                                                                                                                                                                                            | R | 5 |             |
| e)         | State any two applications of LASER.                                                                                                                                                                                                    | R | 5 |             |
| f)         | State two advantages of optical fiber over conventional metal conductors.                                                                                                                                                               | U | 6 |             |
| <b>Q.5</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                 |   |   | <b>(16)</b> |
| a)         | Define refraction of light. State Snell's law of refraction.                                                                                                                                                                            | R | 4 |             |
| b)         | Four resistances in the Wheatstone's network are $20\Omega$ , $30\Omega$ , $15\Omega$ , and $R_4 \Omega$ respectively in cyclic order. Calculate the value of $R_4$ to get null deflection in the galvanometer (To balance the network) | A | 4 |             |
| c)         | Derive the expression for equivalent resistance, when three resistances are connected in series.                                                                                                                                        | A | 4 |             |
| d)         | State principle of photoelectric cell & explain its construction.                                                                                                                                                                       | U | 5 |             |
| e)         | Explain population inversion with the help of diagram.                                                                                                                                                                                  | U | 5 |             |
| f)         | State four applications of optical fiber.                                                                                                                                                                                               | R | 6 |             |
| <b>Q.6</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                 |   |   | <b>(16)</b> |
| a)         | State any four applications of photoelectric effect.                                                                                                                                                                                    | R | 5 |             |
| b)         | With neat labelled diagram explain production of x-rays by Coolidge x-ray tube.                                                                                                                                                         | U | 5 |             |
| c)         | i) Define dispersion of light.<br>ii) Define specific resistance with S.I unit.                                                                                                                                                         | R | 4 |             |
| d)         | State and explain properties of LASER.                                                                                                                                                                                                  | U | 5 |             |
| e)         | i) An accelerated electron emits a quantum of radiation with frequency $8 \times 10^8$ cycles per second. Calculate energy of electron ( $h=6.625 \times 10^{-34} \text{ Js}$ )<br>ii) Draw the structure of optical fiber.             | A | 5 |             |
| f)         | Explain total internal reflection phenomenon.                                                                                                                                                                                           | R | 6 |             |
|            |                                                                                                                                                                                                                                         | U | 6 |             |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

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**ODD TERM END EXAM NOV/DEC -2018****EXAM SEAT NO.**

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**LEVEL: FIRST****PROGRAM: COMMON****COURSE CODE: CCF110/CCE110/X111/R112 COURSE NAME: APPLIED MECHANICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 15/12/2018****Instruction:-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

| S<br>QN | Q<br>N | Question Text                                                                                                                                                                                                                                                                   | R<br>U<br>A | CO<br>CCF<br>110 | Marks |
|---------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|-------|
| Q.1     |        | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                         |             |                  | (08)  |
|         | a)     | Differentiate between mass & weight. <sup>1</sup>                                                                                                                                                                                                                               | U           | 1                |       |
|         | b)     | State the principle of transmissibility of force.                                                                                                                                                                                                                               | R           | 1                |       |
|         | c)     | State the Varignon's theorem of moments & its use.                                                                                                                                                                                                                              | R           | 2                |       |
|         | d)     | State Lami's theorem & Draw a sketch to explain it with mathematical expression.                                                                                                                                                                                                | R           | 2                |       |
|         | e)     | State graphical conditions of equilibrium of force system.                                                                                                                                                                                                                      | R           | 2                |       |
|         | f)     | Define coefficient of friction.                                                                                                                                                                                                                                                 | R           | 2                |       |
| Q.2     |        | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                         |             |                  | (16)  |
|         | a)     | A man of mass 50 kg is standing on a roof having an inclination of 25° to the horizontal. Determine the components of his weight along the roof & normal to the roof.                                                                                                           | A           | 2                |       |
|         | b)     | Determine the angle between two equal forces 'p' if their resultant is also equal to p.                                                                                                                                                                                         | U           | 2                |       |
|         | c)     | Six forces are acting along the lines joining toward the centre of a hexagon. Determine the equilibrant force which keep this hexagon in equilibrium. Refer fig.no.1.                                                                                                           | A           | 2                |       |
|         | d)     | A thread of load carrying capacity 102.2N. is used to hold a sphere of weight 100N, against a smooth, wall, radius of sphere is 100 mm & length of the thread is 200 mm. But it is found that thread fails By calculation find why thread fail. Refer fig.No.3.                 | U           | 2                |       |
|         | e)     | ABCD is weightless rod under the action of four forces as shown in figure no.2. Calculate the resultant & locate the position of resultant with respect to point 'A'. Use graphical method.                                                                                     | U           | 3                |       |
|         | f)     | A body of weight 400N is placed on an inclined plane at an angle 15° to the horizontal. If the coefficient of friction is 0.14. Find the value of force to be applied parallel to the plane to just to move the body up the plane.                                              | A           | 2                |       |
| Q.3     |        | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                         |             |                  | (16)  |
|         | a)     | A concurrent force system is as shown in figure no.4. Determine resultant of the given force system & also position from horizontal axis. Use graphical method.                                                                                                                 | U           | 3                |       |
|         | b)     | A beam ABC is hinged at A & placed on roller at B. The distance between two support AB is 5m & the overhang BC is 1 m. The beam carries a u.d.l of 2 KN/m over its entire length ABC & a point load of 5 KN is acting at C. Calculate support reaction using analytical method. |             |                  |       |

**P.T.O**



|            |                                                                                                                                                                                                                                                                                                                |        |        |      |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|------|
| c)         | A simply supported beam of span 4 m is loaded with an u.d.l of 5 KN/m for 2 m from left end support & a point load of 30KN at 1 m from right end. Determine support reactions using graphical method.                                                                                                          |        |        |      |
| d)         | A wooden block is resting on a rough inclined plane whose inclination to the horizontal plane is $10^\circ$ . The push force 2 N is acting parallel to the inclined plane. The block is just moving down the plane. If coefficient of friction between block & plane is 0.32 estimate the weight of the block. | A      | 2      |      |
| e)         | A loader of weight 800 N of length 4.5 m is rest against a smooth wall & rough floor. The coefficient of friction between loader & floor is 0.33 will loader stand in $60^\circ$ positions with respect to the floor.                                                                                          | A      | 2      |      |
| f)         | i) Explain polygon law of forces with a neat sketch<br>ii) Calculate coefficient of friction if angle of repose is $30^\circ$                                                                                                                                                                                  | A<br>A | 3<br>2 |      |
| <b>Q.4</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                        |        |        | (08) |
| a)         | State the centroid of semicircle of radius R.                                                                                                                                                                                                                                                                  | R      | 4      |      |
| b)         | Define centroid and center of gravity.                                                                                                                                                                                                                                                                         | R      | 4      |      |
| c)         | State Newton's first law of motion.                                                                                                                                                                                                                                                                            | R      | 5      |      |
| d)         | State the equation of rectilinear motion & meaning of each.                                                                                                                                                                                                                                                    | R      | 5      |      |
| e)         | Calculate angular velocity of a shaft rotating at 130 rpm.                                                                                                                                                                                                                                                     | A      | 5      |      |
| f)         | State the law of conservation of energy.                                                                                                                                                                                                                                                                       | R      | 5      |      |
| <b>Q.5</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                        |        |        | (17) |
| a)         | Determine the centroid of T-section with respect to bottom having flange 120 x 10 mm and web 20 x 150 mm.                                                                                                                                                                                                      | A      | 4      |      |
| b)         | Locate center of gravity of frustum of solid circular cone as shown in fig. Refer fig.no.5. w.r.t to bottom.                                                                                                                                                                                                   | A      | 4      |      |
| c)         | A body starts from rest with a constant acceleration of $0.5 \text{ m/s}^2$ after what time its velocity be 2.5 m/s & How much distance it will be travelled during this time?                                                                                                                                 | A      | 5      |      |
| d)         | A body falling freely under gravity passes two points 9 m apart vertically in 0.2 sec. Find from what height above the upper point did it start to fall?                                                                                                                                                       | A      | 5      |      |
| e)         | The shaft of motor rotates at 1000 rpm at a particular instant in 10 sec. The speed uniformly decreases to 400 rpm. Find angular retardation.                                                                                                                                                                  | A      | 5      |      |
| f)         | A wheel 800 mm diameter starts from rest and accelerates uniformly. After 24 sec, it attains angular velocity of 120 rad/sec. Find the angular acceleration and total angle turned trough.                                                                                                                     | A      | 5      |      |
| <b>Q.6</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                        |        |        | (16) |
| a)         | How many litres of water can be lifted in 20 min to a height of 30 m by means of a pump of 100 KW?                                                                                                                                                                                                             | A      | 5      |      |
| b)         | A bollet weighing 3 N leaves the barrel of a ripple with muzzle velocity of 1000 m/s. If the length barrel in 800 mm, Find the impulse and impulsive force.                                                                                                                                                    | A      | 5      |      |
| c)         | Draw the nature of following graphs for a lifting machine.<br>i) Load vs Effort ii) Load vs Ideal effort iii) Load vs Mechanical Advantages iv) Load vs Effort lost in friction                                                                                                                                | U      | 6      |      |
| d)         | Calculate efficiency of a machine to lift a load of 1000 N, if the velocity ratio of the machine is 25 and law of machine is $p = (0.01W + 5) \text{ N}$ .                                                                                                                                                     | A      | 6      |      |
| e)         | Calculate the effort required to lift a load of 3 KN. If the machine can lift a load of 1 KN by an effort of 56 N. and 2 KN load by an effort of 96 N.                                                                                                                                                         | A      | 6      |      |
| f)         | In a differential axle & wheel, the diameter of effort wheel is 400 mm and the diameter of bigger axle is 100 mm and smaller axle is 80 mm. If an effort of 50 N can lift a load of 1500 N, find velocity ratio and efficiency of the machine.                                                                 | A      | 6      |      |

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Figure No. 1

Q.2) c)

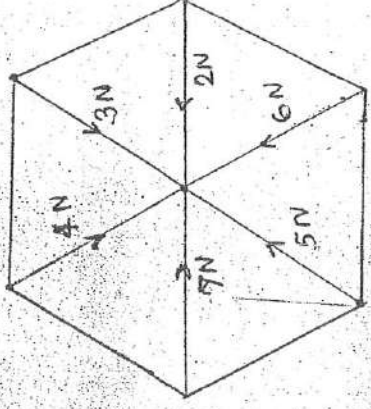


Figure No. 2

Q.2) e)

