

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM APRIL/MAY -2018**EXAM SEAT NO.**

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LEVEL: THIRD**PROGRAM: ELECTRICAL ENGINEERING****COURSE CODE: EE301/R228****COURSE NAME: HIGHER MATHEMATICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 19/05/2018****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**(08)**

- a) Find the factorial polynomial of $f(x) = 3x^2 - 5x + 8$
- b) Find $\Delta^2(x^2 - 3)$, assume $h=1$
- c) Form forward difference table of following data $f(3)=8, f(5)=11, f(7)=15, f(9)=19, f(11)=25$
- d) If 2 dice are thrown. Find the probability that the total score obtained is a perfect square.
- e) A box contains 7 red and 5 white balls, 2 balls are drawn at random. What is the probability that both are white?
- f) If A & B are 2 events such that $P(A) = \frac{1}{2}, P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{7}{12}$, find

$$P(A' \cap B')$$

Q.2 Attempt any FOUR**(16)**

- a) Find the missing term in the following using Forward difference table.

x	5	10	15	20	25	30	35
y	9	-	12	18	-	25	40

- b) Find $\Delta^3(12x^3 - 3x^2 + 2x - 1)$ take $h=1$

- c) Estimate $f(0.2)$ from the following data

x	1	1.5	2.0	2.5	3.0
f(x)	27	106.75	324	783.25	1621

- d) Solve the following equation using Gauss Seidel method upto 3 iteration.

$$8x - y + 2z = 13, x - 10y + 3z = 17, 3x + 2y + 12z = 25$$

- e) Evaluate $\int_0^{\infty} e^{-x^4} dx$

- f) Evaluate $\int_0^{\infty} \sqrt{x} e^{-\sqrt[3]{x}} dx$

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

- a) Using Newton Raphson method, find the approximate root of $x^3 + x - 1 = 0$ upto 3 iteration.

- b) Find the root of above equation [i.e. $x^3 + x - 1 = 0$] using Regula Falsi method.

- c) Evaluate $\int_0^1 (\log^4 dx)$

- d) Evaluate $\int_0^4 \sqrt{x} (4-x)^{3/2} dx$

P.T.O

e) Express $f(x) = 3x^4 - 2x^3 + 3x^2 + 2x - 7$ into a factorial polynomial. Hence find $\Delta^3 f(x)$ at $x = 2$

f) Use Lagrange's formula to evaluate u_{28} for following

$$u_{10} = 49225$$

$$u_{25} = 48316$$

$$u_{30} = 47236$$

$$u_{35} = 45926$$

$$u_{40} = 44306$$

Q.4 Attempt any **FOUR**

(08)

a) Find a_0 , for Fourier expansion of $f(x) = e^{ax}$ in $(-\pi, \pi)$

b) Find $L^{-1}\left\{\frac{(s+1)^2}{s^3}\right\}$

c) Find a_0 for Fourier series for $f(x) = 0, -\pi < x \leq 0$
 $= x, 0 \leq x < \pi$

d) Find $L\{\cos^2 2t\}$

e) Find $L^{-1}\left\{\frac{2}{(s-3)^5}\right\}$

f) Find $L\{t^2 e^t\}$

Q.5 Attempt any **FOUR**

(16)

a) Find Fourier series to represent $f(x) = x^2$ in $(0, 2\pi)$

b) Find the Fourier transform of $f(x) = e^{ax}, a < x < b$
 $= 0, x < a, x > b$

c) Obtain Fourier series for $f(x) = x + \frac{\pi}{2}, -\pi < x < 0$
 $= \frac{\pi}{2} - x, 0 < x < \pi$

d) Find $L\left\{\frac{\cos at - \cos bt}{t}\right\}$

e) Find Fourier series for $f(x) = 0, -5 < x < 0$
 $= 3, 0 < x < 5$

f) Solve: $\frac{dx}{dt} + x = e^{3t}, x(0) = 0$

Q.6 Attempt any **FOUR**

(16)

a) Obtain Fourier series for $f(x) = e^x$ in $(0, 2\pi)$

b) Find $L\{t^2(1 - \cos t)\}$

c) Solve: $3\frac{dx}{dt} + 2x = e^{3t}, x = 1$ at $t = 0$

d) Apply convolution theorem to evaluate $L^{-1}\left\{\frac{1}{(s-1)(s-3)}\right\}$

e) Obtain Fourier series expansion for $f(x) = 1 - \frac{2x}{\pi}, -\pi \leq x \leq 0$
 $= 1 + \frac{2x}{\pi}, 0 \leq x \leq \pi$

f) Solve: $\frac{dy}{dt} + 2y = e^{3t}$ if $y(0) = 0$

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ODD TERM ENDEXAM NOV./DEC-2018

EXAM SEAT NO.

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LEVEL :- THIRD

PROGRAM : ELECTRICAL ENGINEERING

COURSE CODE :- EEF312

COURSE NAME :- BASIC MECHANICAL AND CIVIL ENGINEERING

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 03/12/2018

Instruction :-

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

QN	S Q N	SECTION - I	R/ U/ A	Co EEF 312	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Write the Function of coupling.	R	1	
	b)	Classify keys.	R	1	
	c)	Give the function of bearing.	R	3	
	d)	List various power transmission devices.	R	2	
	e)	State the function of turbine.	R	4	
	f)	Write down working principle of compressor.	R	5	
Q.2		Attempt any FOUR :			16
	a)	Explain different types of thread profile for nut and bolts.	U	1	
	b)	Describe the working principle of reciprocating compressor with neat sketch.	U	5	
	c)	Write selection procedure for bearing.	R/ U	3	
	d)	Classify various types of gear and draw tooth profile for spur gear.	U	2	
	e)	Describe construction and working of any one coupling with neat diagram.	U	1	
	f)	Write function of following energy conversion devices. i) Boiler ii) Steam turbine iii) I.C. Engine iv) Hydraulic turbine.	A	4	
Q.3		Attempt any FOUR :			16
	a)	Draw a neat labelled sketch of spur and bevel gear.	U	2	
	b)	Explain the working principle of Hydraulic turbine.	U	4	
	c)	List down any four applications of keys.	R	1	
	d)	Differentiate between centrifugal and reciprocating compressor.	U	5	
	e)	Write down function of condenser and cooling tower in thermal power plant.	R/ U	4	
	f)	Explain types of belt drives.	U	2	

P.T.O.

QN	S Q N	SECTION - II	R/ U/ A	Co EFF 312	Ma rks
Q.4		Attempt any FOUR :			08
	a)	Write full form of i) G.I. ii) C.M.	R	4	
	b)	Define machine foundation.	R	4	
	c)	Write the meaning of i) CC 1:2:4	R	4	
	d)	Define substructure.	R	4	
	e)	What is necessity of external plastering?	U	4	
	f)	Enlist any two types of instruments used for survey.	R	5	
Q.5		Attempt any FOUR :			16
	a)	Sketch the schematic diagram of water treatment plant.	U	6	
	b)	List the different types of bonds in brickwork masonry and explain any one.	U	4	
	c)	List the various types of Deep foundation and explain any one in brief.	U	4	
	d)	Define bearing capacity and write its importance.	U	4	
	e)	Define irrigation Engineering. Write types of irrigation projects with suitable examples.	U	6	
	f)	Name the ingredients used in cement concrete and write its general ratio used in R.C.C. slab.	U	4	
Q.6		Attempt any FOUR :			16
	a)	Enlist the different types of vertical circulation and explain any one in brief.	U	4	
	b)	Write the uses of dumpy level and total station.	U	5	
	c)	State the basic types of foundation with one example each.	U	4	
	d)	Write any four advantages of Irrigation projects.	U	6	
	e)	Sketch the schematic diagram of waste water treatment plant.	U	6	
	f)	Write the purpose of i) Tunnels ii) Bridges iii) Railways iv) Roads.	U	6	

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

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LEVEL: FOURTH**PROGRAM: ELECTRICAL****COURSE CODE: EE403/3407/EE409/EEE406/EE307 COURSE NAME: SWITCHGEAR AND****PROTECTION****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 06/12/2018****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	Question Text	R	CO	Mar ks
	Q		U	EEF	
	N		A	403	
Section -I					
Q.1		Attempt any FOUR			(08)
	a)	Define electrical substation.	R	1	
	b)	List types of static relay.	R	2	
	c)	In which way electromagnetic relays operates.	R	2	
	d)	Define relay time.	R	2	
	e)	What is a circuit breaker?	R	3	
	f)	For EHV applications which types of circuit barker is mostly preferred?	R	3	
Q.2		Attempt any FOUR			(16)
	a)	Draw single line diagram of transmission substation.	U	1	
	b)	List & explain in brief equipments used in substation.	U	1	
	c)	Explain working of an over current relay & mention the types of it.	U	2	
	d)	What do you mean by the term Making current & Braking current?	U	2	
	e)	List Different types of circuit breaker & explain any one.	U	3	
	f)	Write advantages of sf6 circuit breaker & disadvantages or limitations.	U	3	
Q.3		Attempt any FOUR			(16)
	a)	List the applications of current limiting reactor with their arrangement.	U	1	
	b)	Explain translay relay.	U	2	
	c)	Write duality between amplitude & phase comparators.	U	2	
	d)	Describe the time current characteristics of over current relay.	U	2	

P.T.O

e)	"ELCB is must for an residential installation", Justify the statement.	U	3
f)	Explain how does a circuit breaker is different from switch.	U	3

Section-II

Q.4	Attempt any FOUR		(08)
a)	Describe current chopping.	R	4
b)	State the requirement of transmission line protection.	R	6
c)	Buchholz relay is a relay.	R	5
d)	State the limitations of rod gap arrester.	U	4
e)	Name the most commonly use schemes for bus-bar protection.	U	6
f)	State the faults arises in transformers in abnormal conditions.	U	5
Q.5	Attempt any FOUR		(16)
a)	Draw & explain with neat diagram Ferranti surge absorber.	U	4
b)	Write short note on time graded protection of feeders.	A	6
c)	With neat circuit diagram, explain restricted earth fault protection.	A	5
d)	Describe the distance protection for transmission line.	U	6
e)	Draw the construction of Buchholz relay & explain working of Buchholz relay.	U	5
f)	Draw & explain value type arrester.	U	4
Q.6	Attempt any FOUR		(16)
a)	Describe the desirable features of bus-bar protection.	U	6
b)	With neat sketch explain the principle of operation of lighting Arrester.	R	4
c)	Draw the diagram for modified differential protection for alternator.	U	5
d)	Describe the Merz-price voltage balance system for transmission line.	A	6
e)	What are the abnormal conditions in a large alternator against which protection is necessary? Discuss them briefly.	U	5
f)	Explain insulation co-ordination.	R	4

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

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LEVEL: FOURTH**PROGRAM: ELECTRICAL****COURSE CODE: EE402/E207/EEE401 COURSE NAME: AC ROTATING MACHINES****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 04/12/2018****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	Q	Question Text	R	CO	Mar
QN	N		U	EEF	ks
			A	402	
Section -I					
Q.1		Attempt any FOUR			(08)
	a)	Define i) Synchronous speed. ii) Slip.	R	1	
	b)	Name the test you have to perform to draw circle diagram.	R	2	
	c)	What are the different types of starters used for AC induction motors?	R	3	
	d)	A 400kw, 3phase, 440volts, 50Hz induction motor has speed of 950 rpm on full load. The machine has 6 poles. Find the slip of machine.	A	1	
	e)	State any two applications of squirrel cage induction motor.	U	3	
	f)	List the parameters which will be determined by circle diagram.	R	2	
Q.2		Attempt any FOUR			(16)
	a)	Draw neat diagram of star delta-starter used for 3 phase induction motor.	U	3	
	b)	State various methods to control the speed of 3 phase induction motor. Explain any one method.	A	3	
	c)	Derive the expression for maximum torque of an induction motor under running & standstill condition.	U	1	
	d)	The input to 3 phase 6 pole 50Hz induction motor in 47KW at certain load. The stator and mechanical losses amount to 1.5KW and 1KW respectively. Find the BHP output of the motor when it runs at 970 rpm.	A	1	
	e)	List the data that are required for constructing the circle diagram of induction motor.	U	2	
	f)	Explain concept of i) Rotor Frequency. ii) Rotor induced emf.	U	1	
Q.3		Attempt any TWO			(16)
	a)	Explain in brief induction motor as a generalised transformer with phasor diagram.	U	1	

P.T.O

	b)	Draw the circle diagram for 5HP (3.73KW) 200V, 50Hz, 3phase, 4pole, star connected induction motor from the following. <table><tr><td>Condition</td><td>Line voltage</td><td>Line current</td><td>Total input</td></tr><tr><td>No-Load</td><td>200V</td><td>5A</td><td>350Watts</td></tr><tr><td>Blocked Rotor</td><td>100V</td><td>26A</td><td>1700Watts</td></tr></table> Given that rotor Cu loss at standstill is half the total Cu loss. Estimate from the diagram for full load i) Line current ii) p.f ii) Max.torque in terms of full load torque iv) Max. Output.				Condition	Line voltage	Line current	Total input	No-Load	200V	5A	350Watts	Blocked Rotor	100V	26A	1700Watts	A	2	
Condition	Line voltage	Line current	Total input																	
No-Load	200V	5A	350Watts																	
Blocked Rotor	100V	26A	1700Watts																	
	c)	Explain in brief soft starter used for induction motors.				U	3													
Section-II																				
Q.4		Attempt any FOUR						(08)												
	a)	Define: distribution factor. Write equation of it and specify each term used in equation.				R	4													
	b)	State clearly the difference between full pitch coil and short-pitch coil.				R	4													
	c)	Define: Load angle in case of synchronous motor.				R	5													
	d)	State the use of damper winding in synchronous motor.				R	5													
	e)	State any two applications of Repulsion motor.				R	6													
	f)	State the function of capacitor in starting winding of single-phase induction motor.				R	6													
Q.5		Attempt any FOUR						(16)												
	a)	The input to a 11KV, 3phase, Y-connected synchronous motor is 60A. The effective resistance and synchronous reactance per phase are 1Ω and 25 Ω respectively. Find i) Power supplied to the motor. ii) The induced emf for a p.f of 0.8 leading.				A	5													
	b)	With neat diagram, explain principle of operation of synchronous motor.				U	5													
	c)	Explain how the 3phase synchronous motor is started like induction motor.				U	5													
	d)	Explain the factors affecting the terminal voltage of an alternator.				U	4													
	e)	Suggest type of alternator suitable for following applications with reasons: i) Hydro-power station. ii) Thermal power station.				A	4													
	f)	With neat diagram, explain the armature reaction when alternator load is purely inductive in nature.				U	4													
Q.6		Attempt any TWO						(16)												
	a)	i) Draw constructional sketch of universal motor.(03 marks) ii) Explain the construction difference if compared with D.C series motor (03 marks) iii) Explain the principle of operation of universal motor. (02 marks)				U	6													
	b)	i) With neat circuit diagram and phasor diagram, explain the principle of operation of capacitor-start-induction-run motor. (06 marks) ii) State what are the V-curves of 3-phase synchronous motor. (02 marks)				U	6													
	c)	Apply the test results of O.C and S.C test on alternator to determine voltage regulation of it. Explain the method of computation with neat diagrams.				A	4													

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

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LEVEL :- THIRD**PROGRAM : ELECTRICAL ENGINEERING****COURSE CODE :- EEF303/EEE201/EE206****COURSE NAME :- BASIC ELECTRONICS****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 07/12/2018****Instruction :-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches 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.

