

**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**EVEN TERM END EXAM MAY -2019****EXAM SEAT NO.**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

**LEVEL: FOURTH****PROGRAM: ELECTRICAL****COURSE CODE: EEF404/EEE508****COURSE NAME: ELECTRICAL POWER UTILIZATION AND TRACTION****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 22/05/2019****Instruction:-**

- 1) Answer to two sections must be written in separate section answer book provided
- 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>EEF<br>404 | Mar<br>ks   |
|-------------------|--------|---------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|-------------|
| <b>Section -I</b> |        |                                                                                                                                 |             |                  |             |
| <b>Q.1</b>        |        | Attempt any <b>FOUR</b>                                                                                                         |             |                  | <b>(08)</b> |
|                   | a)     | Draw a neat sketch of feeding post.                                                                                             | R           | 1                |             |
|                   | b)     | List the two types of overlap & explain in brief.                                                                               | U           | 2                |             |
|                   | c)     | State the requirement of train lighting.                                                                                        | U           | 3                |             |
|                   | d)     | Define Encumbrances & State its general rule.                                                                                   | R           | 2                |             |
|                   | e)     | Give various protection schemes used for traction substation transformer.                                                       | U           | 1                |             |
|                   | f)     | Draw a neat sketch of single battery output system.                                                                             | R           | 3                |             |
| <b>Q.2</b>        |        | Attempt any <b>FOUR</b>                                                                                                         |             |                  | <b>(16)</b> |
|                   | a)     | With suitable diagram explain neutral section.                                                                                  | A           | 2                |             |
|                   | b)     | Draw & explain the working of double battery parallel block system in train lighting.                                           | U           | 3                |             |
|                   | c)     | With neat diagram, explain trolley collector or pole collector for system of supplying power in electric traction.              | U           | 2                |             |
|                   | d)     | Give the protection scheme used for 25 kv catenary protection.                                                                  | A           | 1                |             |
|                   | e)     | State the essential characteristics of efficient maintenances.                                                                  | R           | 3                |             |
|                   | f)     | What is the importance of contact wire gradient in OHE?                                                                         | R           | 3                |             |
| <b>Q.3</b>        |        | Attempt any <b>FOUR</b>                                                                                                         |             |                  | <b>(16)</b> |
|                   | a)     | Explain the transformer protection system for AC traction.                                                                      | U           | 1                |             |
|                   | b)     | State the functions of contactors in electric locomotive. List the different types of contactors for the same with its purpose. | R           | 3                |             |
|                   | c)     | Compare diamond type pantograph with faiveley type pantograph (any four points)                                                 | A           | 2                |             |
| <b>P.T.O</b>      |        |                                                                                                                                 |             |                  |             |

|                   |    |                                                                                                                                                                                 |   |   |             |
|-------------------|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------------|
|                   | d) | Discuss the points on the reliability of a locomotive.                                                                                                                          | R | 3 |             |
|                   | e) | Explain third rail conductor current collection system with suitable labelled sketches.                                                                                         | U | 2 |             |
|                   | f) | Explain the 3 $\phi$ power supply arrangement for traction motor.                                                                                                               | U | 3 |             |
| <b>Section-II</b> |    |                                                                                                                                                                                 |   |   |             |
| <b>Q.4</b>        |    | Attempt any <b>FOUR</b>                                                                                                                                                         |   |   | <b>(08)</b> |
|                   | a) | Name the electrode used for spot welding.                                                                                                                                       | U | 4 |             |
|                   | b) | State any two arc welding equipment.                                                                                                                                            | U | 4 |             |
|                   | c) | Define electric drives.                                                                                                                                                         | R | 5 |             |
|                   | d) | State any two A.C. drives used as an industrial drive.                                                                                                                          | R | 5 |             |
|                   | e) | State the principle of inductions heating.                                                                                                                                      | R | 6 |             |
|                   | f) | Give two applications of eddy current heating.                                                                                                                                  | R | 6 |             |
| <b>Q.5</b>        |    | Attempt any <b>FOUR</b>                                                                                                                                                         |   |   | <b>(16)</b> |
|                   | a) | Explain working of direct core type of induction heating.                                                                                                                       | U | 6 |             |
|                   | b) | State any six applications of dielectric heating.                                                                                                                               | U | 6 |             |
|                   | c) | Explain principle of working of induction arc furnace.                                                                                                                          | U | 6 |             |
|                   | d) | Compare between AC and DC drives.                                                                                                                                               | U | 5 |             |
|                   | e) | State the factors governing selection of electric drives.                                                                                                                       | U | 5 |             |
|                   | f) | Compare between metal arc and carbon arc welding.                                                                                                                               | U | 5 |             |
| <b>Q.6</b>        |    | Attempt any <b>FOUR</b>                                                                                                                                                         |   |   | <b>(16)</b> |
|                   | a) | Compare Coreless and Ajax Wyatt furnace.                                                                                                                                        | A | 6 |             |
|                   | b) | Explain the Radiant & Infrared heating in detail.                                                                                                                               | A | 6 |             |
|                   | c) | Define load equalization. Explain how it is achieved.                                                                                                                           | A | 6 |             |
|                   | d) | Compare AC and DC welding.                                                                                                                                                      | A | 4 |             |
|                   | e) | Suggest suitable type of electric motor for following applications.<br>Justify why they are used.<br>i) Domestic<br>ii) Paper mill<br>iii) Floor mill<br>iv) Electric traction. | A | 5 |             |
|                   | f) | Discuss why a D.C series motor is ideally suited for traction services.                                                                                                         | A | 5 |             |

\*\*\*\*\*

**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**  
(An Autonomous Institute of Govt.of Maharashtra)  
**EVEN TERM ENDE EXAM MAY -2019**

**EXAM SEAT NO.**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

LEVEL: **THIRD**

PROGRAM: **ELECTRICAL ENGG.**

COURSE CODE:**EEF302/E203/EE 202/EE203/EEE30** COURSE NAME: **ELECTRIC CIRCUITS**

MAX. MARKS: **80**

TIME: **3 Hrs**

DATE: **23/05/2019**

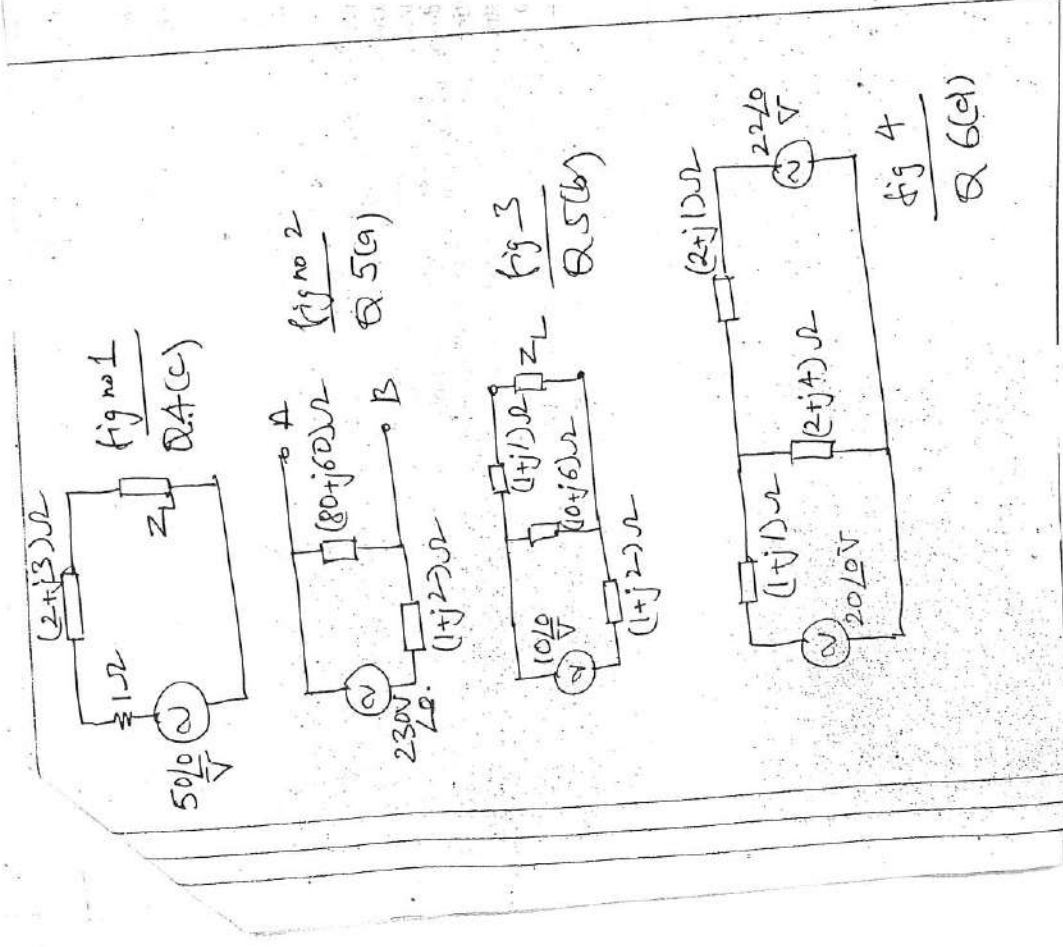
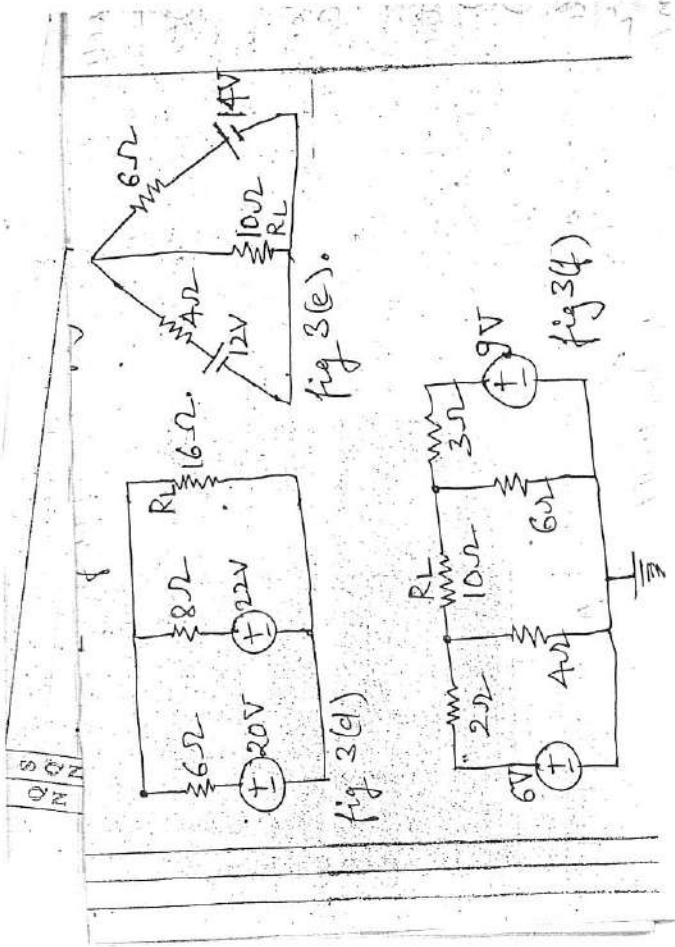
Instruction:-

- 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 EEF-302 | Marks |
|---------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------|-------|
| Q.1           |         | Attempt any <b>FOUR</b>                                                                                                                                                                                                                       |                       |                 | (08)  |
|               | a       | Show on a neat sketch peak values and cycle in respect of alternating quantities.                                                                                                                                                             | U                     | 2               |       |
|               | b       | Define a phasor.                                                                                                                                                                                                                              | U                     | 3               |       |
|               | c       | Explain the terms average value & RMS value.                                                                                                                                                                                                  | U                     | 2               |       |
|               | d       | Define the term quality factor related to a.c. circuits.                                                                                                                                                                                      | R                     | 3               |       |
|               | e       | Explain the significance of from factor of a.c.                                                                                                                                                                                               | U                     | 2               |       |
|               | f       | Convert $14.14 \angle 45^\circ$ to rectangular form.                                                                                                                                                                                          | U                     | 3               |       |
| Q.2           |         | Attempt any <b>FOUR</b>                                                                                                                                                                                                                       |                       |                 | (16)  |
|               | a       | Explain the working of the elementary alternator using a neat labeled diagram                                                                                                                                                                 | U                     | 2               |       |
|               | b       | A coil of self inductance coefficient 0.1H in connected across a voltage source of $320 \sin(100\pi)t$ . calculate the RMS value of the current in it                                                                                         | A                     | 3               |       |
|               | c       | The domestic supply is rated at single phase 230V, 50Hz. Convert it to the form $V=V_m \cos wt$ .                                                                                                                                             | A                     | 2               |       |
|               | d       | Convert the terms to polar form and determine the result<br>i) $\frac{(3+j5)}{(3+j4)}$ ii) $\frac{(4-j3)}{(3+j4)}$                                                                                                                            | A                     | 3               |       |
|               | e       | Determine the resultants of $V_1$ & $V_2$ below for $(V_1 + V_2)$ & for $(V_1 - V_2)$ if $V_1 = 12 \sin 100\pi t$ & $V_2 = 16 \cos 100\pi t$                                                                                                  | A                     | 2               |       |
|               | f       | A resistance of 10 ohms inductive reactance of 24 ohms and capacitive reactance of 34 ohms are connected in series across a 230V, 60Hz supply. Determine the impedance, current, real power, reactive power and apparent power of the circuit | A                     | 3               |       |
| Q.3           |         | Attempt any <b>Four</b>                                                                                                                                                                                                                       |                       |                 | (16)  |
|               | a       | Three resistances of x, y & Z values are connected in delta. Determine the equivalent star network by derivation.                                                                                                                             | A                     | 1               |       |
|               | b       | Explain with a neat circuit diagram Narton's theorem applied in electric networks.                                                                                                                                                            | R/U                   | 1               |       |
|               | c       | Three resistances 4 ohms, 6ohms and 'R' (ohms) are connected in series. This circuit is now powered by a source of 20V and internal resistance of 2 ohms. Determine the value of 'R' for maximum power transfer to it.                        | A                     | 1               |       |
|               | d       | Determine using Thevenin's theorem the current in resistance $R_L$ of circuit fig. 3(d).                                                                                                                                                      | A                     | 1               |       |
| <b>P.T.O.</b> |         |                                                                                                                                                                                                                                               |                       |                 |       |

|            |   |                                                                                                                                                                                                                                                                          |   |   |      |
|------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
|            | e | Determine using loop analysis the current in resistance $R_L$ of circuit fig. 3(e).                                                                                                                                                                                      | A | 1 |      |
|            | f | Determine using node analysis the current in resistance $R_L$ of circuit in fig.3 (f).                                                                                                                                                                                   | A | 1 |      |
|            |   |                                                                                                                                                                                                                                                                          |   |   |      |
| <b>Q.4</b> |   | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                  |   |   | (08) |
|            | a | Define conductance and susceptance in case of parallel circuit                                                                                                                                                                                                           | R | 4 |      |
|            | b | State Kirchhoff's laws.                                                                                                                                                                                                                                                  | R | 5 |      |
|            | c | Find $Z_L$ to transfer maximum amount of power from source to load in fig.no.4.(c)                                                                                                                                                                                       | A |   |      |
|            | d | Define resonant frequency in case of parallel AC circuit.                                                                                                                                                                                                                | R | 4 |      |
|            | e | Define balanced three phase load.                                                                                                                                                                                                                                        | R | 6 |      |
|            | f | Write down relation between line and phase values of voltages and current in 3 phase delta connected systems.                                                                                                                                                            | R | 6 |      |
|            |   |                                                                                                                                                                                                                                                                          |   |   |      |
| <b>Q.5</b> |   | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                  |   |   | (16) |
|            | a | Develop Thevenin's equivalent circuit across A and B in the network shown in fig.5(a)                                                                                                                                                                                    | A | 5 |      |
|            | b | Find the value of $Z_L$ to transfer maximum power in the network shown in fig.5(b)                                                                                                                                                                                       | A | 5 |      |
|            | c | State any four advantages of polyphase circuits over single phase circuit.                                                                                                                                                                                               | R | 6 |      |
|            | d | Derive expression for apparent power and reactive power in 3 phase AC circuit for delta connected load.                                                                                                                                                                  | A | 6 |      |
|            | e | Explain the terms.<br>1) Apparent power<br>2) Reactive power                                                                                                                                                                                                             | U | 4 |      |
|            | f | Compare series and parallel resonance.                                                                                                                                                                                                                                   | U | 4 |      |
|            |   |                                                                                                                                                                                                                                                                          |   |   |      |
| <b>Q.6</b> |   | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                  |   |   | (16) |
|            | a | Derive an expression for frequency of parallel resonance circuit assuming suitable data.                                                                                                                                                                                 | A | 4 |      |
|            | b | A Condenser of capacitance $50\ \mu\text{F}$ is connected in parallel with a choke coil which has a resistance of 20 ohms and inductance of 0.05H across a 200 volt 50Hz supply calculate the current drawn from the mains by parallel circuit. Draw the vector diagram. | A | 4 |      |
|            | c | State Norton's theorem. Draw Norton's equivalent circuit.                                                                                                                                                                                                                | R | 5 |      |
|            | d | Find current in $(2+j4)\Omega$ using superposition theorem for the circuit shown below fig.no.6 (d)                                                                                                                                                                      | A | 5 |      |
|            | e | State the principle of three phase emf generation and sketch three phase voltage waveform.                                                                                                                                                                               | U | 6 |      |
|            | f | Derive expression for apparent power and reactive power in 3 phase AC circuit for star connected load.                                                                                                                                                                   | U | 6 |      |







# GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

## EVEN TERM END EXAM MAY -2019

EXAM SEAT NO.

|  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|

LEVEL: ~~FIFTH~~ PROGRAM: ELECTRICAL

COURSE CODE: ~~EEE502~~ COURSE NAME: MICROPROCESSOR AND MICROCONTROLLER

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 17/05/2019

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

(08)

#### Q.1 Attempt any **FOUR**

- a) Write the pin functions of following pins of 8085

i)  $\overline{RESET}$  IN

ii)  $IO/\overline{M}$

- b) State any two features of 8085 microprocessor.

- c) Define the following terms

i) Instruction cycle

ii) Machine cycle

- d) State any one instruction from data transfer group and logical group each.

- e) State all the hardware interrupts of 8085 microprocessor according to their priorities.

- f) Define the term addressing mode and give example of each addressing mode.

#### Q.2 Attempt any **FOUR**

(16)

- a) With the help of neat diagram explain how to generate memory read/write control signals for 8085 microprocessor.

- b) Explain the need for demultiplexing the address/data bus (AD0-AD7)

- c) Consider ten data bytes are stored from memory locations 1000H onwards of 8085. Write an assembly language program to transfer the data on to consecutive memory locations starting from 2000H

- d) Explain the instruction ADC M of 8085 microprocessor with respect to its operations, size, addressing mode flags affected. Also give an example.

- e) Draw the format of SIM instruction of 8085 and explain the significance of each bit.

- f) Differentiate between software interrupt and hardware interrupt. (any four points)

**Q.3** Attempt any **TWO****(16)**

- With the help of neat labelled diagram explain the architecture of 8085 microprocessor.
- Draw a neat labelled timing diagram of instruction MOV A, B and explain it.
- With the help of neat diagram and example, explain CALL & RET instruction of 8085 microprocessor.

**Section – II****Marks****Q.4** Attempt any **FOUR****(08)**

- What will be size of address bus and data bus for following memory chip?
  - 1k x 8
  - 1k x 4
- Describe mode 2 of 8255 PPI in brief.
- Write advantages of using 8255 PPI in interfacing I/O devices. (any four)
- Compare 8085 microprocessor and 8051 microcontroller (any four points)
- List various interrupts of 8051 microcontroller with their default priorities.
- Describe any two rotate instructions of 8051.

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

- Compare memory mapped I/O with I/O mapped I/O with reference to
  - no. of I/O devices connected
  - addressing lines
  - control signal
  - instructions.
- Write any eight architectural features of 8051 microcontroller.
- Draw the format of PSW and describe each bit.
- Write ALP to add two 8 bit numbers stored in internal RAM of 8051 and store the result of addition in internal RAM.
- Describe any four logical instructions of 8051.
- What will be the contents of accumulator after execution of each instruction of the following program?