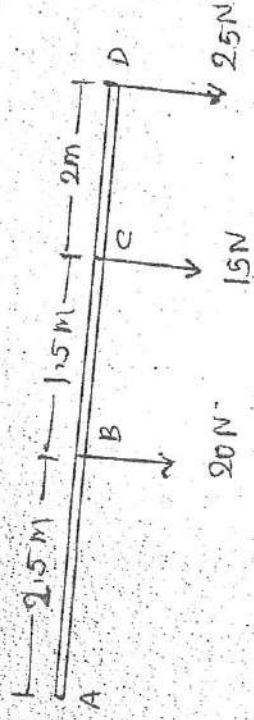
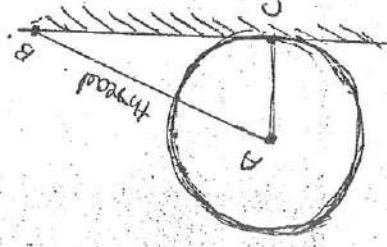


Fig No. 3

Q.2) d)

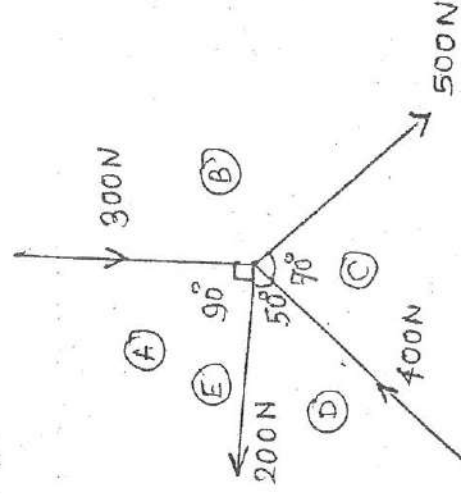


$$AB = 200 \text{ mm}$$

$$AC = 100 \text{ mm}$$

Fig No. 4

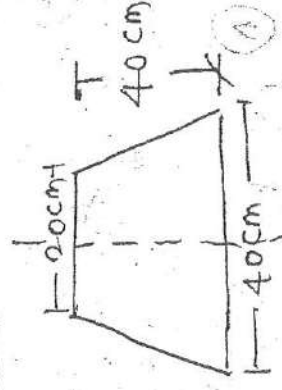
Q.8) a)



Refer Bow's notations given in figure.

Fig. No. 5

Q.5 (b)







**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

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**ODD TERM END EXAM NOV/DEC -2018****EXAM SEAT NO.**

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**LEVEL: THIRD****PROGRAM: IE / E&TC****COURSE CODE: EIF307/IEE307/ETE307** **COURSE NAME: LINER INTEGRATED CIRCUITS.****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 04/12/2018**

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) **QN**>Question No, **SN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application

| QN         | S. Q. N | Question Text                                                                                                                                                                             | Cognition Level R/U/A | Co Code EIF 307 | Marks       |
|------------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------|-------------|
| <b>Q.1</b> |         | Attempt any <b>FOUR</b>                                                                                                                                                                   |                       |                 | <b>(08)</b> |
|            | a)      | State configuration of differential amplifier.                                                                                                                                            | R                     | 1               |             |
|            | b)      | Calculate gain of inverting amplifier if $R_F=10K\Omega$ and $R_1=2K\Omega$ .                                                                                                             | A                     | 2               |             |
|            | c)      | Draw the diagram of Dual input balanced output (DIBO) differential amplifier.                                                                                                             | R                     | 1               |             |
|            | d)      | Draw transfer characteristic curve of Inverting comparator.                                                                                                                               | R                     | 3               |             |
|            | e)      | Explain virtual short concept with help of circuit diagram.                                                                                                                               | U                     | 2               |             |
|            | f)      | State two application of comparator.                                                                                                                                                      | R                     | 3               |             |
| <b>Q.2</b> |         | Attempt any <b>FOUR</b>                                                                                                                                                                   |                       |                 | <b>(16)</b> |
|            | a)      | Explain block diagram of op-amp.                                                                                                                                                          | U                     | 1               |             |
|            | b)      | Derive output expression of Integrator using circuit diagram                                                                                                                              | A                     | 2               |             |
|            | c)      | Draw and explain equivalent circuit of op-amp.                                                                                                                                            | U                     | 1               |             |
|            | d)      | Explain full wave precision rectifier with help of circuit diagram and wave form.                                                                                                         | A                     | 3               |             |
|            | e)      | Derive output expression of 3-op-amp instrumentation amplifier.                                                                                                                           | A                     | 3               |             |
|            | f)      | For non-inverting Summing amplifier having $V_1, V_2, V_3$ that $V_1=1V, V_2=2V$ and $V_3=5V$ , if $R_F=10K\Omega$ and $R_1=10K\Omega$ . Calculate o/p voltage and draw designed circuit. | A                     | 2               |             |
| <b>Q.3</b> |         | Attempt any <b>FOUR</b>                                                                                                                                                                   |                       |                 | <b>(16)</b> |
|            | a)      | Derive o/p expression of V-I converter with floating load.                                                                                                                                | A                     | 3               |             |

(P.T.O.)

|            | Define following parameter of op-amp :                                                                                               | R | 1           |
|------------|--------------------------------------------------------------------------------------------------------------------------------------|---|-------------|
| b)         | i) Input offset voltage, ii) Input offset current, iii) SVRR, iv) Slew rate.                                                         |   |             |
| c)         | Explain window detector with help of circuit diagram and o/p wave form.                                                              | U | 3           |
| d)         | Explain o/p stage of op-amp with circuit diagram.                                                                                    | U | 1           |
| e)         | Derive o/p expression of non-inverting closed loop amplifier.                                                                        | A | 2           |
| f)         | Explain subtractor with help of circuit diagram.                                                                                     | U | 2           |
| <b>Q.4</b> | Attempt any <b>FOUR</b>                                                                                                              |   | <b>(08)</b> |
| a)         | Classify multivibrator.                                                                                                              | U | 4           |
| b)         | Draw pin diagram of IC 565.                                                                                                          | R | 6           |
| c)         | Define : i) Centre frequency of PLL, ii) Lock range.                                                                                 | R | 6           |
| d)         | Draw ideal frequency response curve of low pass filter.                                                                              | R | 5           |
| e)         | Compare active & passive filter (any two points).                                                                                    | U | 5           |
| f)         | List any two applications of bistable multivibrator.                                                                                 | R | 4           |
| <b>Q.5</b> | Attempt any <b>FOUR</b>                                                                                                              |   | <b>(16)</b> |
| a)         | Explain the design procedure to design a narrow band pass filter. Also draw the circuit diagram for the same.                        | U | 5           |
| b)         | Explain frequency synthesizer.                                                                                                       | U | 6           |
| c)         | Draw block diagram of PLL. Write operating principle of it.                                                                          | U | 6           |
| d)         | Explain how OPAMP works as table multivibrator ?                                                                                     | U | 4           |
| e)         | Design second order Butterworth high pass filter of cut off frequency of 10 KHz. Draw designed circuit and frequency response curve. | A | 5           |
| f)         | Draw a circuit diagram of triangular wave form generator and explain it's operation.                                                 | U | 4           |
| <b>Q.6</b> | Attempt any <b>FOUR</b>                                                                                                              |   | <b>(16)</b> |
| a)         | Describe with neat circuit diagram working of Quadrature oscillator.                                                                 | U | 4           |
| b)         | Draw circuit diagram of wide band reject filter. Explain it's working.                                                               | R | 5           |
| c)         | Explain how IC555 works as bistable multivibrator.                                                                                   | U | 6           |
| d)         | Draw wien bridge oscillator using op-amp. Draw wave forms for it.                                                                    | R | 4           |
| e)         | Describe PLL transfer characteristics.                                                                                               | U | 6           |
| f)         | Define : i) Pass band, ii) Stop band, iii) Centre Frequency, iv) Roll-off rate.                                                      | R | 5           |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**ODD TERM END EXAM NOV./DEC-2018****EXAM SEAT NO.**

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**LEVEL :- FIFTH PROGRAM : ELECTRONICS & TELECOMMUNICATION****COURSE CODE :- ETF502/ETE502/EJ307****COURSE NAME :- OPTICAL FIBER COMMUNICATION****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 10/12/2018****Instruction :-**

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

| QN  | S  | Section- I                                                                                                                                                                                                | R/<br>U/<br>A | Co<br>ETF<br>502 | Mar<br>ks |
|-----|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.1 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                 |               |                  | 08        |
|     | a) | Define the term refraction.                                                                                                                                                                               | R             | 1                |           |
|     | b) | Write down the classification of optical fibers.                                                                                                                                                          | R             | 2                |           |
|     | c) | Give two ways to reduce Miescattering loss.                                                                                                                                                               | R             | 3                |           |
|     | d) | State the concept of photon.                                                                                                                                                                              | R             | 1                |           |
|     | e) | List any four requirements of optical fiber connectors.                                                                                                                                                   | R             | 2                |           |
|     | f) | Define the term attenuation. How it is expressed in optical fiber communication                                                                                                                           | R             | 3                |           |
| Q.2 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                 |               |                  | 16        |
|     | a) | Explain light propogation in multimode graded index fiber.                                                                                                                                                | U             | 2                |           |
|     | b) | Compare intrinsic and extrinsic absorption in optical fiber.                                                                                                                                              | U             | 3                |           |
|     | c) | Enlist all splicing techniques and explain any one.                                                                                                                                                       | U             | 2                |           |
|     | d) | Explain cut-back technique used for attenuation measurement.                                                                                                                                              | U             | 3                |           |
|     | e) | A silica optical fiber has a core refractive index of 1.50 and cladding refractive index of 1.47. Determine<br>i) Critical angle at the core cladding interface.<br>ii) Numerical aperture for the fiber. | A             | 1                |           |
|     | f) | Draw and explain optical fiber structure in detail.                                                                                                                                                       | U             | 2                |           |
| Q.3 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                 |               |                  | 16        |
|     | a) | Explain dispersion in optical fiber in detail.                                                                                                                                                            | U             | 3                |           |
|     | b) | Compare single mode fiber and multimode fiber on following parameters:<br>i) Core diameter                      ii) Type of optical source<br>iii) Effect of intermodal dispersion   iv) Application.     | U             | 2                |           |
|     | c) | Enlist fiber bend losses and explain any one.                                                                                                                                                             | U             | 3                |           |