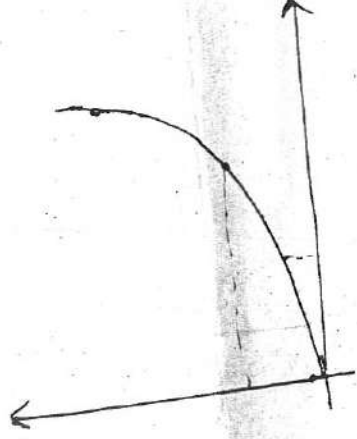
QN	S	Question Text	R/ U/ A	Co EFF 303	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Label the following diagram (Refer Fig-1)	R	1	
	b)	List any four specification of p-n junction diode.	R	1	
	c)	Define 'Barrier Potential'.	R	1	
	d)	Write need of filters.	U	2	
	e)	List demerits of unregulated power supply.	R	2	
	f)	List different transistor configurations.	R	3	
Q.2		Attempt any FOUR :			16
	a)	Describe operation of p-n junction diode in forward biased condition.	U	1	
	b)	Draw V-I characteristics of zener diode and explain it in detail.	U	1	
	c)	Draw and explain transistor shunt voltage regulator.	U	2	
	d)	How does a capacitor input filter reduce the ripple content in the output of a rectifier?	A	2	
	e)	What is transistor? Why it is called Bipolar device?	U	3	
	f)	Which configuration of transistor is known as emitter follower and why?	A	3	
Q.3		Attempt any FOUR :			16
	a)	Justify- 'Zener diode used as a voltage regulator'.	A	1	
	b)	State need of doping and explain N type and P type semiconductor with neat diagram.	U	1	
	c)	What is rectification? With the help of neat diagram and waveform explain the operation of a half wave rectifier circuit.	U	2	
	d)	Compare rectifiers and regulators.	A	2	
	e)	Draw and explain formation of depletion region.	U	3	
	f)	Explain with neat diagram, switching action of transistor.	U	3	

P.T.O.

Q.4	Attempt any FOUR :			08
	a) Draw symbols of following devices i) Photodiode ii) Phototransistor.	R	5	
	b) Give classification of PCB.	R	6	
	c) Draw symbols and logical equation for i) OR ii) NAND gate	R	4	
	d) Enlist the applications of photodevices.	R	5	
	e) State the associative law of Boolean algebra.	R	4	
	f) List the applications of Opto-couplers.	R	5	
Q.5	Attempt any FOUR :			16
	a) Draw symbols and truth table for following gates. i) AND ii) Ex-NOR.	U	4	
	b) Explain construction and working of LASCR.	U	5	
	c) List the steps in the development of PCB.	R	6	
	d) Prove the following logic expressions using Boolean algebra i) $(A + B)(A + C) = A + BC$ ii) $ABC + \bar{A}\bar{B}C + AB\bar{C} + A\bar{B}C + \bar{A}\bar{B}\bar{C} = A\bar{B} + \bar{A}\bar{B}$	A	4	
	e) Explain the working principle of photo tachometer.	U	5	
	f) List the types of soldering and describe any one.	U	6	
Q.6	Attempt any FOUR :			16
	a) State and prove De-Morgan's theorems.	U	4	
	b) Explain construction and working of LDR.	U	5	
	c) Describe the rules for designing the PCB layout.	U	6	
	d) Simplify the following expressions using K-map i) $f(A, B, C) = \sum m(0, 1, 3, 4, 6)$ ii) $f(A, B, C) = \sum m(0, 1, 2, 4)$	A	4	
	e) Explain the construction and working of photodiode.	U	5	
	f) Design PCB layout for following circuit by considering PCB design rules. (Refer Fig.2)	A	6	

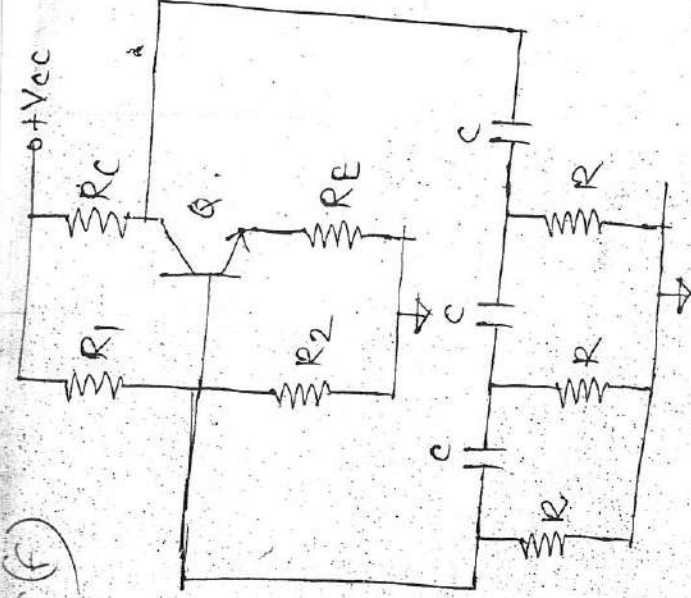
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Q₁
Q₂



(Fig-1)

Q.6(f)



(Fig-2)

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

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

Instruction:-

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

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

P.T.O

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

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LEVEL :- THIRD**PROGRAM : ELECTRICAL ENGINEERING****COURSE CODE :- EEF307/EE208/EEE302****COURSE NAME :- DC MACHINES AND TRANSFORMERS****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 20/12/2018****Instruction :-**

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

QN	S	Question Text	R/ U/ A	Co EEF 307	Ma rks
Q.1		Attempt any FOUR :			08
	a)	State two functions of yoke of a dc machines.	R	1	
	b)	State the applications of dc generator (any four)	R	1	
	c)	List the various losses in dc motor.	R	2	
	d)	State the factors on which torque developed in dc motor depends.	U	2	
	e)	State working principle of transformer.	R	3	
	f)	Why transformer core is made up of silicon steel?	U	3	
Q.2		Attempt any FOUR :			16
	a)	Draw a neat labelled diagram showing main parts of dc generator.	R	1	
	b)	State the functions of following parts of dc machines i) Armature core ii) Brush iii) Pole shoe iv) commutator.	U	1	
	c)	Describe Ta-Ia characteristic for DC series and DC shunt motors.	U	2	
	d)	Draw the neat sketch of 3 point starter used for dc shunt motor.	U	2	
	e)	A transformer taken 0.75 amps, when its primary is connected to 200V, 50Hz supply. The secondary is kept open. The power absorbed is 64 Watts. Find the iron loss current and magnetizing current. Draw the vector diagram.	A	3	
	f)	A single phase transformer has 1000 turns on its primary and 400 turns on secondary side. An ac voltage of 1250V, 50Hz is applied to its primary side with secondary open circuit. find i) The emf on secondary side ii) The peak value of flux density Take effective area of core as 60cm^2 .	A	3	
Q.3		Attempt any FOUR :			16
	a)	A lap wound dc shunt generator having 80 slots with 10 conductors per slot generates an emf of 400V on no-load when running at a speed of 1000rpm. Determine the flux/pole.	A	1	

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	b)	With the help of neat circuit diagram explain the procedure to vary the speed of dc shunt motor above normal speed.	U	2	
	c)	What is back emf? Explain the significance of back emf.	R	2	
	d)	Draw the phasor diagram when transformer is on no-load. Explain it in brief.	A	3	
	e)	Compare core type transformer with shell type transformer. (any four points)	A	3	
	f)	State the location and functions of conservator and breather in transformer.	R	3	
Q.4		Attempt any FOUR :			08
	a)	State the reason why core losses are considered to be constant in transformer.	U	4	
	b)	State the reason behind to perform OC and SC tests of transformer.	U	4	
	c)	Write any four applications of 3-phase transformer.	R	6	
	d)	Explain in short the necessity of parallel operation of transformer.	U	5	
	e)	Define all day efficiency of a transformer.	R	4	
	f)	Write the formulas to calculate the equivalent resistance and reactance referred to the primary in term of its transformation ratio.	R	4	
Q.5		Attempt any FOUR :			16
	a)	Draw a neat set-up connection diagram and explain in brief open circuit test of a single phase transformer.	U	4	
	b)	State the condition at which the efficiency of a transformer will be maximum and prove it.	U	4	
	c)	State the conditions to be satisfied for the parallel operation of transformers.	U	5	
	d)	A 11000/230V, 150KVA, single phase, 50Hz transformer has core loss of 1.4KW and full load copper loss of 1.6KW. Determine i) The KVA load for maximum efficiency and the value of maximum efficiency at unity pf. ii) The efficiency at half full load at 0.8 leading pf.	A	4	
	e)	A 100 KVA, lighting transformer has a full load loss of 3KW, the losses being equally divided between iron and copper losses. During a day, the transformer operates on full load for 3 hours, one half load for 4 hours, the output being negligible for the remainder of the day. Calculate the all day efficiency of the transformer.	A	4	
	f)	State the reasons to have parallel operation of transformer (at least four)	U	5	

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Q.6 .	Attempt any TWO:		16
a)	i) Explain in short different winding connections of 3-phase transformer. OR ii) Write down any four applications of 3-phase transformer considering their transformation ratio. OR ii) Explain parallel operation of single phase transformer and write the formula showing load sharing by each transformer.	A U U R	6 6 4 5
b)	Two single phase transformers A and B are connected in parallel. They have same KVA ratings but their resistances are 0.005 p.u. and 0.01 p.u. and their leakage reactances are 0.05 P.U. and 0.04 p.u. If A is operated on full load at a P.F. of 0.8 lag. What will be the load and P.F. of B?	A	5
c)	Consider a 4 KVA, 200V/400V, single phase transformer supplying full load current at 0.8 lagging P.F. The OC/SC test results are as follows: OC Test (LV side) ; 200V,0.8A,70W. SC Test (HV side) ; 20V, 10A, 60W Calculate efficiency, secondary voltage and primary current at the above load. Calculate the load at unity P.F. Corresponding to maximum efficiency.	A	4

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LEVEL: THIRD**PROGRAM: ELECTRICAL****COURSE CODE: EEF304/EE204/EEEE310 COURSE NAME: ELECTRICAL MEASUREMENT AND****INSTRUMENTATION****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 11/12/2018**

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches 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	Marks
Q.1		Attempt any FOUR		EEF A 304	(08)
	a)	State working principle of Dynamometer type instrument.	R	1	
	b)	Compare attraction & repulsion type of moving Iron instrument.	U	1	
	c)	Define Accuracy and precision	R	2	
	d)	Explain low medium and high resistance values.	U	2	
	e)	Explain calibration of energy meters.	U	3	
	f)	Name any two methods for power measurement in 3 phase circuit.	R	3	
Q.2		Attempt any FOUR			(16)
	a)	Write equation of all types of power. State their units, write relation between them.	U	3	
	b)	Write any four advantages of digital energy meter over analog type.	U	3	
	c)	Write the effect of power factor on the reading of two wattmeter for 3 phase power measurement.	U	3	
	d)	List any four measure blocks of LCR meter & write function of each.	R	2	
	e)	Explain how PMMC instrument are used for DC measurement.	U	1	
	f)	Explain method to measure inductance using Anderson bridge.	U	2	
Q.3		Attempt any FOUR			(16)
	a)	Describe method to measure capacitance using Schering bridge.	U	2	
	b)	Explain any four application of megger.	U	2	
	c)	Draw a block diagram of digital energy meter.	U	3	
	d)	Write a short note on Tri-Vector meter.	U	3	
	e)	Explain the working of digital voltmeter & ammeter with analog.	U	1	
	f)	Give the details classification of electrical measurement instrument.	U	1	