MOV A, #00H

DEC A

ADD A, #0FFH

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

- Write ALP to procedure a delay of 10 msec timer of 8051 microcontroller. Assume XTAL = 12 MHz. draw flowchart.
- Draw architectural block diagram of 8051 microcontroller and label it. also describe PC and DPTR
- Draw internal block diagram of 8255 PPI and describe each block

\*\*\*\*\*



**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**EVEN TERM END EXAM MAY -2019****EXAM SEAT NO.**

|  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|

**LEVEL: THIRD****PROGRAM: ELECTRICAL****COURSE CODE: EEF309/EEE304/EE310 COURSE NAME: APPLIED ELECTRONICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 14/05/2019**

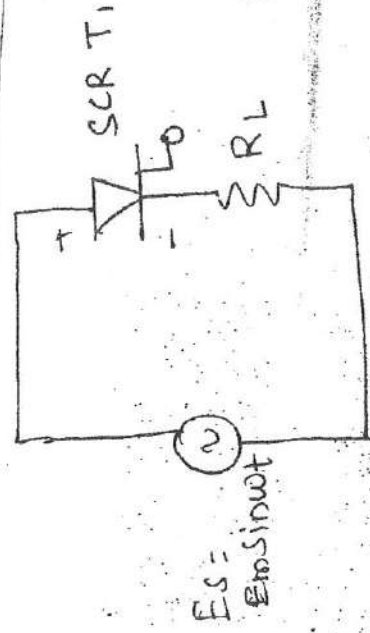
Instruction:-

- 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

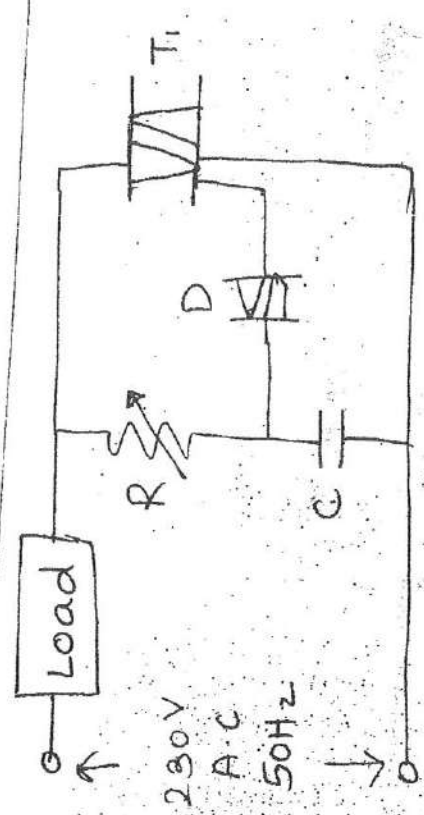
| QN  | S<br>Q<br>N | Question Text                                                                                                                                                     | R<br>U<br>A | CO<br>EEF309 | Marks |
|-----|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------|-------|
| Q.1 |             | Attempt any <b>FOUR</b>                                                                                                                                           |             |              | (08)  |
|     | a)          | Draw block diagram of oscillator.                                                                                                                                 | R           | 2            |       |
|     | b)          | State the need of multistage amplifier.                                                                                                                           | R           | 1            |       |
|     | c)          | Draw a neat circuit of CE configuration.                                                                                                                          | R           | 1            |       |
|     | d)          | Classify the types of multivibrator.                                                                                                                              | U           | 3            |       |
|     | e)          | State Barkhausen's criteria for oscillator.                                                                                                                       | R           | 2            |       |
|     | f)          | Draw circuit for direct coupled amplifier.                                                                                                                        | R           | 1            |       |
| Q.2 |             | Attempt any <b>FOUR</b>                                                                                                                                           |             |              | (16)  |
|     | a)          | Explain Circuit diagram of RC coupled amplifier. Write the function of each component.                                                                            | U           | 1            |       |
|     | b)          | Explain with neat diagram Bistable multivibrator.                                                                                                                 | U           | 3            |       |
|     | c)          | Calculate the time period and frequency of oscillations for astable multivibrator with component value of $R_1=R_2=4.7\text{ k}\Omega$ and $C_1=C_2=270\text{PF}$ | A           | 3            |       |
|     | d)          | Explain common collector configuration of transistor with diagram.                                                                                                | U           | 1            |       |
|     | e)          | Calculate the frequency of oscillations of a colpitt's oscillator with $C_1=C_2=500\text{PF}$ & $L=1\text{mH}$                                                    | A           | 3            |       |
|     | f)          | Compare LC and RC oscillator (any four points).                                                                                                                   | U           | 2            |       |
| Q.3 |             | Attempt any <b>FOUR</b>                                                                                                                                           |             |              | (16)  |
|     | a)          | Explain class A power amplifier with diagram.                                                                                                                     | U           | 1            |       |
|     | b)          | Explain Astable multivibrator with circuit diagram                                                                                                                | U           | 3            |       |
|     | c)          | Compare between class A, class B power amplifier on the basis of following points<br>i) Conduction<br>ii) Operating point<br>iii) Efficiency<br>iv) Distortion    | U           | 1            |       |

**(1/4) P.T.O**

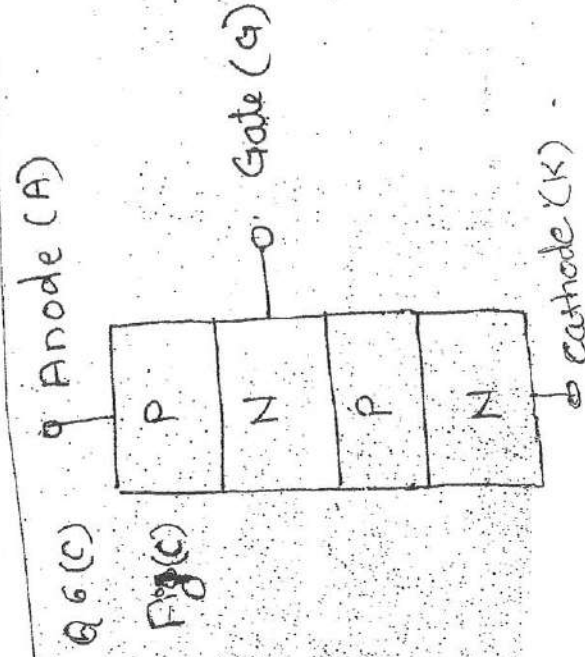
|     |    |                                                                                                                                                                                                                                                             |   |   |      |
|-----|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
|     | d) | Define oscillator. List different types of oscillator.                                                                                                                                                                                                      | R | 2 |      |
|     | e) | Explain with a neat diagram for showing different switching times in a transistor.                                                                                                                                                                          | U | 3 |      |
|     | f) | Explain with neat circuit diagram of Tuned circuit oscillator.                                                                                                                                                                                              | U | 2 |      |
| Q.4 |    | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                     |   |   | (08) |
|     | a) | List out the turn on methods of transistor.                                                                                                                                                                                                                 | R | 4 |      |
|     | b) | Match the following<br><div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>A (2)</p> <p>1) PUT</p> <p>2) IGBT</p> </div> <div style="text-align: center;"> <p>B (2)</p> </div> </div> | R | 4 |      |
|     | c) | Draw the diagram of class E commutation.                                                                                                                                                                                                                    | R | 5 |      |
|     | d) | Define term commutation in SCR                                                                                                                                                                                                                              | R | 5 |      |
|     | e) | List any two applications for thyristor.                                                                                                                                                                                                                    | R | 6 |      |
|     | f) | Define snubber circuit and draw.                                                                                                                                                                                                                            | R | 6 |      |
| Q.5 |    | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                     |   |   | (16) |
|     | a) | Explain in details with neat diagram of two- transistor analogy of SCR.                                                                                                                                                                                     | U | 4 |      |
|     | b) | Explain dynamic turn off characteristics of thyristor.                                                                                                                                                                                                      | U | 4 |      |
|     | c) | Compare MOSFET & IGBT (any 4 points)                                                                                                                                                                                                                        | U | 4 |      |
|     | d) | Identify the circuit diagram show in fig (a). Draw its waveforms and explain the circuit.                                                                                                                                                                   | A | 5 |      |
|     | e) | Identify the circuit shown in fig (d). Draw its waveforms and explain the working.                                                                                                                                                                          | A | 6 |      |
|     | f) | Identify the circuit shown in fig (b). Explain the function of R, C & D in diagram.                                                                                                                                                                         | A | 6 |      |
| Q.6 |    | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                     |   |   | (16) |
|     | a) | With the help of diagram explain dv/dt and di/dt protections in SCR                                                                                                                                                                                         | U | 6 |      |
|     | b) | Draw the circuit diagram of 'class B' commutation give its advantages and disadvantages.                                                                                                                                                                    | U | 5 |      |
|     | c) | Identify the structure shown in fig (C) and give 4 advantages of it. Also explain its constructions and draw symbol.                                                                                                                                        | A | 4 |      |
|     | d) | Draw the diagram and waveforms for phase control using ramp & pedestal triggering circuit.                                                                                                                                                                  | U | 6 |      |
|     | e) | Explain in detail line commutation and forced commutation and give of each.                                                                                                                                                                                 | U | 5 |      |
|     | f) | Identify the waveforms shown in fig (e) and fig (f) and draw the circuits.                                                                                                                                                                                  | A | 5 |      |

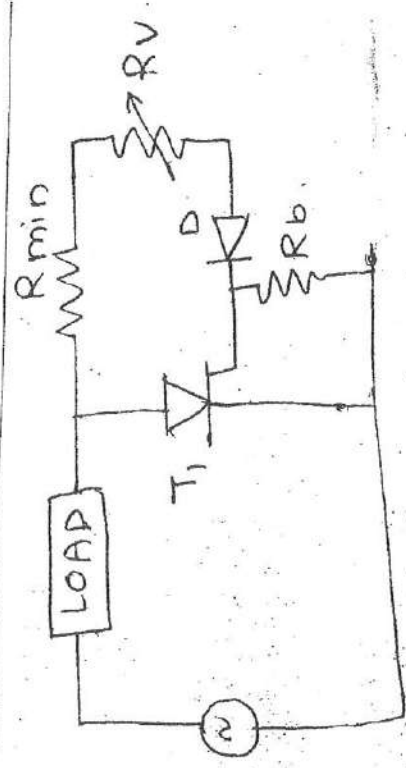


Q.5(d) Fig(a)



Q.5(f) Fig(b)





Q 5 (e) fig (d)

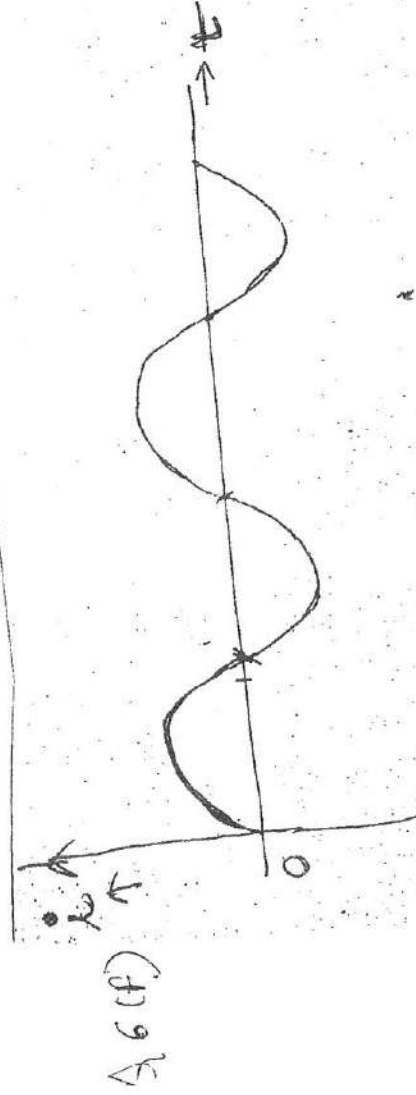


fig (e)

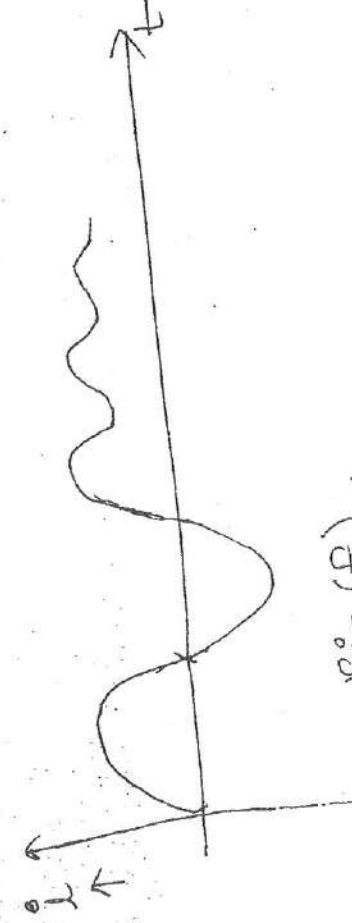


fig (f)

# GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

**EVEN TERM END EXAM MAY -2019**

**EXAM SEAT NO.**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

**LEVEL: THIRD**

**PROGRAM: ELECTRICAL**

**COURSE CODE: EEF303/EEEE201/EE206 COURSE NAME: BASIC ELECTRONICS**

**MAX. MARKS: 80**

**TIME: 3 HRS.**

**DATE: 17/05/2019**

**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        |
|--------------|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----|-------------|
|              | Q  |                                                                                                                                                                    | U | EEF | s           |
|              | N  |                                                                                                                                                                    | A | 303 |             |
| <b>Q.1</b>   |    | Attempt any <b>FOUR</b>                                                                                                                                            |   |     | <b>(08)</b> |
|              | a) | Define reverse saturation current of diode.                                                                                                                        | R | 1   |             |
|              | b) | Label the following diagram. (Refer.fig.1)                                                                                                                         | R | 1   |             |
|              | c) | Compare silicon & germanium diode (any two points)                                                                                                                 | U | 1   |             |
|              | d) | Draw the neat diagram of series Inductor filter & label it.                                                                                                        | R | 2   |             |
|              | e) | Distinguish between transistors configuration (CB, CC, CE) on the basis of <i>I/P &amp; O/P Current, I/P &amp; O/P voltage, Dynamic resistance.</i>                | U | 3   |             |
|              | f) | Identify the following diagram & name it. (Refer.fig.2)                                                                                                            | A | 3   |             |
| <b>Q.2</b>   |    | Attempt any <b>FOUR</b>                                                                                                                                            |   |     | <b>(16)</b> |
|              | a) | Define following terms with respect to rectifier.<br>i) Average value<br>ii) Ripple factor<br>iii) Rectifier efficiency                                            | R | 2   |             |
|              | b) | Prove the application of zener diode as a voltage regulator.                                                                                                       | A | 1   |             |
|              | c) | Give any four applications of P-N Junction diode also give its specification & explain any one.                                                                    | U | 1   |             |
|              | d) | Explain the formation of Depletion region in an unbiased P-N junction diode and state the importance of barrier potential.                                         | U | 1   |             |
|              | e) | Explain working of full wave rectifier with neat waveforms & diagram.                                                                                              | U | 2   |             |
|              | f) | Derive the relationship between $\alpha$ & $\beta$ of transistor.                                                                                                  | A | 3   |             |
| <b>Q.3</b>   |    | Attempt any <b>FOUR</b>                                                                                                                                            |   |     | <b>(16)</b> |
|              | a) | State the need of filter in power supply. And state the use of capacitor in CLC ( $\pi$ ) filter.                                                                  | A | 2   |             |
|              | b) | Distinguish between Shunt voltage regulator and Series regulator.                                                                                                  | U | 2   |             |
|              | c) | Prove that "Transistor used as a switch".                                                                                                                          | A | 3   |             |
|              | d) | Construct the circuit for zener diode in reverse biased condition & Explain with V-I characteristics in reverse biased V-I characteristics in reverse biased mode. | A | 1   |             |
|              | e) | Explain input & output characteristics of common Emitter configuration.                                                                                            | U | 3   |             |
| <b>P.T.O</b> |    |                                                                                                                                                                    |   |     |             |



|            |    |                                                                                                                                                                  |   |   |             |
|------------|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------------|
|            | f) | Organize the following blocks in proper order & Explain its working<br>Also Draw diagram & identify it i) Rectifier ii) Regulator iii) Filter<br>iv) Transformer | A | 2 |             |
| <b>Q.4</b> |    | Attempt any <b>FOUR</b>                                                                                                                                          |   |   | <b>(08)</b> |
|            | a) | Draw the symbol's of i) Phototransistor ii) photodiode.                                                                                                          | R | 5 |             |
|            | b) | Enlist applications of photo devices.                                                                                                                            | R | 5 |             |
|            | c) | Draw symbol & truth table for<br>i) NOT gate<br>ii) NAND gate                                                                                                    | R | 4 |             |
|            | d) | Enlist law's of Boolean Algebra. (any four)                                                                                                                      | R | 4 |             |
|            | e) | Give classification of PCB.                                                                                                                                      | R | 6 |             |
|            | f) | Simplify following expression. $(A+B)(A+C)$                                                                                                                      | A | 4 |             |
| <b>Q.5</b> |    | Attempt any <b>FOUR</b>                                                                                                                                          |   |   | <b>(16)</b> |
|            | a) | Define opto-coupler & explain its working.                                                                                                                       | U | 5 |             |
|            | b) | Convert expression into standard SOP.<br>i) $AC + DC + CB$<br>ii) $\overline{A}(\overline{B} + C)$                                                               | A | 4 |             |
|            | c) | State & explain rules for designing PCB layout.                                                                                                                  | U | 6 |             |
|            | d) | Draw symbols & truth table for following gates<br>i) EX-OR<br>ii) NOR gate                                                                                       | U | 4 |             |
|            | e) | Explain working principle of Burglar Alarm system.                                                                                                               | U | 5 |             |
|            | f) | State various steps involved for PCB designing of center -tapped full<br>wave Rectifier.                                                                         | U | 6 |             |
| <b>Q.6</b> |    | Attempt any <b>FOUR</b>                                                                                                                                          |   |   | <b>(16)</b> |
|            | a) | Explain construction & working of LDR.                                                                                                                           | U | 5 |             |
|            | b) | List types of soldering & explain any one in detail.                                                                                                             | U | 6 |             |
|            | c) | Explain working principle of photo tachometer.                                                                                                                   | U | 5 |             |
|            | d) | Using K map solve expressions<br>i) $F(A, B, C) = \sum m(0, 1, 3, 4, 6)$<br>ii) $F(A, B, C) = \sum m(0, 1, 2, 4)$                                                | A | 4 |             |
|            | e) | Explain De-Morgan's theorem.                                                                                                                                     | U | 4 |             |
|            | f) | By using PCB layout rules design PCB layout for following circuit.                                                                                               | A | 6 |             |

Diagrams for respective question

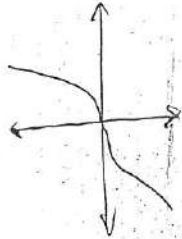


Fig 1

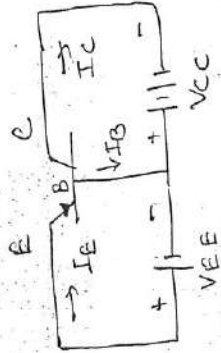


Fig 2

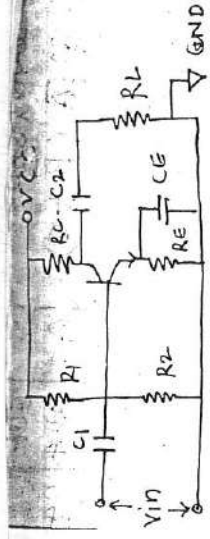


Fig 3

# GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

**EVEN TERM END EXAM MAY -2019**

**EXAM SEAT NO.**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

**LEVEL: FIRST**

**PROGRAM: COMMON**

**COURSE CODE: CCF110/X111/CCE110**

**COURSE NAME: APPLIED MECHANICS**

**MAX. MARKS: 80**

**TIME: 3 HRS.**

**DATE: 20/05/2019**

**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

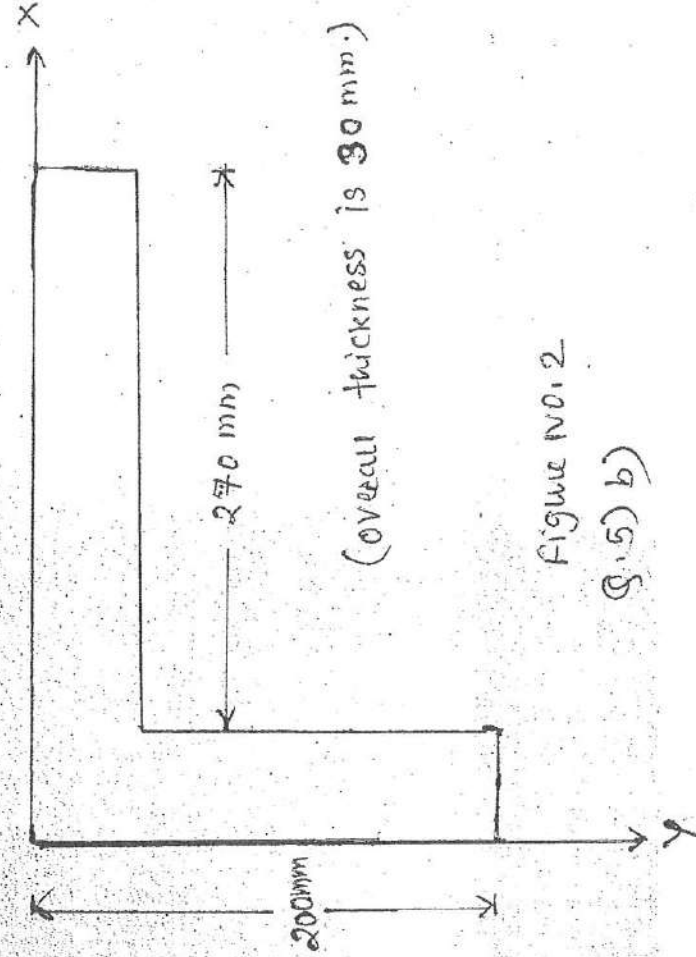
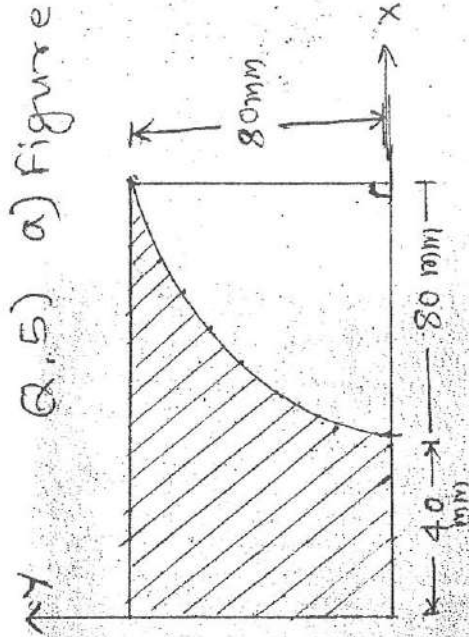
| QN         | S<br>Q<br>N | Question Text                                                                                                                                                                                                                                                                                                                                                                          | R<br>U<br>A | CO<br>CCF<br>110 | Marks       |
|------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|-------------|
| <b>Q.1</b> |             | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                                                                                                |             |                  | <b>(08)</b> |
|            | a)          | Different between particle & body. (any two)                                                                                                                                                                                                                                                                                                                                           | U           | 1                |             |
|            | b)          | State principle of transmissibility.                                                                                                                                                                                                                                                                                                                                                   | R           | 1                |             |
|            | c)          | Give field examples of i) Concurrent force system. ii) Parallel force system.                                                                                                                                                                                                                                                                                                          | R           | 1                |             |
|            | d)          | Define equilibrant & state its effect on body.                                                                                                                                                                                                                                                                                                                                         | R           | 2                |             |
|            | e)          | Define i) Angle of friction ii) Angle of Repose.                                                                                                                                                                                                                                                                                                                                       | R           | 2                |             |
|            | f)          | State laws of friction. (any two)                                                                                                                                                                                                                                                                                                                                                      | R           | 2                |             |
| <b>Q.2</b> |             | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                                                                                                |             |                  | <b>(16)</b> |
|            | a)          | Determine the components of the force 500kN at $20^\circ$ & $30^\circ$ at either side of it.                                                                                                                                                                                                                                                                                           | A           | 1                |             |
|            | b)          | Two forces acts at an angle $120^\circ$ , The bigger force is 50 N and resultant of both is perpendicular to smaller force. Find smaller force.                                                                                                                                                                                                                                        | A           | 1                |             |
|            | c)          | Determine the magnitude & direction of resultant force of forces away from point 8 N, 10 N, 20 N and 12 N making an angle $30^\circ$ , $120^\circ$ , $200^\circ$ & $310^\circ$ with the x-axis measured in clockwise direction respectively. (solve by Analytical method)                                                                                                              | A           | 1                |             |
|            | d)          | Three forces of 20 N, 40 N, & 60 N along the sides of equilateral triangle of side 30 cm respectively in order. Calculate the magnitude & position of resultant of force system from apex point.                                                                                                                                                                                       | A           | 1                |             |
|            | e)          | A light string ABCDE whose extremity 'A' is fixed, has 'W <sub>1</sub> ' and 'W <sub>2</sub> ' attached at 'B' & 'C'. It passes frictionless pulley at 'D' carrying a weight of 200 N at free end 'E'. If in equilibrium position BC is horizontal & AB & CD makes an angle $150^\circ$ & $100^\circ$ respectively with BC, Determine magnitudes 'W <sub>1</sub> ' & 'W <sub>2</sub> ' | A           | 2                |             |
|            | f)          | Solve Q.No.2(C) by Graphical method.                                                                                                                                                                                                                                                                                                                                                   | U           | 3                |             |
| <b>Q.3</b> |             | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                                                                                                |             |                  | <b>(16)</b> |
|            | a)          | Simply supported beam of 5m span carries UDL of 12 kN/m over half span from left side support & vertically downward point load of 27kN acting 1 m from right side support. Determine support reaction by analytical method.                                                                                                                                                            | A           | 2                |             |
|            | b)          | Solve Q. No 3(a) by graphical method.                                                                                                                                                                                                                                                                                                                                                  | U           | 3                |             |
|            | c)          | State advantages & limitations of graphical method over analytical method.                                                                                                                                                                                                                                                                                                             | R           | 3                |             |
|            | d)          | A heavy stone of mass 400 kg is on hill of $45^\circ$ inclined with horizontal. If coefficient of friction between stone & hill is 0.50, is stone stable?                                                                                                                                                                                                                              | A           | 2                |             |