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|     |    |                                                                                                                                  |    |     |           |
|-----|----|----------------------------------------------------------------------------------------------------------------------------------|----|-----|-----------|
|     | d) | Give the advantages and disadvantages of optical fiber. ( any four)                                                              | R  | 2   |           |
|     | e) | Draw the electromagnetic spectrum indicating frequency band used for fiber optic communication.                                  | U  | 1   |           |
|     | f) | Draw set-up for eye-pattern measurement and eye pattern showing performance parameters.                                          | U  | 3   |           |
| QN  | S  | Section - II                                                                                                                     |    |     | Mar       |
|     | Q  |                                                                                                                                  | U/ | 502 | ks        |
|     | N  |                                                                                                                                  | A  |     |           |
| Q.4 |    | Attempt any <b>FOUR</b> :                                                                                                        |    |     | <b>08</b> |
|     | a) | Define indirect bandgap semiconductor.                                                                                           | R  | 4   |           |
|     | b) | State any two requirements of a photodetector.                                                                                   | R  | 5   |           |
|     | c) | Draw block diagram of optical fiber communication system.                                                                        | R  | 6   |           |
|     | d) | Write any two advantages of LED.                                                                                                 | R  | 4   |           |
|     | e) | Draw symbols of phototransistor and photodarlington transistor.                                                                  | R  | 5   |           |
|     | f) | Define OTDR.                                                                                                                     | R  | 6   |           |
| Q.5 |    | Attempt any <b>FOUR</b> :                                                                                                        |    |     | <b>16</b> |
|     | a) | Explain population inversion of radiation.                                                                                       | U  | 4   |           |
|     | b) | Compare between PIN & avalanche photodiode with following points<br>i) Gain ii) Output current iii) Sensitivity iv) Application. | U  | 5   |           |
|     | c) | Write a note on optical power budgeting.                                                                                         | U  | 6   |           |
|     | d) | Explain with diagram, the type of laser which gives current as well as optical confinement.                                      | A  | 4   |           |
|     | e) | Explain the working of photodiode which provides amplification with neat diagram.                                                | A  | 5   |           |
|     | f) | Draw and explain block diagram of optical receiver circuit.                                                                      | U  | 6   |           |
| Q.6 |    | Attempt any <b>FOUR</b> :                                                                                                        |    |     | <b>16</b> |
|     | a) | Explain with diagram surface emitting LED.                                                                                       | A  | 4   |           |
|     | b) | Explain with diagram, the type of bandgap semiconductor used for fabrication of LED and lasers.                                  | A  | 4   |           |
|     | c) | Explain the emission mechanisms of LED and laser.                                                                                | A  | 4   |           |
|     | d) | Draw and explain working of PN photodiode. Also draw diagram of electrical characteristics of it.                                | U  | 5   |           |
|     | e) | Explain the three factors that limit the speed of response of PIN photodiode.                                                    | U  | 5   |           |
|     | f) | Explain any four source limitations.                                                                                             | U  | 6   |           |

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## ODD TERM END EXAM NOV/DEC -2018

EXAM SEAT NO.

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LEVEL: FIFTH

PROGRAM: IE / E&TC

COURSE CODE: ETE512/IEE512

COURSE NAME: PIC MICROCONTROLLER.

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 10/12/2018

Instruction:-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

| Section – I |                         | Marks |
|-------------|-------------------------|-------|
| Q.1         | Attempt any <b>FOUR</b> | (08)  |

- a) State any two differences among any two PIC microcontrollers from PIC18f family.
- b) List any four features of RISC architecture.
- c) State the significance of Barak select Register (BSR) and explain.
- d) Which of the following instructions are 2 byte-instructions ?
  - i) BZ, ii) BNC, iii) GOTO, iv) BRA.
- e) Assume that XTAL=10MHz. find the TMR0H, TMR0L values needed to generate a time delay of 100  $\mu$ sec. Use 16 bit mode.
- f) Find the T1CON value for 16 bit mode, no prescaler, timer oscillator off, with clock coming from PIC18's crystal.

|     |                         |      |
|-----|-------------------------|------|
| Q.2 | Attempt any <b>FOUR</b> | (16) |
|-----|-------------------------|------|

- a) Give various steps involving assembly language programming on Assembler like MPLAB.
- b) Explain the RISC architecture in PIC.
- c) For PIC18 system of 8MHz. Find how long it takes to execute each of the following instructions :
  - i) ADDLW, ii) NOP, iii) GOTO, iv) BNC.
- d) Explain the working of instructions :
  - i) CPFSEQ, ii) CPFSGT.
- e) Write a program to generate a square wave of 66% duty cycle on bit 3 of port C.
- f) Program Timer 1 to be an event counter, Use 16 bit mode and display the binary count on port B and port D continuously. Set the initial count to 20,000 d.

(P.T.O.)

(16)

**Q.3** Attempt any **FOUR**

- Draw the format of PIC18 status register and explain.
- Illustrate bank switching in PIC18 with suitable example.
- Write a program to implement nested loop to program an action 1000 times.
- Write a program to multiply the following numbers and save the result in a file register locations : 0X20 , 0X50,
- Explain the dual role of port C and port B of PIC18f458.
- Write a program to generate square wave of 50% duty cycle on PORTB.5 bit using Timer 0 to generate time delay.

**Marks**

(08)

**Section – II**

**Q.4** Attempt any **FOUR**

- Define software interrupt for PIC microcontroller.
- State the name of dc motor driver IC and list any two features.
- State the uses of CCP modules in PIC microcontroller.
- Give advantages of DS RTC 1306 chip.
- State the use of D to A interfacing with PIC microcontroller.
- How much interrupt sources are present for PIC microcontroller ?

(16)

**Q.5** Attempt any **FOUR**

- Draw and explain capture mode operational block diagram.
- Draw a LCD interfacing with PIC microcontroller.
- Explain the format of ADCON0 register for PIC microcontroller in detail.
- How Relay can be interfaced with PIC18 microcontroller ? Draw neat interfacing diagram.
- Draw and explain compare mode operational block diagram.
- How speed of DC motor can be controlled when it is connected to PIC18 microcontroller. Write its program.

(16)

**Q.6** Attempt any **FOUR**

- Write all important steps used for making serial port programming with PIC microcontroller.
- Write a program to display "GPKP" on LCT by using PIC18 microcontroller.
- Draw an interfacing diagram of stepper motor with PIC18.
- Differentiate standard and enhance CCP module and write a note on each.
- State the significance of H-Bridge circuit while interfacing DC motor with PIC18 microcontroller.
- Draw an interfacing diagram of DS1306 with PIC microcontroller.

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EXAM SEAT NO.

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LEVEL: **THIRD**

PROGRAM: **IE/ET/EE/IT**

COURSE CODE:

EIF301/EEF301/ITF301/EEE305/E201/EE201/IEE301/IX201/IF201/IT201/ITE301/6201/EJ201/ETE301

COURSE NAME: **APPLIED MATHEMATICS**

MAX. MARKS: **80**

TIME: **3 HRS.**

DATE: **03/12/2018**

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

| QN           | S  | Question Text                                                                              | R | CO  | Mar         |
|--------------|----|--------------------------------------------------------------------------------------------|---|-----|-------------|
|              |    |                                                                                            | U | EIF | ks          |
|              |    |                                                                                            | A | 301 |             |
| <b>Q.1</b>   |    | Attempt any <b>FOUR</b>                                                                    |   |     | <b>(08)</b> |
|              | a) | What is the value of $\int 4^x \cdot 3^x dx$                                               | R | 1   |             |
|              | b) | Find $\int (x^{3a} + a^{3x} + e^{3\log x}) dx$                                             | R | 1   |             |
|              | c) | Find $\int \frac{4x-6}{2x^2-6x+4} dx$                                                      | R | 1   |             |
|              | d) | Find $\int_{-1}^1 \frac{x dx}{1+x^2}$                                                      | R | 1   |             |
|              | e) | Show that $\int e^x [f(x) + f'(x)] dx = e^x f(x) + c$                                      | U | 1   |             |
|              | f) | Find the area enclosed by the curve $y = 3x^2$ and the lines $x=1$ , $x=3$ and x -axis.    | A | 1   |             |
| <b>Q.2</b>   |    | Attempt any <b>FOUR</b>                                                                    |   |     | <b>(16)</b> |
|              | a) | Show that $\int (\log x)^2 dx = x(\log x)^2 - 2x \log x + 2x + c$                          | U | 1   |             |
|              | b) | Show that $\int \frac{dx}{1+\tan x} = \frac{1}{2}x + \frac{1}{2}\log(\cos x + \sin x) + c$ | U | 1   |             |
|              | c) | Evaluate $\int \frac{x+1}{x^2(x-2)} dx$                                                    | A | 1   |             |
|              | d) | Evaluate $\int \sin^{-1} x dx$                                                             | A | 1   |             |
|              | e) | Evaluate $\int \frac{dx}{1+\sin 2x}$                                                       | A | 1   |             |
|              | f) | Evaluate $\int \frac{3x+7}{2x^2+3x-2} dx$                                                  | A | 1   |             |
| <b>Q.3</b>   |    | Attempt any <b>FOUR</b>                                                                    |   |     | <b>(16)</b> |
|              | a) | Show that $\int_0^{\pi/4} \sec^4 x dx = \frac{4}{3}$                                       | U | 1   |             |
|              | b) | Evaluate $\int_0^{\pi} \frac{x \sin x}{1+\cos^2 x} dx$                                     | A | 1   |             |
|              | c) | Evaluate $\int_{-\pi/2}^{\pi/2} \frac{x \sin(1+x^2)}{1+x^4} dx$                            | A | 1   |             |
| <b>P.T.O</b> |    |                                                                                            |   |     |             |