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Q.4	Attempt any FOUR			(08)
a)	Sketch labeled circuit diagram of ammeter with shunt.	R	4	
b)	State various types of power factor meter.	R	4	
	OR			
	Classify maximum demand indicators.	R	4	
c)	State classification of transducers.	R	5	
d)	Explain working of piezo electric transducer.	R	5	
e)	Draw labeled block diagram of AC signal conditioning system in instrumentation.	R	6	
f)	Discuss application of digital multimeter.	R	6	
Q.5	Attempt any FOUR			(16)
a)	Describe with suitable sketch 1 ϕ power factor meter & it's working in 3 cases (unity, lag, lead).	U	4	
b)	State various temperature measuring devices & their types.	U	5	
c)	Describe transducer selection factors.	U	5	
d)	Explain unbounded resistance wire strain gauge.	U	5	
e)	Draw labeled sketch of strip chart recorder & explain working & application.	U	6	
f)	Draw detail diagram & label the parts of cathode ray oscilloscope.	U	6	
Q.6	Attempt any FOUR			(16)
a)	State various types of frequency meter & explain any one suitable labeled sketch.	U	4	
	OR			
	Derive shunt resistance expression used for ammeters range extension.	A	4	
b)	State & sketch various types of semiconductor type thermometers.	U	4	
c)	Explain working of linear variable differential transformer for linear displacement measurement.	U	5	
d)	State various types of strain gauges & Explain any one with suitable sketch.	U	5	
e)	Explain working of electron gun used for cathode ray oscilloscope.	U	6	
f)	Draw block diagram of function generator & explain briefly.	U	6	

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LEVEL :- THIRD PROGRAM : INDUSTRIAL ELECTRONICS**COURSE CODE :- IEF310/IEE310****COURSE NAME :- ELECTRICAL MACHINE****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 30/ 11 / 2018****Instruction :-**

- 1) Answers must be written in the main answer book provided.(and supplements if required)
- 2) Illustrate your answers with sketches 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/ U/ A	Co EF 310	Ma rks
Q.1		Attempt any FOUR :			08
	a)	State the losses in DC machines.	R	1	
	b)	Discuss functions of three point starter.	R	1	
	c)	Enlist the type of transformers according to construction.	R	2	
	d)	Define efficiency and regulation of transformer.	R	2	
	e)	State type of 3 phase induction motor.	R	3	
	f)	Define slip speed of 3 phase induction motor.	R	3	
Q.2		Attempt any FOUR :			16
	a)	Explain the working principle with suitable sketch of DC motor	U	1	
	b)	Define transformer and its transformation ratio.	U	1	
	c)	Plot phasor diagram of single phase transformer on no load condition and explain working in brief.	U	2	
	d)	Sketch and explain equivalent circuit diagram of single phase transformer referred to primary side.	U	2	
	e)	Sketch and explain working principle of 3 phase induction motor.	U	3	
	f)	Comment on slip and derive expression for slip 'S' for 3 phase induction motor.	U	3	
Q.3		Attempt any FOUR :			16
	a)	Comment on significance of back emf in case of DC motors.	U	1	
	b)	Explain and derive expression of emf equation of single phase transformer.	U A	2	
	c)	Discuss transformer on load condition in view of power transfer and internal losses of transformer.	U	2	
	d)	Sketch and label various parts and accessory for 3 phase induction motor (squirrel cage type).	A	3	
	e)	Derive and explain magnitude of motor torque expression under running condition.	A	3	
	f)	Explain the rotor emf and reactance of 3 phase induction motor under running condition.	U	3	

P.T.O.

Q.4	Attempt any FOUR :			08
	a) Give two applications of shaded pole motor.	R	4	
	b) Which motor is used for food mixer?	U/ A	4	
	c) Define voltage regulation of alternator.	R	5	
	d) Define distribution factor (kd) in case of alternator winding.	R	5	
	e) State applications of stepper motor.	A/ R	6	
	f) Give two applications of servo motor.	A	6	
Q.5	Attempt any FOUR :			16
	a) Differentiate between alternator and D.C. generator.	A	5	
	b) State the advantages of stationary armature in 3 phase alternator.	A	5	
	c) Explain the construction and working of variable reluctance stepper motor.	U	6	
	d) Explain the construction and working principle of unidirectional and bi-directional stepper motor.	U	6	
	e) Explain the operation of shaded pole induction motor with neat diagrams.	U	4	
	f) Explain construction and working of Repulsion motor.	U	4	
Q.6	Attempt any FOUR :			16
	a) Compare D.C. and AC servo motor.	A	6	
	b) Explain the construction and working of permanent magnet stepper motor with 2 phase winding.	U	6	
	c) Derive an emf equation of an alternator.	U/ A	5	
	d) Explain the method of finding regulation of alternator by synchronous impedance method.	U	5	
	e) Explain the construction and applications of AC series motor.	U	4	
	f) Describe with neat diagram the working of capacitor start capacitor run single phase induction motor.	U	4	

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LEVEL: FIFTH

PROGRAM: ELECTRICAL

COURSE CODE: EEE503/E305 COURSE NAME: ELECTRICAL MACHINE CONTROL AND AUTOMATION

TIME: 3 HRS.

DATE: 12/12/2018

MAX. MARKS: 80

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.

Marks

Section – I

(08)

Q.1 Attempt any FOUR

- State the applications of float switch.
- List the application of lock out type contactor.
- State the use of transducer in motor control.
- Define i) Dropout current ii) Pull in current.
- Related the term solenoid & solenoid value.
- Draw the symbol for fuse unit & fuse switch unit.

Q.2 Attempt any FOUR (16)

- Explain drum switch with its representation of master controller used for forward & reverses operation.
- Draw a labelled diagram of single solenoid spring return value & Explain it.
- Describe the interlocking in drive control.
- Describe the working of copper type contactor.
- Explain frequency responsive relay in detail.
- State the need of power diagrams & control diagrams.

Q.3 Attempt any FOUR (16)

- Draw a labelled diagram of Earth leakage circuit breaker (ELCB) & explain it.
- Describe single phasing preventer (phase failure relay)
- Explain Heavy duty limit switch.
- Explain Bellow type pressure switch.
- Explain the semiconductor fuse with neat sketch.
- Describe the working of latching relay in brief.

P.T.O

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

- a) Draw the graph of rms current of three phase induction motor at start, during acceleration and under constant speed running condition.
- b) Define “Dynamic Breaking”.
- c) Compare in brief direct on line starting of three phase squirrel-cage motor and slip-ring motor.
- d) Why under voltage protection is needed for motor?
- e) What is PLC?
- f) “Control over acceleration of motor” means what?

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

- a) Write short note on “phase failure and phase reversal protection” of induction motor.
- b) Write short note on “co-ordination of fuse, over-load relay and contactor/C.B operating characteristics.
- c) Explain with neat block diagram, components of PLC.
- d) Explain any two advantages of digital logic over relay logic.
- e) i) State any two applications of PLC.(2 marks)
ii) State any two devices used to protect the induction motor from short-circuit.
- f) With neat diagram of control circuit, explain plugging of three-phase induction motor.

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

- a) For current limit acceleration starter.
 - i) Draw power circuit. (2 marks)
 - ii) Draw control circuit. (3 marks)
 - iii) Explain the operation. (3 marks)
- b) For fully automatic Star-Delta starter (open circuit transition)
 - i) Draw power circuit. (2 marks)
 - ii) Draw control circuit. (3 marks)
 - iii) Explain the operation. (3 marks)
- c) For DOL with Forward-Stop-Reverse.
 - i) Draw power circuit. (2 marks)
 - ii) Draw control circuit. (3 marks)
 - iii) Explain the operation. (3 marks)

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LEVEL: FOUR**PROGRAM: ELECTRICAL ENGINEERING****COURSE CODE: EEF405****COURSE NAME: Energy Conservation & Audit.****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 12/12/2018****Instruction:-**

- 1) Answer to each section must be written in separate answer book.
- 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, **SQL**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application

QN	S. Q. N	Question Text (Section - I)	Cognition Level	Co Code EEF 405	Marks
Q.1		Attempt any FOUR			(08)
	a)	State the need of co-generation.	R	2	
	b)	State the advantages of back pressure steam turbine co-generation.	R	2	
	c)	State the advantages of amorphous core in transformer. (Any two)	R	3	
	d)	State need of energy conservation in electric motors.	R	3	
	e)	What are the consequences of global warming?	U	1	
	f)	State any four sources which are used to generate electrical energy.	R	1	
Q.2		Attempt any FOUR			(16)
	a)	Discuss present energy scenario of India.	A	1	
	b)	State any four salient features of Electricity Act 2003.	R	1	
	c)	What is TOD tariff? How it help in energy conservation.	U	2	
	d)	Explain with diagram bottoming cycle type of cogeneration.	U	2	
	e)	Explain use of epoxy resin cast material for energy conservation in transformer.	U	3	
	f)	Explain with diagram extraction condensing steam turbine.	U	2	
Q.3		Attempt any FOUR			(16)
	a)	What is carbon trading? Explain in brief.	U	1	
	b)	The maximum demand of a consumer is 200KW, power factor 0.85 kg and load factor 70%. The tariff applied is Rs.80/KVA of maximum demand plus 15 paise / KWh consumed. Calculate the bill for the month of June.	A	2	
	c)	State and explain advantages of co-generation.	U	2	
	d)	i) State the methods of energy conservation in transformer. (Any four) ii) Explain any one method.	U	3	
	e)	Explain the method of matching motor rating and load for energy conservation in motor.	U	3	
	f)	State the advantages of soft starters. (Any four)	A	3	

P.T.O

	Section – II			Marks
Q.4	Attempt any FOUR			(08)
a)	Enlist motion sensors used for conservation of energy in lighting system.	R	4	
b)	Comment on epoxy resin material used for distribution transformer.	R	5	
c)	List out typical areas of energy conservation methods can be applied in distribution system.	R	5	
d)	Comment on maintenance contributes in energy conservation of distribution system.	R	5	
e)	State & comment on formulae used for payback period calculations.	R	6	
f)	Discuss the term return on investment.	R	6	
Q.5	Attempt any FOUR			(16)
a)	Describe use of servo stabilizer for energy conservation in lighting system.	A	4	
b)	Comment on regular survey for lighting system in view of energy conservation.	A	4	
c)	Discuss various technique used for reducing technical losses in distribution system.	A	5	
d)	State advantages of cost resin dry. Type transformer used for distribution system.	A	5	
e)	Describe detailed audit system.	U	6	
f)	State advantages & disadvantages of detailed audit system (at least 4 each)	U	6	
Q.6	Attempt any FOUR			(16)
a)	Compare fluorescent lights with high intensity discharge (HID) lights.	U	4	
b)	Explain uses of light emitting diode for replacement of old luminaries.	A	4	
c)	Comment on Automatic power factor compensator used in distribution system.	A	5	
d)	Explain the term optimizing distribution voltage in distribution system results in conserving the energy.	A	5	
e)	State and explain significance of energy flow helps in Audit point of view.	U	6	
f)	Comment on any two : i) Energy audit, ii) Simple payback period, iii) Return on investment, iv) Energy audit instruments.	U	6	

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LEVEL :- THIRD**COURSE CODE :- EEF305****PROGRAM : ELECTRICAL ENGINEERING****COURSE NAME :- ELECTRICAL MATERIAL WIRING & ILLUMINATION****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 13/12/2018****Instruction :-**

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

QN	S Q N	Question Text	R/ U/ A	Co EF 305	Ma rks
Q.1		Attempt any FOUR :			08
	a)	State meaning of positive and negative temperature coefficient of resistance.	R	1	
	b)	Give full form CRGO and HRGO.	R	2	
	c)	State the characteristics of mercury as conducting material (any two)	U	1	
	d)	Define surface resistance of insulating material.	R	3	
	e)	State any two types of liquid insulators state their one application.	A	3	
	f)	State any four properties of hard magnetic material.	U	2	
Q.2		Attempt any FOUR :			16
	a)	Describe why copper is preferred in electrical machine windings.	U	1	
	b)	Enlist any eight properties of aluminium conducting material.	R	1	
	c)	Explain the importance of hysteresis loop in magnetic material.	U	3	
	d)	Describe the factors affecting insulation resistance.	U	2	
	e)	Compare paramagnetic, Diamagnetic & Ferromagnetic materials. (any two points)	U	2	
	f)	State the thermal and mechanical properties of insulating material.	U	3	
Q.3		Attempt any FOUR :			16
	a)	Enlist thermal, mechanical and electrical properties of "copper".	R	1	
	b)	State one application of Lead, Nickel, Tin and Brass related to electrical materials.	A	1	
	c)	Comment on hysteresis loss? Methods of hysteresis loss can be minimized.	U	2	
	d)	Discuss meaning of magnetostriction effect? State reasons of humming sound in choke and transformer.	U	2	
	e)	Give one use of following insulating material i) Mica ii) Porcelain iii) Transformer oil iv) Cotton v) Bakelite vi) Asbestos (for any 4 materials)	A	3	
	f)	State the temperature with stand capacity of following class insulating material Class -Y , Class-A; Class-B, Class-F. Also state two examples for each.	U	3	

P.T.O.

Q.4	Attempt any FOUR :			08
	a) Draw symbols of i) Ceiling Fan ii) Fan Regulator.	R	4	
	b) Define i) Illumination ii) Luminous intensity.	R	5	
	c) State inverse square law of illumination.	U	5	
	d) State the height for electrical switch board placement.	U	4	
	e) List types of wiring system.	R	4	
	f) State illumination levels required for i) Study room ii) Operation theater.	A	5	
Q.5	Attempt any FOUR :			16
	a) Explain how number of sub circuits are decided in wiring.	U	4	
	b) Draw wiring circuit of main board of domestic consumer.	A	4	
	c) Draw wiring diagram for a small flat of 3 rooms in which a hall is provided with 2 tubes, 2 fans and 1 socket point. Bedroom is provided with 1 lamp, 1 fan, 1 tube, 1 socket. Kitchen is provided with 2 lamps, 1 fan and 1 socket, for WC and bathroom lamp each.		5	
	d) Draw and explain control of one lamp using two single pole switches.		4	
	e) Explain the design consideration of good lighting scheme.		4	
	f) State the recommended illumination level in lux for i) Drawing Hall ii) Show room iii) class room iv) very fine work.		5	
Q.6	Attempt any TWO :			16
	a) Explain function and specification of i) Ceiling rose ii) Indicator bulb iii) DB iv) ELCB		4	
	b) Design an illumination scheme for a small one BHK flat for proper lighting.		5	
	c) Draw schematic diagram, wiring diagram and a single line diagram to control one lamp and one bell from first switch board and one 5 ampere socket from second switch board each point is controlled by its own switch.		5	

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EXAM SEAT NO.