(Page 4/3)

P.T.O

|            |                                                                                                                                                                                                                                                                                                         |   |   |             |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------------|
| e)         | A block weighing 40KN resting on rough horizontal plane can be moved by a force of 22 KN applied at an angle $35^\circ$ with the horizontal. Determine coefficient of friction.                                                                                                                         | A | 2 |             |
| f)         | A ladder of 3 m weighing 100 N is kept $30^\circ$ inclined with smooth horizontal ground and rough wall. If the man weighing 700 N is standing on mid of ladder, what is the force 'P', horizontal to ground contact surface, required to keep the ladder in rest. Take $\mu$ for ladder & wall is 0.3. | A | 2 |             |
| <b>Q.4</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                 |   |   | <b>(08)</b> |
| a)         | Define Kinematics.                                                                                                                                                                                                                                                                                      | R | 5 |             |
| b)         | Define momentum.                                                                                                                                                                                                                                                                                        | R | 5 |             |
| c)         | Define angular acceleration.                                                                                                                                                                                                                                                                            | R | 5 |             |
| d)         | State law of conservation of energy.                                                                                                                                                                                                                                                                    | R | 5 |             |
| e)         | Define work & power.                                                                                                                                                                                                                                                                                    | R | 5 |             |
| f)         | Define velocity ratio.                                                                                                                                                                                                                                                                                  | R | 6 |             |
| <b>Q.5</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                 |   |   | <b>(16)</b> |
| a)         | Determine the co-ordinates of the centroid of the shaded area with respect to the axes shown in figure. no.1 in which a quarter circle of radius 80 mm is cut-off from a rectangle of size 120 mm x 80 mm.                                                                                              | A | 4 |             |
| b)         | Determine the centroid of an unequal angle from the reference axes X & Y as shown in figure No.2.                                                                                                                                                                                                       | A | 4 |             |
| c)         | A ball is dropped from the top of a tower 30 m high. At the same instant a second ball is thrown upward from the ground with an initial velocity 15 m/sec when & where they cross?                                                                                                                      | A | 5 |             |
| d)         | Power supply was cut off to a power driven wheel when it was rotating at a speed of 900 rpm. It was observed to come to rest after making 360 revolutions. Determine its angular retardation & time it took to come to rest after power supply cut-off.                                                 | A | 5 |             |
| e)         | A stone is released from a height 30 m. Calculate velocity of stone when it strikes to the ground using law of conservation of energy.                                                                                                                                                                  | A | 5 |             |
| f)         | In a lifting machine an effort of 500 N is to be raise a load 10,000 N, velocity ratio of machine is 25. Determine efficiency of machine, ideal effort, effort lost in friction & load lost in friction,                                                                                                | A | 6 |             |
| <b>Q.6</b> | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                 |   |   | <b>(16)</b> |
| a)         | A solid right circular cone of height 40 cm & diameter 20 cm is placed on a cylinder of diameter 20 cm & height 30 cm. Locate the position of center of gravity from the base of the cone.                                                                                                              | A | 4 |             |
| b)         | A railway wagon is moving at 108 kmph. The driver observes the red signal & applies brakes to stop the train & it covers a distance of 300 meter before coming to rest. Calculate the retardation produced & time taken to rest.                                                                        | A | 5 |             |
| c)         | A wheel starts from the rest & accelerates at $12 \text{ rad/sec}^2$ until it reaches a speed of 200 rpm. With this speed it rotates for 2 minutes & then retards uniformly for 150 seconds & stops. Determine total number of revolutions made, Acceleration time & angular retardation.               | A | 5 |             |
| d)         | Determine the power required to raise a lift containing 15 persons to a height of 150 m in 10 minutes. The average weight of each person may be taken as 650 N. The weight of lift is 2.5 KN.                                                                                                           | A | 5 |             |
| e)         | In a machine an effort of 15 N can lift a load of 300 N & an effort of 25 N can lift a load of 500N. Determine the law of machine & also effort required to lift a load of 1000N.                                                                                                                       | A | 6 |             |
| f)         | In a lifting machine law of machine is $P = (0.025 W + 0.05) \text{ KN}$ & velocity ratio is 44.44. Calculate efficiency of machine at load 20 KN. and state machine is reversible or not at load 20 KN. Also determine maximum M.A & maximum efficiency of machine.                                    | A | 6 |             |

Q.5) a) Figure No. 1



(Overall thickness is 30 mm.)

Figure No. 2

Q.5) b)





**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**EVEN TERM END EXAM MAY -2019****EXAM SEAT NO.**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

**LEVEL: FIRST****PROGRAM: ELECTRICAL****COURSE CODE: EE102 COURSE NAME: FUNDAMENTALS OF ELECTRICITY AND MAGNETISM****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 20/05/2019****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

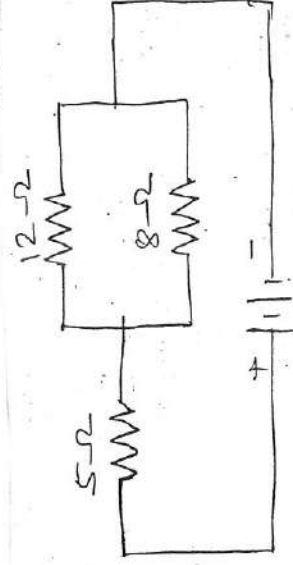
| QN         | S Q N | Question Text                                                                                                                                                                                                                                                       | R U A | CO EE102 | Marks       |
|------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------|-------------|
| <b>Q.1</b> |       | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                             |       |          | <b>(08)</b> |
|            | a)    | State the effect of temperature on the resistance of conductor & semiconductor.                                                                                                                                                                                     | R     | 1        |             |
|            | b)    | State coulomb's inverse square law and write equation based on it.                                                                                                                                                                                                  | R     | 1        |             |
|            | c)    | Define: Electric field strength and state its unit.                                                                                                                                                                                                                 | R     | 1        |             |
|            | d)    | Define: Electric potential and state its unit.                                                                                                                                                                                                                      | R     | 1        |             |
|            | e)    | Define: Alternating current. Express sinusoidal current mathematically.                                                                                                                                                                                             | R     | 1        |             |
|            | f)    | How does the resistance of a conductor depend upon physical dimensions?                                                                                                                                                                                             | R     | 1        |             |
| <b>Q.2</b> |       | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                             |       |          | <b>(16)</b> |
|            | a)    | Explain Ohm's law. State it's any two limitations.                                                                                                                                                                                                                  | U     | 2        |             |
|            | b)    | Determine current and voltage associated with each resistor in the network shown in fig.1                                                                                                                                                                           | A     | 2        |             |
|            | c)    | Determine the equivalent resistance $R_{PQ}$ in the network shown in fig 2.                                                                                                                                                                                         | A     | 2        |             |
|            | d)    | An electric iron is marked 250V, 350W. What current does it take and what is its hot resistance? What is the weekly cost of using it 5 hours daily at RS.3/- per unit?                                                                                              | A     | 1        |             |
|            | e)    | Explain chemical effect of electric current. State its one application.                                                                                                                                                                                             | U     | 1        |             |
|            | f)    | State the laws used to find the direction of magnetic field produced by current flowing through i) straight conductor ii) A coil.                                                                                                                                   | U     | 1        |             |
| <b>Q.3</b> |       | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                             |       |          | <b>(16)</b> |
|            | a)    | Derive formula for equivalent resistance of<br>i) Two resistance in series<br>ii) Two resistance in parallel                                                                                                                                                        | U     | 2        |             |
|            | b)    | Define 'Capacitance' of a capacitor. With neat diagram; explain the concept of capacitance.                                                                                                                                                                         | U     | 3        |             |
|            | c)    | Derive an equation for the capacitance of parallel plate capacitor with uniform dielectric medium.                                                                                                                                                                  | U     | 3        |             |
|            | d)    | A capacitor is made of two plates each having an area of $10 \text{ cm}^2$ , which are separated by a mica sheet 2mm thick. If for mica relative permittivity is 6, find its capacitance. If this capacitor is charged to 200 V, calculate the energy stored in it. | A     | 3        |             |
|            | e)    | Explain the concept of 'Breakdown voltage' and 'Dielectric strength' of material.                                                                                                                                                                                   | U     | 3        |             |

**P.T.O**

|            |    |                                                                                                                                                                                                                                                                                                                                                                                   |   |   |             |
|------------|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------------|
|            | f) | Three capacitors are connected in series across 200V supply. The voltage across them is 60, 100, 40V respectively and charge on each is 3000 micro-coulomb. Find the capacitance of each capacitor and also that of combination.                                                                                                                                                  | A | 3 |             |
| <b>Q.4</b> |    | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                                                                                           |   |   | <b>(08)</b> |
|            | a) | State Biot-Savart law of magnetic field at a point.                                                                                                                                                                                                                                                                                                                               | R | 4 |             |
|            | b) | State formulae for magnetic Reluctance along with unit.                                                                                                                                                                                                                                                                                                                           | R | 5 |             |
|            | c) | Express the AT calculation (mmf) methods for parallel magnetic circuit using formula only.                                                                                                                                                                                                                                                                                        | U | 5 |             |
|            | d) | Comment on hysteresis loop in case of wrought iron, steel & Alnico material for magnetic circuit.                                                                                                                                                                                                                                                                                 | U | 5 |             |
|            | e) | State an expression for self inductance & Mutual inductance using electromagnetic quantities.                                                                                                                                                                                                                                                                                     | A | 6 |             |
|            | f) | Discuss meaning of coefficient of coupling of two coils X & Y having no. of turns $N_x$ & $N_y$                                                                                                                                                                                                                                                                                   | U | 6 |             |
| <b>Q.5</b> |    | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                                                                                           |   |   | <b>(16)</b> |
|            | a) | State explains 'Ampere's circuit law & derive Magnetic field strength & current relation.                                                                                                                                                                                                                                                                                         | A | 4 |             |
|            | b) | Explain magnetic field of an infinite linear conductor & state the expression of magnetic field strength and field density using neat sketch.                                                                                                                                                                                                                                     | A | 4 |             |
|            | c) | Compare electrical circuit & Magnetic circuit analogy.                                                                                                                                                                                                                                                                                                                            | U | 5 |             |
|            | d) | A laminated iron ring of relative permeability of 1000 has mean circumference of 800mm & a cross-sectional area 500 mm <sup>2</sup> . A radial airgap of 1 mm width is cut in the ring & it is wound with 1000 turns. Calculate the current required to produce an airgap flux of 0.5 mWb if leakage factor is 1.2 & stacking factor is 0.9 neglect fringing effect. [See. Fig.3] | A | 5 |             |
|            | e) | Draw neat sketches for Self induction & Mutual induction & explain the phenomena.                                                                                                                                                                                                                                                                                                 | U | 6 |             |
|            | f) | Two identical coils X & Y of 1000 turns each lie in parallel plane such that 80% of flux produced by one coil links with the other. If a current of 5A flowing in X coil producing magnetic flux of 0.5 mWb in it, find the mutual inductance between X&Y.                                                                                                                        | A | 6 |             |
| <b>Q.6</b> |    | Attempt any <b>FOUR</b>                                                                                                                                                                                                                                                                                                                                                           |   |   | <b>(16)</b> |
|            | a) | A cast steel dc electromagnet shown in fig 4 has a coil of 1000 turns on its central limb. Determine the current that the coil should carry to produce a flux of 2.5 mWb in the airgap. The magnetization data is given in table along fig. (All dimensions in fig. are in cm & Neglect leakage-fringing effect)                                                                  | A | 4 |             |
|            | b) | Comment on magnetic field, Magnetic flux & their properties associated with it.                                                                                                                                                                                                                                                                                                   | U | 4 |             |
|            | c) | Explain phenomena of leakage & fringing effect in a magnetic circuit.                                                                                                                                                                                                                                                                                                             | U | 5 |             |
|            | d) | Draw neat labelled circuit & diagram for magnetization curve (B-H curve) & comment on hysteresis loop.                                                                                                                                                                                                                                                                            | R | 5 |             |
|            | e) | State the applications of permanent magnet & Electromagnet (At least four applications each )                                                                                                                                                                                                                                                                                     | R | 5 |             |
|            | f) | State types of inductors, draw their sketches of various designs & Give their applications of each type.                                                                                                                                                                                                                                                                          | U | 6 |             |

\*\*\*\*\*

P.T.O.



20V

Fig 1 [Q. 2 (b)]

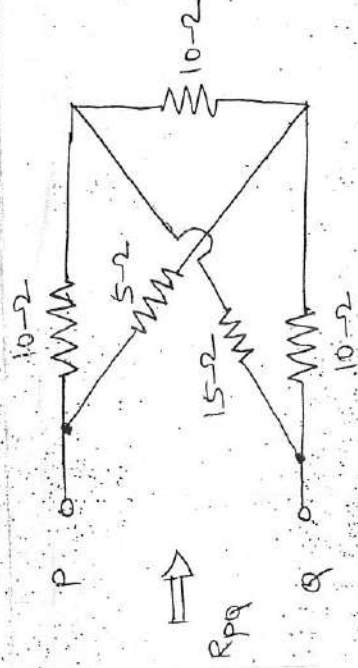
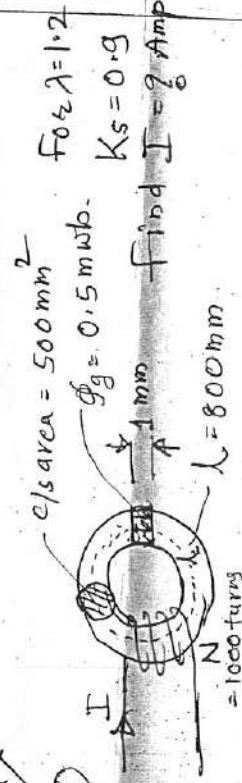


Fig 2 [Q. 2 (c)]

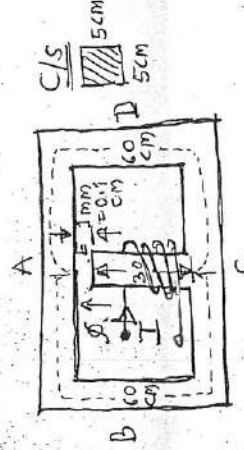
Q. 5-d)

Fig 3



Q. 6-a)

Fig 4



Magnetization data Table.

| $B = \text{flux density}$<br>$\text{wb/m}^2$ | 0.2 | 0.5 | 0.7 | 1.0 | 1.2  |
|----------------------------------------------|-----|-----|-----|-----|------|
| $H = \text{field strength}$<br>$\text{AT/m}$ | 300 | 540 | 650 | 900 | 1150 |



**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt.of Maharashtra)

**EVEN TERM END EXAMMAY -2019****EXAM SEAT NO.**

|  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|

**LEVEL: THIRD****PROGRAM: ELECTRICAL****COURSE CODE: EEF 306 COURSE NAME: ELECTRICAL POWER GENERATION****MAX. MARKS: 80 TIME: 3 HRS.****DATE: 15/05/2019****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 | Marks |
|-----|---------|-------------------------------------------------------------------|-----------------------|---------|-------|
| Q.1 |         | Attempt any <b>FOUR</b>                                           |                       |         | (08)  |
|     | a)      | State any two sources of energy.                                  | R                     | 1       |       |
|     | b)      | What is base load & peak load plants?                             | R                     | 2       |       |
|     | c)      | State average demand & maximum demand.                            | R                     | 2       |       |
|     | d)      | List types of fuel used for the thermal power station.            | R                     | 3       |       |
|     | e)      | Classify Hydro power plant based on head.                         | R                     | 3       |       |
|     | f)      | List types of Nuclear power plant.                                | R                     | 3       |       |
| Q.2 |         | Attempt any <b>FOUR</b>                                           |                       |         | (16)  |
|     | a)      | Compare sources of power.                                         | U                     | 1       |       |
|     | b)      | State the impact of blackouts at national & international level.  | U                     | 2       |       |
|     | c)      | Explain working of the pumped storage plants.                     | U                     | 3       |       |
|     | d)      | Explain the nuclear chain reaction in a nuclear power plant.      | U                     | 3       |       |
|     | e)      | Draw a neat block diagram of thermal power plant.                 | U                     | 3       |       |
|     | f)      | State types of co-generation & explain any one.                   | U                     | 3       |       |
| Q.3 |         | Attempt any <b>FOUR</b>                                           |                       |         | (16)  |
|     | a)      | State environmental issues of electrical power generation.        | R                     | 1       |       |
|     | b)      | State the reasons of blackouts at national & international level. | R                     | 2       |       |
|     | c)      | Define Grid. Compare state grid & National grid.                  | U                     | 2       |       |
|     | d)      | State any four advantages of Hydro electric power station.        | R                     | 3       |       |
|     | e)      | State the function of condenser. Explain any one condenser.       | U                     | 3       |       |
|     | f)      | State selection of site for nuclear power plant.                  | U                     | 3       |       |
| Q.4 |         | Attempt any <b>FOUR</b>                                           |                       |         | (08)  |
|     | a)      | Write down the principle of geothermal energy.                    | R                     | 6       |       |
|     | b)      | Define – 1) tilt angle 2) maximum power point tracking (MPPT)     | U                     | 4       |       |

P.T.O.



|     |    |                                                                                               |   |   |      |
|-----|----|-----------------------------------------------------------------------------------------------|---|---|------|
|     | c) | List the two basic types of OTEC.                                                             | R | 5 |      |
|     | d) | Give the composition of bio-gas & its calorific value.                                        | U | 5 |      |
|     | e) | List the advantages of wind energy power plant.                                               | R | 4 |      |
|     | f) | List the main components of a tidal powder plant.                                             | U | 5 |      |
| Q.5 |    | Attempt any <b>FOUR</b>                                                                       |   |   | (16) |
|     | a) | List the advantages & applications of fuel cell.                                              | U | 6 |      |
|     | b) | With neat sketch discuss the photo voltaic cell construction.                                 | U | 4 |      |
|     | c) | Discuss the bio-mass based power generation plants.                                           | U | 5 |      |
|     | d) | Draw the basic components block diagram & explain the functions of each for wind power plant. | A | 4 |      |
|     | e) | Discuss the utilization of tidal energy.                                                      | U | 5 |      |
|     | f) | List the advantages & limitations of geothermal energy.                                       | U | 6 |      |
| Q.6 |    | Attempt any <b>FOUR</b>                                                                       |   |   | (16) |
|     | a) | Discuss I-V & P-V characteristics of solar power plant.                                       | R | 4 |      |
|     | b) | Draw the neat diagram of Dinbhandu Bio-gas power plant.                                       | U | 5 |      |
|     | c) | Explain the constructions & working of basic induction generator.                             | U | 4 |      |
|     | d) | Explain open cycle MHD power generation with neat sketch.                                     | A | 6 |      |
|     | e) | Describe the closed cycle turbine system for OTEC.                                            | U | 5 |      |
|     | f) | State the working principle with neat diagram of MHD & List the advantages of MHD system.     | U | 6 |      |

\*\*\*

**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**EVEN TERM END EXAM MAY-2019**

**EXAM SEAT NO.**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

**LEVEL :- THIRD**

**PROGRAM : ELECTRICAL ENGINEERING**

**COURSE CODE :- EEF310/EE211/EEE303/EEE403**

**COURSE NAME :- TRANSMISSION & DISTRIBUTION OF ELECTRIC POWER**

**MAX. MARKS : 80 TIME : 3 HRS. DATE :- 16/05 / 2019**

**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>EEF<br>310 | Ma<br>rks |
|-----|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.1 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                          |               |                  | 08        |
|     | a)          | Write two applications of R.C.C. poles.                                                                                                                                                                                                                                                                            | R             | 1                |           |
|     | b)          | Define Ferranti effect.                                                                                                                                                                                                                                                                                            | R             | 2                |           |
|     | c)          | State two factors upon which Proximity effect depends.                                                                                                                                                                                                                                                             | A             | 2                |           |
|     | d)          | What are the constants of transmission line?                                                                                                                                                                                                                                                                       | R             | 2                |           |
|     | e)          | Classify the overhead transmission lines according to voltage level.                                                                                                                                                                                                                                               | R             | 3                |           |
|     | f)          | Draw the block diagram of monopolar link of HVDC transmission system.                                                                                                                                                                                                                                              | R             | 4                |           |
| Q.2 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                          |               |                  | 16        |
|     | a)          | State eight desirable properties of insulating material for transmission line insulator.                                                                                                                                                                                                                           | U<br>+<br>A   | 1                |           |
|     | b)          | Define i) solid conductor<br>ii) Stranded conductor and state two advantages of Bundled conductor.                                                                                                                                                                                                                 | R<br>+<br>U   | 1                |           |
|     | c)          | A transmission line has span of 150m between level supports. The conductor has a cross-sectional area of $2 \text{ cm}^2$ . The tension in the conductor is 2000kg. If the specific gravity of the conductor material is $9.9 \text{ gm/cm}^3$ and Wind pressure is $1.5 \text{ kg/m length}$ , calculate the sag. | A             | 1                |           |
|     | d)          | Explain in brief the term "skin effect". State two methods to reduce it.                                                                                                                                                                                                                                           | U<br>+<br>A   | 2                |           |
|     | e)          | Describe in brief four factors influencing corona.                                                                                                                                                                                                                                                                 | U             | 2                |           |
|     | f)          | Explain in brief four advantages of corona.                                                                                                                                                                                                                                                                        | R             | 2                |           |
| Q.3 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                          |               |                  | 16        |
|     | a)          | A single phase transmission line transmits 1000kw at 10 KV at 0.8 PF lagging. It has total loop ( of both lines) resistance of $2\Omega$ and inductive reactance $3\Omega$ . Determine<br>i) Voltage regulation and ii) Transmission efficiency.                                                                   | A             | 3                |           |