|            |                                                                                                                                                                                                                                             |   |   |             |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------------|
| d)         | Find the area of the region lying between the parabolas $y^2=4ax$ and $x^2=4ay$ ( $a>0$ )                                                                                                                                                   | A | 1 |             |
| e)         | If $v_1=3\cos wt$ and $v_2=4\sin wt$ , express $v_1+v_2$ in the form $r\sin(wt+\alpha)$ and calculate its mean value over the range from $t=0$ to $t=\frac{\pi}{w}$                                                                         | A | 1 |             |
| f)         | Find the R.M.S value of $i=\sin 3t$ over the complete period.                                                                                                                                                                               | A | 1 |             |
| <b>Q.4</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                     |   |   | <b>(08)</b> |
| a)         | Find order and degree of differential equation $\sqrt[3]{\frac{dy}{dx}} = \sqrt[4]{\frac{d^2y}{dx^2}}$                                                                                                                                      | U | 2 |             |
| b)         | State the condition for exact differential equation.                                                                                                                                                                                        | R | 2 |             |
| c)         | Verify that $y = \log x$ is solution of the D.E $x \frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$                                                                                                                                                   | U | 2 |             |
| d)         | The particle starts from rest. Its velocity at any time $t$ is given by $3t^2 - 3t + 2$ Find the distance covered by particle at 3 sec.                                                                                                     | A | 3 |             |
| e)         | If $z_1 = 2 - 3i$ and $z_2 = 4 + 6i$ then find $z_1 + z_2$                                                                                                                                                                                  | A | 3 |             |
| f)         | Define modulus and amplitude of complex number.                                                                                                                                                                                             | R | 3 |             |
| <b>Q.5</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                     |   |   | <b>(16)</b> |
| a)         | Solve $\frac{dy}{dx} = e^{2x-3y} + 4x^2 e^{-3y}$                                                                                                                                                                                            | A | 2 |             |
| b)         | Show that $y^2 = ax^2$ is a solution of $x(\frac{dy}{dx})^2 - 2y\frac{dy}{dx} + ax = 0$                                                                                                                                                     | U | 2 |             |
| c)         | Solve $x \log x \frac{dy}{dx} + y = 2 \log x$                                                                                                                                                                                               | A | 2 |             |
| d)         | Solve $(2x+3\cos y)dx + (2y-3x\sin y)dy = 0$                                                                                                                                                                                                | A | 2 |             |
| e)         | Simplify using De-Moivre's theorem.<br>$\frac{(\cos 3\theta + i \sin 3\theta)^4 (\cos 5\theta - i \sin 5\theta)^{4/5}}{(\cos \frac{9}{2}\theta + i \sin \frac{9}{2}\theta)^{2/3} (\cos \frac{4}{5}\theta - i \sin \frac{4}{5}\theta)^{10}}$ | A | 3 |             |
| f)         | Using Euler's exponential formulae prove that.<br>i) $\sin^2 \theta + \cos^2 \theta = 1$<br>ii) $\cosh^2 \theta - \sinh^2 \theta = 1$                                                                                                       | U | 3 |             |
| <b>Q.6</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                     |   |   | <b>(16)</b> |
| a)         | Solve $\frac{dy}{dx} = \frac{x^2 + y^2}{2xy}$                                                                                                                                                                                               | A | 2 |             |
| b)         | Find the equation of curve whose slope is $(x-4)$ and which passes through the point $(3, 0)$                                                                                                                                               | A | 3 |             |
| c)         | Find cube root of unity.                                                                                                                                                                                                                    | A | 3 |             |
| d)         | Find modulus and amplitude of $z = \frac{(1+i)^2}{1-i}$                                                                                                                                                                                     | A | 3 |             |
| e)         | Separate into real and imaginary part of $\sin(x+iy)$ .                                                                                                                                                                                     | A | 3 |             |
| f)         | Show that $(1+i)^8 + (1-i)^8 = 32$                                                                                                                                                                                                          | U | 3 |             |

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**LEVEL :- THIRD PROGRAM : IE & E & TC****COURSE CODE :- EIF305/IEE305/****COURSE NAME :- ANALOG COMMUNICATION****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 11/12/2018****Instruction :-**

- 1) Answers must be written in the main answer book provided.( and supplements if required)
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

| QN  | S<br>Q<br>N | Question Text                                                                                                                                                                                                                                                                    | R/<br>U/<br>A | Co<br>EIF<br>305 | Ma<br>rks |
|-----|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.1 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                        |               |                  | 08        |
|     | a)          | State mathematical expression for PM wave.                                                                                                                                                                                                                                       | R             | 3                |           |
|     | b)          | An amplifier operating over the frequency range from 18 to 20 MHz has $10K\Omega$ input output resistor. What is the rms noise voltage at the input to this amplifier if the ambient temperature is $27^{\circ}C$ ?                                                              | A             | 1                |           |
|     | c)          | Classify types of noise.                                                                                                                                                                                                                                                         | U             | 1                |           |
|     | d)          | Draw the block diagram of low level AM transmitter.                                                                                                                                                                                                                              | R             | 2                |           |
|     | e)          | Define the terms for FM wave<br>i) Deviation ratio ii) Percentage modulation.                                                                                                                                                                                                    | R             | 3                |           |
|     | f)          | The carrier amplitude after amplitude modulation varies between 4V and 1V. Calculate the depth of modulation.                                                                                                                                                                    | A             | 2                |           |
| Q.2 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                        |               |                  | 16        |
|     | a)          | Derive mathematical equation for FM wave.                                                                                                                                                                                                                                        | A             | 3                |           |
|     | b)          | Draw and explain electromagnetic spectrum.                                                                                                                                                                                                                                       | U             | 1                |           |
|     | c)          | Explain the concept of vestigial sideband with waveform.                                                                                                                                                                                                                         | U             | 2                |           |
|     | d)          | List types of electronic communication system. Explain any two in detail.                                                                                                                                                                                                        | R<br>U        | 1                |           |
|     | e)          | State the frequency ranges of<br>i) Audio frequency ii) Voice frequency<br>iii) Microwave frequency iv) fiber optic communication.                                                                                                                                               | A             | 1                |           |
|     | f)          | A frequency modulated signal is represented by the voltage equation $e_{FM} = 10\sin(6 \times 10^8 t + 5 \sin 1250 t)$ . Calculate<br>i) Carrier frequency ii) Modulating frequency<br>iii) Maximum deviation.<br>iv) What power will FM wave dissipates in $20\Omega$ resistor? | R<br>A        | 3                |           |
| Q.3 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                        |               |                  | 16        |
|     | a)          | Draw and explain how modulation index is measured using the Trapezoidal method.                                                                                                                                                                                                  | U             | 2                |           |
|     | b)          | Explain Armstrong method with the help of neat labelled block diagram.                                                                                                                                                                                                           | U             | 3                |           |

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|     |    |                                                                                                                                                                                                                                                                                                  |        |   |    |
|-----|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---|----|
|     | c) | A modulating signal $10\sin(2\pi \times 10^3 t)$ is used to modulate a carrier signal $20\sin(2\pi \times 10^4 t)$ . Find the<br>i) Modulation index.<br>ii) Percentage modulation.<br>iii) Frequency of the sideband components and their amplitudes.<br>iv) Bandwidth of the modulated signal. | A      | 2 |    |
|     | d) | State methods for FM generation. Explain any one in detail.                                                                                                                                                                                                                                      | U      | 3 |    |
|     | e) | Explain the working of phase shift method with block diagram and output equations of each block.                                                                                                                                                                                                 | U      | 2 |    |
|     | f) | State important sequential steps involved in generation of AM wave.                                                                                                                                                                                                                              | R      | 2 |    |
| Q.4 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                        |        |   | 08 |
|     | a) | Define i) Selectivity ii) Sensitivity, with reference to radio receiver.                                                                                                                                                                                                                         | R      | 4 |    |
|     | b) | A super heterodyne receiver with an IF of 450KHz is tuned to a signal at 1200KHz. Calculate the image frequency.                                                                                                                                                                                 | A      | 4 |    |
|     | c) | For an antenna, define i) Directive gain ii) Radiation resistance.                                                                                                                                                                                                                               | R      | 5 |    |
|     | d) | Draw the radiation patterns for antennas, having length $\ell = 3\lambda/2$ & $\ell = 3\lambda$ .                                                                                                                                                                                                | U      | 5 |    |
|     | e) | Determine the length of half wave dipole operating at a frequency of i) 540KHz and ii) 1650 KHz.                                                                                                                                                                                                 | A      | 5 |    |
|     | f) | Draw the diagram of transverse electromagnetic wave and label it.                                                                                                                                                                                                                                | U      | 6 |    |
|     |    |                                                                                                                                                                                                                                                                                                  |        |   |    |
| Q.5 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                        |        |   | 16 |
|     | a) | Draw and describe the block diagram of TRF receiver.                                                                                                                                                                                                                                             | U      | 4 |    |
|     | b) | Enlist major factors that influence the choice of IF in any particular communication system.                                                                                                                                                                                                     | R      | 4 |    |
|     | c) | Compare resonant and non-resonant antennas on the basis of<br>i) Definition ii) termination<br>iii) Standing wave existence iv) Examples.                                                                                                                                                        | U      | 5 |    |
|     | d) | Suggest antenna for following applications and describe any one of them<br>i) TV reception ii) Direction finding iii) Radio telemetry<br>iv) Radar.                                                                                                                                              | U      | 5 |    |
|     | e) | Write any two reasons of ground wave attenuation. (02 marks)<br>Write applications where ground wave propagation is used.                                                                                                                                                                        | R<br>A | 6 |    |
|     | f) | With the help of diagram, describe the following terms in sky wave propagation i) Virtual height ii) Skip distance.                                                                                                                                                                              | U      | 6 |    |
|     |    |                                                                                                                                                                                                                                                                                                  |        |   |    |
| Q.6 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                        |        |   | 16 |
|     | a) | Compare AM & FM receiver on the basis of<br>i) Frequency range ii) Demodulation methods iii) IF<br>iv) Common and un-common circuits used.                                                                                                                                                       | U      | 4 |    |
|     | b) | Draw the circuit diagram of practical diode detector. Describe its working principle.                                                                                                                                                                                                            | U      | 4 |    |
|     | c) | Describe the concept of fading with reference to sky wave propagation.                                                                                                                                                                                                                           | U      | 6 |    |
|     | d) | With the help of diagram, explain the effect of atmospheric duct on space wave propagation.                                                                                                                                                                                                      | U      | 6 |    |
|     | e) | Draw the neat labelled circuit diagram of<br>i) Transistorized RF amplifier. ii) Two stage IF amplifier.                                                                                                                                                                                         | R      | 4 |    |
|     | f) | Describe PLL as FM demodulator.                                                                                                                                                                                                                                                                  | U      | 4 |    |

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# GOVERNMENT POLYTECHNIC, KOLHAPUR - 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM ENDE EXAM NOV./DEC-2018

EXAM SEAT NO.

|  |  |  |  |  |  |  |  |  |  |
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LEVEL :- FOURTH