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LEVEL :- **THIRD**

PROGRAM : **ELECTRICAL ENGINEERING**

COURSE CODE :- **EEF306**

COURSE NAME :- **ELECTRICAL POWER GENERATION**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **15/12/2018**

Instruction :-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches 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 Q N	Question Text	R/ U/ A	Co EEF 306	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Define plant capacity factor.	R	2	
	b)	List out any two conventional and two non-conventional sources of energy.	R	1	
	c)	State the function of Economizer and superheater in thermal power station.	U	3	
	d)	List any two materials with mass number used as nuclear fuels in Nuclear power station.	R	3	
	e)	Give one example of hydroelectric power station used as base load power station and one use as peak load power station in Maharashtra.	A	3	
	f)	Define average demand.	R	2	
Q.2		Attempt any FOUR :			16
	a)	Explain Rankine cycle with graphical representation in thermal power plate.	U	3	
	b)	State the functions of spillways and surge tank of hydro power station.	R	3	
	c)	State four advantages of thermal power plant compared to other types.	R	1	
	d)	Draw and explain integrated duration curve.	A	2	
	e)	Explain in brief importance of electrical power in day to day life.	A	1	
	f)	Classify Co-generation power stations on the basis of systems.	R	3	
Q.3		Attempt any TWO :			16
	a)	A generating station has connected load 120MW and it supplies a maximum demand 60MW. The number of units generated in a year are 48X 107. Calculate i) Load factor. ii) The demand factor of the generating station.	A	2	
	b)	Explain in brief disposal of nuclear waste and nuclear shielding.	A	3	
	c)	Draw neat sketch and explain working of Francis turbine.	U	3	

P.T.O.

Q.4	Attempt any FOUR :			08
	a) Define MPPT.		R	4
	b) State two application of wind energy.		U	R
	c) Define Biomass energy.		R	5
	d) State limitations of tidal power generation.		U	5
	e) Define fuel cell.		R	6
	f) State the two advantages of MHD system.		U	6
Q.5	Attempt any FOUR :			16
	a) Describe the need and scope for solar energy utilization.	A	4	
	b) Explain with neat diagram the working of photovoltaic (solar) cell.	U	4	
	c) Explain the basic principle of tidal power generation plant.	U	5	
	d) Explain Bio mass based power generation plants.	U	5	
	e) Explain factors to be considered while selecting site for wind energy conversion system.	U	4	
	f) Draw the neat diagram and explain the open cycle MHD power generation.	U	6	
Q.6	Attempt any FOUR :			16
	a) Explain the terms i) I-V , P-V charts. ii) Tilt angle iii) Solar radiation iv) Conversion efficiency	A	4	
	b) Explain the construction and working of basic induction generator.	U	4	
	c) State principle of geothermal energy power plant. State its advantages (any two) and applications (any two)	R	6	
	d) Explain the open cycle turbine system of ocean thermal electric conversion.	U	5	
	e) With neat sketch explain KVIC digester biogas plants.	R	5	
	f) Explain factors to be considered while selecting tidal power.	R	5	

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LEVEL: FIRST**PROGRAM: EE/IE/E&TC/IT****COURSE CODE: CCF102/CCE102****COURSE NAME: ENGINEERING PHYSICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 14/12/2018****Instruction:-**

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

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

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

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LEVEL :- FOURTH PROGRAM : ELECTRICAL ENGINEERING**COURSE CODE :- EE406/EE410/EEE501****COURSE NAME :- POWER ELECTRONICS****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 14/12/2018****Instruction :-**

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

QN	S	Section- I	R/ U/ A	Co EEF 40%	Mar ks
Q.1		Attempt any FOUR :			08
	a)	State the function of free-wheeling diode in short.	R	1	
	b)	Define controlled rectifier and give its classification.	R	1	
	c)	State the classification of choppers.	R	2	
	d)	Write the different applications of inverters.	U	2	
	e)	Draw the block diagram of online UPS.	R	3	
	f)	Explain the requirements of power supply.	R	3	
Q.2		Attempt any FOUR :			16
	a)	Explain single phase bridge rectifier with R-L load with neat circuit diagram and waveforms.	R	1	
	b)	Explain single phase half controlled bridge rectifier with neat circuit diagram and waveforms. (asymmetrical configuration)	A	1	
	c)	Explain single phase bridge inverter with neat circuit diagram and waveforms.	R	2	
	d)	Explain DC chopper with waveforms and circuit diagram.	A	2	
	e)	Explain off-line UPS with proper block diagram.	A	3	
	f)	Explain in detail concept of UPS and its need.	A	3	
Q.3		Attempt any FOUR :			16
	a)	Explain single phase half wave converter with R load.	R	1	
	b)	Explain single phase full wave converter with R load.	R	1	
	c)	Explain Morgan's chopper with diagram and waveforms.	A	2	
	d)	Explain three phase inverter with neat circuit diagram and waveforms.	A	3	
	e)	Explain SMPS with proper block diagram.	A	3	
	f)	Explain Linear power supply with its block diagram.	A	3	

P.T.O.

QN	S Q N	Section- II			R/ U/ A	Co EEF 406	Mar ks
Q.4		Attempt any FOUR :					08
	a)	Classify NC/CNC machine.		U	4		
	b)	Define slip power.		R	6		
	c)	State two advantages of dc drives.		R	6		
	d)	Compare CNC and DNC machine (any 2 points)		U	4		
	e)	List any two applications of cycloconverter.		R	5		
	f)	Define Inching.		R	6		
Q.5		Attempt any FOUR :					16
	a)	Explain with neat diagram operation of CNC machine.		U	4		
	b)	Explain speed control of 3- ϕ induction motor with help of stator voltage control method.		U	6		
	c)	Explain with neat diagram 3- ϕ to 3- ϕ cycloconverter.		U	5		
	d)	Draw the block diagram of 1- ϕ SCR drive with armature current and tachogenerator feedback and explain its operation.		R	6		
	e)	Explain with neat diagram and waveform. How you get the o/p frequency equal to $1/3^{rd}$ of the i/p frequency.		A	5		
	f)	Draw the diagram of 3- ϕ to 1- ϕ cycloconverter and write its two advantages.		R	5		
Q.6		Attempt any FOUR :					16
	a)	Explain in brief Kramer's speed control system with neat diagram.		U	6		
	b)	Compare NC and CNC machine.		U	4		
	c)	State application and advantages of CNC machine.		R	4		
	d)	Explain with neat diagram 1- ϕ to 1- ϕ cycloconverter with centre tapped configuration.		U	5		
	e)	State speed control methods of dc series motor and explain any one in detail.		R	6		
	f)	Explain speed control of 3- ϕ induction motor with help of variable current variable frequency method.		U	6		

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EXAM SEAT NO.

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LEVEL: FIRST

PROGRAM: COMMON

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

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 15/12/2018

Instruction:-

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

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

P.T.O

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

Figure No. 1

Q.2) c)

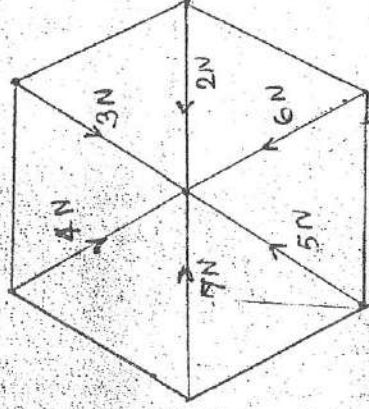


Figure No. 2

Q.2) e)

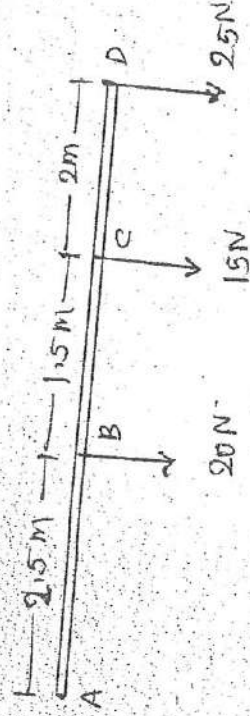
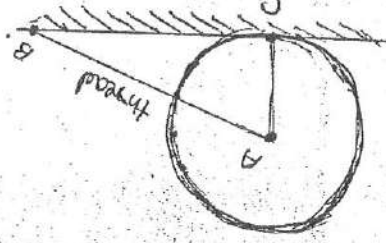


Fig No. 3

Q.2) d)

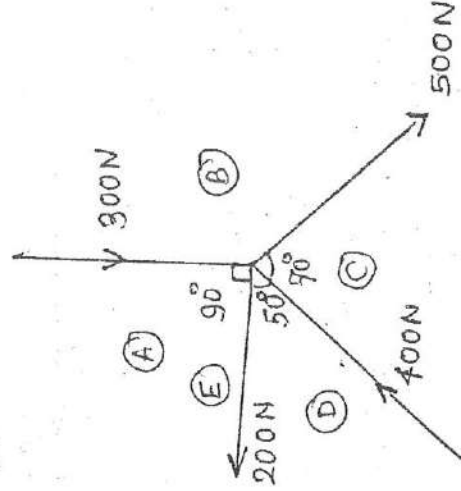


$$AB = 200 \text{ mm}$$

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

Fig No. 4

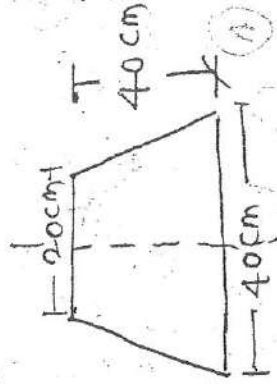
Q.3) a)



Refer Bow's notations given in figure.

Fig. No. 5

Q.5 (b)



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EXAM SEAT NO.

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LEVEL :- FIFTH PROGRAM : ELECTRICAL ENGINEERING

COURSE CODE :- EE510/EE406

COURSE NAME INDUSTRIAL ORGANIZATION & MANAGEMENT

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 04/12 / 2018

Instruction :-

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

QN	S Q N	Section- I	Ma rks
Q.1		Attempt any FOUR :	08
	a)	State various types of Industrial Sectors.	
	b)	Give levels of management.	
	c)	What is motivation?	
	d)	Define the term "Marketing".	
	e)	State objectives of Advertising.	
	f)	What is Globalization?	
Q.2		Attempt any FOUR :	16
	a)	State difference between management and organization.	
	b)	State functions of personnel management.	
	c)	Discuss applications of marketing research.	
	d)	Write a note on "span of control".	
	e)	Explain the term scientific management.	
	f)	Enlist the most important decision making tools.	
Q.3		Attempt any FOUR :	16
	a)	State the function of Marketing Research.	
	b)	What is decision making? Explain.	
	c)	State various steps in an organization.	
	d)	Distinguish between Authority and Responsibility.	
	e)	List advantages of partnership organization.	
	f)	State the skills needed by managers.	

P.T.O.

Q.N	S Q N	Section- II	Ma rks
Q.4		Attempt any FOUR :	08
	a)	List various capitals in terms of finance.	
	b)	Define inventory control.	
	c)	State the meaning of unsafe and safe conditions.	
	d)	State the meaning of PERT.	
	e)	State the qualification of an inspector as per electricity act.	
	f)	Define network analysis.	
Q.5		Attempt any FOUR :	16
	a)	State the importance of working capital. How you will maintain optimum levels?	
	b)	Distinguish between CPM & PERT.	
	c)	Explain factory ESI Act.	
	d)	Define 'Material handling' with its function.	
	e)	Define the term debenture. How it differs from shows?	
	f)	Describe various steps to be taken in shop floor to prevent accident.	
Q.6		Attempt any TWO :	16
	a)	Differentiate clearly between under capitalization and over capitalization.	
	b)	Explain in brief ABC analysis. How ABC analysis supports for material management.	
	c)	Explain in brief Break even analysis and its applications.	

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EXAM SEAT NO.

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LEVEL: FOURTH

COURSE CODE: EEE403

MAX. MARKS: 80

PROGRAM: ELECTRICAL

COURSE NAME: DISTRIBUTION AND UTILIZATION

TIME: 3 HRS.

DATE: 10/12/2018

Instruction:-

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

Section – I		Marks
Q.1	Attempt any FOUR	(08)

- a) Define electric arc welding.
- b) Name the electrodes used for spot welding.
- c) Define resistance welding stating its principle.
- d) What is the provision for rapid cooling & preventing brittleness of weld?
- e) Differentiate AC & DC welding on any two points.
- f) Compare the metal arc & carbon arc welding on two points.

Q.2	Attempt any FOUR	(16)
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- a) State the objectives of electricity tariff.
- b) State the different tariff & describe any one applicable to HT industrial consumer.
- c) State the disadvantages of low power factor.
- d) State how the increased 'kW' demand can be met. Describe each method in brief.
- e) State the advantages of maintain high pf near to unity.
- f) A factory has a M.D tariff of Rs125/KVA monthly. It install p.f improving equipment at an annual cost of Rs1200/kVAR. Calculate the most economical p.f assuming interest & depreciation at 10% per annum for the equipment added.

Q.3	Attempt any FOUR	(16)
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- a) Describe in detail the classification of electric distribution system.
- b) Show Ring, parallel, radial & inter connected distribution system using simple figure & state their applications.
- c) State the factor involved while designing a distribution system.
- d) Compare the AC & DC distribution system on any four points.