P.T.O.

|     |    |                                                                                                                                                                                                                                                                                                                                                                                                                 |             |           |
|-----|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------|
|     | b) | An overhead 3 phase transmission line delivers 5000 KW at 22KV at 0.8 p.f. lagging. The resistance and reactance of each conductor is 4Ω and 6Ω respectively. Determine i) Sending end voltage ii) percentage regulation and iii) Transmission efficiency.                                                                                                                                                      | A           | 3         |
|     | c) | Draw equivalent circuit and phasor diagram for medium transmission line with end condenser method.                                                                                                                                                                                                                                                                                                              | U<br>+<br>R | 3         |
|     | d) | Compare nominal 'T' method with nominal 'Π' method of medium transmission line on four points.                                                                                                                                                                                                                                                                                                                  | U<br>+<br>A | 3         |
|     | e) | Describe Homopolar link of HVDC transmission system with block diagram.                                                                                                                                                                                                                                                                                                                                         | U<br>+<br>A | 4         |
|     | f) | Compare HVDC transmission with A.C. transmission on four points.                                                                                                                                                                                                                                                                                                                                                | R           | 4         |
| Q.4 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                                                                                                                       |             | <b>08</b> |
|     | a) | Classify the distribution system according to the scheme of connection.                                                                                                                                                                                                                                                                                                                                         | R           | 5         |
|     | b) | State the function of the following equipments of substations.<br>i) CT & PT ii) isolators                                                                                                                                                                                                                                                                                                                      | U           | 7         |
|     | c) | Define flat rate tariff.                                                                                                                                                                                                                                                                                                                                                                                        | R           | 6         |
|     | d) | Draw a layout of typical underground substation.                                                                                                                                                                                                                                                                                                                                                                | U           | 7         |
|     | e) | Draw single line diagram of distribution system showing service mains, feeder distributor etc.                                                                                                                                                                                                                                                                                                                  | U           | 5         |
|     | f) | State the objectives of tariff.                                                                                                                                                                                                                                                                                                                                                                                 | U           | 56        |
| Q.5 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                                                                                                                       |             | <b>16</b> |
|     | a) | Classify the substation according to constructional features.                                                                                                                                                                                                                                                                                                                                                   | U           | 7         |
|     | b) | A 300 KVA power generating station is supplying a load of 200 kw at a p.f. of 0.86 lagging. Calculate the KVAR of the capacitor bank so that the p.f. improves to 0.98 lag. Determine the new KVA if the active power drawn remains incharged with the capacitor bank connected                                                                                                                                 | A           | 6         |
|     | c) | Explain the two wire ad three wire DC distribution system.                                                                                                                                                                                                                                                                                                                                                      | U           | 5         |
|     | d) | Explain primary and secondary AC distribution system.                                                                                                                                                                                                                                                                                                                                                           | U           | 5         |
|     | e) | State the causes of low power factor.                                                                                                                                                                                                                                                                                                                                                                           | U           | 6         |
|     | f) | Explain the Radial system for DC distribution system.                                                                                                                                                                                                                                                                                                                                                           | U           | 5         |
| Q.6 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                                                                                                                       |             | <b>16</b> |
|     | a) | Describe the desirable characteristics of tariff.                                                                                                                                                                                                                                                                                                                                                               | U           | 6         |
|     | b) | A Single phase AC distributor AB 300 meters long is fed from end A and is loaded as under<br>i) 100 Amp at 0.707 p.f. lagging 200m from point A.<br>ii) 200 Amp at 0.8 p.f. lagging 300m from point A.<br>The load resistance and reactance of the distributor is 0.2 Ω & 0.1Ω per kilometer. Calculate the total voltage drop in the distributor. The load power factors refer to the voltage at the far end . | A           | 5         |

|    |                                                                                                                                                                                                                                         |   |   |  |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|--|
| c) | Draw a typical layout diagram of 11KV distribution substation.                                                                                                                                                                          | R | 7 |  |
| d) | State the disadvantages of low power factor.                                                                                                                                                                                            |   |   |  |
| e) | With neat diagram explain the inter connected distribution system.                                                                                                                                                                      | U | 5 |  |
| f) | A 3 $\phi$ 5 kw induction motor has a p.f. of 0.75 lagging. A bank of capacitors is connected in delta across the supply terminals and p.f. raised to 0.9 lagging. Determine the KVAR rating of the capacitors connected in each phase. | A | 6 |  |

\*\*\*\*\*





**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**EVEN TERM END EXAM MAY-2019****EXAM SEAT NO.**

|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|

**LEVEL :- FOURTH****PROGRAM : ELECTRICAL ENGINEERING****COURSE CODE :- EEF402/EEE401****COURSE NAME AC ROTATING MACHINES****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 16/05 / 2019****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>EEF<br>402 | Mar<br>ks |
|-----|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.1 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                       |               |                  | <b>08</b> |
|     | a)          | Classify induction motor with respect to i) Type of supply ii) construction.                                                                                                                                                    | R             | 1                |           |
|     | b)          | State i) Synchronous speed and ii) Actual speed                                                                                                                                                                                 | R             | 1                |           |
|     | c)          | State the condition to obtain maximum torque of induction motor.                                                                                                                                                                | R             | 1                |           |
|     | d)          | Draw simplified equivalent circuit of 3 phase induction motor                                                                                                                                                                   | R             | 2                |           |
|     | e)          | Enlist any four parameters calculated from circle, diagram.                                                                                                                                                                     | R             | 2                |           |
|     | f)          | Classify starters used for 3 phase induction motor.                                                                                                                                                                             | R             | 3                |           |
| Q.2 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                                       |               |                  | <b>16</b> |
|     | a)          | Draw constructional diagram of 3 phase induction motor and label it.                                                                                                                                                            | U             | 1                |           |
|     | b)          | Explain production of rotating magnetic field in 3 $\phi$ induction motor with vector diagrams.                                                                                                                                 | U             | 1                |           |
|     | c)          | List the steps to construct circle diagram of 3 $\phi$ induction motor.                                                                                                                                                         | U             | 2                |           |
|     | d)          | State the procedure carried out to perform No load test on 3 $\phi$ induction motor with circuit diagram of experimental setup.                                                                                                 | U             | 2                |           |
|     | e)          | Draw circuit diagram for D.O.L. starter consists with power and control circuit.                                                                                                                                                | U             | 3                |           |
|     | f)          | State necessity of starter with respect to 3 $\phi$ induction motor. State the difference between D.O.L. and star delta starter.                                                                                                | U             | 3                |           |
| Q.3 |             | Attempt any <b>TWO</b> :                                                                                                                                                                                                        |               |                  | <b>16</b> |
|     | a)          | i) Draw torque slip characteristics of a 3 phase induction motor and explain.<br>ii) Select the proper type of 3 phase induction motor for following applications<br>1) Lathe machine 2) Air compressor 3) Hoist 4) flour Mill. | U             | 1                | 04        |
|     |             |                                                                                                                                                                                                                                 | A             | 3                | 04        |

P.T.O.

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |               |                  |           |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------|------------------|-----------|
| b)  | i) An 18.65kw, 4 pole 3 phase induction motor has friction and Winding losses of 2.5 percent of the output. The full load slip is 4%. Compute for full load<br>1) The rotor Cu loss 2) The rotor input 3) The shaft torque 4) Gross electromagnetic torque.<br>ii) Explain power flow diagram of a 3φ induction motor.                                                                                                                                                                                        | A           | 1             | 04               |           |
| c)  | Draw the circle diagram for a 3.73kw 200-v, 50Hz, 4 pole, 3φ star connected induction motor from the following test data :<br>No- load : Line voltage 200/v, line current 5A, total input 350W<br>Blocked Rotor : Line voltage 100V, line current 26A, total input 1700W.<br>Estimate from the circle diagram at full load condition, the line current, power factor and also the maximum torque in terms of the full load torque. The rotor Cu loss at stand still is half the total cu loss at stand still. | U           | 1             |                  |           |
| QN  | S<br>Q<br>N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Section- II | R/<br>U/<br>A | Co<br>EEF<br>402 | Mar<br>ks |
| Q.4 | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |               |                  | <b>08</b> |
| a)  | State any two applications of 3-phase synchronous motor.                                                                                                                                                                                                                                                                                                                                                                                                                                                      | R           | 5             |                  |           |
| b)  | Define<br>i) Pitch factor ii) Distribution factor in case of an alternator.                                                                                                                                                                                                                                                                                                                                                                                                                                   | R           | 4             |                  |           |
| c)  | State any two applications of shaded pole single phase induction motor.                                                                                                                                                                                                                                                                                                                                                                                                                                       | U           | 6             |                  |           |
| d)  | Name the alternator which is suitable for hydro-electric plants.                                                                                                                                                                                                                                                                                                                                                                                                                                              | A           | 4             |                  |           |
| e)  | List the methods of starting a synchronous motor.                                                                                                                                                                                                                                                                                                                                                                                                                                                             | R           | 5             |                  |           |
| f)  | State how the direction of rotation of capacitor start motor be reversed.                                                                                                                                                                                                                                                                                                                                                                                                                                     | U           | 6             |                  |           |
| Q.5 | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |               |                  | <b>16</b> |
| a)  | Compare 3 phase induction motor and 3 phase synchronous motor.                                                                                                                                                                                                                                                                                                                                                                                                                                                | R           | 4             |                  |           |
| b)  | Explain double field revolving theory.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | U           | 6             |                  |           |
| c)  | Explain the phenomenon of hunting and phase swinging in case of 3 phase synchronous motor.                                                                                                                                                                                                                                                                                                                                                                                                                    | A           | 5             |                  |           |
| d)  | Explain construction working principle and applications of shaded pole induction motor.                                                                                                                                                                                                                                                                                                                                                                                                                       | R           | 6             |                  |           |
| e)  | Derive an emf equation of an alternator.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | U           | 4             |                  |           |
| f)  | A 3-phase, 400v star connected synchronous motor has an effective armature resistance and a synchronous reactance per phase of 0.2Ω and 2Ω respectively. It takes 20A to drive a certain load. Calculate the excitation emf induced in the motor if it works with i) 0.8 p.f. lagging ii) 0.8 p.f. leading.                                                                                                                                                                                                   | A           | 5             |                  |           |

| Q.6 | Attempt any TWO:                                                                                                                                                                        |   |   | 16 |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|----|
| a)  | Describe armature reaction with flux distribution waveforms of a three phase alternator when the nature of load on the alternator is resistive, purely inductive and purely capacitive. | A | 4 |    |
| b)  | Explain working principle of AC series motor. Draw torque speed characteristic of AC series motor, also state its applications.                                                         | U | 6 |    |
| c)  | Explain why synchronous motor are not self starting also explain why damper windings are used in synchronous motor state application of synchronous motor.                              | U | 5 |    |

\*\*\*\*\*



**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**EVEN TERM END EXAM MAY -2019****EXAM SEAT NO.**

|  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|

**LEVEL: FOURTH****PROGRAM: ELECTRICAL****COURSE CODE: EE406/ EE410/EEE501 COURSE NAME: POWER ELECTRONICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 16/05/2019****Instruction:-**

- 1) Answer to two sections must be written in separate section answer book provided
- 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<br>Q<br>N | Question Text                                                                                                                                                                 | R<br>U<br>A | CO<br>EEF<br>A | Marks        |
|-------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------|--------------|
| <b>Section -I</b> |             |                                                                                                                                                                               |             |                |              |
| <b>Q.1</b>        |             | Attempt any <b>FOUR</b>                                                                                                                                                       |             |                | <b>(08)</b>  |
|                   | a)          | Classify inverters.                                                                                                                                                           | U           | 2              |              |
|                   | b)          | State any two applications of UPS.                                                                                                                                            | R           | 3              |              |
|                   | c)          | State importance of freewheeling diode in case of 1- $\phi$ fully controlled converter.                                                                                       | R           | 1              |              |
|                   | d)          | Draw the diagram of step-up chopper.                                                                                                                                          | R           | 2              |              |
|                   | e)          | State the function of saturable reactor in Morgan's chopper.                                                                                                                  | R           | 2              |              |
|                   | f)          | Draw the waveform for 3- $\phi$ half-wave controlled converter with R-Load.                                                                                                   | R           | 1              |              |
| <b>Q.2</b>        |             | Attempt any <b>FOUR</b>                                                                                                                                                       |             |                | <b>(16)</b>  |
|                   | a)          | Explain the working of 3 - $\phi$ full converter with R-Load.                                                                                                                 | U           | 1              |              |
|                   | b)          | Explain series inverter with help of diagram and waveform.                                                                                                                    | U           | 2              |              |
|                   | c)          | Identify the diagram (fig.a) and explain its operation.                                                                                                                       | A           | 3              |              |
|                   | d)          | Draw the diagram of 1- $\phi$ fully controlled half wave converter with RL-Load & freewheeling diode and write its operation.                                                 | R           | 1              |              |
|                   | e)          | Explain bridge inverter with 120° mode of conduction and O/P waveform.                                                                                                        | U           | 2              |              |
|                   | f)          | Draw the diagram of linear power supply and explain its operation.                                                                                                            | R           | 3              |              |
| <b>Q.3</b>        |             | Attempt any <b>FOUR</b>                                                                                                                                                       |             |                | <b>(16)</b>  |
|                   | a)          | Compare semiconverter and full converter with respect to following points.<br>i) Circuit diagram<br>ii) Quadrant of operation<br>iii) Avg. load voltage<br>iv) Ripple factor. | U           | 1              |              |
|                   |             |                                                                                                                                                                               |             |                | <b>P.T.O</b> |



|                   |    |                                                                                                        |   |   |             |
|-------------------|----|--------------------------------------------------------------------------------------------------------|---|---|-------------|
|                   | b) | Draw the diagram of step-down chopper and explain its working.                                         | R | 2 |             |
|                   | c) | Identify the diagram and draw its waveform for i) $\alpha=90^\circ$ ii) $\alpha < 90^\circ$ (fig.b)    | A | 1 |             |
|                   | d) | Explain working of Jone's chopper with neat diagram.                                                   | U | 2 |             |
|                   | e) | Explain the need of power supply and state two advantages and two disadvantages of SMPS.               | U | 3 |             |
|                   | f) | Compare $180^\circ$ and $120^\circ$ mode of conduction of 3- $\phi$ inverters.                         | U | 2 |             |
| <b>Section-II</b> |    |                                                                                                        |   |   |             |
| <b>Q.4</b>        |    | Attempt any <b>FOUR</b>                                                                                |   |   | <b>(08)</b> |
|                   | a) | State the need of NC/CNC machine.                                                                      | R | 4 |             |
|                   | b) | Compare CNC and DNC machine.                                                                           | U | 4 |             |
|                   | c) | Draw the circuit diagram of speed control of DC series motor.                                          | R | 5 |             |
|                   | d) | Give the classification of cycloconverter.                                                             | R | 5 |             |
|                   | e) | Explain in short choice between AC & DC drives                                                         | R | 6 |             |
|                   | f) | Classify the speed control methods of 3 $\phi$ inductions motor.                                       | R | 6 |             |
| <b>Q.5</b>        |    | Attempt any <b>FOUR</b>                                                                                |   |   | <b>(16)</b> |
|                   | a) | Write advantages & applications of NC/CNC machines.                                                    | A | 4 |             |
|                   | b) | Draw the block diagram of NC machine & explain its operations.                                         | A | 4 |             |
|                   | c) | Explain 3 $\phi$ to 3 $\phi$ cycloconverter with neat diagram.                                         | U | 5 |             |
|                   | d) | Explain slip power recovery control, speed control method of 3 $\phi$ induction motor.                 | U | 5 |             |
|                   | e) | Explain separately excited DC motor using half controlled bridge rectifier.                            | A | 6 |             |
|                   | f) | Explain 1 $\phi$ SCR drive with Armature current & Tachogenerator feedback with neat circuit diagram.  | U | 6 |             |
| <b>Q.6</b>        |    | Attempt any <b>FOUR</b>                                                                                |   |   | <b>(16)</b> |
|                   | a) | Explain with neat block diagram CNC machine.                                                           | U | 4 |             |
|                   | b) | Explain with neat circuit diagram single phase to bridge cycloconverter.                               | U | 5 |             |
|                   | c) | Explain speed control of three phase induction motor using variable current variable frequency method. | U | 6 |             |
|                   | d) | Explain the concept of DC motor drives i) Stability ii) Plugging iii) Regeneration iv) Inching.        | U | 6 |             |
|                   | e) | Compare AC & DC drives.                                                                                | A | 6 |             |
|                   | f) | Explain with neat circuit diagram single phase to single phase cycloconverter.                         | U | 5 |             |

Q.2]

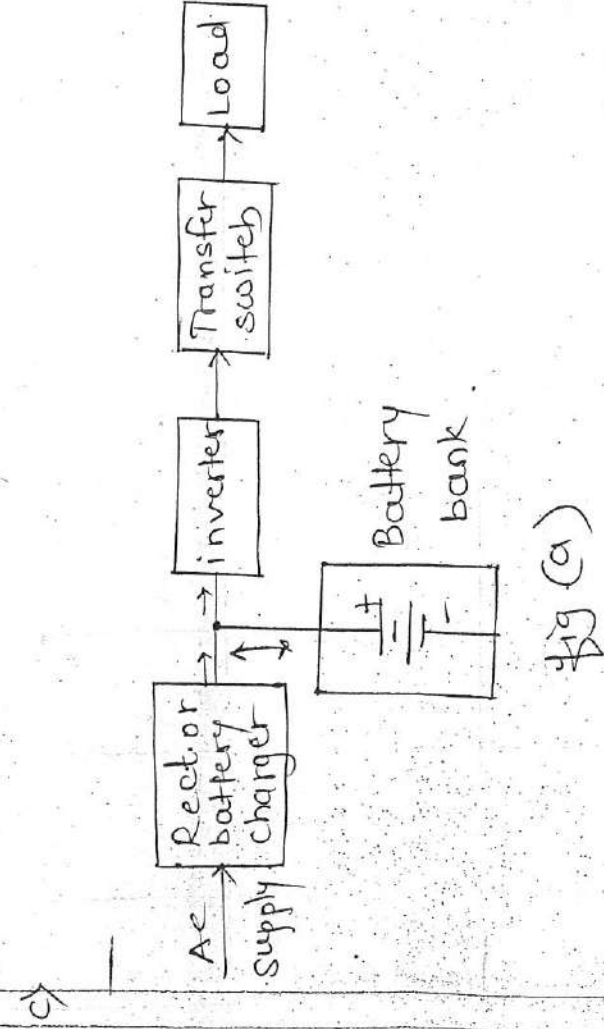


Fig. (a)

Q.3]

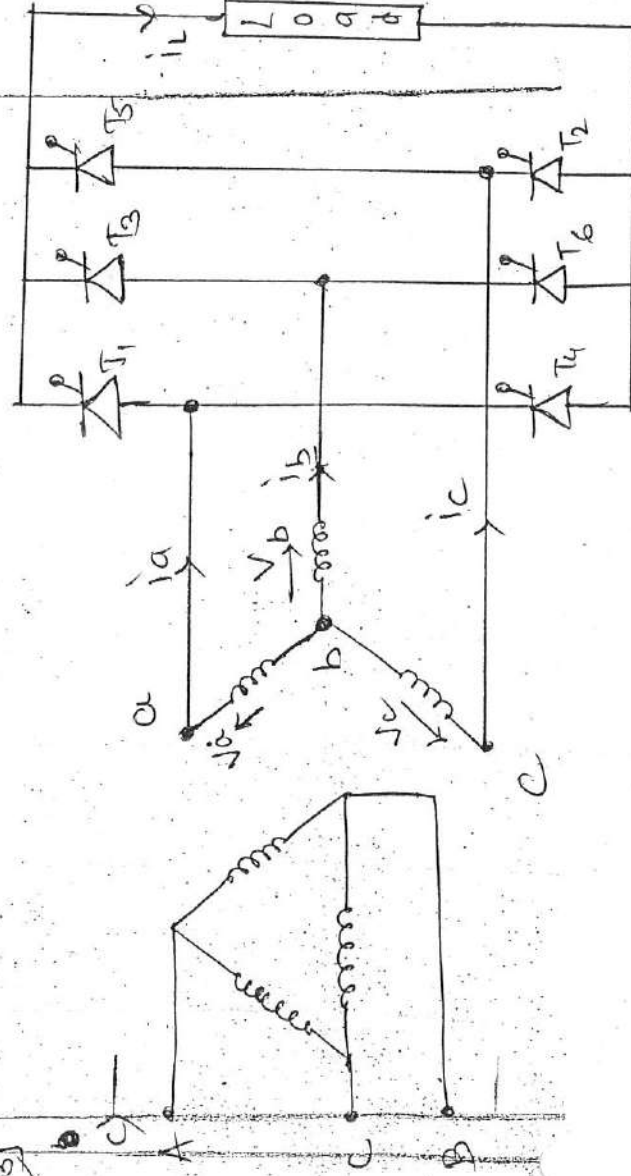


Fig. (b)

\*\*\*\*\*



**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**  
(An Autonomous Institute of Govt. of Maharashtra)  
**EVEN TERM END EXAM MAY -2019**