PROGRAM : IE & E & TC

COURSE CODE :- EIF402/IEE502/

COURSE NAME :- EMBEDDED SYSTEM

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 06/12/2018

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

| QN  | S  | SECTION - I                                                                                                                            | R/<br>U/<br>A | Co<br>EIF<br>402 | Ma<br>rks |
|-----|----|----------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.1 |    | Attempt any <b>FOUR</b> :                                                                                                              |               |                  | <b>08</b> |
|     | a) | Enlist any two 'C' data types related to integer with their value range.                                                               | R             | 1                |           |
|     | b) | Draw the format of TCON register.                                                                                                      | R             | 2                |           |
|     | c) | What memory address in interrupt vector table is assigned to Timer 0 & Timer 1?                                                        | R             | 3                |           |
|     | d) | How particular port can be declared as output PORT?                                                                                    | R             | 1                |           |
|     | e) | With single statement in C, how to disable all interrupts?                                                                             | R             | 3                |           |
|     | f) | State the steps to find the value to be loaded in timer registers TL and TH for a desired time delay.                                  | U             | 2                |           |
| Q.2 |    | Attempt any <b>FOUR</b> :                                                                                                              |               |                  | <b>16</b> |
|     | a) | Explain logical operators in 'C' for AND, NOT, OR & Ex-OR with one example each.                                                       | U             | 1                |           |
|     | b) | Write a 'C' program to generate square wave of 2 KHz of P2.4.                                                                          | A             | 2                |           |
|     | c) | Enlist steps to transfer character bytes serially while programming with 8051.                                                         | U             | 3                |           |
|     | d) | State the use of right shift and Left shift operators used in 'C' programs with one example of each.                                   | R             | 1                |           |
|     | e) | Draw the interfacing diagram of RSs-232 with 8051.                                                                                     | U             | 2                |           |
|     | f) | State the use of EX0, EX1, ET0 & ET1 bits from IE register.                                                                            | R             | 3                |           |
| Q.3 |    | Attempt any <b>FOUR</b> :                                                                                                              |               |                  | <b>16</b> |
|     | a) | Write a 'C' program to send message 'INDIA' serially at 4800 baud rate continuously. Assume XTAL = 11.0592 MHz                         | A             | 3                |           |
|     | b) | Draw the format of TMOD register and explain each bit in detail.                                                                       | U             | 2                |           |
|     | c) | Write a 'C' program to toggle bit P0.6 continuously without disturbing rest of bits.                                                   | A             | 1                |           |
|     | d) | Write a 'C' program to generate 1 KHz frequency on P2.4 using timer mode 2.                                                            | A             | 3                |           |
|     | e) | If timer 1 is programmed for interrupts in mode 0. Explain when interrupt will activate?                                               | U             | 3                |           |
|     | f) | With crystal frequency of 11.0592 MHz what value should be loaded in toTH1 to have bude rate 9600. Give answer in both Hex and Decimal | U             | 2                |           |

P.T.O.



| QN          | S<br>Q<br>N | SECTION - II                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | R/<br>U/<br>A | Co<br>SMF<br>403 | Ma<br>rks |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|-------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|---|---|------------------------------------|---|---|------------------------------------|---|---|------------------------------------|---|---|-------------------------------------|---|---|--|
| Q.4         |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |               |                  | <b>08</b> |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|             | a)          | For ADC 0804, if $V_{ref}$ 2 pin is applied with 1.28v, what will be the step size in mV?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | U             | 4                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|             | b)          | Define the functions of following pins of DS12887 RTC.<br>i) IRQ ii) MOT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | R             | 5                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|             | c)          | State any two advantages of LCD display over seven segment displays.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | R             | 4                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|             | d)          | Give the Half-step sequence for a Unipolar, stepper motor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | U             | 3                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|             | e)          | Find the MAX1112 control byte for i) CH0 ii) CH3. Assume single ended, Unipolar; internal clock and fully operational mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | U             | 4                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|             | f)          | Find out the full scale o/p voltage of DAC 0808 for following angles<br>i) $30^0$ ii) $60^0$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | U             | 4                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
| Q.5         |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |               |                  | <b>16</b> |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|             | a)          | Draw the interfacing diagram of ADC 0809 with 8051 $\mu$ C for input connected to CH-1 and 10mV step size.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | A             | 4                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|             | b)          | Write a 'C' language program for 8051 $\mu$ C to display message "HELLO" on LCDS using busy flag method.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | A             | 4                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|             | c)          | Draw the interfacing diagram of unipolar stepper motor with part 1 of 8051 $\mu$ C and write the program to move the motor clockwise in 4 step sequence.                                                                                                                                                                                                                                                                                                                                                                                                                                            | A             | 1                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|             | d)          | Give the memory Map ( RAM) of DS 12887 and write a program to set time to 16:58:55 & data to 29 NOV 2018 of RTC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | A             | 9                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|             | e)          | Explain in detail the selection criteria for sensor interfacing in 8051 $\mu$ C based system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | U             | 6                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|             | f)          | Consider ADC MAX1112 as interfaced with 8051. Write a 'C' code for sending a control byte to MAX 1112 ADC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | A             | 4                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
| Q.6         |             | Attempt any <b>TWO</b> :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |                  | <b>16</b> |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|             | a)          | Draw the interfacing diagram of DAC 0808 with 8051 $\mu$ C. Assume a switch is connected to pin P.0.0. Write a 'C' program for 8051 to perform the following.<br>i) When SW=0 , generate a staircase waveform of DAC output.<br>ii) When SW=1; generate a triangular waveform at DAC output.                                                                                                                                                                                                                                                                                                        | A             | 4                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|             | b)          | Draw the interfacing diagram of DC motor to 8051 $\mu$ C, using ILQ 75 optoisolator. Also write a C program to monitor the status of two switches ( SW 1 & SW 2) connected to P2.0 and P2.1 and perform the following<br><table><tr><th>SW 2 (P2.1)</th><th>SW 1 (P2.0)</th><th></th></tr><tr><td>0</td><td>0</td><td>DC motor moves with 25% Duty cycle</td></tr><tr><td>0</td><td>1</td><td>DC motor moves with 50% Duty cycle</td></tr><tr><td>1</td><td>0</td><td>DC motor moves with 75% Duty cycle</td></tr><tr><td>1</td><td>1</td><td>DC motor moves with 100% Duty cycle</td></tr></table> | SW 2 (P2.1)   | SW 1 (P2.0)      |           | 0 | 0 | DC motor moves with 25% Duty cycle | 0 | 1 | DC motor moves with 50% Duty cycle | 1 | 0 | DC motor moves with 75% Duty cycle | 1 | 1 | DC motor moves with 100% Duty cycle | A | 5 |  |
| SW 2 (P2.1) | SW 1 (P2.0) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |               |                  |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
| 0           | 0           | DC motor moves with 25% Duty cycle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |               |                  |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
| 0           | 1           | DC motor moves with 50% Duty cycle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |               |                  |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
| 1           | 0           | DC motor moves with 75% Duty cycle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |               |                  |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
| 1           | 1           | DC motor moves with 100% Duty cycle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               |                  |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |
|             | c)          | Design a 8051 $\mu$ C based Data Acquisition System (DAS) which will collect the information from various sensors such as temperature, pressure etc and display it on LCD. Write the 'C' program for same with detailed H/W schematic.                                                                                                                                                                                                                                                                                                                                                              | A             | 6                |           |   |   |                                    |   |   |                                    |   |   |                                    |   |   |                                     |   |   |  |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**ODD TERM END EXAM NOV./DEC-2018****EXAM SEAT NO.**

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**LEVEL :- FOURTH PROGRAM : IE & E&TC****COURSE CODE :- EIF401/IX211/IEE401/EJ211/ETE401****COURSE NAME POWER ELECTRONICS-I****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 04/12/2018****Instruction :-**

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

| QN  |    | S | Section-I                                                                                                                                                  |  |  | R/<br>U/<br>A | Co<br>EIF<br>401 | Mar<br>ks |
|-----|----|---|------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|---------------|------------------|-----------|
| Q.1 |    |   | Attempt any <b>FOUR</b> :                                                                                                                                  |  |  |               |                  | <b>08</b> |
|     | a) |   | Draw system of following devices i) UJT ii) PUT.                                                                                                           |  |  | R             | 1                |           |
|     | b) |   | State any two advantages of gate triggering.                                                                                                               |  |  | R             | 2                |           |
|     | c) |   | Define i) Latching current ii) Holding current.                                                                                                            |  |  | R             | 1                |           |
|     | d) |   | List any two advantages of PUT over UJT.                                                                                                                   |  |  | R             | 2                |           |
|     | e) |   | Define commutation and give the classification of commutation.                                                                                             |  |  | R             | 3                |           |
|     | f) |   | State the need of high power semiconductor switches.                                                                                                       |  |  | R             | 1                |           |
| Q.2 |    |   | Attempt any <b>FOUR</b> :                                                                                                                                  |  |  |               |                  | <b>16</b> |
|     | a) |   | Explain two transistor analogy of SCR with the help of diagram and derive equation for anode current.                                                      |  |  | A             | 1                |           |
|     | b) |   | Explain $dv/dt$ triggering of thyristor.                                                                                                                   |  |  | U             | 2                |           |
|     | c) |   | Compare natural and force commutation ( any 4 points)                                                                                                      |  |  | U             | 3                |           |
|     | d) |   | Draw the symbol, constructional diagram and V-I characteristics of DIAC.                                                                                   |  |  | R             | 1                |           |
|     | e) |   | Draw the circuit of PUT relaxation oscillator. With the related waveforms explain the operation of the circuit.                                            |  |  | U             | 2                |           |
|     | f) |   | Draw the V-I characteristics of power transistor and show different operating regions in it, also state what is primary and secondary break down in it.    |  |  | U             | 1                |           |
| Q.3 |    |   | Attempt any <b>FOUR</b> :                                                                                                                                  |  |  |               |                  | <b>16</b> |
|     | a) |   | Explain class C commutation with waveforms.                                                                                                                |  |  | U             | 3                |           |
|     | b) |   | Explain triac triggering using DIAC.                                                                                                                       |  |  | U             | 2                |           |
|     | c) |   | Describe four modes of operation of TRIAC.                                                                                                                 |  |  | U             | 1                |           |
|     | d) |   | Draw and explain turn-off characteristics of SCR.                                                                                                          |  |  | U             | 3                |           |
|     | e) |   | Compare UJT and PUT with the help of following points:<br>i) Layer diagram ii) Value of intrinsic standoff ratio.<br>iii) Characteristics iv) Application. |  |  | U             | 1                |           |
|     | f) |   | State the requirements of gate pulse to trigger SCR successfully.<br>( any four)                                                                           |  |  | R             | 2                |           |