P.T.O

- e) An AC two wire feeder P-Q-R has a load by 100A, $\text{pf}=0.86\text{lag}$ at 'R' & 40A, $\text{pf}=0.9\text{lag}$ at 'Q'. The impedance of section PQ & QR are $(0.03+j0.05)$ ohm & $(0.08+j0.15)$ ohm respectively. The terminal voltage at 'R' is 400V. Determine the voltage fed at 'P' & the voltage at 'Q'.
- f) State the methods of obtaining the DC-3 wire distribution system.

Section – II

Marks

Q.4 Attempt any **FOUR**

(08)

- Draw pantograph collector. Label the parts.
- What is an Electric drive?
- State the principle of induction heating.
- State different modes of heat transfer.
- Define load equalization.
- What is meant by Rheostatic breaking in case of electric traction?

Q.5 Attempt any **FOUR**

(16)

- State advantages of electric drives.
- Explain with neat sketch of resistance oven.
- Explain the radiant & infrared heating in detail.
- Explain bridge transition method used in electric traction.
- State eight describable characteristics of traction motors.
- Draw a 25KV, 3 ϕ , 50Hz, single line diagram of A.C traction substation

Q.6 Attempt any **FOUR**

(16)

- State requirements of ideal breaking systems.
- Describe any four causes of failure of heating elements.
- State any four advantages and any two disadvantages of electric heating.
- Write the different system of track electrification.
- Describe the concept of load cycle with their graphical representation.
 - Continuous loading
 - Short time loading.
- Explain how load equalization is obtained for electric motors.

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

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LEVEL: FOUR**PROGRAM: ELECTRICAL ENGINEERING.****COURSE CODE: EEF404/EEE508****COURSE NAME: Electric Power Utilization & Traction.****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 10/12/2018****Instruction:-**

- 1) Answer to each section must be written in separate answer book.
- 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 (Section – I)	Cognition Level R/U/A	Co Code EEF 404	Marks
Q.1		Attempt any FOUR			(08)
	a)	Define traction system.	R	1	
	b)	State which type of motor is suitable for traction motor.	R	1	
	c)	State the types of Catenary used in case of electric traction.	R	2	
	d)	Draw a Pantograph collector & Label the parts.	R	2	
	e)	Define Train lighting system.	R	3	
	f)	What are the Auxiliary circuit equipments used in Electric Locomotive.	R	3	
Q.2		Attempt any FOUR			(16)
	a)	Explain effect of speed on OHE.	U	1	
	b)	Draw a neat labeled diagram to show automatic weight tension and temperature compensation of OHE.	A	1	
	c)	With the help of neat diagram explain the method to obtain unidirectional polarity in train lightening.	A	2	
	d)	Draw a neat labeled diagram of feeding post and write any four points related to it.	A	2	
	e)	Draw and explain construction of faiveley type Pantograph collector. Also explain its working in brief.	U	3	
	f)	List any two types of relays and contactors with their function used in AC locomotive.	U	3	
Q.3		Attempt any FOUR			(16)
	a)	State any four ideal maintenance of electric locomotive.	U	1	
	b)	Draw a neat layout diagram of Traction substation.	U	1	

P.T.O.

	c)	State the functions of Insulated overlap and un-insulated overlap.	U	2	
	d)	Describe the special requirements of train lightening.	U	2	
	e)	Draw a neat labeled diagram of Power circuit of a 3 phase locomotive.	U	3	
	f)	List the various current collectors. Explain bow collector.	U	3	
		Section – II			Marks
Q.4		Attempt any FOUR			(08)
	a)	State basic principle of resistance welding.	R	4	
	b)	Enlist types of resistance & Arc welding.	R	4	
	c)	Comment on Individual drives & Group drives.	R	5	
	d)	Enlist the various type of insulation used for motor.	R	5	
	e)	State types of heating elements & their max operating temperature levels.	R	6	
	f)	State modes of heat transfer.	R	6	
Q.5		Attempt any FOUR			(16)
	a)	Sketch labeled diagram & explain working of seam type welding their applications as examples.	A	4	
	b)	Discuss various advantages of an electric drives.	U	5	
	c)	Comment on duty cycle of an electric drive.	U	5	
	d)	Sketch labeled diagram & explain working of an electric oven with their types & applications.	A	6	
	e)	Describe an electrodes used for an arc furnace.	U	6	
	f)	Explain concept of an induction heating. Draw labeled diagram & state applications.	A	6	
Q.6		Attempt any FOUR			(16)
	a)	Explain the requirements of good welding using suitable sketches.	U	4	
	b)	State most important electrical properties of an electric drive. (Each at least 8)	U	5	
	c)	Comment on Speed control methods of motor used as drives.	A	5	
	d)	State various causes of failure of a heating elements.	U	6	
	e)	Draw labeled sketch and explain dielectric heating furnace & state applications.	A	6	
	f)	Classify electric heating methods.	U	6	

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LEVEL: **THIRD**

COURSE CODE:

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

COURSE NAME: **APPLIED MATHEMATICS**

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

MAX. MARKS: **80**

TIME: **3 HRS.**

DATE: **03/12/2018**

Instruction:-

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

S	Q	Question Text	R	CO	Mar
QN	N		U	EIF	ks
			A	301	
Q.1		Attempt any FOUR			(08)
	a)	What is the value of $\int 4^x \cdot 3^x dx$	R	1	
	b)	Find $\int (x^{3a} + a^{3x} + e^{3\log x}) dx$	R	1	
	c)	Find $\int \frac{4x-6}{2x^2-6x+4} dx$	R	1	
	d)	Find $\int \frac{x dx}{1+x^2}$	R	1	
	e)	Show that $\int e^x [f(x) + f'(x)] dx = e^x f(x) + c$	U	1	
	f)	Find the area enclosed by the curve $y = 3x^2$ and the lines $x=1$, $x=3$ and x -axis.	A	1	
Q.2		Attempt any FOUR			(16)
	a)	Show that $\int (\log x)^2 dx = x(\log x)^2 - 2x \log x + 2x + c$	U	1	
	b)	Show that $\int \frac{dx}{1+\tan x} = \frac{1}{2}x + \frac{1}{2}\log(\cos x + \sin x) + c$	U	1	
	c)	Evaluate $\int \frac{x+1}{x^2(x-2)} dx$	A	1	
	d)	Evaluate $\int \sin^{-1} x dx$	A	1	
	e)	Evaluate $\int \frac{dx}{1+\sin 2x}$	A	1	
	f)	Evaluate $\int \frac{3x+7}{2x^2+3x-2} dx$	A	1	
Q.3		Attempt any FOUR			(16)
	a)	Show that $\int_0^{\pi/4} \sec^4 x dx = \frac{4}{3}$	U	1	
	b)	Evaluate $\int_0^{\pi} \frac{x \sin x}{1+\cos^2 x} dx$	A	1	
	c)	Evaluate $\int_{-\pi/2}^{\pi/2} \frac{x \sin(1+x^2)}{1+x^4} dx$	A	1	

P.T.O

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

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EXAM SEAT NO.

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LEVEL: **FOURTH**

PROGRAM: **ELECTRICAL ENGINEERING**

COURSE CODE: **EEF401/EE411/EEE402** COURSE NAME: **Electrical Estimation & Contracting.**

MAX. MARKS: **80**

TIME: **3 HRS.**

DATE: **30/11/2018**

Instruction:-

- 1) Answer to each section must be written in separate answer book.
- 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, **SQLN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application

QN	S. Q. N	Question Text (Section - I)	Cognition Level R/U/A	Co Code EEF 401	Marks
Q.1		Attempt any FOUR			(08)
	a)	State any four IE rules related to Electrical Installation.	R	1	
	b)	Define service connection.	R	1	
	c)	List types of internal wiring.	R	2	
	d)	State the principle of circuit design in lighting circuit.	R	2	
	e)	State two factors for selection of layout of commercial installation.	R	3	
	f)	Explain the differences between shop and street lighting.	R	3	
Q.2		Attempt any TWO			(16)
	a)	i) Draw any eight symbols of accessories used in electrical installations. ii) Compare residential and commercial electrical installation.	U	1	
	b)	A commercial hall is 80 m x 25 m is to be fitted with an electrical installation of following load flurorescent lamps, ceiling fan, plug points. Draw a layout and show the position of lamps & fans . Calculate the rating of equipments. Prepare a schedule of material. Find out cost of work.	A	2	
	c)	i) Explain DP-MCB, state its advantages. ii) State the procedure for the selection of rating of main switch & distribution board in residential building electrification.	A U	3 3	

P.T.O.

Q.3	Attempt any TWO			(16)
a)	A lecture hall of 6 m x 12 m is to be provide with light and fan wiring. Power point is also to be provided. Prepare a branch circuit schedule.	A	3	
b)	i) Explain the test for ascertaining the circuit continuity. ii) Explain the coverage in respect of safety and precautions provided with vide IE Rules.	A	1	
c)	i) List eight examples of commercial installations. ii) What sequence you will follow to prepare the estimation for carrying out wiring installation for commercial building ?	U	2	
	Section – II			Marks
Q.4	Attempt any FOUR			(08)
a)	Give reasons for necessity of testing of executed wiring Installation work.	R	5	
b)	State the formulas for calculation of 3 phase motor current.	R	4	
c)	Describe various requirements of valid contract. (any four)	R	6	
d)	State the various type of cables used for Industrial Electrical Installation works.	R	4	
e)	Explain how to decide rating of main switch of mains 3 phase supply system in an Industry.	U	4	
f)	Enlist the components of earthing of Electrical installation.	R	5	
Q.5	Attempt any FOUR			(16)
a)	Sketch and label wiring diagram of 3 phase main switch board.	U	4	
b)	Explain the procedure how to decide the rating of cables having Industrial motor loads of 1,3 & 5 HP capacity.	U	4	
c)	Prepare schedule of estimation of material of approximate costing for the 10 HP motor in a saw mill of working area 8m x 15m size with a supply of 3 ph 415v 50Hz AC.	A	4	
d)	Enlist the testing equipments used for measurement of high resistance & explain any one with neat sketch.	U	5	
e)	Comment on IE rule related to testing of wiring installation work.	U	5	
f)	Describe the criteria for selection of contractor and supplier.	U	6	

Q.6	Attempt any FOUR			(16)
a)	Design & prepare estimation of material schedule for floor mill contains 7.5 HP, 415 v, 50 Hz AC induction motor in a room size of 4 m x 6 m with 3 m height.	A	4	
b)	Prepare approximate costing for above given Q.3(a) problem & draw single line diagram with specifications.	A	4	
c)	Explain with neat labeled sketch the selection of conduit and its procedure along with its correction factor table.	A	4	
d)	Sketch and explain testing of Insulation between phase & neutral wiring of completed Installation works.	A	5	
e)	Discuss the step by step procedure to submit the Tender documents followed by a contractor.	U	6	
f)	Explain step by step procedure to prepare Tender documents followed by a contractor.	U	6	

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

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LEVEL: THIRD**PROGRAM: IE/ET/EE/IT****COURSE CODE:****MEF313/ME214/MEE313/CEF313/CEE313/EIF312/IX210/IEE312/ITE312/MG228/EJ210/ ETE312/R228****COURSE NAME: HIGHER MATHEMATICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 27/11/2018****Instruction:-**

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

QN	S Q N	Question Text	R U A	CO EIF312	Marks														
Q.1		Attempt any FOUR			(08)														
	a)	Find the first order partial derivatives w. r. t 'x' & 'y' of the following functions. 1) $\log(ax + by)$ 2) $(y - ax)^{3/2}$	R	2															
	b)	Prove that i) $\Delta'' = \nabla'' E''$ ii) $(E^{1/2} + E^{-1/2})(1 + \Delta)^{1/2} = 2 + \Delta$	U	1															
	c)	Define the Jacobian of u, v & w w.r.t x, y & z	R	2															
	d)	If $u = xy$, $v = x + y$ Then prove that $\frac{\partial(u, v)}{\partial(x, y)} = y - x$	U	2															
	e)	Define the shift operator E & write the relation between E, Δ & ∇	R	1															
	f)	Write the Lagrange's interpolation formula for unequal intervals for the following data. <table><tr><td>x</td><td>x₀</td><td>x₁</td><td>x₂</td><td>x₃</td><td>x₄</td></tr><tr><td>y</td><td>y₀</td><td>y₁</td><td>y₂</td><td>y₃</td><td>y₄</td></tr></table>	x	x ₀	x ₁	x ₂	x ₃	x ₄	y	y ₀	y ₁	y ₂	y ₃	y ₄	R	1			
x	x ₀	x ₁	x ₂	x ₃	x ₄														
y	y ₀	y ₁	y ₂	y ₃	y ₄														
Q.2		Attempt any FOUR			(16)														
	a)	Express the polynomial $f(x) = x^4 + 2x^3 - 5x^2 + 3x + 7$ in factorial notation & Hence, Show that $\Delta^4 f(x) = 24$	U	1															
	b)	Using Lagrange's interpolation formula find the value of f(9) from the following data: <table><tr><td>x</td><td>5</td><td>7</td><td>11</td><td>13</td><td>17</td></tr><tr><td>y</td><td>150</td><td>392</td><td>1452</td><td>2366</td><td>5202</td></tr></table>	x	5	7	11	13	17	y	150	392	1452	2366	5202	A	1			
x	5	7	11	13	17														
y	150	392	1452	2366	5202														
	c)	Using Newton's Backward interpolation formula, find the value of f(0.7) from the following data: <table><tr><td>x</td><td>0.1</td><td>0.2</td><td>0.3</td><td>0.4</td><td>0.5</td><td>0.6</td></tr><tr><td>f(x)</td><td>2.68</td><td>3.04</td><td>3.38</td><td>3.68</td><td>3.96</td><td>4.21</td></tr></table>	x	0.1	0.2	0.3	0.4	0.5	0.6	f(x)	2.68	3.04	3.38	3.68	3.96	4.21	A	1	
x	0.1	0.2	0.3	0.4	0.5	0.6													
f(x)	2.68	3.04	3.38	3.68	3.96	4.21													
	d)	If $u = \log(\frac{x^3 + y^3}{x^2 - y^2})$ Then by using Euler's Theorem, Prove that $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = -1$	U	2															
					P.T.O														