**EXAM SEAT NO.**

|  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|

**LEVEL: First**

**COURSE CODE:CCF 102/CCE 102**

**MAX. MARKS: 80**

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

**COURSE NAME: Engineering Physics**

**TIME: 3 HRS.**

**DATE: 09/05/2019**

**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 | Co Code CCF 102 | Marks |
|-----|---------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------|-------|
| Q.1 |         | Attempt any <b>FOUR</b>                                                                                                             | R/U/A           | 102             | (08)  |
|     | a)      | Define specific mass and give its SI unit.                                                                                          | R               | 01              |       |
|     | b)      | Shape of a liquid drop is spherical. Explain.                                                                                       | U               | 01              |       |
|     | c)      | Define coefficient of viscosity & give its SI unit.                                                                                 | R               | 01              |       |
|     | d)      | State any two applications of nanotechnology in the field of automobile.                                                            | R               | 03              |       |
|     | e)      | Define surface tension. Give its SI unit.                                                                                           | R               | 01              |       |
|     | f)      | Define 1) Nanotechnology<br>2) Nanoparticle                                                                                         | R               | 03              |       |
| Q.2 |         | Attempt any <b>FOUR</b>                                                                                                             |                 |                 | (16)  |
|     | a)      | Explain the behavior of wire under continuously increasing load.                                                                    | U               | 01              |       |
|     | b)      | Derive an expression for coefficient of viscosity using Stoke's method.                                                             | A               | 01              |       |
|     | c)      | Define capillary action. Give any three examples of capillary action.                                                               | R               | 01              |       |
|     | d)      | State any four points of distinction between longitudinal and transverse waves.                                                     | U               | 02              |       |
|     | e)      | Mention any two applications each of nanotechnology in the field of textile and environment.                                        | R               | 03              |       |
|     | f)      | A wire of diameter 2mm and length 2.5m extends by 1.5mm when a force of 15N is applied to it. Find the Young's modulus of the wire. | A               | 01              |       |
| Q.3 |         | Attempt any <b>FOUR</b>                                                                                                             |                 |                 | (16)  |
|     | a)      | Explain the molecular theory of surface tension.                                                                                    | U               | 01              |       |
|     | b)      | Define 1) Amplitude 2) Period 3) Frequency 4) Wavelength of a wave.                                                                 | R               | 02              |       |
|     | c)      | Derive expression $h_{1r1} = h_{2r2}$ for capillary action.                                                                         | A               | 01              |       |
|     | d)      | Define stress and explain the three types of stress.                                                                                | R               | 01              |       |
|     | e)      | State any four applications of viscosity.                                                                                           | R               | 01              |       |
|     | f)      | Define resonance. Give any three examples of resonance.                                                                             | R               | 02              |       |

P.T.O.

|            |                                                                                                                                                   |   |    |      |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------|---|----|------|
| <b>Q.4</b> | Attempt any <b>FOUR</b>                                                                                                                           |   |    | (08) |
| a)         | Define refraction of light.                                                                                                                       | R | 04 |      |
| b)         | State Ohm's law for electricity.                                                                                                                  | R | 04 |      |
| c)         | Define photoelectric effect.                                                                                                                      | R | 05 |      |
| d)         | State two properties of laser.                                                                                                                    | R | 05 |      |
| e)         | State the principle of production of X-rays.                                                                                                      | R | 05 |      |
| f)         | Define critical angle.                                                                                                                            | R | 06 |      |
| <b>Q.5</b> | Attempt any <b>FOUR</b>                                                                                                                           |   |    | (16) |
| a)         | Derive prism formula to calculate refractive index of given prism.                                                                                | A | 04 |      |
| b)         | A 6 m long copper wire has diameter 0.45 mm. If its resistance is $18\ \Omega$ , calculate its resistivity.                                       | A | 04 |      |
| c)         | State any four characteristics of photoelectric effect.                                                                                           | R | 05 |      |
| d)         | Distinguish between spontaneous and stimulated emission. (any four points.)                                                                       | U | 05 |      |
| e)         | State any four applications of X-rays.                                                                                                            | R | 05 |      |
| f)         | State any four applications of optical fibre.                                                                                                     | R | 06 |      |
| <b>Q.6</b> | Attempt any <b>FOUR</b>                                                                                                                           |   |    | (16) |
| a)         | How long will light take in travelling a distance 500 m in water ? R.I. of water is $4/3$ and velocity of light in vacuum is $3 \times 10^8$ m/s. | A | 04 |      |
| b)         | Derive equation of equivalent resistance for parallel combination of three resistors.                                                             | A | 04 |      |
| c)         | Explain construction and working of photoelectric cell.                                                                                           | U | 05 |      |
| d)         | Describe the term population inversion.                                                                                                           | U | 05 |      |
| e)         | Explain the term total internal reflection.                                                                                                       | U | 06 |      |
| f)         | Obtain balancing condition for Wheatstone's network.                                                                                              | A | 04 |      |

\* \* \*



**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**EVEN TERM END EXAM MAY-2019****EXAM SEAT NO.**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

**LEVEL :- FOURTH****PROGRAM : ELECTRICAL ENGINEERING****COURSE CODE :- EEF405/EEE404****COURSE NAME :- ENERGY CONSERVATION AND AUDIT****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 09/05 / 2019****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>EEF<br>405 | Mar<br>ks |
|-----|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------|------------------|-----------|
| Q.1 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                          |  |               |                  | <b>08</b> |
|     | a) | Classify energy sources.                                                                                                                                                                                                                                                                                           |  | R             | 1                |           |
|     | b) | List any four methods for improving energy scenario in the present situation in our country                                                                                                                                                                                                                        |  | R             | 1                |           |
|     | c) | Define i) Electricity tax ii) Tariff structure                                                                                                                                                                                                                                                                     |  | U             | 2                |           |
|     | d) | State any two advantages of Amorphous metal.                                                                                                                                                                                                                                                                       |  | A             | 3                |           |
|     | e) | State any four objectives of tariff.                                                                                                                                                                                                                                                                               |  | R             | 2                |           |
|     | f) | What is cogeneration system?                                                                                                                                                                                                                                                                                       |  | R             | 2                |           |
| Q.2 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                          |  |               |                  | <b>16</b> |
|     | a) | State any four salient features of energy conservation Act 2003.                                                                                                                                                                                                                                                   |  | U             | 1                |           |
|     | b) | State how green House gases are related to global warming. Describe steps to control and reduce the green house gases.                                                                                                                                                                                             |  | A             | 1                |           |
|     | c) | State the incentives and penalty related to the following tariff structure i) Power factor tariff ii) Maximum Demand tariff.                                                                                                                                                                                       |  | U             | 2                |           |
|     | d) | Two monthly tariff are offered<br>i) Rs. 3000 + Rs 0.90 per kwh ii) Rs 3.0 per kwh.<br>At which consumption per month, which tariff is more suitable for a consumer.                                                                                                                                               |  | A             | 2                |           |
|     | e) | Explain energy conservation technique in induction motor by minimizing the idle and redundant running of motor.                                                                                                                                                                                                    |  | U             | 3                |           |
|     | f) | Suggest the energy conservation techniques in following cases.<br>i) Motor is running with 70% loaded condition.<br>ii) Motor is continuously loaded condition.<br>iii) Motor runs with 30% loaded condition but sometimes rises to 50% loading condition.<br>iv) Motor runs continuously under No load condition. |  | A             | 3                |           |
| Q.3 |    | Attempt any <b>FORU</b> :                                                                                                                                                                                                                                                                                          |  |               |                  | <b>16</b> |
|     | a) | Classify commercial and Non-commercial energy sources.                                                                                                                                                                                                                                                             |  | A             | 1                |           |
|     | b) | State and explain any four factor on which cogeneration system is selected.                                                                                                                                                                                                                                        |  | U             | 2                |           |

P.T.O.

|     |    |                                                                                                                                                        |    |     |           |
|-----|----|--------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|-----------|
|     | c) | How the application of tariff system helps to reduce the energy bill?                                                                                  | A  | 2   |           |
|     | d) | What is the modification in 'Energy Efficient Motor' (EEM) as compared to standard motor for energy saving purpose?                                    | A  | 3   |           |
|     | e) | Compare steam turbine and gas turbine on any four points.                                                                                              | U  | 2   |           |
|     | f) | Epoxy resin transformers are more suitable in hazardous area. Give reason.                                                                             | U  | 3   |           |
|     |    |                                                                                                                                                        |    |     |           |
| QN  | S  | Section- II                                                                                                                                            |    |     | Mar       |
|     | Q  |                                                                                                                                                        | R/ | EEF | ks        |
|     | N  |                                                                                                                                                        | U/ | 405 |           |
|     |    |                                                                                                                                                        | A  |     |           |
| Q.4 |    | Attempt any <b>FOUR</b> :                                                                                                                              |    |     | <b>08</b> |
|     | a) | List types of light control gears used in lighting system.                                                                                             | R  | 4   |           |
|     | b) | State any two benefits of phase balancing.                                                                                                             | A  | 5   |           |
|     | c) | Define energy audit.                                                                                                                                   | R  | 6   |           |
|     | d) | Define i) Illuminance ii) Luminous efficiency                                                                                                          | U  | 4   |           |
|     | e) | State any two reasons for line loss.                                                                                                                   | A  | 5   |           |
|     | f) | Define ABC analysis.                                                                                                                                   | R  | 6   |           |
|     |    |                                                                                                                                                        |    |     |           |
| Q.5 |    | Attempt any <b>FOUR</b> :                                                                                                                              |    |     | <b>16</b> |
|     | a) | Explain the energy conservation by adopting following techniques.<br>i) Replacing lamp sources<br>ii) Using energy efficient light control equipments. | U  | 4   |           |
|     | b) | Explain the following method of energy conservation in distribution system - Balancing of phase load current.                                          | U  | 5   |           |
|     | c) | Explain the stepwise procedure for assessing energy efficiency of existing hospital lighting system                                                    | U  | 4   |           |
|     | d) | How system voltage optimization helps in energy conservation in distribution system.                                                                   | U  | 5   |           |
|     | e) | Describe detailed energy audit procedure to be carried out for an organization.                                                                        | U  | 6   |           |
|     | f) | State the difference between Walkthrough audit and detailed audit.                                                                                     | U  | 6   |           |
|     |    |                                                                                                                                                        |    |     |           |
| Q.6 |    | Attempt any <b>TWO</b> :                                                                                                                               |    |     | <b>16</b> |
|     | a) | State various instruments used in energy audit procedure with function.                                                                                | U  | 6   |           |
|     | b) | Explain in brief the effect of distribution losses at state and national level.                                                                        | U  | 5   |           |
|     | c) | Explain energy conservation method in lighting system by using installation of separate transformer and servo stabilizer.                              | U  | 5   |           |

\*\*\*\*\*

# GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

**EVEN TERM END EXAM MAY -2019**

**EXAM SEAT NO.**

|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|

**LEVEL: FIRST**

**PROGRAM: COMMON**

**COURSE CODE: CCF106/0108/X110/CCE106/R108 COURSE NAME: ENGINEERING MATHEMATICS**

**MAX. MARKS: 80**

**TIME: 3 HRS.**

**DATE: 13/05/2019**

**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 CCF106 | Marks       |
|------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------|-------------|
| <b>Q.1</b> | Attempt any <b>FOUR</b> |                                                                                                                                            |       |           | <b>(08)</b> |
|            | a)                      | Find centroid of a triangle whose vertices are (-1, 2), (3, 2), (4, 5)                                                                     | R     | 1         |             |
|            | b)                      | Find the distance between parallel lines $3x+2y-6=0$ and $3x+2y-12=0$                                                                      | U     | 1         |             |
|            | c)                      | Find equation of line passing through (-4, 6) and (8,-3)                                                                                   | R     | 1         |             |
|            | d)                      | Find center and radius of circle $2x^2+2y^2+5x-6y+4=0$                                                                                     | U     | 1         |             |
|            | e)                      | Find equation of circle having center (-1, -2) and radius $\sqrt{15}$                                                                      | R     | 1         |             |
|            | f)                      | Show that the root of equation $x^3 - 2x - 5 = 0$ lies between 2 and 3                                                                     | R     | 2         |             |
| <b>Q.2</b> | Attempt any <b>FOUR</b> |                                                                                                                                            |       |           | <b>(16)</b> |
|            | a)                      | Find area of quadrilateral whose vertices are (4, 1), (-3, 0), (-2, 3) and (3, 4)                                                          | A     | 1         |             |
|            | b)                      | Find the equation of straight line passing through (4, 5) and perpendicular to the line $7x - 5y = 420$                                    | U / A | 1         |             |
|            | c)                      | Find the equation of circle whose center is at point of intersection of lines $2x+3y=13$ , $5x-y=7$ and passing through the point (1, -1). | A     | 1         |             |
|            | d)                      | Using Bisection method, find the approximate root of $x^2 + x - 3 = 0$ (Three iteration only)                                              | A     | 2         |             |
|            | e)                      | Using Regula falsi method find real root of the equation $xe^x = 3$ (Two iteration)                                                        | A     | 2         |             |
|            | f)                      | Using Bisection method find value of $\sqrt{10}$ by performing three iteration                                                             | A     | 2         |             |
| <b>Q.3</b> | Attempt any <b>FOUR</b> |                                                                                                                                            |       |           | <b>(16)</b> |
|            | a)                      | Find the angle between the lines $y = 5x + 6$ , $y = x$                                                                                    | A     | 1         |             |
|            | b)                      | Find the equation of circle whose center is at (-1, 3) and which touches the line $2x+y=4$                                                 | U / A | 1         |             |
|            | c)                      | Solve the following equation by Jacobi's method $20x + y - 2z = 17$ , $3x + 20y - z = -18$ , $2x - 3y + 20z = 25$                          | A     | 2         |             |
|            | d)                      | Solve the equation by using Gauss-seidal method, $4x + y + 2z = 12$ , $-x + 11y + 4z = 33$ , $2x - 3y + 8z = 20$                           | A     | 2         |             |

**P.T.O**

|            |    |                                                                                                                                     |             |   |             |
|------------|----|-------------------------------------------------------------------------------------------------------------------------------------|-------------|---|-------------|
|            | e) | Solve the following equations by Gauss –seidal method $5x - y = 9$ ,<br>$x - 5y + z = -4$ , $y - 5z = 6$                            | A           | 2 |             |
|            | f) | Solve the following equations by Jacobis method $10x + y + z = 12$ ,<br>$x + 10y + z = 12$ , $x + y + 10z = 12$                     | A           | 2 |             |
| <b>Q.4</b> |    | Attempt any <b>FOUR</b>                                                                                                             |             |   | <b>(08)</b> |
|            | a) | If $f(x) = \frac{x^2 + 2x + 5}{x^3 + 8}$ find $f(1) + f(-1)$                                                                        | U           | 3 |             |
|            | b) | Define odd and even functions                                                                                                       | R           | 3 |             |
|            | c) | Evaluate $\lim_{x \rightarrow 1} \frac{x^3 - 1}{x - 1}$                                                                             | U<br>/<br>A | 3 |             |
|            | d) | Evaluate $\lim_{x \rightarrow 0} \frac{3 \sin x + 4x}{7x - 2 \tan x}$                                                               | U<br>/<br>A | 3 |             |
|            | e) | State the Quotient Rule of the Derivative.                                                                                          | U           | 4 |             |
|            | f) | Find the slope of the tangent to the circle $x^2 + y^2 = 25$ at $(-3, 4)$                                                           | A           | 4 |             |
| <b>Q.5</b> |    | Attempt any <b>FOUR</b>                                                                                                             |             |   | <b>(16)</b> |
|            | a) | If $f(x) = \frac{1}{1-x}$ then show that $f(f(f(x))) = x$                                                                           | U           | 3 |             |
|            | b) | Evaluate $\lim_{x \rightarrow \infty} \left( \sqrt{x^2 + 3x + 2} - \sqrt{x^2 + x + 1} \right)$                                      | A           | 3 |             |
|            | c) | If $x\sqrt{1+y} + y\sqrt{1+x} = 0$ then show that $\frac{dy}{dx} = -\frac{1}{(1+x)^2}$                                              | U           | 4 |             |
|            | d) | Find $\frac{dy}{dx}$ if $y = \tan^{-1} \frac{1-x}{1+x}$                                                                             | A           | 4 |             |
|            | e) | Find $\frac{dy}{dx}$ if $y = (x)^{\sin x} + (\sin x)^x$                                                                             | A           | 4 |             |
|            | f) | Find the equations of the tangents to the curve $y = x^2 - 2x - 3$ where it meets the x-axis                                        | A           | 4 |             |
| <b>Q.6</b> |    | Attempt any <b>FOUR</b>                                                                                                             |             |   | <b>(16)</b> |
|            | a) | Evaluate $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\sin x - \cos x}{x - \frac{\pi}{4}}$                                             | A           | 3 |             |
|            | b) | Find $\frac{dy}{dx}$ if $\sin y = \log(x+y)$                                                                                        | A           | 4 |             |
|            | c) | If $y = \cos^{-1} \left( \frac{\cos x + \sqrt{3} \sin x}{2} \right)$ show that $\frac{dy}{dx} = -1$                                 | U           | 4 |             |
|            | d) | If $x = 3 \cos \theta - 2 \cos^3 \theta$ and $y = 3 \sin \theta - 2 \sin^3 \theta$ find $\frac{dy}{dx}$ at $\theta = \frac{\pi}{4}$ | A           | 4 |             |
|            | e) | If $y = (\sin^{-1} x)^2$ prove that $(1-x^2) \frac{d^2 y}{dx^2} - x \frac{dy}{dx} - 2 = 0$                                          | U           | 4 |             |
|            | f) | A metal wire 36 cm long is bent to form a rectangle. Find its dimensions when its area is maximum.                                  | A           | 4 |             |

\*\*\*\*\*



# GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

## EVEN TERM END EXAM MAY -2019

EXAM SEAT NO.

LEVEL: THIRD

PROGRAM: EE/E&TC/IE/IT

COURSE CODE:

EEF301/EIF301/TF301/EE201/EEE305/0201/EJ201/ETE301/IX201/IEE301/TT201/TF201/TTE301/6201

COU RSE NAME: APPLIED MATHEMATICS

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 10/05/2019

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 | S<br>Q<br>N | Question Text                                                                               | R<br>U<br>A | CO<br>EEF301 | Marks |
|---------|-------------|---------------------------------------------------------------------------------------------|-------------|--------------|-------|
| 1       |             | Attempt any FOUR                                                                            |             |              | (08)  |
|         | a)          | Evaluate $\int_{x-2}^{x+3} dx$                                                              | U           | 1            |       |
|         | b)          | Find the area under the curve $y = \cos x$ & $x = 0$ & $x = \pi$                            | A           | 1            |       |
|         | c)          | Evaluate $\int_0^{\frac{\pi}{2}} \frac{dx}{\sqrt{1-x^2}}$                                   | R           | 1            |       |
|         | d)          | Evaluate $\int \sqrt{1-\cos 2x} dx$                                                         | R           | 1            |       |
|         | e)          | Find the mean value of the function $y = 3e^{-x}$ over the range from $x = 0$ to $x = 1$    | A           | 1            |       |
|         | f)          | Evaluate $\int \frac{3-5x^2+9x^4-10x^6}{x^6} dx$                                            | R           | 1            |       |
| Q.2     |             | Attempt any FOUR                                                                            |             |              | (16)  |
|         | a)          | Evaluate $\int \frac{x^5}{1+x^{12}} dx$                                                     | U           | 1            |       |
|         | b)          | Find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ by integration method. | A           | 1            |       |
|         | c)          | Evaluate $\int \frac{1-\tan x}{1+\tan x} dx$                                                | U           | 1            |       |
|         | d)          | Evaluate $\int_0^{\frac{\pi}{2}} \cos^2 x dx$                                               | A           | 1            |       |
|         | e)          | Evaluate $\int \cot^{-1} x dx$                                                              | A           | 1            |       |
|         | f)          | Evaluate $\int_2^6 \frac{\sqrt{1-x} dx}{\sqrt{1-x} + \sqrt{x-7}}$                           | A           | 1            |       |
| Q.3     |             | Attempt any FOUR                                                                            |             |              | (16)  |
|         | a)          | Evaluate $\int \frac{(x^2+1)dx}{x(2x-1)(1-x)}$                                              | A           | 1            |       |
|         | b)          | Evaluate $\int_{-1}^1 \frac{x+x^2}{x^2+1} dx$                                               | A           | 1            |       |

P.T.O



|     |    |                                                                                                                                                                                         |   |   |      |
|-----|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
|     | c) | Find the area enclosed between the parabola $y^2 = 4x$ and the line $2x - y = 4$                                                                                                        | A | 1 |      |
|     | d) | Evaluate $\int \cos(\sqrt{x}) dx$                                                                                                                                                       | U | 1 |      |
|     | e) | If $i_1 = 10 \sin wt$ & $i_2 = 20 \cos wt$ Find $i_1 + i_2$ in the form $r \sin(wt + \alpha)$ & calculate the R.M.S value over the range from $t = 0$ to $t = \frac{\pi}{w}$            | A | 1 |      |
|     | f) | Evaluate $\int \frac{dx}{(x+1)(x^2+4)}$                                                                                                                                                 | A | 1 |      |
| Q.4 |    | Attempt any <b>FOUR</b>                                                                                                                                                                 |   |   | (08) |
|     | a) | Define order and degree of a differential equation.                                                                                                                                     | R | 2 |      |
|     | b) | Find order and degree of the following differential equation<br>$y - x \frac{dy}{dx} = \left( \frac{dy}{dx} \right)^2$                                                                  | R | 2 |      |
|     | c) | Define i) Conjugate of a complex number ii) Modulus of a complex number.                                                                                                                | R | 3 |      |
|     | d) | Find real and imaginary part of $\frac{1+i}{1-i}$                                                                                                                                       | R | 3 |      |
|     | e) | Find the value of $i^{30} + i^{40} + i^{60}$                                                                                                                                            | R | 3 |      |
|     | f) | Separate into real and imaginary parts: $\cosh(x + iy)$                                                                                                                                 | R | 3 |      |
| Q.5 |    | Attempt any <b>FOUR</b>                                                                                                                                                                 |   |   | (16) |
|     | a) | Show that $y^2 = ax^2$ is a solution of $x \left( \frac{dy}{dx} \right)^2 - 2y \frac{dy}{dx} + ax = 0$                                                                                  | U | 2 |      |
|     | b) | Find the equation of the curve whose slope of the tangent at any point $(x, y)$ is $3x-4$ and which passes through the point $(3, 2)$                                                   | A | 2 |      |
|     | c) | Prove that $(1+i)^8 + (1-i)^8 = 32$ , by using De-Moivre's theorem.                                                                                                                     | U | 3 |      |
|     | d) | Solve by using variable separable method $x - y \frac{dx}{dy} = a \left( x^2 + \frac{dx}{dy} \right)$                                                                                   | A | 2 |      |
|     | e) | Use De Moivre's theorem to find $\frac{(\cos 2\theta + i \sin 2\theta)^{3/2} (\cos \theta - i \sin \theta)^3}{(\cos 3\theta - i \sin 3\theta)^2 (\cos 5\theta - i \sin 5\theta)^{5/2}}$ | A | 3 |      |
|     | f) | Solve $x(y-x) \frac{dy}{dx} = y(x+y)$                                                                                                                                                   | A | 2 |      |
| Q.6 |    | Attempt any <b>FOUR</b>                                                                                                                                                                 |   |   | (16) |
|     | a) | Show that $\frac{2x}{y^3} dx + \frac{y^2 - 3x^2}{y^4} dy = 0$ is exact differential equation and hence solve it.                                                                        | U | 2 |      |
|     | b) | The particle starts from rest, its acceleration at any time is $(t+3)m/s^2$ . Find the distance travelled in 4 seconds.                                                                 | A | 2 |      |
|     | c) | Using Euler's formula, prove that $\cos A - \cos B = -2 \sin \left( \frac{A+B}{2} \right) \sin \left( \frac{A-B}{2} \right)$                                                            | U | 3 |      |
|     | d) | Solve $x \log x \frac{dy}{dx} + y = 2 \log x$                                                                                                                                           | A | 2 |      |
|     | e) | Find modulus and amplitude of $\frac{(1+i)(2+i)}{3-i}$                                                                                                                                  | A | 3 |      |
|     | f) | Find cube root of unity.                                                                                                                                                                | A | 3 |      |

# GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM MAY-2019

EXAM SEAT NO. 