**P.T.O.**

| QN  |    | S | Section- II                                                                                                                                        |   | R/<br>U/<br>A | Co<br>EIF<br>401 | Mar<br>ks |
|-----|----|---|----------------------------------------------------------------------------------------------------------------------------------------------------|---|---------------|------------------|-----------|
| Q.4 |    |   | Attempt any <b>FOUR</b> :                                                                                                                          |   |               |                  | <b>08</b> |
|     | a) |   | Give any two need of series and parallel connection of SCR.                                                                                        | R | 4             |                  |           |
|     | b) |   | Show expression for average output voltage and rms output voltage of three phase half wave uncontrolled rectifier.                                 | U | 5             |                  |           |
|     | c) |   | Draw a line voltage of 3 $\phi$ supply.                                                                                                            | R | 5             |                  |           |
|     | d) |   | Define phase voltage and write down their properties.                                                                                              | R | 5             |                  |           |
|     | e) |   | Explain regenerative action or power feedback.                                                                                                     | U | 6             |                  |           |
|     | f) |   | Construct a waveform for $\alpha=90^\circ$ for single phase full wave ( Full converter) with inductive load. ( Fully controlled bridge rectifier.) | A | 6             |                  |           |
| Q.5 |    |   | Attempt any <b>FOUR</b> :                                                                                                                          |   |               |                  | <b>16</b> |
|     | a) |   | Draw a diagram of static equalization network and derive equation for static resistance.                                                           | A | 4             |                  |           |
|     | b) |   | Explain reasons of unequal current distribution.                                                                                                   | U | 4             |                  |           |
|     | c) |   | Draw a diagram and waveform of three phases half wave uncontrolled rectifier.                                                                      | R | 5             |                  |           |
|     | d) |   | Explain with diagram single phase half wave controlled rectifier with resistive load.                                                              | U | 6             |                  |           |
|     | e) |   | Compare symmetrical and asymmetrical configuration of half controlled bridge rectifier.                                                            | U | 6             |                  |           |
|     | f) |   | Draw a diagram and waveform of 1 $\phi$ fully controlled bridge rectifier with inductive load.                                                     | R | 6             |                  |           |
| Q.6 |    |   | Attempt any <b>TWO</b> :                                                                                                                           |   |               |                  | <b>16</b> |
|     | a) |   | Explain current equalization in DC and AC supply                                                                                                   | U | 4             |                  |           |
|     | b) |   | Draw a diagram and waveform of three phase uncontrolled bridge rectifier circuit and explain its operation.                                        | R | 5             |                  |           |
|     | c) |   | Describe operation of single phase halfwave controlled rectifier with RL load and free wheeling diode, draw diagram and waveform.                  | U | 5             |                  |           |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**ODD TERM END EXAM NOV/DEC -2018****EXAM SEAT NO.**

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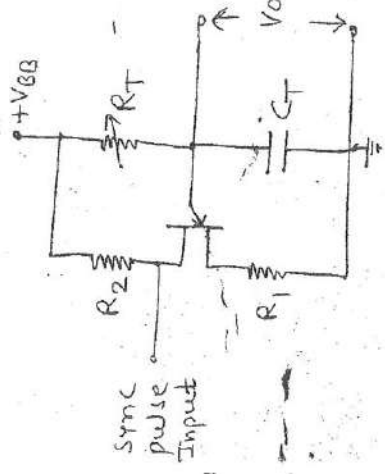
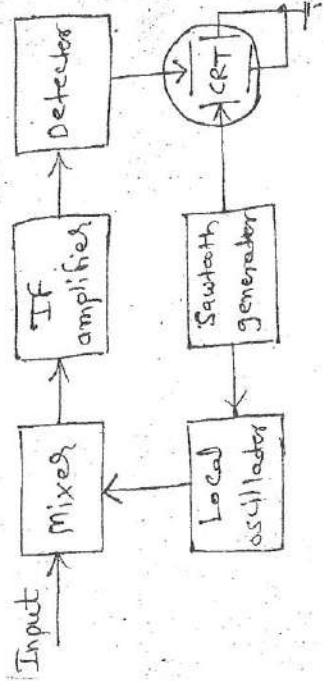
**LEVEL: THIRD****PROGRAM: IE/E&TC****COURSE CODE: EIF303/ /IX203/IEE303/ETE303****COURSE NAME: ELECTRONICS MEASURING INSTRUMENTS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 07/12/2018****Instruction:-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

| QN         | S Q N | Question Text                                                                                                                                                                                                                                                       | R U A | CO EIF 303 | Marks |
|------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------|-------|
| <b>Q.1</b> |       | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                             |       |            | (08)  |
|            | a)    | Define the terms i) Accuracy ii) Precision                                                                                                                                                                                                                          | R     | 1          |       |
|            | b)    | List different types of errors.                                                                                                                                                                                                                                     | R     | 1          |       |
|            | c)    | Draw the circuit diagram of Hay bridge.                                                                                                                                                                                                                             | R     | 2          |       |
|            | d)    | State the balancing equation of a Whetstone's bridge.                                                                                                                                                                                                               | R     | 2          |       |
|            | e)    | Draw construction diagram of PMMC.                                                                                                                                                                                                                                  | R     | 3          |       |
|            | f)    | State different type of DVM's.                                                                                                                                                                                                                                      | R     | 3          |       |
| <b>Q.2</b> |       | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                             |       |            | (16)  |
|            | a)    | Explain systematic errors in details & list methods to minimise it.                                                                                                                                                                                                 | U     | 1          |       |
|            | b)    | Describe with diagram the operation the operation of Kelvin's bridge.                                                                                                                                                                                               | U     | 2          |       |
|            | c)    | Explain with a diagram the working the working of a Wagher's ground connection.                                                                                                                                                                                     | U     | 2          |       |
|            | d)    | Illustrate with diagram how Schering's bridge can be used to measure unknown capacitance.                                                                                                                                                                           | A     | 2          |       |
|            | e)    | Explain with the help of diagram the working principle of dual slope type DVM.                                                                                                                                                                                      | U     | 3          |       |
|            | f)    | Explain with a diagram the basic principle of a successive approximation type DVM.                                                                                                                                                                                  | U     | 3          |       |
| <b>Q.3</b> |       | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                             |       |            | (16)  |
|            | a)    | Explain secondary standards. State any two application of it.                                                                                                                                                                                                       | U     | 1          |       |
|            | b)    | A capacitance comparison bridge is used to measure a capacitive impedance at a frequency of 2KHz. The bridge constants at balance are $C_3=100\mu f$ , $R_1=10k\Omega$ , $R_2=50k\Omega$ , $R_3=100k\Omega$ . Calculate equivalent series of the unknown impedance. | A     | 2          |       |
|            | c)    | A Maxwell bridge is used to measure an inductive impedance. The bridge constants at balance are $C_1=0.01\mu f$ , $R_1=\Delta 70k\Omega$ , $R_2=5.1k\Omega$ , $R_3=100k\Omega$ . Find the series equivalent of the unknown impedance.                               | A     | 2          |       |
|            | d)    | Explain the working principle of a digital frequency meter.                                                                                                                                                                                                         | U     | 3          |       |
|            | e)    | State the functions and explain the operations of a gate control flip flop.                                                                                                                                                                                         | U     | 3          |       |

**P.T.O**



|            |    |                                                                                                                                                                                        |   |   |      |
|------------|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
|            | f) | Describe with the help of block diagram the operation of digital frequency meter.                                                                                                      | U | 3 |      |
| <b>Q.4</b> |    | Attempt any <b>FOUR</b>                                                                                                                                                                |   |   | (08) |
|            | a) | State uses of logic analyzer.                                                                                                                                                          | R | 5 |      |
|            | b) | Draw block diagram of delay line.                                                                                                                                                      | R | 4 |      |
|            | c) | State any two application of circular chart recorder.                                                                                                                                  | R | 5 |      |
|            | d) | Write the names of blocks present in vertical deflection subsystem.                                                                                                                    | R | 4 |      |
|            | e) | Define strip chart recorder.                                                                                                                                                           | R | 5 |      |
|            | f) | State the function of CRO probe of List any two types of it.                                                                                                                           | R | 4 |      |
| <b>Q.5</b> |    | Attempt any <b>FOUR</b>                                                                                                                                                                |   |   | (16) |
|            | a) | Write any four specification of pulse generator.                                                                                                                                       | A | 5 |      |
|            | b) | State the procedure for measurement of frequency using lissajous pattern. Also calculate vertical frequency (fv) for following lissajous patterns, where horizontal frequency fh=7KHz. | A | 4 |      |
|            |    |                                                                                                     |   |   |      |
|            | c) | Draw & explain block diagram of logic analyzer.                                                                                                                                        | U | 5 |      |
|            | d) | Identify the following diagram & explain its working.                                                                                                                                  |   |   |      |
|            |    |                                                                                                    | A | 4 |      |
|            | e) | State any four applications of XY recorder.                                                                                                                                            | A | 5 |      |
|            | f) | Explain with block diagram, dual beam CRO.                                                                                                                                             | U | 4 |      |
| <b>Q.6</b> |    | Attempt any <b>FOUR</b>                                                                                                                                                                |   |   | (16) |
|            | a) | Explain the concept of time domain & frequency domain.                                                                                                                                 | U | 5 |      |
|            | b) | Write any four applications of strip chart recorder.                                                                                                                                   | U | 5 |      |
|            | c) | Draw & explain block diagram of horizontal amplifier.                                                                                                                                  | U | 4 |      |
|            | d) | Identify the following diagram & explain its working.                                                                                                                                  |   |   |      |
|            |    |                                                                                                    | A | 5 |      |
|            | e) | Draw block diagram of digital storage oscilloscope.                                                                                                                                    | U | 4 |      |
|            | f) | Write the procedure for measurement of phase angle using CRO. Sketch suitable diagrams for 0° & 90° phase angle.                                                                       | A | 4 |      |

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**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**ODD TERM END EXAM NOV/DEC -2018****EXAM SEAT NO.**