e)	If $u = \log(\tan x + \tan y + \tan z)$ then. Find the value of $\sin 2x \frac{\partial u}{\partial x} + \sin 2y \frac{\partial u}{\partial y} + \sin 2z \frac{\partial u}{\partial z}$	A	2															
f)	If $x = v^2 + w^2$, $y = w^2 + u^2$ & $z = u^2 + v^2$ Then find J & J'	A	2															
Q.3																		
a)	Attempt any FOUR If $x = uv$, $y = \frac{u}{v}$ prove that $JJ' = 1$	U	2	(16)														
b)	Find the missing terms in the following table with the help of a forward difference operator. <table><tr><td>x</td><td>1</td><td>1.5</td><td>2</td><td>2.5</td><td>3</td><td>3.5</td></tr><tr><td>y</td><td>1</td><td>3</td><td>-</td><td>5</td><td>-</td><td>10</td></tr></table>	x	1	1.5	2	2.5	3	3.5	y	1	3	-	5	-	10	A	1	
x	1	1.5	2	2.5	3	3.5												
y	1	3	-	5	-	10												
c)	Using Newton's forward interpolation formula find the value of f(142) from the following data <table><tr><td>x</td><td>140</td><td>150</td><td>160</td><td>170</td><td>180</td></tr><tr><td>f(x)</td><td>3.685</td><td>4.854</td><td>6.302</td><td>8.076</td><td>10.225</td></tr></table>	x	140	150	160	170	180	f(x)	3.685	4.854	6.302	8.076	10.225	A	1			
x	140	150	160	170	180													
f(x)	3.685	4.854	6.302	8.076	10.225													
d)	Show that $\Delta^2 \cos 2x = -4 \sin^2 h \cos(2x + 2h)$	U	1															
e)	If $u = x^3 \phi(\frac{y}{x}) + y^3 \psi(\frac{x}{y})$ Then by using Euler's Theorem find the value of $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$	A	2															
f)	Verify Euler's Theorem for $u = \sin(\frac{x+y}{x-y})$	A	2															
Q.4																		
a)	Attempt any FOUR Define inverse Laplace transform			(08)														
b)	Find $L[\cosh at - \cos at]$	R	3															
c)	Find $L^{-1} \left[\frac{4s+15}{16s^2-25} \right]$	R	3															
d)	Find a_0 for $f(x) = x^2 + x$ in $(-\pi, \pi)$	R	3															
e)	Find a_n for $f(x) = e^{ax}$ in $(0, 2\pi)$	A	4															
f)	Write formula for a_0 and a_n in the interval $(0, 2\ell)$	A	4															
Q.5																		
a)	Attempt any FOUR Prove that $L(\frac{e^{-at} - e^{-bt}}{t}) = \log\left(\frac{s+b}{s+a}\right)$			(16)														
b)	Find Laplace transform of $e^{2t}(1 + \sqrt{t})^2$	U	3															
c)	Find $L(te^{-t} \sin t)$	A	3															
d)	Find $L^{-1}\left(\frac{4s+12}{s^2+8s+16}\right)$	U	3															
e)	By using convolution theorem find $L^{-1}\left\{\frac{1}{(s-2)(s+2)^2}\right\}$	A	3															
f)	Use Laplace Transform method to solve $(D^2+9)y=18t$ with $y(0)=0$, $y'(0)=0$	A	3															
Q.6																		
a)	Attempt any TWO Find the Fourier series to represent the function f(x) given by $f(x) = \begin{cases} x & 0 < x < \pi \\ 2\pi - x & \pi < x < 2\pi \end{cases}$ and deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$			(16)														
b)	Obtain Fourier series for the function $f(x) = 2x - x^3$ in $(0, 3)$	A	4															
c)	Find Fourier series for $f(x) = x \sin x$ in $(-\pi, \pi)$ Hence deduce that $\frac{\pi-2}{4} = \frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \frac{1}{7.9} + \dots$	U	4															

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

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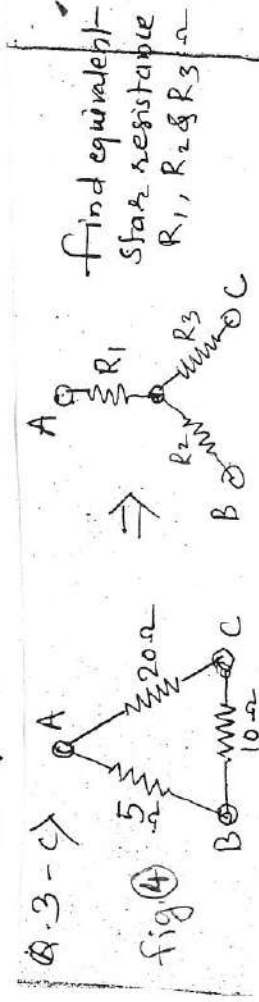
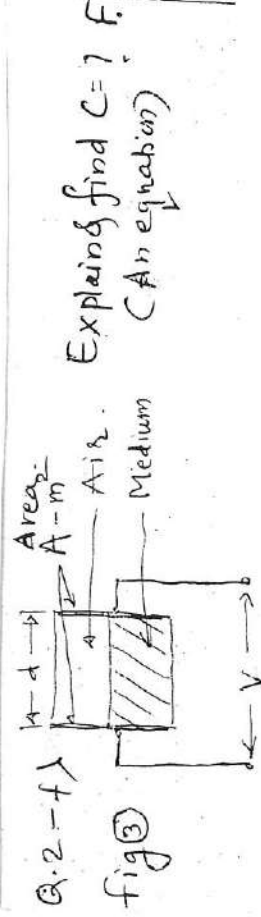
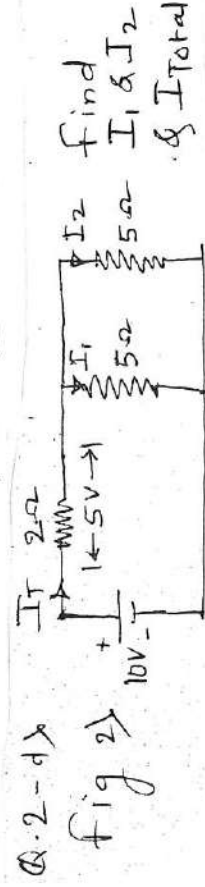
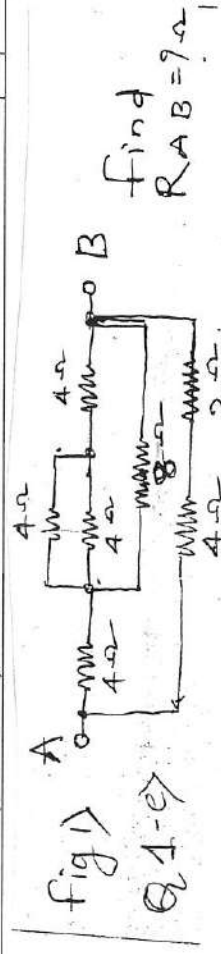
LEVEL: FIRST**PROGRAM: ELECTRICAL****COURSE CODE: EE102 COURSE NAME: FUNDAMENTALS OF ELECTRICITY AND MAGNETISM****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 01/12/2018**

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches 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 A 102	Mar ks
Q.1		Attempt any FOUR			(08)
	a)	State at least two properties of electric charge.	R	1	
	b)	Define Coulomb's law of electrostatics.	R	1	
	c)	Define Ohms law for resistive circuit.	R	2	
	d)	Write conversion formula for Star or Delta network.	A	2	
	e)	Solve the network to find equivalent resistance between terminals A&B as shown in fig.1.	A	2	
	f)	State the equation to find capacitance of parallel plate.	A	3	
Q.2		Attempt any FOUR			(16)
	a)	Explain with suitable sketch an electrical field around a charged body.	U	1	
	b)	Derive an expression for electrical potential.	A	1	
	c)	Explain & state an equation for potential difference between two points of an electrical field.	U	1	
	d)	Solve the given network to find currents in each branch & total current as shown in fig.2.	A	2	
	e)	Explain with neat sketch a parallel plate capacitor partly with medium & partly with air.	U	3	
	f)	Describe special case of capacitor like partly air & partly medium separated by distance 'd' apart using equations as shown in fig.3.	R	3	
Q.3		Attempt any FOUR			(16)
	a)	Compare AC and DC electric current on basis of i) (AV) Value ii) Waveform iii) Frequency iv) Max. Value. v) RMS value.	R	1	
	b)	State & explain 'Temperature coefficient of resistance' value of copper.	U	1	
	c)	Solve the given network as shown in fig.4 by conversion method from Delta to Star.	A	2	
	d)	Explain in brief concept of break down voltage.	U	3	
	e)	State & explain composite medium capacitance & its equation.	U	3	
	f)	Describe with suitable sketch charging of capacitor their equations & waveform/Graphs.	U	3	
Q.4		Attempt any FOUR			(08)
	a)	Define "Magnetic field".	R	4	
	b)	State "Cork Screw Rule"	R	4	
	c)	Define "Reluctance" and state its unit.	R	5	
	d)	State any one difference between useful flux and leakage flux.	U	5	
	e)	Define "self- inductance" and state its unit.	R	6	
	f)	State "Faraday's second law of electromagnetic induction."	R	6	
					P.T.O

Q.5	Attempt any FOUR			(16)
a)	Explain the meaning of magnetic flux & Magnetic flux density and state their units.	U	4	
b)	With neat sketch, explain the Right Hand rule. State its use.	U	4	
c)	Draw a neat sketch showing the magnetic field produced by a current carrying circular loop (single turn coil). Mark directions of current & magnetic flux on it and state the rule used to determine the direction of magnetic field.	U	4	
d)	State any four similarities between electric circuit & magnetic circuit.	R	5	
e)	With neat diagrams of B-H curve, explain the difference between magnetic material & non – magnetic material.	U	5	
f)	A circular iron ring of mean circumference of 25 cm and a cross-sectional area of 5cm^2 has a radial saw cut of 1mm in it. The ring is uniformly wound with a coil of 500 turns and a current of 2A, in the coil produces a flux of 0.5×10^{-3} Wb in the ring. Calculate the relative permeability of iron at this flux density.	A	5	
Q.6	Attempt any TWO			(16)
a)	i) With neat diagram, explain any one mechanism by which an emf is induced in a coil. (06 marks) ii) Define permeability. (02 marks)	A	6	
b)	i) With neat diagram, explain the concept of mutual induction. Define coefficient of mutual inductance & state its unit. (06 marks) ii) State the relation between hysteresis loss & area of hysteresis loop (02 marks)	R	4	
c)	i) Two coils A & B are magnetically coupled coils with coefficient of self- inductance (both coils) 0.8 and coefficient of mutual- inductance 0.6. If a current of 5A in coil A is uniformly reversed in 5 millisecond, What will be the magnitude of emf induced in coil A and coil B(04 marks). ii) Explain the construction of ferrite cored inductor & state one application of it. (04 marks)	U	6	



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LEVEL: FIFTH**PROGRAM: ELECTRICAL****COURSE CODE: EEE502/E305****COURSE NAME: Microprocessor & Microcontrollers.****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 01/12/2018**

Instruction:-

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

Section – I			Marks
Q.1	Attempt any FOUR		(08)
a)	Write the function of following pins of microprocessor 8085. i) Reset out, ii) ALE		
b)	State the different types of Interrupt of 8085 microprocessor with their vector location.		
c)	Write an assembly language program to add two 8 bit Numbers.		
d)	Write No. of bytes of following instructions, i) SHLD address, ii) ACI data.		
e)	Define the term : i) Stack, ii) Subroutine.		
f)	Draw the format of SIM Instruction.		
Q.2	Attempt any FOUR		(16)
a)	Draw & explain Demultiplexing the bus AD0 - AD7.		
b)	Explain different types of addressing mode of 8085 microprocessor with suitable example.		
c)	Draw the Timing diagram for instruction STA 9000H.		
d)	Write an assembly language program to count number of 1's & Zero's in number. The number is stored at location 50 H.		
e)	Explain following instruction with respect to their description, No. of bytes, Addressing modes & effect on flag, : i) CN2, ii) CC.		
f)	Explain RST as software interrupts.		
Q.3	Attempt any FOUR		(16)
a)	Explain the 8085 bus organization with suitable diagram.		

P.T.O.

	b)	Draw & explain Generation of control signals (Read / write) for memory & I/O.	
	c)	State different types of Instruction format. Also explain it's types with example.	
	d)	Write an assembly language program to transfer a block of sixteen data bytes from memory location 5000 H onwards to new Memory location 6000 H on words.	
	e)	Draw the format of RIM Instruction. Explain significance of each bit.	
	f)	Explain Implementation of RST instruction with suitable timing diagram.	
		Section – II	Marks
Q.4		Attempt any FOUR	(08)
	a)	Draw the control word format of 8255 PPI and describe function of each bit.	
	b)	Prepare chip select logic for input device to use following instruction : IN 80 H.	
	c)	Describe the function of following pins of 8051 micro controller : i) $\overline{EA}$ ii) $\overline{PSEN}$, iii) ALE, iv) TxD.	
	d)	Suggest with justification, whether to use microprocessor or microcontroller for following applications : i) Switching the heater and A.C. alternately. ii) Sending and receiving serial data.	
	e)	Define addressing mode, List various addressing modes used in 8051 micro controller.	
	f)	Identify the contents of the accumulator execution of the following program : Org 0030 H Mov A, #05 H Mov 0FOH, # 05 H DIV AB END	
Q.5		Attempt any TWO	(16)
	a)	Draw and describe the block diagram of 8255 programmable peripheral interface.	

	b)	Draw the format and describe the function of each bit of the following SFRS. i) TCON (03 Marks) ii) TMOD. (03 Marks) What will be the contents of TMOD if pulses connected to pin T0 of 8051 microcontroller are to be counted ? (02 Marks)	
	c)	Write assembly language program to exchange the blocks of ten data bytes stored at 40 H and 50 H locations in the internal RAM. Write the comments.	
Q.6		Attempt any TWO	(16)
	a)	Interface two chips of 1k x 8 and two chips of 1k x 4 to implement a total memory of 3k x 8. Draw interfacing diagram and write memory map of each chip.	
	b)	Draw architectural diagram of 8051 microcontroller and describe function of PSW with format & function of each bit.	
	c)	Write assembly language program to generate a rectangular wave on port pin P1.0 with $T_{ON}=100$ msec, $T_{OFF}=50$ msec. Use Timer to provide delay. Show appropriate calculations done to find timer count.	