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

LEVEL :- FIRST

COURSE CODE :-

CCF104/CCE104

COURSE NAME

CHEMISTRY OF ENGINEERING MATERIALS /  
ENGINEERING CHEMISTRY

PROGRAM : EE / IE / IT / E & TC

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 08/05/2019

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>CCF<br>104 | Ma<br>rks |
|-----|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.1 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                          |               |                  | 08        |
|     | a) | Explain fundamental particles of atom.                                                                                                                                                                                                                             | U             | 1                |           |
|     | b) | Define i) Atomic number ii) Mass number.                                                                                                                                                                                                                           | R             | 1                |           |
|     | c) | State Faraday's second law of electrolysis.                                                                                                                                                                                                                        | R             | 2                |           |
|     | d) | Define i) Electro plating ii) Electrode.                                                                                                                                                                                                                           | R             | 2                |           |
|     | e) | Define i) Atmospheric corrosion. ii) Electrochemical corrosion.                                                                                                                                                                                                    | R             | 3                |           |
|     | f) | Explain why Porous oxide film is called as non-protective film.                                                                                                                                                                                                    | U             | 3                |           |
| Q.2 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                          |               |                  | 16        |
|     | a) | i) State Pauli's exclusion principle.                                                                                                                                                                                                                              | R             | 1                |           |
|     |    | i) Write electronic configuration of $20\text{Ca}^{40}$ , $12\text{Mg}^{24}$ .                                                                                                                                                                                     |               |                  |           |
|     | b) | Differentiate between metallic conduction and electrolytic conduction.                                                                                                                                                                                             | U             | 2                |           |
|     | c) | Explain Tinning method of electroplating with diagram.                                                                                                                                                                                                             | U             | 3                |           |
|     | d) | Explain disadvantages of hard water in<br>i) Textile industry ii) Dyeing industry                                                                                                                                                                                  | U             | 4                |           |
|     | e) | Write any four reactions of hard water with soap.                                                                                                                                                                                                                  | U             | 4                |           |
|     | f) | Explain causes of scale formation in boilers.                                                                                                                                                                                                                      | U             | 4                |           |
| Q.3 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                          |               |                  | 16        |
|     | a) | Explain Lewis and Langmuir's concept of stable electronic configuration.                                                                                                                                                                                           | U             | 1                |           |
|     | b) | An electric current is passed through a solution of $\text{ZnSO}_4$ and $\text{CuSO}_4$ connected in series. If in a given time 0.716 gm of Zn is deposited, what would be the weight of Cu that would deposit in the same time? (At. Wt. of Cu= 63.5 and Zn = 65) | A             | 2                |           |
|     | c) | Explain with diagram the method which is used to coat the metal in form of sheet.                                                                                                                                                                                  | U             | 3                |           |
|     | d) | Explain the method for sterilization of water by using Chloramine.                                                                                                                                                                                                 | U             | 4                |           |

P.T.O.

|     |    |                                                                                               |   |   |    |
|-----|----|-----------------------------------------------------------------------------------------------|---|---|----|
|     | e) | Define pH. Draw pH scale. Write impurities in water.                                          | R | 4 |    |
|     | f) | Differentiate between Hard water and Soft water. ( any four points)                           | U | 4 |    |
| Q.4 |    | Attempt any <b>FOUR</b> :                                                                     |   |   | 08 |
|     | a) | Draw a neat labelled diagram of gravity separation method.                                    | U | 5 |    |
|     | b) | Define i) E.M.F. ii) Discharge                                                                | R | 5 |    |
|     | c) | Give important ores of copper with their molecular formula.                                   | A | 6 |    |
|     | d) | Distinguish between ferrous and non ferrous alloys ( any 2 points)                            | U | 6 |    |
|     | e) | Write two properties of graphite.                                                             | R | 6 |    |
|     | f) | Classify the composite materials with example.                                                | R | 7 |    |
| Q.5 |    | Attempt any <b>FOUR</b> :                                                                     |   |   | 16 |
|     | a) | Give charging and discharging reactions of lead acid storage cell.                            | R | 5 |    |
|     | b) | Draw a neat labelled diagram of dry cell. Explain its construction and working.               | U | 5 |    |
|     | c) | Name and explain method used for concentration of Sulphide ores.                              | A | 6 |    |
|     | d) | State and explain purposes of making alloys ( any four)                                       | R | 6 |    |
|     | e) | Write properties and applications of germanium as a semiconductor.                            | R | 6 |    |
|     | f) | Distinguish between thermosetting and thermosetting plastics.                                 | U | 7 |    |
| Q.6 |    | Attempt any <b>FOUR</b> :                                                                     |   |   | 16 |
|     | a) | Draw a neat labelled diagram and explain working and advantages of hydrogen-oxygen fuel cell. | R | 5 |    |
|     | b) | Define i) Flux ii) Mineral iii) Ore iv) Gangue.                                               | R | 5 |    |
|     | c) | Distinguish between calcination and roasting. ( any 4 points)                                 | U | 6 |    |
|     | d) | Explain with diagram electro refining of copper.                                              | U | 6 |    |
|     | e) | Give preparation, properties and applications of thermocole.                                  | U | 7 |    |
|     | f) | Write properties and applications of Teflon.                                                  | U | 7 |    |

\*\*\*\*\*

# GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

**EVEN TERM END EXAM MAY-2019**

**EXAM SEAT NO.**

LEVEL :- **THIRD** PROGRAM : **ELECTRICAL**

COURSE CODE :- **EEF307/EE208/EEE302**

COURSE NAME :- **DC MACHINE AND TRANSFORMERS**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **09/05 / 2019**

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>EFF<br>307 | Ma<br>rks |
|-----|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.1 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                          |               |                  | <b>08</b> |
|     | a) | State working principle of DC generator?                                                                                                                                                           | R             | 1                |           |
|     | b) | State any four applications of DC shunt motor.                                                                                                                                                     | R             | 2                |           |
|     | c) | State need of starter for Dc motor.                                                                                                                                                                | R             | 2                |           |
|     | d) | Define the following terms related to transformer.<br>1) Step up transformer 2) Step down transformer.                                                                                             | R             | 3                |           |
|     | e) | Define transformation ratio of transformer.                                                                                                                                                        | R             | 3                |           |
|     | f) | List any four characteristics of ideal transformer.                                                                                                                                                | R             | 3                |           |
| Q.2 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                          |               |                  | <b>16</b> |
|     | a) | Draw a neat connection diagram of DC short shunt and long shunt differential compound generator showing the direction of all the current.                                                          | R             | 1                |           |
|     | b) | State various losses that occurs in dc motor; state locations at which they occur and how to minimize them.                                                                                        | R             | 2                |           |
|     | c) | Derive the emf equation of dc generator.                                                                                                                                                           | U             | 1                |           |
|     | d) | Explain with suitable diagram flux control method of DC series motor.                                                                                                                              | U             | 2                |           |
|     | e) | Draw and explain load characteristics ( Terminal voltage and load current ) of d.c. shunt and series generator.                                                                                    | U             | 1                |           |
|     | f) | A 250 V D.C. shunt motor takes 4 A at no load. the armature and field resistance are $0.8\Omega$ and $250\Omega$ respectively. Calculate full load efficiency when the current is 22A.             | A             | 2                |           |
| Q.3 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                          |               |                  | <b>16</b> |
|     | a) | A 4 pole 1250 r.p.m. Dc generator has 72 slot and 12 conductors per slot on its armature. The flux per pole is 0.02 wb. Calculate the emf induced when the armature is i) Lap Wound ii) Wave Wound | A             | 1                |           |
|     | b) | Derive E.M.F. equation of single phase transformer.                                                                                                                                                | U             | 3                |           |
|     | c) | Classify transformer based on the<br>i) Construction ii) voltage level<br>iii) Number of phases iv) Application.                                                                                   | A             | 3                |           |
|     | d) | “DC shunt motor Never be started on heavy load” . Justify with Torque-Armature current characteristics.                                                                                            | A             | 2                |           |

P.T.O.



|     |    |                                                                                                                                                                                                                                                                                                                                                             |   |   |    |
|-----|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|----|
|     | e) | Explain why the rating of transformer is always in KVA and not in KW                                                                                                                                                                                                                                                                                        | U | 3 |    |
|     | f) | A single phase transformer has 400 primary and 800 secondary turns. The net cross-sectional area of the core is $40 \text{ cm}^2$ . If the primary winding connected to 50 HZ supply at 500 volts. Calculate - i) Peak value of the flux density in the core.<br>ii) Voltage induced in secondary.                                                          | A | 3 |    |
| Q.4 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                                                                   |   |   | 08 |
|     | a) | List out three phase transformer connections                                                                                                                                                                                                                                                                                                                | R | 6 |    |
|     | b) | State the need of parallel operation of transformer.                                                                                                                                                                                                                                                                                                        | U | 5 |    |
|     | c) | Define voltage regulation of a transformer.                                                                                                                                                                                                                                                                                                                 | R | 4 |    |
|     | d) | Draw the circuit diagram for parallel operation of single phase transformer.                                                                                                                                                                                                                                                                                | U | 5 |    |
|     | e) | State the merits of star-star connection of 3 phase transformer.                                                                                                                                                                                                                                                                                            | R | 6 |    |
|     | f) | Compare commercial and all day efficiency of transformer (any two points)                                                                                                                                                                                                                                                                                   | U | 4 |    |
| Q.5 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                                                                   |   |   | 16 |
|     | a) | Compare distribution transformer and power transformer.                                                                                                                                                                                                                                                                                                     | U | 6 |    |
|     | b) | Explain the working principle of single $\phi$ auto-transformer.                                                                                                                                                                                                                                                                                            | U | 4 |    |
|     | c) | Two $1\phi$ transformers A and B rated at 250 KVA each are operated in parallel on both sides. Percentage impedances for A & B are $(1 + j6)$ & $(1.2 + j4.8)$ respectively. Compute the load shared by each when the total load is 500 KVA at 0.8 p.f. lagging.                                                                                            | A | 5 |    |
|     | d) | State the advantages and disadvantages of determining performance of a transformer using O.C. & S.C. tests over direct loading test.                                                                                                                                                                                                                        | R | 4 |    |
|     | e) | State the conditions for parallel operation of $1\phi$ transformer.                                                                                                                                                                                                                                                                                         | U | 5 |    |
|     | f) | Derive the condition for maximum efficiency of a transformer.                                                                                                                                                                                                                                                                                               | A |   |    |
| Q.6 |    | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                                                                                                                   |   |   | 16 |
|     | a) | In a no load test of a single phase transformer. The following test data was obtained.<br>$V_1=220\text{V}$ , $V_2=110\text{V}$ , $I_0 = 0.5 \text{ A}$ , $i/p \text{ power} = 30 \text{ watts}$ .<br>Find the following i) Turns ratio ii) $I_m$ iii) $I_w$ iv) Iron loss.<br>The resistance of the primary winding is $0.6 \Omega$ .                      | A | 4 |    |
|     | b) | Explain the construction of shell type $3\phi$ transformer.                                                                                                                                                                                                                                                                                                 | U | 6 |    |
|     | c) | Two $1\phi$ transformers with equal turns have impedances of $(0.5 + j3) \Omega$ and $(0.6 + j10) \Omega$ with respect to the secondary. If they operate in parallel determine how they will share a total load of 100KW at p.f. 0.8 lagging.                                                                                                               | A | 5 |    |
|     | d) | Explain open circuit test of a transformer.                                                                                                                                                                                                                                                                                                                 | U | 4 |    |
|     | e) | Two single phase transformers A & B of equal voltage ratios are running in parallel and supply a load of 1000 Amp at 0.8 p.f. lag. The equivalent impedances of the two transformers are $(2 + j3) \Omega$ & $(2.5 + j5) \Omega$ , respectively calculated the current supplied by each transformer and the ratio of the KW output of the two transformers. | A | 5 |    |
|     | f) | Explain short circuit test of the $1\phi$ transformer.                                                                                                                                                                                                                                                                                                      | U | 4 |    |

\*\*\*\*\*



**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**EVEN TERM END EXAM MAY-2019****EXAM SEAT NO.**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

**LEVEL :- FIFTH PROGRAM : ELECTRICAL ENGINEERING****COURSE CODE :- EEF501/EE413/EEEE405****COURSE NAME TESTING OF MAINTENANCE OF ELECTRICAL EQUIPMENTS****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 30/05 / 2019**

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>EEF<br>501 | Mar<br>ks |
|-----|-------------|-----------------------------------------------------------------------------------------------------|--|--|---------------|------------------|-----------|
|     |             |                                                                                                     |  |  |               |                  |           |
| Q.1 |             | Attempt any <b>FOUR</b> :                                                                           |  |  |               |                  | 08        |
|     | a)          | What do you mean by tolerance?                                                                      |  |  | R             | 2                |           |
|     | b)          | List the routine tests carried out on 3 $\phi$ I.M.                                                 |  |  | A             | 3                |           |
|     | c)          | State the advantages of preventive maintenance.                                                     |  |  | R             | 2                |           |
|     | d)          | Relate the objectives of testing.                                                                   |  |  | A             | 3                |           |
|     | e)          | Define the terminologies i) Safety ii) Hazard                                                       |  |  | R             | 1                |           |
|     | f)          | List the type tests carried out on 1 $\phi$ I.M.                                                    |  |  | R             | 3                |           |
| Q.2 |             | Attempt any <b>FOUR</b> :                                                                           |  |  |               |                  | 16        |
|     | a)          | Describe the safety measures taken while working on electrical installations.                       |  |  | A             | 1                |           |
|     | b)          | Discuss maintenance required for 3 $\phi$ alternator.                                               |  |  | U             | 3                |           |
|     | c)          | Distinguish clearly between routine preventive and breakdown maintenance with one example of each.  |  |  | A             | 2                |           |
|     | d)          | State the factors on which severity of electric shock depends.                                      |  |  | R             | 1                |           |
|     | e)          | List the four factors affecting preventive maintenance schedule.                                    |  |  | A             | 2                |           |
|     | f)          | Explain the methods of testing<br>i) Direct ii) Indirect by giving example.                         |  |  | U             | 2                |           |
| Q.3 |             | Attempt any <b>FOUR</b> :                                                                           |  |  |               |                  | 16        |
|     | a)          | Describe in brief measurement of DC resistance and reduced voltage running up test in 3 $\phi$ I.M. |  |  | R             | 3                |           |
|     | b)          | List out DO's & Don't to achieve safety while working in substation.                                |  |  | R             | 1                |           |
|     | c)          | Draw circuit diagram and explain how a voltage ratio test is performed on 3 $\phi$ slip ring I.M.   |  |  | A             | 3                |           |
|     | d)          | Explain the procedure to be followed to rescue a person who have received on electric shock.        |  |  | A             | 1                |           |
|     | e)          | Explain the procedure for developing preventive maintenance schedule.                               |  |  | U             | 2                |           |
|     | f)          | Explain the special tests of 3 $\phi$ I.M.                                                          |  |  | A             | 3                |           |

P.T.O.

| QN  | S<br>Q<br>N | Section- II                                                                                                                                                                                                |  |  | R/<br>U/<br>A | Co<br>EFF<br>501 | Mar<br>ks |
|-----|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|---------------|------------------|-----------|
|     |             |                                                                                                                                                                                                            |  |  |               |                  |           |
| Q.4 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                  |  |  | A             |                  | <b>08</b> |
|     | a)          | How much insulation resistance the distribution transformer should have as per IS between<br>i) LV & HV winding. ii) Windings and earthed body parts.                                                      |  |  | R             | 4                |           |
|     | b)          | State the use of silica gel in transformer.                                                                                                                                                                |  |  | R             | 4                |           |
|     | c)          | List out any two agents which contaminate the transformer oil.                                                                                                                                             |  |  | R             | 5                |           |
|     | d)          | Give any two examples of class C type of insulating material.                                                                                                                                              |  |  | R             | 5                |           |
|     | e)          | State the use of i) Filler gauge ii) Spirit level.                                                                                                                                                         |  |  | R             | 6                |           |
|     | f)          | State any two troubles in MCCB.                                                                                                                                                                            |  |  | R             | 6                |           |
| Q.5 |             | Attempt any <b>FOUR</b> :                                                                                                                                                                                  |  |  |               |                  | <b>16</b> |
|     | a)          | With neat diagram, explain how to conduct induced over voltage withstand test on transformers.                                                                                                             |  |  | U             | 4                |           |
|     | b)          | With neat diagram, explain how to measure insulation resistance of transformers.                                                                                                                           |  |  | U             | 4                |           |
|     | c)          | Explain how to measure temperature of internal parts of electrical machines.                                                                                                                               |  |  | U             | 5                |           |
|     | d)          | Explain how the electrical equipment is protected during the period of inactivity.                                                                                                                         |  |  | U             | 5                |           |
|     | e)          | Explain Magnetic faults in electrical machines and their causes.                                                                                                                                           |  |  | U             | 6                |           |
|     | f)          | Explain any two internal causes of failure of electrical equipment.                                                                                                                                        |  |  | U             | 6                |           |
| Q.6 |             | Attempt any <b>TWO</b> :                                                                                                                                                                                   |  |  |               |                  | <b>16</b> |
|     | a)          | Prepare trouble- shooting chart for 50 KVA, 11KV/415 V, 3 $\phi$ distribution transformer.                                                                                                                 |  |  | A             | 6                |           |
|     | b)          | Prepare preventive maintenance schedule for distribution transformer as per IS 10028 ( PART iii) 1981..                                                                                                    |  |  | A             | 4                |           |
|     | c)          | i Classify the insulating materials as per IS 8504 ( part III) 1994 and give one example of each . ( 06 Marks)<br><br>ii) State the purpose of Impulse voltage withstand test of transformer. ( 02 m arks) |  |  | A             | 5                |           |

\*\*\*\*\*

**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**EVEN TERM END EXAM MAY-2019****EXAM SEAT NO.**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

**LEVEL :- FOURTH PROGRAM : ELECTRICAL ENGINEERING****COURSE CODE :- EE401/EE411/EEE402****COURSE NAME ELECTRICAL ESTIMATION AND CONTRATING****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 21/05 / 2019****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.

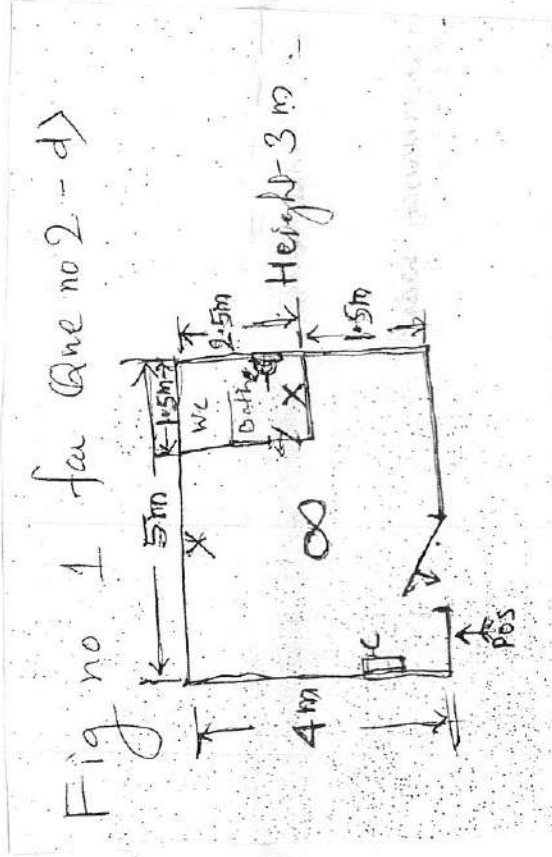
| QN  | S  | Section-I                                                                                                                               | R/<br>U/<br>A | Co<br>EEF<br>401 | Mar<br>ks |
|-----|----|-----------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.1 |    | Attempt any <b>FOUR</b> :                                                                                                               |               |                  | <b>08</b> |
|     | a) | Discuss safe guard elements of frame work of IE rules laid down by institution of engineers.                                            | R             | 1                |           |
|     | b) | Draw wiring diagram of lamp control two way switches.                                                                                   | A             | 1                |           |
|     | c) | State basic requirements of residential wiring system.                                                                                  | R             | 2                |           |
|     | d) | Draw and label typical single line diagram for meter board and distribution board of residential wiring ( assume nos of circuits)       | R             | 2                |           |
|     | e) | List the material used for earthing used for commercial wiring system along with specifications.                                        | R             | 3                |           |
|     | f) | Enlist the accessory components used for meter and distribution board installation in commercial building.                              | R             | 3                |           |
| Q.2 |    | Attempt any <b>FOUR</b> :                                                                                                               |               |                  | <b>16</b> |
|     | a) | State any four IE Rules regarding wiring installation works necessarily to be followed.                                                 | R             | 1                |           |
|     | b) | Comment on 'Measurement of various wiring points' in electrical installation works.                                                     | U             | 1                |           |
|     | c) | Enlist the various procedure sequentially used to working out residential installation works.                                           | A             | 2                |           |
|     | d) | Design and prepare schedule of material for electrical wiring installation of self content single room. With layout as shown in fig. 1. | A             | 2                |           |
|     | e) | Prepare an approximate costing for material schedule of wiring of self content single room along with final report.                     | A             | 2                |           |
|     | f) | Explain various wiring equipment positioning guide lines used in commercial wiring system.                                              | U             | 3                |           |

P.T.O.