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**LEVEL: FIRST****PROGRAM: COMMON****COURSE CODE: CCF105/CCE105/X104/R107/0107 COURSE NAME: BASIC MATHEMATICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 19/12/2018****Instruction:-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)  
 2) Illustrate your answers with sketches where ever necessary.  
 3) Use of non-programmable pocket calculator is permissible.  
 4) Mathematical and other tables will be made available on request.  
 5) Assume and mention suitable additional data necessary.  
 6) Use of Mobile is strictly prohibited.  
 7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

| S<br>QN    | Q<br>N | Question Text                                                                                                                                                                                  | R<br>U<br>A | CO<br>CCF<br>105 | Marks       |
|------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|-------------|
| <b>Q.1</b> |        | Attempt any <b>FOUR</b>                                                                                                                                                                        |             |                  | <b>(08)</b> |
|            | a)     | Define $n^{\text{th}}$ order determinant.                                                                                                                                                      | R           | 1                |             |
|            | b)     | Resolve into partial fraction $\frac{1}{x^2 - x}$                                                                                                                                              | A           | 2                |             |
|            | c)     | Define improper fraction with suitable example.                                                                                                                                                | R           | 2                |             |
|            | d)     | If $A = \begin{bmatrix} 1 & 2 \\ -3 & 4 \end{bmatrix}$ , $B = \begin{bmatrix} 4 & 5 \\ 1 & -3 \end{bmatrix}$ find $3A + B$                                                                     | U           | 3                |             |
|            | e)     | If $A = \begin{bmatrix} 5 & 4 \\ 4 & 3 \end{bmatrix}$ , $B = \begin{bmatrix} -3 & 4 \\ 4 & -5 \end{bmatrix}$ verify that $AB = BA$                                                             | U           | 3                |             |
|            | f)     | Expand using Binominal theorem $\left(\frac{x^2}{2} - \frac{2}{x^2}\right)^4$                                                                                                                  | A           | 4                |             |
| <b>Q.2</b> |        | Attempt any <b>FOUR</b>                                                                                                                                                                        |             |                  | <b>(16)</b> |
|            | a)     | Solve by Cramer's rule $3x + 3y - z = 11$ , $2x - y + 2z = 9$ , $4x + 3y + 2z = 25$                                                                                                            | A           | 1                |             |
|            | b)     | Solve by Cramer's rule $\frac{1}{p} + \frac{3}{q} = 4$ and $\frac{-2}{p} + \frac{4}{q} = 5$                                                                                                    | A           | 1                |             |
|            | c)     | If $A = \begin{bmatrix} 1 & 2 \\ -2 & 3 \end{bmatrix}$ , $B = \begin{bmatrix} 2 & 1 \\ 2 & 3 \end{bmatrix}$ , $C = \begin{bmatrix} -3 & 1 \\ 2 & 0 \end{bmatrix}$ verify that $A(B+C) = AB+BC$ | U           | 3                |             |
|            | d)     | If $A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$ Find $A^{-1}$ by using Adjoint method.                                                                           | A           | 3                |             |
|            | e)     | Resolve into partial fraction $\frac{x+3}{(x^2-1)(x+5)}$                                                                                                                                       | A           | 2                |             |
|            | f)     | Resolve into partial fraction $\frac{x^3+x}{(x^2-9)}$                                                                                                                                          | A           | 2                |             |

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| Q.3 | Attempt any <b>FOUR</b>                                                                                                                                                          |   |   | (16) |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
| a)  | Resolve into partial fraction $\frac{x^2}{(x+1)(x-2)^2}$                                                                                                                         | A | 2 |      |
| b)  | Solve the simultaneous equations by using matrix inversion method.<br>$x+3y+3z=12, x+4y+4z=15, x+3y+4z=13$                                                                       | A | 3 |      |
| c)  | If $A = \begin{bmatrix} 1 & -3 \\ 2 & -1 \end{bmatrix}_{2 \times 2}$ and $B = \begin{bmatrix} 1 & 0 & 1 \\ 2 & -1 & 3 \end{bmatrix}_{2 \times 3}$ verify that $(AB)^T = B^T A^T$ | U | 3 |      |
| d)  | If $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$ , $B = \begin{bmatrix} 3 & -5 \\ -1 & 2 \end{bmatrix}$ show that $AB = BA = I$                                             | U | 3 |      |
| e)  | Prove that $(\sqrt{2}+1)^5 - (\sqrt{2}-1)^5 = 82$                                                                                                                                | U | 4 |      |
| f)  | Expand using Binomial theorem $\left(x - \frac{1}{x}\right)^6$                                                                                                                   | A | 4 |      |
| Q.4 | Attempt any <b>FOUR</b>                                                                                                                                                          |   |   | (08) |
| a)  | Express the following angles in radian measures. i) $30^\circ$ ii) $-135^\circ$                                                                                                  | R | 5 |      |
| b)  | Prove that $\cos(\pi + \theta) = -\cos \theta$                                                                                                                                   | U | 6 |      |
| c)  | Using compound angle formula find $\sin(75^\circ)$                                                                                                                               | R | 6 |      |
| d)  | If $\sin \alpha = 0.4$ find $\sin(3\alpha)$                                                                                                                                      | R | 7 |      |
| e)  | Express as product : $\cos 4\theta + \cos 8\theta$                                                                                                                               | R | 8 |      |
| f)  | Find the principal value of $\cos\left[\frac{\pi}{2} - \sin^{-1}\left(\frac{1}{\sqrt{2}}\right)\right]$                                                                          | R | 9 |      |
| Q.5 | Attempt any <b>FOUR</b>                                                                                                                                                          |   |   | (16) |
| a)  | Prove that $\frac{\cos \theta}{1 - \sin \theta} + \frac{1 - \sin \theta}{\cos \theta} = 2 \sec \theta$                                                                           | A | 5 |      |
| b)  | Prove that $\cos(A+B) = \cos A \cos B - \sin A \sin B$                                                                                                                           | A | 6 |      |
| c)  | If $\tan(A+B) = \frac{3}{4}$ and $\tan(A-B) = \frac{77}{36}$ then find $\tan(2A)$                                                                                                | A | 6 |      |
| d)  | Prove that $\sqrt{2} + \sqrt{2} + 2 \cos 4\theta = 2 \cos \theta$                                                                                                                | A | 7 |      |
| e)  | Show that $\tan 3A - \tan 2A - \tan A = \tan 3A \tan 2A \tan A$                                                                                                                  | A | 7 |      |
| f)  | Show that $\cos 35^\circ + \cos 85^\circ + \cos 155^\circ = 0$                                                                                                                   | A | 8 |      |
| Q.6 | Attempt any <b>FOUR</b>                                                                                                                                                          |   |   | (16) |
| a)  | Show that $(\cos A - \cos B)^2 + (\sin A - \sin B)^2 = 4 \sin^2\left(\frac{A-B}{2}\right)$                                                                                       | A | 7 |      |
| b)  | Prove that $\frac{\sin A + 2 \sin 2A + \sin 3A}{\cos A + 2 \cos 2A + \cos 3A} = \tan 2A$                                                                                         | A | 8 |      |
| c)  | Show that $\sin 10^\circ \cdot \sin 30^\circ \cdot \sin 50^\circ \cdot \sin 70^\circ = \frac{1}{16}$                                                                             | A | 8 |      |
| d)  | Show that $\tan^{-1}\left(\frac{3}{4}\right) + \tan^{-1}\left(\frac{3}{5}\right) - \tan^{-1}\left(\frac{8}{19}\right) = \frac{\pi}{4}$                                           | A | 9 |      |
| e)  | Prove that $\tan^{-1}(x) - \tan^{-1}(y) = \tan^{-1}\left(\frac{x-y}{1+xy}\right)$ , if $x > 0, y > 0$                                                                            | A | 9 |      |
| f)  | Show that $\sin^{-1}\left(\frac{3}{5}\right) + \cos^{-1}\left(\frac{12}{13}\right) = \sin^{-1}\left(\frac{56}{65}\right)$                                                        | U | 9 |      |

# GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

ODD TERM END EXAM NOV/DEC -2018

EXAM SEAT NO.

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LEVEL: THIRD

PROGRAM: IE/E&TC

COURSE CODE: EIF302/IEE302/EJ302/ETE302 COURSE NAME: APPLIED ELECTRONICS

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 05/12/2018

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

| QN  | S  | Q | Text                                                                                                                                                                                                                                                                                  | R | U | CO | EIF | 302 | Marks |
|-----|----|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|----|-----|-----|-------|
| Q.1 |    |   | Attempt any FOUR                                                                                                                                                                                                                                                                      |   |   |    |     |     | (08)  |
|     | a) |   | Define i) Positive feedback<br>ii) Negative feedback                                                                                                                                                                                                                                  | R |   |    |     | 1   |       |
|     | b) |   | State Backhausen's criteria.                                                                                                                                                                                                                                                          | R |   |    |     | 2   |       |
|     | c) |   | Draw block diagram of oscillator.                                                                                                                                                                                                                                                     | R |   |    |     | 2   |       |
|     | d) |   | State classification of power amplifiers with their conduction angle.                                                                                                                                                                                                                 | R |   |    |     | 3   |       |
|     | e) |   | State any four advantages of negative feedback amplifier.                                                                                                                                                                                                                             | R |   |    |     | 1   |       |
|     | f) |   | State the need of tank circuit.                                                                                                                                                                                                                                                       | R |   |    |     | 3   |       |
| Q.2 |    |   | Attempt any FOUR                                                                                                                                                                                                                                                                      |   |   |    |     |     | (16)  |
|     | a) |   | Explain with diagram concept of cross over distortion in class -B power amplifier.                                                                                                                                                                                                    | U |   |    |     | 3   |       |
|     | b) |   | In a colpitt's oscillator $c_1=0.2\mu F$ , $c_2=0.02\mu F$ . If the frequency of oscillations is 10 KHz, Find the value of inductor. Also find required gain for the oscillation.                                                                                                     | A |   |    |     | 2   |       |
|     | c) |   | Draw the block diagram of<br>i) Current series feedback<br>ii) Current shunt feedback                                                                                                                                                                                                 | R |   |    |     | 1   |       |
|     | d) |   | With a neat circuit diagram explain operation of class-B push-pull amplifier.                                                                                                                                                                                                         | U |   |    |     | 3   |       |
|     | e) |   | Draw neat diagram of Darlington amplifier & state its characteristics.                                                                                                                                                                                                                | R |   |    |     | 1   |       |
|     | f) |   | With neat diagram explain the operations of RC phase shift oscillator.                                                                                                                                                                                                                | U |   |    |     | 2   |       |
| Q.3 |    |   | Attempt any FOUR                                                                                                                                                                                                                                                                      |   |   |    |     |     | (16)  |
|     | a) |   | When negative voltage feedback is applied to an amplifier of gain 100, the overall gain falls to 50.<br>i) Calculate the fraction of the output voltage feedback<br>ii) If the fraction is maintained. Calculate the value of the amplifier gain required if overall stage gain is 75 | A |   |    |     | 1   |       |
|     | b) |   | Compare LC & RC Oscillator. (any four points)                                                                                                                                                                                                                                         | U |   |    |     | 2   |       |
|     | c) |   | A Hartley oscillator circuit has a tank circuit inductance of $L_1=L_2=100\mu H$ . It is required to design the oscillator to produce oscillations at 50KHz. Obtain value of capacitor & also required gain for sustained oscillation.                                                | A |   |    |     | 2   |       |