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LEVEL :- **THIRD** PROGRAM: **ELECTRICAL ENGINEERING**
COURSE CODE :- **EEF310/EE211/EEE303/E303**
COURSE NAME :- **TRANSMISSION AND DIST. OF ELECTRIC POWER**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **29/11/2018**

Instruction :-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches 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 Q N	Question Text	R/ U/ A	Co EFF 310	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Define line supports	R	1	
	b)	Classify the transmission lines.	U	3	
	c)	Define i) Critical disruptive voltage ii) Visual critical voltage.	U	2	
	d)	List the advantage and disadvantages of bundled conductor (each 02)	R	1	
	e)	List four advantages of HVDC transmission.	R	4	
	f)	Define i) Voltage regulation of transmission line. ii) Transmission efficiency.	U	3	
Q.2		Attempt any FOUR :			16
	a)	Compare HVDC transmission with AC transmission.	R	4	
	b)	Draw a neat sketch and explain pin type insulator.	U	1	
	c)	What is the maximum length in km for a single phase transmission line having copper conductor of 0.775cm^2 cross section over which 200kw at unity power factor and at 3300V can be delivered? The efficiency is 90%. Take specific resistance as $1.725\mu\Omega/\text{cm}$.	A	3	
	d)	Explain the methods of reducing corona effect.	U	2	
	e)	A 3 ϕ transmission line is being supported by three disc insulators. The potential across top unit (i. e. near to the tower) and middle unit are 8kv and 11kv respectively. Calculate i) The ratio of capacitance between pin and earth to self capacitance of each unit. ii) The line voltage. iii) String efficiency.	A	1	
	f)	Define skin effect and state the factors on which skin effect depends.	R	2	
Q.3		Attempt any FOUR :			16
	a)	Define sag. Derive the sag when the supports are at equal level.	U	1	
	b)	Explain nominal Π method with vector diagram.	U	3	
	c)	Explain Ferranti effect and proximity effect related to transmission lines.	R	2	

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	d)	List the types of HVDC link. Explain any one.	R	4	
	e)	A 3 ϕ line delivers 3600 KW at a p.f. 0.8 lagging to a load. If the sending end voltage is 33KV, determine i) The receiving end voltage ii) Line current iii) Transmission efficiency. The resistance and reactance of each conductor are 5.31 Ω and 5.54 Ω respectively.	A	3	
	f)	State the advantages and disadvantages of corona.	R	2	
Q.4		Attempt any FOUR :			08
	a)	Define i) Distribution system and ii) Service mains.	R	5	
	b)	Write two disadvantages of Radial connection scheme of distribution system.	R	5	
	c)	State four disadvantages of using synchronous condenser method for power factor improvement.	R	6	
	d)	State four objectives of tariff.	R	6	
	e)	Define the term "sub-station".	R	7	
	f)	State the function of i) CT and ii) Isolator in substation.	R	7	
Q.5		Attempt any FOUR :			16
	a)	A single phase A.C. distributor AB 300 meters long is fed from end A and is loaded as: i) 100 A at 0.707 p.f. lagging 200 meter from point A. ii) 200 A at 0.8 p.f. lagging 300 meter from point A. The load resistance and reactance of the distributor is 0.2 Ω & 0.1 Ω per kilometer. Calculate the total voltage drop in the distributor. The load power factors are referred to the voltage at the far end.	A	5	
	b)	Draw Ring-main connection scheme of distribution system and state its two advantages.	R	5	
	c)	Explain in brief four factors to be considered while designing the feeder.	U	5	
	d)	Explain secondary distribution system with neat diagram.	U	5	
	e)	Compare A.C. distribution with D.C. distribution on four points.	U+ A	5	
	f)	State eight factors to be considered for selection of site for substation.	U	7	
Q.6		Attempt any FOUR :			16
	a)	A three phase 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 the p.f. raised to 0.9 lagging. Determine the KVAR rating of capacitors connected in each phase.	A	6	
	b)	Explain in brief the block rate tariff and state its two advantages.	R+ U	6	
	c)	A factory which has a maximum demand of 175KW at a power factor of 0.75 lagging is charged at Rs 72 per KVA per annum. If the phase advancing equipment costs Rs 120 per KVAR. Find the most economical power factor at which the factory should operate. Interest and depreciation total 10% of the capital investment on the phase advancing equipment.	A	6	
	d)	Describe in brief four causes of low power factor.	U	6	
	e)	A consumer has a maximum demand of 200 KW at 40% load factor. If the tariff is as Rs 100 per KW of maximum demand plus 10 paise per KWH. Find the overall cost per KWH.	A	6	
	f)	Draw a neat labeled single line diagram of 11KV/400V distribution substation.	U	7	

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LEVEL :- **FOURTH** PROGRAM : **ELECTRICAL ENGINEERING**

COURSE CODE **EEE405/EE413**

COURSE NAME :- **TESTING & MAINT. OF ELECTRICAL EQUIPMENT**

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

Instruction :-

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

QN	S Q N	Section- I	Mar ks
Q.1		Attempt any FOUR :	
	a)	Write any two consequences of unsafe practices in electrical engineering. Explain them briefly.	08
	b)	Explain two objectives of testing machines.	
	c)	Write IE rules for earthing of electrical equipment.	
	d)	Explain breakdown maintenance briefly.	
	e)	Explain indirect testing method for electrical machines giving a short example.	
	f)	Write down the conditions of parallel operation of three phase alternators.	
Q.2		Attempt any FOUR :	
	a)	Explain the factors that influence preventive maintenance schedules of machines.	16
	b)	Write the advantages of preventive maintenance	
	c)	Explain the role of substation operator stating the do's and don't's for him/her.	
	d)	Draw the circuit diagram to conduct the turns ratio test on the 3 phase slipring induction motor and explain the test in brief.	
	e)	Prepare a maintenance schedule for a 3 phase alternator rated at 6 MVA, 18KV.	
	f)	Describe the steps involved in conducting any one routine test on the 3 phase induction motor.	
Q.3		Attempt any FOUR :	
	a)	Explain with relevant sketches any one method of giving artificial respiration to a person getting an electric shock and falling unconscious with stopped breath.	16
	b)	Describe the coverage of the TPM.	
	c)	Write down the routine maintenance activities for a 50HP, 400V, 3 phase induction motor.	
	d)	Explain the reduced voltage running up test on 3 phase induction, motor, using proper circuit diagrams.	
	e)	Differentiate type tests, routine tests and special tests on electrical machines.	
	f)	Prepare the maintenance schedule for synchronous machines.	

P.T.O.

QN	S Q N	Section- II	Marks
Q.4		Attempt any FOUR : a) Specify approximate values of no load current and no load losses as percentage of full load current and full load losses respectively. b) Write any two sensors used for measuring the temperature of internal parts of machine. c) State any two agents which contaminate the insulating oil. d) State the use of i) Bearing Puller ii) Growler. e) State any two common troubles in cables. f) State any two effects of misalignment.	08
Q.5		Attempt any FOUR : a) Two transformers are connected in parallel to supply common load of 6 KVA at 0.8 pf lagging. Rating of transformer A is 5 KVA and impedance of $(0.8 + j 7) \%$. Rating of transformer B is 3 KVA and impedance of $(1+j5)\%$. How will the two transformers share the common load? b) Explain with neat circuit diagram, the test to measure impedance voltage of 1-ph transformer. c) With neat circuit diagram, explain how to conduct impulse voltage withstand test on transformer. d) Explain which information is obtained from back-to-back test on transformer. e) Explain any two factors involved in designing the machine foundation. f) Which are the devices and tools used in loading and unloading of heavy equipment? Explain the use of all.	16
Q.6		Attempt any TWO : a) Explain various mechanical, electrical and magnetic faults in electrical machines, and also state the reason for each. b) i) Prepare trouble-shooting chart for 3-phase induction motor. (6 marks) ii) Classify insulating materials as per IS 8504 (part III) 1994 (2 marks). c) i) State any four properties of good transformer oil. (4 marks) ii) Explain the process of vacuum impregnation. (4 marks)	16

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LEVEL :- THIRD

PROGRAM : ELECTRICAL ENGINEERING

COURSE CODE :- EEF309/EE310/EEE304

COURSE NAME :- APPLIED ELECTRONICS

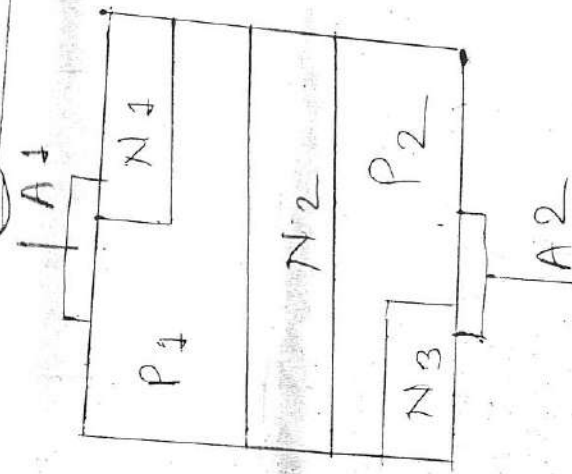
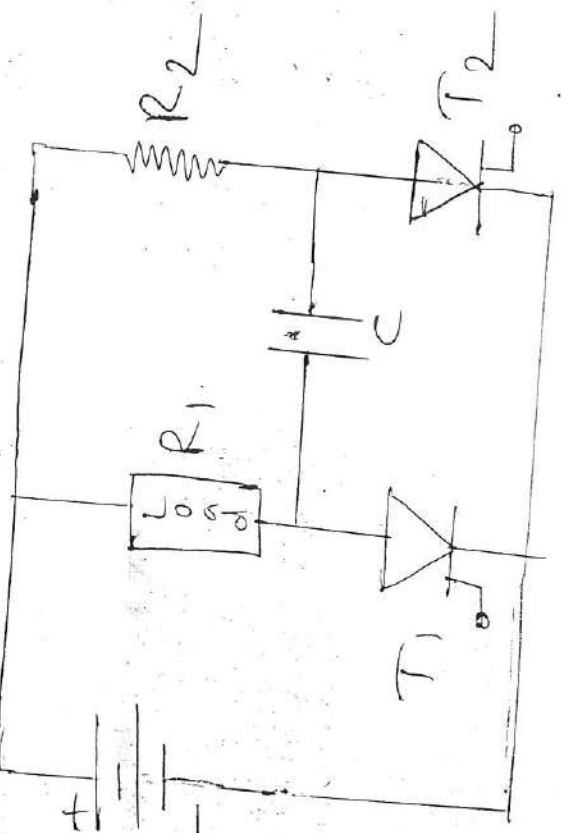
MAX. MARKS : 80 TIME : 3 HRS. DATE :- 28/11/2018

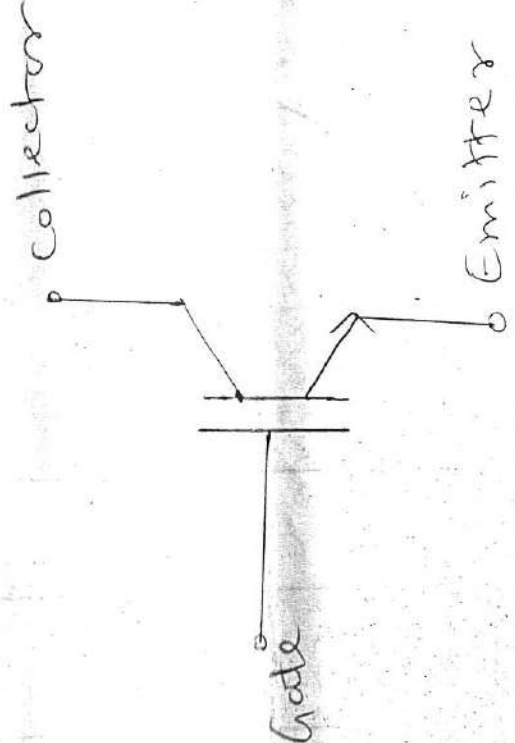
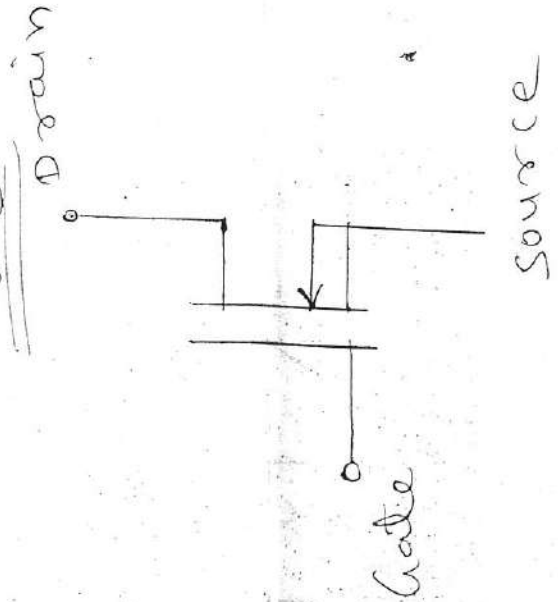
Instruction :-