| Q.3 | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                      |         |            | 16     |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------|--------|
| a)  | State various qualities of good estimator of electrical wiring installation works.                                                                                                                                                                             | U       | 3          |        |
| b)  | Explain with neat labeled sketch any one of the following<br>i) Cleat wiring ii) Wood casting wiring.                                                                                                                                                          | U       | 2          |        |
| c)  | Discuss important instructions for concealed wiring.                                                                                                                                                                                                           | U       | 2          |        |
| d)  | Comment on commercial wiring installation work and compare with the residential wiring installation work.                                                                                                                                                      | U       | 3          |        |
| e)  | Explain procedure for selection of wires in the wiring installation work of commercial type used in the MDB, SMDB & point wiring.                                                                                                                              | A       | 3          |        |
| f)  | Prepare wiring and single line diagram for MDB and SMDB of 5 storey commercial mall having 6 KW load of single phase at each floor having mains input service connection supply of 3 phase 415V 50Hz AC ( label and specification must be written in diagram ) | A       | 3          |        |
| QN  | S' Q N                                                                                                                                                                                                                                                         | R/ U/ A | Co EE/ 401 | Mar ks |
| Q.4 | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                      |         |            | 08     |
| a)  | Mention the types of contracts.                                                                                                                                                                                                                                | R       | 6          |        |
| b)  | Define the term e-tender.                                                                                                                                                                                                                                      | R       | 6          |        |
| c)  | State the meaning of negotiated tender.                                                                                                                                                                                                                        | R       | 6          |        |
| d)  | State types of induction motor starters.                                                                                                                                                                                                                       | R       | 4          |        |
| e)  | Give procedure to calculate motor current in any industrial installation.                                                                                                                                                                                      | R       | 5          |        |
| f)  | How the fuse rating and starter are decided in factory unit.                                                                                                                                                                                                   | R       | 4          |        |
| Q.5 | Attempt any <b>FOUR</b> :                                                                                                                                                                                                                                      |         |            | 16     |
| a)  | State the sequence followed to prepare estimate for a factory installation.                                                                                                                                                                                    | U       | 4          |        |
| b)  | State four rules for motor wiring .                                                                                                                                                                                                                            | U       | 4          |        |
| c)  | 1HP, 3 $\phi$ , 415V, motor, 5 HP 3 $\phi$ 415 V motor, 0.5HP 240V 1 $\phi$ motor are proposed to the connected to AC supply. Calculate full load current, starting current rating of main switch and cable.                                                   | A       | 4          |        |
| d)  | As per IS describe testing of wiring installation for rectification of current.                                                                                                                                                                                | A       | 5          |        |
| e)  | Explain the procedure to perform insulation resistance test between conductors.                                                                                                                                                                                | U       | 5          |        |
| f)  | State and explain in brief IE rules related to testing of residential wiring installation.                                                                                                                                                                     | U       | 5          |        |



| Q.6 | Attempt any TWO:                                                                                                                                                                                        |        | 16     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|
| a)  | In a factory of area 30m X 15m two lathe machine of 1 H.P 3 $\phi$ 440volt is to be erected. Estimate the cost for the power wiring.                                                                    | A      | 4-     |
| b)  | i) State the important guidelines about power wiring and motor wiring.<br>ii) Explain criteria for selecting contractor.                                                                                | U<br>U | 4<br>6 |
| c)  | i) Explain the test for ascertaining the circuit continuity.<br>ii) Prepare a tender notice with all details of supply and installation of a 1 phase, 400v 50Hz, 63 kVA alternator to your Polytechnic. | U<br>U | 5<br>6 |



X X X X X X X





# GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVENT TERM END EXAM MAY-2019

EXAM SEAT NO. 

|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|

LEVEL :- FIFTH PROGRAM : ELECTRICAL ENGINEERING  
COURSE CODE :- EEE510/EE406/E406  
COURSE NAME INDUSTRIAL ORGANIZATION AND MANAGEMENT  
MAX. MARKS : 80 TIME : 3 HRS. DATE :- 27/05 / 2019

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.
- 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 |             |                                                                 | Ma<br>rks |
|------------|-------------|-----------------------------------------------------------------|-----------|
| QN         | S<br>Q<br>N |                                                                 |           |
| Q.1        |             | Attempt any FOUR:                                               | 08        |
|            | a)          | Define the term 'trade'.                                        |           |
|            | b)          | Enlist various plans considered in planning.                    |           |
|            | c)          | List shortcomings of poor communication.                        |           |
|            | d)          | State four qualities of a good supervisor.                      |           |
|            | e)          | Define the term 'Authority'.                                    |           |
|            | f)          | State the objectives of advertising.                            |           |
| Q.2        |             | Attempt any FOUR:                                               | 16        |
|            | a)          | Differentiate between sole proprietorship and partnership.      |           |
|            | b)          | How a joint stock company is formed?                            |           |
|            | c)          | Discuss the role of cooperatives in Indian environment.         |           |
|            | d)          | Describe various levels of management.                          |           |
|            | e)          | Discuss various steps in planning function.                     |           |
|            | f)          | State the importance of controlling.                            |           |
| Q.3        |             | Attempt any FOUR:                                               | 16        |
|            | a)          | Describe 'Directing' as management function.                    |           |
|            | b)          | Discuss the role of personnel manager.                          |           |
|            | c)          | Describe various leadership styles.                             |           |
|            | d)          | State the importance of effective coordination and supervision. |           |
|            | e)          | Define 'Marketing Research'. State its functions.               |           |
|            | f)          | Describe product classification and its necessity.              |           |

P.T.O.

| Q.N | S<br>Q<br>N | Section- II                                                                 | Ma<br>rks |
|-----|-------------|-----------------------------------------------------------------------------|-----------|
| Q.4 |             | Attempt any <b>FOUR</b> :<br>Define financial management.                   | <b>08</b> |
|     | a)          |                                                                             |           |
|     | b)          | What is EOQ?                                                                |           |
|     | c)          | Give personnel protective equipments used in industries to avoid accidents. |           |
|     | d)          | State the causes of industrial dispute.                                     |           |
|     | e)          | What do you mean by under capitalization?                                   |           |
|     | f)          | What is network in management?                                              |           |
| Q.5 |             | Attempt any <b>FOUR</b> :                                                   | <b>16</b> |
|     | a)          | Discuss the role of a financial manager.                                    |           |
|     | b)          | State the importance of inventory management.                               |           |
|     | c)          | What is safety management?                                                  |           |
|     | d)          | What is 'PERT'? Explain in short.                                           |           |
|     | e)          | Write short note on "Factory Act".                                          |           |
|     | f)          | Differentiate between shares and debentures.                                |           |
| Q.6 |             | Attempt any <b>FOUR</b> :                                                   | <b>16</b> |
|     | a)          | What is material management? State its function.                            |           |
|     | b)          | List sources of rising fixed capital.                                       |           |
|     | c)          | What are the causes of accidents in an Industry?                            |           |
|     | d)          | What is break even analysis? Give its application.                          |           |
|     | e)          | What provisions are made in Workmen's compensation act?                     |           |
|     | f)          | What are the objectives of purchasing?                                      |           |

\*\*\*\*\*

**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**EVEN TERM END EXAM MAY-2019****EXAM SEAT NO.**

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|--|--|--|--|--|

**LEVEL: THIRD****PROGRAM: ELECTRICAL****COURSE CODE: EE301/R228****COURSE NAME: HIGHER MATHEMATICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 24/05/2019**

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 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.

**Q.1 Attempt any FOUR****Marks  
(08)**

- a) With usual notations of symbols prove that  $\Delta \log f(x) = \log \left[ 1 + \frac{\Delta f(x)}{f(x)} \right]$

- b) Prove that  $\nabla = 1 - E^{-1}$

- c) Find  $\Delta^2 e^x$  (take  $h=1$ )

- d) Construct the forward difference table for the data:

|      |   |    |    |    |    |    |
|------|---|----|----|----|----|----|
| x    | 0 | 5  | 10 | 15 | 20 | 25 |
| f(x) | 7 | 11 | 14 | 18 | 24 | 32 |

- e) If  $B(n, 3) = 1/3$  (n is a positive integer) find n.

- f) Two coins tossed simultaneously. Find the probability of getting at least one head.

**Q.2****(16)**

- a) Using Newton's Backward Interpolation formula estimate  $f(7)$ , given that  $f(0)=2, f(2)=5, f(4)=10, f(6)=17, f(8)=26$

- b) Using Newton's forward interpolation formula estimate the population of a town for the year 1895 given that,

|                        |      |      |      |      |      |
|------------------------|------|------|------|------|------|
| Year                   | 1891 | 1901 | 1911 | 1921 | 1931 |
| Population in thousand | 46   | 66   | 81   | 93   | 103  |

- c) Using Lagrange's interpolation formula evaluate  $f(10)$  from the following data.

|      |    |    |    |    |
|------|----|----|----|----|
| x    | 5  | 6  | 9  | 11 |
| f(x) | 12 | 13 | 14 | 16 |

- d) Express the polynomial  $f(x) = x^3 - 3x^2 + 4x - 7$  in factorial notation. Hence find  $\Delta^3 f(x)$

- e) There are 20 white and 10 black balls in a bag. What is the probability of drawing a white ball in a draw?

- f) Solve  $x^3 + x - 1 = 0$  by Regula Falsi method (3 iterations only)

P.T.O

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

(16)

- a) Evaluate  $\int_0^{\infty} x^2 e^{-h^2 x^2} dx$
- b) Prove that  $\int_0^a x^m (a-x)^n dx = a^{m+n+1} B(m+1, n+1)$
- c) Evaluate  $\int_0^1 x^3 (1-\sqrt{x})^5 dx$
- d) Prove that  $B(m, n) = \int_0^1 \frac{x^{m-1} + x^{n-1}}{(1+x)^{m+n}} dx$
- e) Use Gauss-Seidel method to solve the equations  $8x + 4y - 2z = 3$ ,  
 $2x - 6y + z = 15$ ,  $4x + 5y + 15z = 37$  (upto 3 iterations)
- f) Find  $\sqrt[3]{150}$  by using Newton-Raphson method (3 iterations).

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

(08)

- a) Find the Laplace transform of  $\sin^2 t$
- b) Find the Laplace transform of  $3 + 2t^2 - e^{-t}$
- c) Find the Laplace transform of  $(e^{2t} t^3)$
- d) State Dirichlet's conditions.
- e) State the Fourier constants in  $(0, 2\pi)$
- f) Find the Fourier transform of  $f(x) = \begin{cases} 1 & |x| < 1 \\ 0 & \text{for } |x| > 1 \end{cases}$

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

(16)

- a) Find the Laplace transform of  $\sin 3t \cos 2t$
- b) Find  $L^{-1} \left\{ \frac{2}{s-3} + \frac{3s}{s^2+9} + \frac{4}{s^2+16} \right\}$
- c) Apply convolution theorem to evaluate  $L^{-1} \left\{ \frac{1}{(s+1)(s-2)} \right\}$
- d) Obtain the Fourier expansion of the function  $f(x) = x$  over the interval  $(-\pi, \pi)$
- e) Find a Fourier series to represent  $f(x) = x - x^2$  from  $x = -\pi$  to  $x = \pi$
- f) Obtain the Fourier series for  $f(x) = e^{-x}$  in  $(0, 2\pi)$

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

(16)

- a) The function is defined by  
 $f(x) = \pi + x \quad -\pi < x < 0$   
 $= \pi - x \quad 0 < x < \pi$   
Obtain Fourier series for  $f(x)$  over the interval  $(-\pi, \pi)$
- b) Find a Fourier series to represent  $x^2$  in the interval  $(-\ell, \ell)$
- c) Solve using Laplace transform method the equation  $\frac{dx}{dt} + 2x = e^{-t}$  given that  
 $x=2$  at  $t=0$
- d) Solve using Laplace transform the differential equation  $\frac{dy}{dt} + 3y = 1 + e^t$
- e) Solve using Laplace transform method
- |  | Solve                                            | using                               | Laplace    | transform | method |
|--|--------------------------------------------------|-------------------------------------|------------|-----------|--------|
|  | $\frac{d^2 y}{dt^2} - 2 \frac{dy}{dt} + y = e^t$ | with $y = 2$ , $\frac{dy}{dt} = -1$ | at $t = 0$ |           |        |
- f) Find the Fourier transform of  $f(x) = \begin{cases} 1-x^2 & |x| \leq 1 \\ 0 & |x| > 1 \end{cases}$

\*\*\*\*\*



**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**  
(An Autonomous Institute of Govt. Of Maharashtra)

**EVEN TERM END EXAM MAY-2019**

**EXAM SEAT NO.**

**PROGRAM : ELECTRICAL ENGINEERING**

**LEVEL :- THIRD**

**COURSE CODE :- EEF305/EEE308**

**COURSE NAME :- ELECTRICAL MATERIAL WIRING & ILLUMINATION**

**MAX. MARKS : 80 TIME : 3 HRS. DATE :- 27 / 05 / 2019**

**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>EFF<br>305 | Ma<br>rks |
|-----|-------------|--------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.1 |             | Attempt any <b>FOUR</b> :                                                                              |               |                  | <b>08</b> |
|     | a)          | Define i) Thermal stability ii) thermal conductivity.                                                  | R             | 3                |           |
|     | b)          | State two characteristics of electrical conducting materials.                                          | R             | 1                |           |
|     | c)          | State any two materials used for permanent magnets.                                                    | R             | 2                |           |
|     | d)          | Classify insulating material.                                                                          | U             | 3                |           |
|     | e)          | Name any two conducting materials used for machine winding.                                            | R             | 1                |           |
|     | f)          | State any one use of i) Brass ii) Bronze                                                               | U             | 1                |           |
| Q.2 |             | Attempt any <b>FOUR</b> :                                                                              |               |                  | <b>16</b> |
|     | a)          | Explain properties of soft and hard ferrites magnetic material.                                        | U             | 2                |           |
|     | b)          | List any four insulating material and state its one application of each.                               | U             | 3                |           |
|     | c)          | Compare any four points of copper and aluminium as conductors for power transmission lines.            | U             | 1                |           |
|     | d)          | Explain in brief paramagnetic materials and diamagnetic material.                                      | R             | 2                |           |
|     | e)          | Explain how mica and porcelain materials are suitable to use as an insulating material.                | A             | 3                |           |
|     | f)          | Explain thermal mechanical and electrical properties of i) Mercury ii) Tungsten                        | A             | 1                |           |
| Q.3 |             | Attempt any <b>TWO</b> :                                                                               |               |                  | <b>16</b> |
|     | a)          | Explain in brief mechanical properties of an insulating materials.                                     | U             | 3                |           |
|     | b)          | With help of graphical representation. Explain hysteresis loops for i) Hard steel ii) Wrought iron     | A             | 2                |           |
|     | c)          | List commonly used conducting materials. Explain in brief characteristics of good conducting material. | U             | 1                |           |

**P.T.O.**

|     |                                                                                                                 |   |    |
|-----|-----------------------------------------------------------------------------------------------------------------|---|----|
| Q.4 | Attempt any <b>FOUR</b> :                                                                                       |   | 08 |
| a)  | Why all domestic loads are connected in parallel?                                                               | R | 4  |
| b)  | State different types of wiring system.                                                                         | R | 4  |
| c)  | State various types of switches used in wiring and give the specifications.                                     | R | 4  |
| d)  | Define lumens related to illumination.                                                                          | R | 5  |
| e)  | State the importance of mounting height in illumination calculations.                                           | R | 5  |
| f)  | Define space height ratio in case of illumination.                                                              | R | 5  |
| Q.5 | Attempt any <b>FOUR</b> :                                                                                       |   | 16 |
| a)  | Explain different types of lightning schemes in case of illumination.                                           | U | 5  |
| b)  | Define i) Maintenance factor ii) Depreciation factor.                                                           | U | 5  |
| c)  | State laws of illumination.                                                                                     | U | 5  |
| d)  | Describe the different points to be considered for the selection of a wiring system.                            | U | 5  |
| e)  | With neat diagram explain test lamp and tester.                                                                 | U | 5  |
| f)  | Why earthing is necessary for power circuit?                                                                    | U | 5  |
| Q.6 | Attempt any <b>FOUR</b> :                                                                                       |   | 16 |
| a)  | Explain the types of wiring circuits with control of one lamp using two single pole switches.                   | A | 4  |
| b)  | Explain staircase wiring for one and two staircases.                                                            | A | 4  |
| c)  | Draw and explain ICDP, ICTP, MCB & ELCB.                                                                        | A | 4  |
| d)  | Justify the need for lighting control schemes.                                                                  | U | 5  |
| e)  | Describe the effect of the wall colours and clean lines of light sources on the illumination of working planes. | U | 5  |
| f)  | List in detail the steps in design of an illumination scheme.                                                   | A | 5  |

\*\*\*\*\*

**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**EVEN TERM END EXAM MAY -2019****EXAM SEAT NO.**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

**LEVEL: FIFTH****PROGRAM: ELECTRICAL****COURSE CODE: EEF502/EE305/EEF503****COURSE NAME: ELECTRICAL MACHINES****CONTROL & AUTOMATION****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 28/05/2019****Instruction:-**

- 1) Answer to two sections must be written in separate section answer book provided
- 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<br>Q<br>N | Question Text                                                                                                                                    | R CO   |              | Marks       |
|------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------|-------------|
|            |             |                                                                                                                                                  | U      | EEF<br>A 502 |             |
| <b>Q.1</b> |             | Attempt any <b>FOUR</b>                                                                                                                          |        |              | <b>(08)</b> |
|            | a)          | Draw a neat labelled diagram of 3-wire control.                                                                                                  | R      | 1            |             |
|            | b)          | State the function of over-load relay.                                                                                                           | R      | 2            |             |
|            | c)          | Which conduction is called "single-phasing"?                                                                                                     | R      | 2            |             |
|            | d)          | State the use of control transformer.                                                                                                            | R      | 2            |             |
|            | e)          | Why is the under voltage protection necessary for motors?                                                                                        | U      | 3            |             |
|            | f)          | Draw circuit symbol of<br>i) Push button<br>ii) Float switch                                                                                     | R      | 2            |             |
| <b>Q.2</b> |             | Attempt any <b>FOUR</b>                                                                                                                          |        |              | <b>(16)</b> |
|            | a)          | Explain any four selection factors for contactor in motor feeder circuit.                                                                        | U      | 3            |             |
|            | b)          | What is interlocking? Explain its need.                                                                                                          | U      | 1            |             |
|            | c)          | List any four advantages of magnetic control.                                                                                                    | U      | 1            |             |
|            | d)          | With neat diagram, explain the operation of limit switch.                                                                                        | U      | 2            |             |
|            | e)          | With neat diagram, explain the operation of float switch                                                                                         | U      | 2            |             |
|            | f)          | With neat diagram, explain the operation of pressure switch.                                                                                     | U      | 2            |             |
| <b>Q.3</b> |             | Attempt any <b>TWO</b>                                                                                                                           |        |              | <b>(16)</b> |
|            | a)          | Explain how the fuse is selected in motor feeder circuit by matching its characteristics with those of other components.                         | A      | 3            |             |
|            | b)          | i) Explain any four protections required for AC motors (4 marks)<br>ii) With neat diagram, explain the operation of motor driven timer (4 marks) | U<br>U | 3<br>2       |             |

**P.T.O**

|                   |    |                                                                                                                  |   |      |
|-------------------|----|------------------------------------------------------------------------------------------------------------------|---|------|
|                   | c) | Draw a neat diagram of Lock-out type contactor and explain its working. State any two applications of it.        | U | 2    |
| <b>Section-II</b> |    |                                                                                                                  |   |      |
| <b>Q.4</b>        |    | Attempt any <b>FOUR</b>                                                                                          |   | (08) |
|                   | a) | Define plugging of motor.                                                                                        | R | 4    |
|                   | b) | Define PLC.                                                                                                      | R | 6    |
|                   | c) | List the advantages of automatic control for a pump (any 4)                                                      | U | 5    |
|                   | d) | State the principle of definite time control.                                                                    | R | 4    |
|                   | e) | Draw only power circuit diagram using drum switch for series & parallel connection of electrical oven.           | R | 5    |
|                   | f) | Justify, 'Definite time acceleration starters are more widely used than current limit starter'.                  | R | 4    |
| <b>Q.5</b>        |    | Attempt any <b>FOUR</b>                                                                                          |   | (10) |
|                   | a) | Draw & explain the control circuit for random reverting type.                                                    | U | 4    |
|                   | b) | State the advantages and disadvantages of PLC.                                                                   | U | 6    |
|                   | c) | Draw & explain schematic diagram for a planer m/c.                                                               | U | 5    |
|                   | d) | Draw & explain the control circuit for lifting magnet with auto-drop using two position switch.                  | U | 5    |
|                   | e) | Draw & explain the typical PLC I/P & typical O/P PLC.                                                            | U | 6    |
|                   | f) | Draw and explain the control circuits for motors using auto-transformer type starter.                            | U | 4    |
| <b>Q.6</b>        |    | Attempt any <b>FOUR</b>                                                                                          |   | (10) |
|                   | a) | Draw and explain the control circuits for an automatic star-delta starter.                                       | U | 4    |
|                   | b) | Draw and explain the control circuits for reverting of an I.M with plugging facility.                            | U | 4    |
|                   | c) | Discuss the ladder diagram for DOL starter.                                                                      | U | 6    |
|                   | d) | Draw and explain the power cut for current limit acceleration starter.                                           | U | 4    |
|                   | e) | State the various requirements for the proper functioning of control cut for automatic control for a water pump. | R | 5    |
|                   | f) | Draw & explain dynamic braking for 3 $\phi$ I.M.                                                                 | U | 4    |

\*\*\*\*\*



**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**EVEN TERM END EXAM MAY -2019****EXAM SEAT NO.**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

**LEVEL: THIRD****PROGRAM: ELECTRICAL****COURSE CODE: EEF312/EEE101 COURSE NAME: BASIC MECHANICAL AND CIVIL ENGINEERING****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 28/05/2019****Instruction:-**

- 1) Answer to two sections must be written in separate section answer book provided
- 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<br>Q<br>N | Question Text                                                            | R<br>U<br>A | CO<br>EEF<br>A 312 | Marks       |
|-------------------|-------------|--------------------------------------------------------------------------|-------------|--------------------|-------------|
| <b>Section -I</b> |             |                                                                          |             |                    |             |
| <b>Q.1</b>        |             | Attempt any <b>FOUR</b>                                                  |             |                    | <b>(08)</b> |
|                   | a)          | State the functions of keys.                                             | R           | 1                  |             |
|                   | b)          | Enlist the types of couplings.                                           | R           | 1                  |             |
|                   | c)          | State the formula for shaft design.                                      | A           | 1                  |             |
|                   | d)          | Enlist the types of gears.                                               | U           | 2                  |             |
|                   | e)          | State the function of I.C. engine.                                       | R           | 2                  |             |
|                   | f)          | Enlist the component used for any boiler.                                | R           | 2                  |             |
| <b>Q.2</b>        |             | Attempt any <b>FOUR</b>                                                  |             |                    | <b>(16)</b> |
|                   | a)          | Draw the neat sketches of various types of keys.                         | U           | 1                  |             |
|                   | b)          | Give the selection criteria for bearing.                                 | R           | 1                  |             |
|                   | c)          | Explain the working of 4-stroke petrol engine.                           | U           | 2                  |             |
|                   | d)          | Explain closed cycle gas turbine with neat sketch.                       | U           | 2                  |             |
|                   | e)          | Draw neat sketches of following<br>i) Spur gear<br>ii) Bevel gear        |             |                    |             |
|                   | f)          | Explain with neat sketch reciprocating pump.                             |             |                    |             |
| <b>Q.3</b>        |             | Attempt any <b>FOUR</b>                                                  |             |                    | <b>(16)</b> |
|                   | a)          | Classify coupling and explain any one of them with neat sketch.          | U           | 1                  |             |
|                   | b)          | State the applications of keys.                                          | A           | 1                  |             |
|                   | c)          | Enlist power transmission devices & explain belt drive with neat sketch. | U           | 2                  |             |
|                   | d)          | Draw the schematic diagram of I.C engine & name the part.                | U           | 2                  |             |
|                   | e)          | Classify Hydraulic Turbine & explain pelton wheel with neat sketch.      | U           | 2                  |             |
|                   | f)          | Explain Axial flow compressor with neat sketch.                          | U           | 3                  |             |
| <b>P.T.O</b>      |             |                                                                          |             |                    |             |