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|            |    |                                                                                                                                                                                                 |   |   |             |
|------------|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------------|
|            | d) | With neat circuit diagram describe operation of single tuned amplifier.                                                                                                                         | U | 3 |             |
|            | e) | Describe with neat circuit diagram operation of transformer coupled class-A power amplifier.                                                                                                    | U | 3 |             |
|            | f) | Compare class 'A' class 'B' & class 'C' power amplifier. (any four points)                                                                                                                      | U | 3 |             |
| <b>Q.4</b> |    | Attempt any <b>FOUR</b>                                                                                                                                                                         |   |   | <b>(08)</b> |
|            | a) | Draw switching waveforms of bistable multivibrator.                                                                                                                                             | R | 2 |             |
|            | b) | Explain Delay time and rise time in transistor switching circuit.                                                                                                                               | U | 2 |             |
|            | c) | Define term sweep-error.                                                                                                                                                                        | R | 5 |             |
|            | d) | Draw basic diagram of exponential sweep generation.                                                                                                                                             | R | 5 |             |
|            | e) | List any two applications of a differentiating circuit.                                                                                                                                         | R | 6 |             |
|            | f) | Draw response of low pass RC network to a square wave.                                                                                                                                          | R | 6 |             |
| <b>Q.5</b> |    | Attempt any <b>FOUR</b>                                                                                                                                                                         |   |   | <b>(16)</b> |
|            | a) | Draw the circuit of Schmitt trigger and explain its principle of operation.                                                                                                                     | U | 4 |             |
|            | b) | Determine the period and frequency of oscillation for an astable multivibrator with component values of $R_1=R_2=5\ \Omega$ and $C_1=C_2=300\ \text{pf}$                                        | A | 4 |             |
|            | c) | Explain with diagram Bootstrap sweep generator.                                                                                                                                                 | U | 5 |             |
|            | d) | Construct and explain sweep circuit using unijunction transistor switch.                                                                                                                        | A | 5 |             |
|            | e) | Explain combinational clipper with circuit diagram and waveforms.                                                                                                                               | U | 6 |             |
|            | f) | Sinusoidal waveform of 20V peak-to-peak is applied to the circuit shown in fig (a). Sketch the waveform at the circuit output.                                                                  | A | 6 |             |
| <b>Q.6</b> |    | Attempt any <b>FOUR</b>                                                                                                                                                                         |   |   | <b>(16)</b> |
|            | a) | The input signal with waveform shown in fig. (b) is applied to the clamper circuit shown in fig.(c). Sketch the waveform of the output voltage.                                                 | A | 6 |             |
|            | b) | A sinusoidal waveform of 20 V peak-to-peak is applied to the circuit shown in fig. (d). Sketch the waveform at the circuit output.                                                              | A | 6 |             |
|            | c) | Explain with diagram miller sweep generator.                                                                                                                                                    | U | 5 |             |
|            | d) | Explain with circuit diagram transistorized constant current /sweep generator.                                                                                                                  | U | 5 |             |
|            | e) | A monostable multivibrator is required to convert a 100KHz, 30% duty cycle square wave to a 100KHz, 50% duty cycle square wave. Find the values of $R_3$ if $C_1=1\ \mu\text{f}$ .              | A | 4 |             |
|            | f) | Determine the value of capacitors to be used in an astable multivibrator to provide a train of pulse 1 $\mu\text{sec}$ wide at a repetition rate of 100 KHz. Given $R_1=R_2=10\text{k}\Omega$ . | A | 4 |             |

Q5) a)

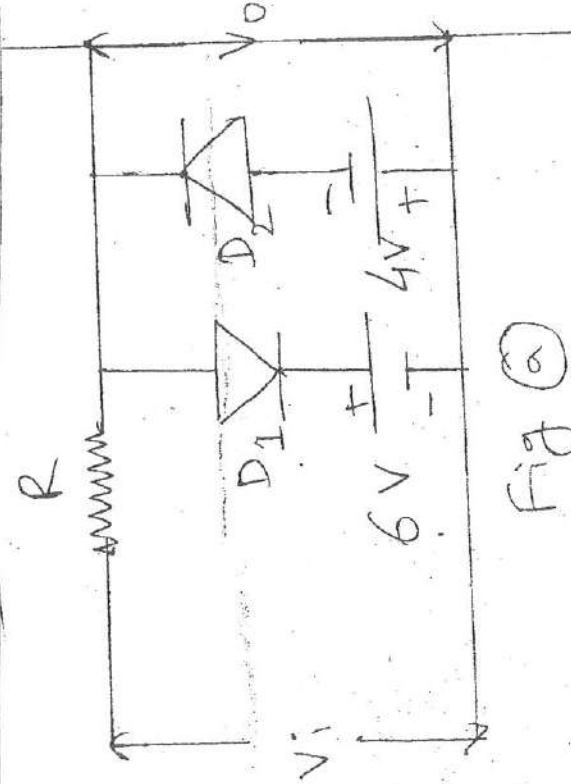
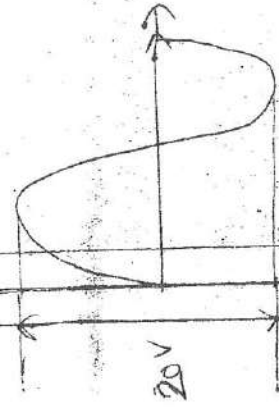


Fig a)

Q6) a)

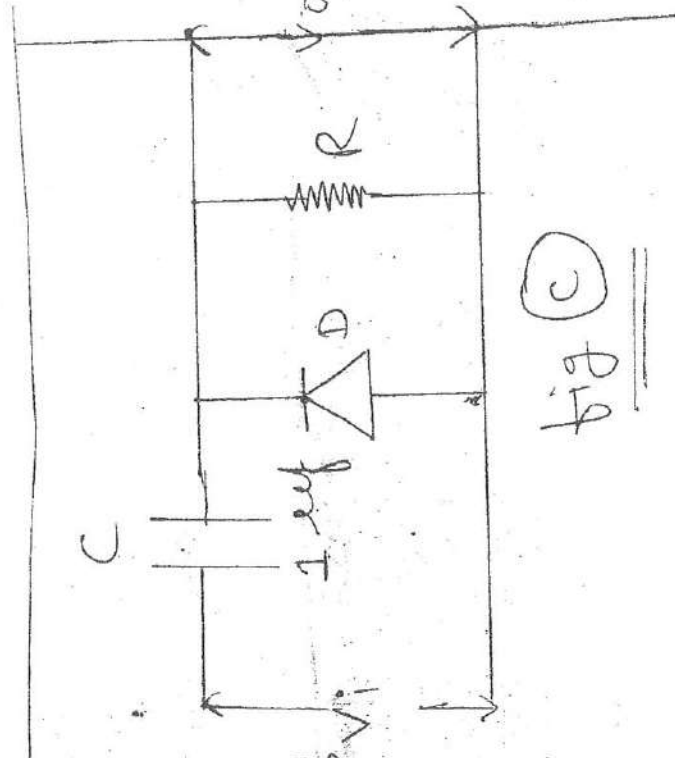
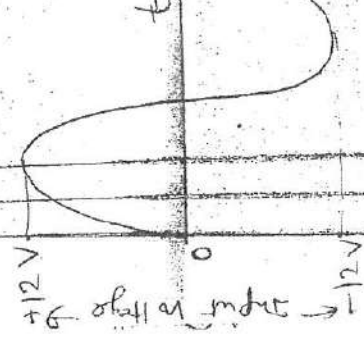


Fig c)

Fig b)

Q6) b)

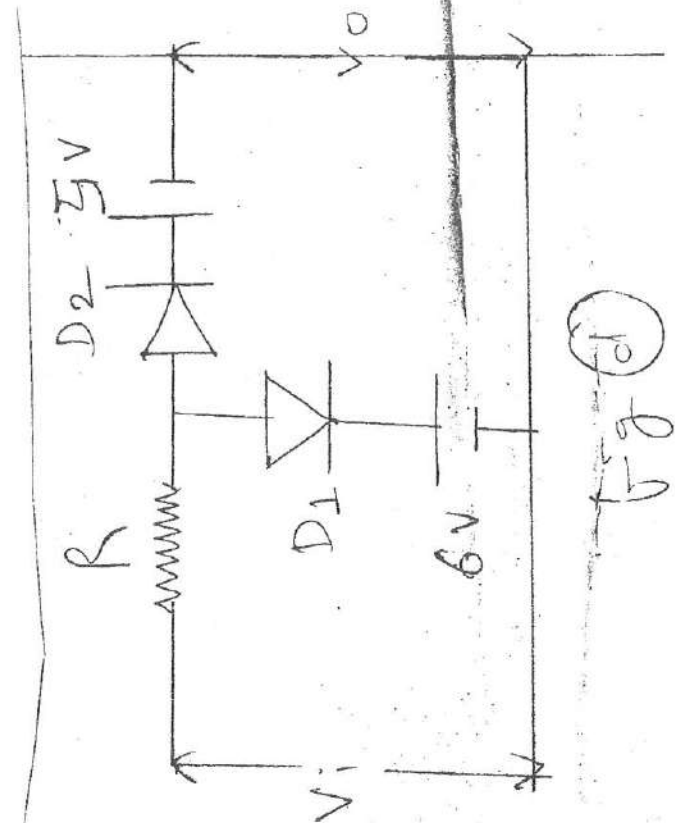
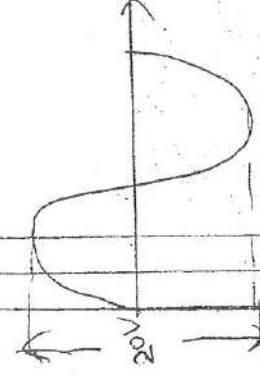


Fig d)