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

QN	S Q N	Question Text	R/ U/ A	Co EEF 309	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Draw CB configuration of transistor.	R	1	
	b)	State Barkhausen's criteria.	R	2	
	c)	Define multivibrator.	R	3	
	d)	Classify multistage amplifier.	U	1	
	e)	Draw a neat labeled circuit diagram of crystal oscillator. Give the formula for oscillation frequency.	R	2	
	f)	List different biasing methods of transistor.	R	1	
Q.2		Attempt any FOUR :			16
	a)	Explain i) DC load line ii) AC load line of CE amplifier.	U	1	
	b)	Explain monostable multivibrator with neat circuit diagram.	U	3	
	c)	Explain voltage divider bias method with circuit diagram.	U	1	
	d)	Compare Hartley and Colpitt's oscillator on the basis of i) Tank circuit ii) F/b factor iii) Formula for frequency of oscillation. Iv) Application.	U	2	
	e)	Explain how transistor works as a switch.	U	3	
	f)	Explain RC phase shift oscillator with neat circuit diagram.	U	2	
Q.3		Attempt any FOUR :			16
	a)	Explain class B push pull amplifier.	U	1	
	b)	Calculate the frequency of oscillation for Colpitt's oscillator for $C_1=0.01\mu F$, $C_2=0.01\mu F$, and $L=5\mu H$.	A	2	
	c)	For Astable multivibrator if $R_1=R_2=7.5K\Omega$ & $C_1=C_2=0.15\mu F$. Calculate the time period for astable multivibrator.	A	3	
	d)	For monostable multivibrator, find the value of resistor, if $C=100\mu F$ and output pulse width of 400ns.	A	3	
	e)	Explain frequency response curve of RC coupled amplifier.	U	1	
	f)	Define i) Feedback ii) Oscillator. List the types of feedback.	R	2	

QN	S Q N	Question Text	R/ U/ A	Co EF 302	Ma rks
Q.4		Attempt any FOUR :	A		08
	a)	Name one:- i) Current controller device. ii) Voltage controller device.	R	4	
	b)	Define commutation of SCR.	R	5	
	c)	Define holding current in SCR.	R	4	
	d)	Draw the diagram of class E commutation.	R	5	
	e)	List the protection techniques for thyristor.	R	6	
	f)	State three operating regions of UJT.	R	4	
Q.5		Attempt any FOUR :			16
	a)	Identify the construction diagram (fig1) and explain its working.	A	4	
	b)	Explain load and line commutation techniques in thyristor.	U	5	
	c)	Explain working of class-F commutation.	U	5	
	d)	Explain Resistor capacitor full wave triggering circuit.	U	6	
	e)	Explain in detail snubber circuit.	U	6	
	f)	Draw and explain pedestal and Ramp triggering circuit.	U	6	
Q.6		Attempt any FOUR :			16
	a)	Identify diagram Fig (2) and explain its working.	A	5	
	b)	Identify the following symbol and draw its construction diagram. (Fig. 3 and Fig. 4)	A	4	
	c)	Sketch the diagram for triac using diac and explain it.	A	6	
	d)	Explain in detail di/dt protection in thyristor.	U	6	
	e)	Identify the following methods used for turn-on or turn-off of thyristor. i) Forward voltage triggering. ii) Radiation triggering. iii) Gate triggering. iv) Natural commutation and explain radiation triggering. In detail.	A	4	
	f)	Explain with neat circuit diagram and waveform operation of class D commutation in thyristor.	U	5	

Q. No.	Question text	Cognition Level R/U/A	CO Code	Mark
95a)	 <u>Fig 1</u>			
96a)	 <u>Fig 2</u>			

Q. No.	Question-text	Cognition Level R/U/A	CO Code	Marks out of
36b	Question-text <u>ii</u>  <u>Fig (3)</u>  <u>Fig (4)</u>			

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LEVEL: **FIFTH**

PROGRAM: **ELECTRICAL**

COURSE CODE: **EEE504** COURSE NAME: **ILLUMINATION OF ENGINEERING MATERIALS**

MAX. MARKS: **80**

TIME: **3 HRS.**

DATE: **28/11/2018**

Instruction:-

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

	Section – I	Marks
Q.1	Attempt any FOUR	(08)
	a) Define “Luminous intensity and state its unit. b) Define “Illumination” and state its unit. c) State “Depreciation factor”. d) Write “Coefficient of utilization”. e) Define “Lamp Efficiency” and state its unit. f) Explain the term “Reflection factor”.	
Q.2	Attempt any FOUR	(16)
	a) Explain any four points which are considered in flood lighting. b) Explain any four features of factory lighting. c) With neat diagram explain Inverse square law of illumination. d) With neat diagram, explain i) Direct lighting. ii) Indirect lighting. e) State any four purposes of lighting control. f) With neat diagram, explain electronic dimmer.	
Q.3	Attempt any TWO	(16)
	a) It is required to provide an illumination of 100 lumens/m² in a workshop hall of size 40mx15m. Calculate the number and rating of lamps required when seven trusses are provided at mutual distance of 5m. Assume the depreciation factor as 0.8, coefficient of utilization as 0.4 and efficiency of lamps as 10 lumens/watt. b) Explain any four factors to be considered in designing a good lighting schemes. c) i) Explain any two techniques of enhancing lighting control (04 marks) ii) With neat diagram, explain dimmer transformer & its types (04 marks)	

P.T.O

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

- a) State illumination lux required for
 - i) Dispensaries
 - ii) Kitchens.
- b) State the basic requirement of street lighting.
- c) State the factors on which efficiency of electrical installation depends.
- d) Name the lamps used for
 - i) Conference hall
 - ii) Restaurants.
- e) Enlist light control methods.
- f) State the Name of the lamps used for advertisement board.

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

- a) Draw and explain design consideration of street light.
- b) Describe sports lighting.
- c) Explain in brief component of Industrial lighting.
- d) Explain lighting schemes in the following areas of hotel.
 - i) Corridors
 - ii) Stairs
 - iii) Lift.
- e) Describe factors on which the lighting of aquarium depends.
- f) Explain with necessary diagrams stage lighting.

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

- a) Draw and explain design consideration illumination scheme for conference hall. Name the necessary lamps required.
- b) Explain in brief lighting schemes for Health care center, which types of controls will you use?
- c) With help of diagram explain flood lighting.

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

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

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LEVEL: THIRD**PROGRAM: ELECTRICAL****COURSE CODE: EE301/R228****COURSE NAME: HIGHER ENGINEERING****MATHEMATICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 27/11/2018****Instruction:-**

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right 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.

Marks**Section -I****Q.1 Attempt any FOUR****(08)**

- a) Prove that $\nabla E = \Delta$
- b) Evaluate $\Delta \tan^{-1} x$
- c) Evaluate $\Delta^2 \left(\frac{5x+12}{x^2+5x+16} \right)$
- d) Show that $\left(\frac{\Delta^2}{E} \right) x^2 = 2, (h=1)$
- e) If a die is thrown find the probability that prime number appears.
- f) Evaluate $\int_0^{\infty} e^{-x^2} dx$

Q.2 Attempt any FOUR**(16)**

- a) A card is drawn at random from a well shuffled pack of 52 cards find the probability that card is black or a face card.
- b) Express the polynomial $f(x) = x^4 - 12x^3 + 24x^2 - 30x + 9$ in factorial notation.
- c) Find missing terms from the following table

x	0	1	2	3	4	5	6
y	5	11	22	40	-	140	-

- d) Using Newton's forward difference interpolation formula find $f(8)$ from the data

x	5	10	15	20
f(x)	50	70	100	145

- e) Using Laranges interpolation evaluate $f(10)$ from the following data

x	5	6	9	11
y	12	13	14	16

- f) Evaluate $\int_0^2 x^3 (2-x)^2 dx$

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

- a) Use Newton raphson method to evaluate $\sqrt[3]{20}$ upto three decimal places (3 iterations only)
- b) Using Regula Falsi method solve $x^3 + x - 3 = 0$ (upto 3 iterations)

P.T.O

- c) Solve the system using Gauss-seidal method upto two iterations

$$10x + 2y + z = 9$$

$$2x + 20y - 2z = -44$$

$$-2x + 3y + 10z = 22$$

- d) Show that $B(m, n) = B(n, m)$

e) Evaluate $\int_0^{\infty} x^2 e^{-x^2} dx$

- f) Express $\int_0^1 x^m (1-x^n)^p dx$ as Beta function.

Q.4 Attempt any FOUR

- Define Fourier Transform.
- Write Dirichlet conditions.
- Find Fourier constant a_0 if $f(x) = x^2$ define in $(-\pi, \pi)$
- Find $L(t^2 + \sin 3t)$
- Find $L(e^{-2t} \cos 4t)$
- Find $L^{-1}\left(\frac{s+2}{s^2-4s+13}\right)$

(08)

Section -II

Q.5 Attempt any FOUR

- Find $L\left(\frac{\sin t}{t}\right)$
- Find $L(t.e^{-3t} \cos^2 t)$
- Find $L^{-1}\left(\frac{1}{s(s^2+4)}\right)$ by using convolution theorem.

(16)

d) Find $L^{-1}\left(\frac{2s^2-4}{(s+1)(s-4)(s+2)}\right)$

- e) Find the Fourier transform of

$$f(x) = \begin{cases} 1 & \text{if } |x| < 1 \\ 0 & \text{if } |x| > 1 \end{cases}$$

- f) Find the Fourier series expansion of $f(x) = \frac{1}{2}(\pi - x)$ in $(0, 2\pi)$

Q.6 Attempt any FOUR

- Find the Fourier constant b_n for the function $f(x) = \sqrt{1 - \cos x}$ in $(0, 2)$
- Obtain the Fourier series for $f(x) = 0, -\pi < x \leq 0$
 $= x, 0 < x \leq \pi$
- Find the Fourier constant a_0 and a_n for $f(x) = e^{-x}$ in $(-1, 1)$
- Solve by L.T method $L \frac{dl}{dt} + RI = E e^{-at}$ Given $I(0) = 0$
- Solve $\frac{dy}{dt} + y = e^{-3t}, y(0) = 1$ by L.T method.
- Solve by L.T. method $\frac{dx}{dt} + 2x = e^{-t}, x(0) = 2$

(16)

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ODD TERM END EXAM NOV. / DEC. 2017

EXAM SEAT NO.

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LEVEL :- FOURTH

PROGRAM : ELECTRICAL ENGINEERING

COURSE CODE :- EEE406 /EE409/EE307

COURSE NAME :- SWITCHGEAR & PROTECTION

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 09 / 12/ 2017

Instruction :-

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

Section – I

Marks

Q.1 Attempt any FOUR

(08)

- a) Define normal condition related to a certain section or part of the electrical power system.
- b) Define neutral earthing related to electrical power systems.
- c) State the causes of over voltages in power systems.
- d) State the functions of CTs & PTs in substations.
- e) Justify the need for isolator location on both sides of the CB connected to large transformers.

- f) Justify the need for protective systems for different parts of the electric power systems.

Q.2 Attempt any FOUR

(16)

- a) List the different types of neutral earthing.
Describe anyone using labeled diagram. (01)
- b) Justify the need for the lightning arresstor even though the earth wire is located at the top of the transmission tower at a higher altitude as compared to the transformer in the substation. Does not the earth wire conduct the lightning to earth? (03)
- c) List the different types of isolators and describe the working of any one with labeled diagram.

- d) Draw labeled diagrams to show the different types of current limiting reactors.

- e) Describe methods of earthing large substations in brief. State the value range of the earth resistance for such substations.

- f) Describe using proper graphical representation the insulation coordination of a transformer substation. Justify the positioning of the insulation characteristics of the components there in.

Q.3 Attempt any FOUR

(16)

- a) Compare the HRC and semi-enclosed fuse on any four points.
- b) Describe using proper diagrams the arc formation process in the arcing chamber of the circuit breaker. Name two means by which it can be extinguished.
- c) State the various components of the circuit breaker operating time and show them on a diagram starting from the instant of fault to final closing of arcing contacts after the fault is cleared.

P.T.O.

- d) Describe using proper figures the operation of minimum oil circuit breaker under load conditions.
- e) A three phase circuit breaker is rated at 1250 A , 2000 MVA, 33KV, 4 sec. Determine the rated symmetrical breaking current, making current and short time rating.
- f) Describe the auto-reclosing feature of circuit breakers and state its advantages. State its types (two)

Section – II

Marks

Q.4 Attempt any **FOUR**

(08)

- Define “plug-setting Multiplier (P.S.M.)”.
- Define : i) Selectivity ii) Sensitivity of protection system.
- Define i) Pick-up current ii) Reset current of relay.
- What is Negative-phase sequence currents?
- Define “Zones of Protection”.
- State any two faults and atleast one cause of each for alternator.

Q.5 Attempt any **TWO**

(16)

- Write short note on “static over-current Relay”.
 - With neat diagram, explain the time-current characteristic of inverse type and IDMT type over-current relay.
- With neat diagram, explain how earth fault protection is provided for alternator. (04)
 - Explain with diagram, how protection against inter-turn fault is provided for alternator? (04)

(04)

(04)

- With neat diagram, explain differential pilot-wire protection of transmission lines.

Q.6 Attempt any **TWO**

(16)

- State any three advantages and disadvantages of static and microprocessor based relays. (06)
 - State the importance of C.T. and P.T. in power system protection. (02)
- With neat diagram, explain the operation of Translay Relay. (04)
 - Explain various abnormalities and faults in transformers. (04)
- Draw neat sketch of Buchholz relay. (03)
 - Explain how transformer is protected using Buchholz relay. (03)
 - State any two advantages of Buchholz protection. (02)