## Section -II

| Q.4 | Attempt any <b>FOUR</b>                                                                                                            |   |   | (08) |
|-----|------------------------------------------------------------------------------------------------------------------------------------|---|---|------|
|     | a) Define Bearing capacity of soil. Give its unit.                                                                                 | R | 4 |      |
|     | b) Define i) surveying ii) Leveling                                                                                                | R | 5 |      |
|     | c) Enlist the various types of flooring.                                                                                           | R | 4 |      |
|     | d) Explain brief the necessity of plastering.                                                                                      | U | 4 |      |
|     | e) State any two uses of Tunnels.                                                                                                  | R | 6 |      |
|     | f) Define i) Substructure ii) Superstructure                                                                                       | R | 4 |      |
| Q.5 | Attempt any <b>FOUR</b>                                                                                                            |   |   | (16) |
|     | a) Explain various types of bonds in brick masonry with neat sketch.                                                               | A | 4 |      |
|     | b) State the use of i) Auto level ii) Prismatic compass iii) Metric chain iv) Theodolite.                                          | R | 5 |      |
|     | c) Explain various types of pointing with any one type with neat sketch.                                                           | U | 4 |      |
|     | d) Explain the contents & importance of submission drawing in building construction.                                               | U | 4 |      |
|     | e) Explain the procedure of concreting in building construction with a flow diagram.                                               | U | 4 |      |
|     | f) State the types of irrigation projects.                                                                                         | U | 6 |      |
| Q.6 | Attempt any <b>FOUR</b>                                                                                                            |   |   | (16) |
|     | a) List the various types of Doors. Draw the neat sketch of typical door.                                                          | U | 4 |      |
|     | b) Enlist the various types of Foundation. Explain in brief the most common type of bridge foundation                              | A | 4 |      |
|     | c) State the advantages of irrigation projects.                                                                                    | U | 6 |      |
|     | d) Draw schematic diagram showing the component of water treatment plant. State the function of two important components in brief. | A | 6 |      |
|     | e) Explain in brief the role of transportation in the development of country.                                                      | U | 6 |      |
|     | f) Write a short note on classification of surveying.                                                                              | U | 5 |      |

\*\*\*\*\*

**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**EVEN TERM END EXAM MAY -2019****EXAM SEAT NO.**

|  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|

**LEVEL: FOURTH****PROGRAM: ELECTRICAL****COURSE CODE: EEF403/3407/EE307/EE409/EEE406 COURSE NAME: SWITCHGEAR AND****PROTECTION****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 23/05/2019****Instruction:-**

- 1) Answer to two sections must be written in separate section answer book provided
- 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 EEF 403 | Marks       |
|-------------------|-------|-------------------------------------------------------------------|-------|------------|-------------|
| <b>Section -I</b> |       |                                                                   |       |            |             |
| <b>Q.1</b>        |       | Attempt any <b>FOUR</b>                                           |       |            | <b>(08)</b> |
|                   | a)    | Give characteristics of fuse element.                             | R     | 3          |             |
|                   | b)    | State the function of earth switch.                               | R     | 3          |             |
|                   | c)    | What is the function of current limiting reactor?                 | R     | 1          |             |
|                   | d)    | State the methods of arc extinction in CB.                        | R     | 3          |             |
|                   | e)    | Define i) Relay time ii) Breaker time.                            | R     | 2          |             |
|                   | f)    | Give advantages of microprocessor based relays.                   | R     | 2          |             |
| <b>Q.2</b>        |       | Attempt any <b>FOUR</b>                                           |       |            | <b>(16)</b> |
|                   | a)    | Explain with sketch induction type over current relay.            | U     | 2          |             |
|                   | b)    | Explain with a neat sketch reverse power relay.                   | U     | 2          |             |
|                   | c)    | State difference between Isolator & CB.                           | U     | 3          |             |
|                   | d)    | Discuss merits of SF <sub>6</sub> CB.                             | U     | 3          |             |
|                   | e)    | State equipments in substation & explain each in brief.           | R     | 1          |             |
|                   | f)    | State the meaning of current chopping in connection with A.B.C.B. | A     | 2          |             |
| <b>Q.3</b>        |       | Attempt any <b>FOUR</b>                                           |       |            | <b>(16)</b> |
|                   | a)    | Compare indoor & outdoor substation.                              | U     | 1          |             |
|                   | b)    | Explain fundamental requirements of protective relaying.          | U     | 2          |             |
|                   | c)    | Draw the block diagram of microprocessor based static relay.      | A     | 2          |             |
|                   | d)    | Discuss applications of over current protection.                  | A     | 2          |             |
|                   | e)    | State chemical properties of SF <sub>6</sub> gas.                 | U     | 3          |             |
|                   | f)    | Explain with diagram HRC fuse.                                    | U     | 3          |             |
| <b>P.T.O</b>      |       |                                                                   |       |            |             |

| Section-II |                                                                                                                   |  |   |   |      |
|------------|-------------------------------------------------------------------------------------------------------------------|--|---|---|------|
| Q.4        | Attempt any <b>FOUR</b>                                                                                           |  |   |   | (08) |
| a)         | State the causes of over voltage.                                                                                 |  | R | 4 |      |
| b)         | The ideal scheme of protection for line is ----- protection. (differential, distance)                             |  | R | 6 |      |
| c)         | Draw the schematic arrangement of circulating current & inter-turn protection of 3 $\phi$ double wound generator. |  | U | 5 |      |
| d)         | Draw the schematic diagram for protective scheme against overloading of feeders.                                  |  | U | 6 |      |
| e)         | List the most commonly used devices for protection against lighting.                                              |  | A | 4 |      |
| f)         | State the important faults occurs in alternator.                                                                  |  | U | 5 |      |
| Q.5        | Attempt any <b>FOUR</b>                                                                                           |  |   |   | (16) |
| a)         | Explain protection of radial feeder.                                                                              |  | A | 6 |      |
| b)         | Discuss the phenomenon of lighting stroke.                                                                        |  | U | 4 |      |
| c)         | Explain reverse power protection for alternator.                                                                  |  | R | 5 |      |
| d)         | With neat diagram explain the principle of differential bus-bar protection.                                       |  | U | 6 |      |
| e)         | Discuss the negative phase sequence protection for alternator.                                                    |  | U | 5 |      |
| f)         | Write a note on surge absorbers.                                                                                  |  | R | 4 |      |
| Q.6        | Attempt any <b>FOUR</b>                                                                                           |  |   |   | (16) |
| a)         | Explain the over current protection of parallel feeders.                                                          |  | U | 6 |      |
| b)         | Discuss the term in brief i) Crest ii) Front iii) Tail iv) Polarity                                               |  | A | 4 |      |
| c)         | Discuss the inter-turn fault protection of transformer.                                                           |  | U | 5 |      |
| d)         | Explain translay scheme differential pilot wire protection for transmission line.                                 |  | U | 6 |      |
| e)         | Discuss the abnormal conditions & type of protection for transformer.                                             |  | A | 5 |      |
| f)         | Draw neat labelled diagram of Horn gap lighting Arrester.                                                         |  | R | 4 |      |

\*\*\*\*\*

**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**EVEN TERM END EXAM MAY-2019****EXAM SEAT NO.**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

**LEVEL :- FIRST****PROGRAM : CE/EE/MT/SM****COURSE CODE :- CCF108/R107/X107/CCE108/R110****COURSE NAME :- ENGINEERING DRAWING - II****MAX. MARKS : 80 TIME : 4 HRS. DATE :- 29 / 05 / 2019****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>108 | Ma<br>rks |
|-----|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|-----------|
| Q.1 |             | Attempt any ONE:<br>Fig. (1) shows pictorial view of an object. Draw following views.<br>i) Front view looking in the direction X.<br>ii) Side view looking in the direction Y.<br>iii) Top view. | U             | 1                | 16        |
|     | b)          | Fig. (2) shows pictorial view of an object. Draw following views.<br>i) Front view looking in the direction X.<br>ii) Side view looking in the direction Y.<br>iii) Top view.                     | U             | 1                |           |
| Q.2 |             | Attempt any ONE:                                                                                                                                                                                  |               |                  | 16        |
|     | a)          | Fig. ( 3) shows isometric view of a machine component. Draw following views.<br>i) Sectional F.V. looking in the direction X ( section A-A)<br>ii) Right hand side view.<br>iii) Top view.        | U             | 2                |           |
|     | b)          | Fig. ( 4) shows isometric view of a machine component. Draw following views<br>i) Sectional F.V. looking in the direction X ( section A-A)<br>ii) Top view.<br>iii) Left hand side view.          | U             | 2                |           |

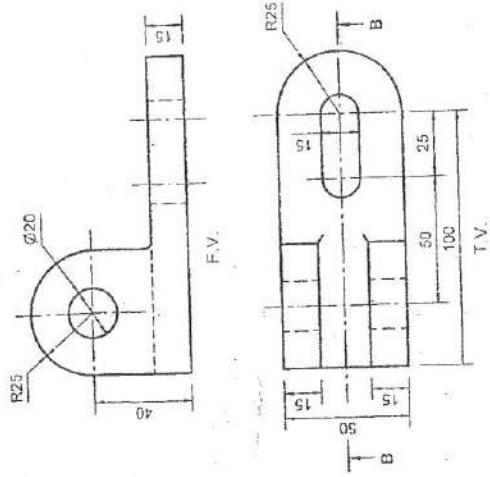
• 1/5

P.T.O.

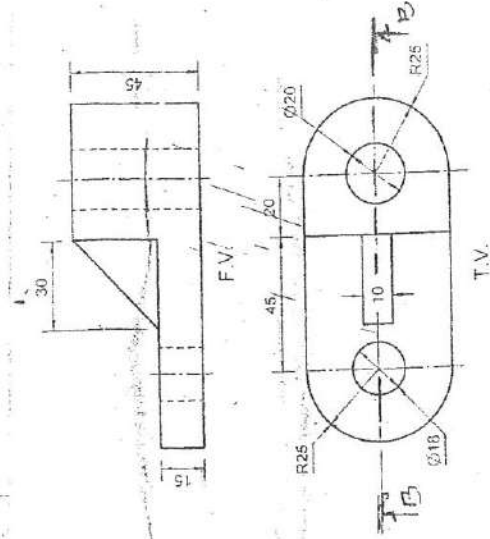
|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |   |   |    |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|----|
| Q.3 | Draw proportionate free hand sketches ( any four)<br>i) Internal thread ( 2 views)<br>ii) Capstan Nut ( 2 views)<br>iii) Eye Bolt ( 2 views)<br>iv) Eye foundation Bolt.<br>v) Double rivetted lap joint.<br>vi) Looking by split pin ( 2 views)                                                                                                                                                                                                                                                    | U | 3 | 08 |
| Q.4 | Attempt any <b>ONE</b> :<br>a) Fig. 5 shows front view and top view of an object. By using 1 <sup>st</sup> angle method, draw<br>i) Sectional F.V. section along B-B ( 02 Marks)<br>ii) Top view ( 02 Marks)<br>iii) Missing right hand side view. (04 Marks)<br>b) Fig. 6 shows F.V. & T.V. of an object. Draw<br>i) Missing left hand side view of an object use 1 <sup>st</sup> angle method. (04 Marks)<br>ii) Top view. (02 Marks)<br>iii) Sectional front view section along B-B. ( 02 Marks) | U | 4 | 08 |
| Q.5 | Attempt any <b>TWO</b> :<br>a) Fig No. 7 shows elbow joint of two pipes. Develop the lateral surfaces of two pipes.<br>b) Fig. No. 8 shows F.V. of square prism 50mm side of base and 70mm height resting on its base on H.P. with all its rectangular faces equally inclined to V.P. A triangular hole is cut into it as shown. Develop the lateral surface with the hole in it.<br>c) Fig. No. 9 shows F.V. of a square pyramid. Draw its development of lateral surface and also draw T.V.       | U | 6 | 16 |
| Q.6 | Attempt any <b>ONE</b> :<br>a) Fig. No. 10 shows F.V. & T.V. of an object. Draw isometric view of an object consider '0' as an origin.<br>b) Fig No. 11 shows F.V. & T.V. of an object. Draw isometric projection of an object. Construct isometric scale. Consider '0' as an origin.                                                                                                                                                                                                               | U | 5 | 16 |







Q.4(a) Fig-5 ↑



Q.4(b) Fig-6 ↑

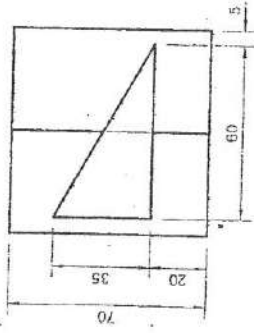
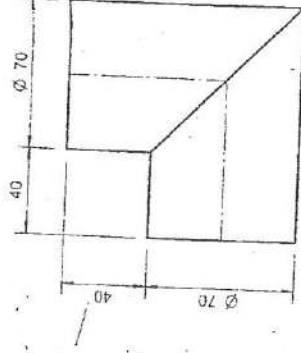


Fig-8  
Q.5(b) ↑



Q.5(a) Fig-7 ↑

(P.T.O.)

4/5

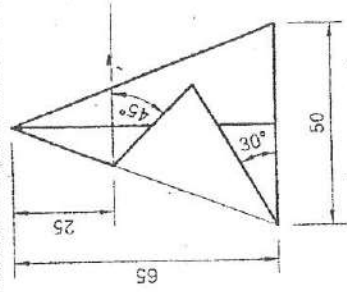
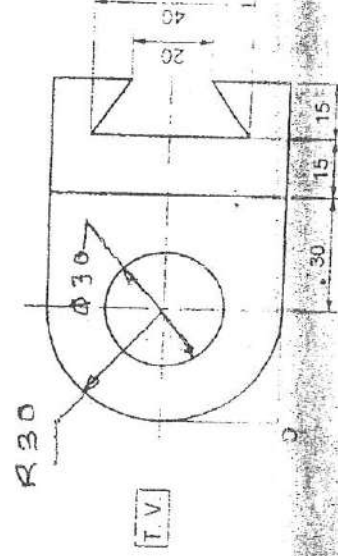
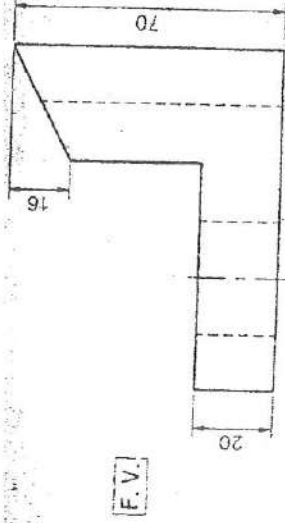
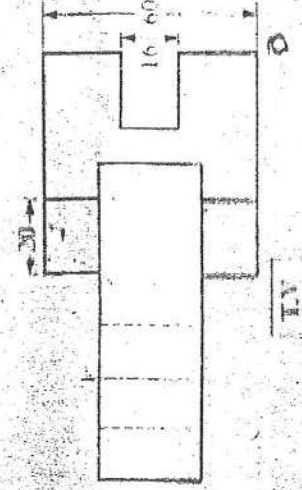
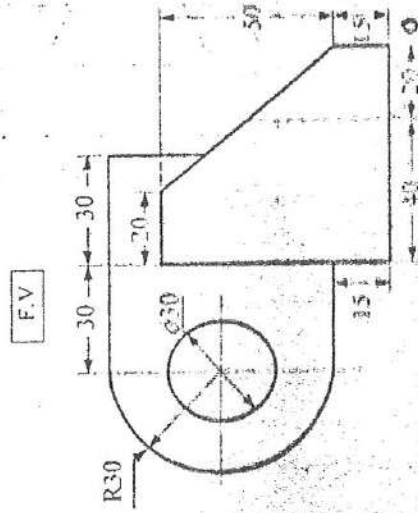


Fig-9  
Q.5(c)



Q.6(a) Fig 10-10



Q.6(b)

Fig-11



**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**EVEN TERM END EXAM MAY-2019****EXAM SEAT NO.**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

**LEVEL :- THIRD****PROGRAM : ELECTRICAL ENGINEERING****COURSE CODE :- EEF304/ EE204/EE205/EEE306/EEE310****COURSE NAME :- ELECTRICAL MEASUREMENT & INSTRUMENTATION****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 22/05 / 2019****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>EF<br>304 | Ma<br>rks |
|-----|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------|-----------|
| Q.1 |             | Attempt any <b>FOUR</b> :                                                                                                                                               |               |                 | <b>08</b> |
|     | a)          | Write two advantages of digital voltmeter.                                                                                                                              | R             | 1               |           |
|     | b)          | Define following terms related to measuring instruments<br>i) Accuracy & ii) precision                                                                                  | R             | 2               |           |
|     | c)          | Write two applications of Kelvin's double bridge.                                                                                                                       | R             | 2               |           |
|     | d)          | Define the term "Multiplying factor" with respect to wattmeter.                                                                                                         | R             | 3               |           |
|     | e)          | Write two applications of Trivector meter.                                                                                                                              | A             | 3               |           |
|     | f)          | Define balanced load and unbalanced load in three phase circuit.                                                                                                        | R             | 3               |           |
| Q.2 |             | Attempt any <b>FOUR</b> :                                                                                                                                               |               |                 | <b>16</b> |
|     | a)          | Explain working of PMMC instrument with neat diagram.                                                                                                                   | A             | 1               |           |
|     | b)          | Describe constructional features of Dynamometer type instrument with neat diagram                                                                                       | U             | 1               |           |
|     | c)          | Explain working of Repulsion type moving iron instrument with neat sketch.                                                                                              | A             | 1               |           |
|     | d)          | Explain measurement of capacitance by using Schering bridge with circuit diagram.                                                                                       | A             | 2               |           |
|     | e)          | Explain working of Wheatstone bridge method for resistance measurement.                                                                                                 | A             | 2               |           |
|     | f)          | Explain in brief two advantages and two disadvantages of measurement of resistance with voltmeter-ammeter method.                                                       | U             | 2               |           |
| Q.3 |             | Attempt any <b>FOUR</b> :                                                                                                                                               |               |                 | <b>16</b> |
|     | a)          | With neat sketch explain working of Megger.                                                                                                                             | U             | 2               |           |
|     | b)          | Draw neat connection diagram to measure active power in three phase balanced delta connected load by using two wattmeter method. Also draw the relevant phasor diagram. | A             | 3               |           |

**P.T.O.**



|     |                                                                                                                                                                                                |         |   |           |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---|-----------|
| c)  | With neat circuit diagram, explain calibration of single phase energy meter by direct loading.                                                                                                 | U       | 3 |           |
| d)  | Draw a neat circuit to measure active power in three phase balanced Star connected load by using one wattmeter. Explain its working.                                                           | U       | 3 |           |
| e)  | Write four advantages and four disadvantages of Digital energy meters.                                                                                                                         | R       | 3 |           |
| f)  | A 3-phase, 440V motor load has a power factor of 0.6 lagging. Two wattmeters are connected to measure input. They show the input to be 25k W. find out reading of each wattmeter.              | A       | 3 |           |
| Q.4 | Attempt any <b>FOUR</b> :                                                                                                                                                                      |         |   | <b>08</b> |
| a)  | State how the range of ammeter and voltmeter can be extended.                                                                                                                                  | R       | 4 |           |
| b)  | State the function of electrical instrument<br>i) Synchroscope ii) Phase sequence indicator.                                                                                                   | R       | 4 |           |
| c)  | Define primary transducer and secondary transducer.                                                                                                                                            | R       | 5 |           |
| d)  | Write any four factors considered to select transducers                                                                                                                                        | A       | 5 |           |
| e)  | State the applications of strip chart recorder.                                                                                                                                                | R       | 6 |           |
| f)  | State the function of delay line used in vertical section of CRO.                                                                                                                              | R       | 6 |           |
| Q.5 | Attempt any <b>FOUR</b> :                                                                                                                                                                      |         |   | <b>16</b> |
| a)  | Explain in short construction and working of Ferro-dynamic electrical resonance type frequency meter.                                                                                          | U       | 4 |           |
| b)  | Explain in brief construction and working of 1- $\phi$ electro-dynamometer type p.f. meter.                                                                                                    | U       | 4 |           |
| c)  | Write advantages and disadvantages of LVDT.                                                                                                                                                    | A       | 5 |           |
| d)  | Explain with labeled sketches the working of the LVDT and illustrate one practical situation for its use.                                                                                      | U/<br>A | 5 |           |
| e)  | State the effect of temperature on strain gauge and how it is to be compensated.                                                                                                               | A       | 5 |           |
| f)  | State the advantages of digital multimeter.                                                                                                                                                    | A       | 6 |           |
| Q.6 | Attempt any <b>FOUR</b> :                                                                                                                                                                      |         |   | <b>16</b> |
| a)  | A 1mA meter movement with on internal resistance of $100\Omega$ is to be converted into a 0-100mA, calculate the shunt resistance required. What particulars should be specified on the shunt? | A       | 4 |           |

P.T.O.

|    |                                                                                                                 |   |   |  |
|----|-----------------------------------------------------------------------------------------------------------------|---|---|--|
| b) | State working principle of piezoelectric transducer. State their two advantages and two applications.           | A | 5 |  |
| c) | State working principle of strain gauge and state the application of resistance strain gauges.                  | U | 5 |  |
| d) | State the principle of operation of thermocouple, their types and explain how temperature is measured using it. | U | 5 |  |
| e) | Draw the block diagram and explain in brief AC signal conditioning system.                                      | U | 6 |  |
| f) | Explain Lissajous patterns. And how they are used for measurement of frequency and phase angle?                 | U | 6 |  |

\*\*\*\*\*

