

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO.

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LEVEL :- THIRD

PROGRAM : ELECTRICAL ENGINEERING

COURSE CODE :- EEG310 / EEF310

COURSE NAME TRANSMISSION AND DISTRIBUTION OF ELECTRICAL POWER

MAX. MARKS : 80 TIME : 03.45 HRS. DATE :- 25/06 / 2022

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	Question Text	R/ U/ A	Co EEG 310	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Classify underground cables based on voltage level.	U	1	
	b)	State any two disadvantages of proximity effect.	R	2	
	c)	'Skin effect increases with increase in frequency'. Justify.	R	2	
	d)	State two assumptions made while drawing equivalent circuit of nominal 'T' network of medium transmission line.	R	3	
	e)	State the effect of power factor on regulation of transmission lines.	R	3	
	f)	State the reasons for adoption of EHVAC transmission.	R	4	
Q.2		Attempt any FOUR :			16
	a)	Explain Bipolar HVDC link with neat diagram.	U	4	
	b)	Explain method of improving string efficiency by using a guard ring. Draw neat diagram.	A	1	
	c)	A transmission line has a span of 170m between level supports. The conductor has cross sectional area of 2cm^2 . The tension in the conductor is 2100kg. If the specific gravity of conductor material is 9.7 gm/cm^3 and wind pressure is 1.6Kg/m length, calculate the sag.	A	1	
	d)	Explain factors affecting corona.	U	2	
	e)	Explain Inductive coupling wireless power transmission system.	U	3	
	f)	Explain in brief procedural steps for construction of 110KV transmission system.	U	3	
Q.3		Attempt any TWO :			16
	a)	A single phase line transmits 1000KW at PF of 0.85 lagging. It has total resistance of 2Ω and inductive reactance of 3Ω . Determine: i) Voltage regulation ii) Transmission efficiency.	A	3	08
	b)	Explain i) Ferranti effect in transmission system. ii) Visual critical voltage	U	2	04 04
	c)	i) Explain with neat diagram 'Shackle Insulators. ii) Compare HVDC transmission with EHVAC transmission.	I	1	04 04

P.T.O.

Q.4	Attempt any FOUR :			08
	a)	What is Tariff? List the types of Tariffs employed in Electricity bill calculations.	R	2
	b)	List the causes of Low Power Factor.	U	2
	c)	List different types of Distribution Schemes.	R	2
	d)	Write the function of Isolator and Circuit breaker.	R	2
	e)	List the desirable characteristics of Good Tariff.	U	2
	f)	Classify the Distribution Substations on the basis of features and Load Capacity they carry.	R	2
Q.5		Attempt any FOUR :		16
	a)	Draw and Explain functioning of 3 wire distribution system.	U	4
	b)	Draw and explain 3 phase 4 wire A.C. distribution system.	U	4
	c)	Differentiate between Feeder and Distributor on basis of Design and use.	U	4
	d)	List and explain different methods employed for improvement of Power Factor.	R	4
	e)	Explain power factor Tariff employed and name type of customers for whom power factor tariff is employed.	U	4
	f)	List the required design considerations in distribution system.	U	4
Q.6		Attempt any TWO :		16
	a)	Draw and explain a neat labelled single line diagram of 33Kv/11Kv substation.	U	8
	b)	List and explain functions of all necessary equipments used in transmission and distribution systems.	R	8
	c)	Draw and explain a neat labelled single line diagram of 11Kv/415V substation.	U	8

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EVEN TERM ENDE EXAM JUNE – JULY 2022**EXAM SEAT NO.**

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LEVEL :- FOURTH**PROGRAM : ELECTRICAL ENGINEERING****COURSE CODE :- EEF402****COURSE NAME :- A. C. ROTATING MACHINES.****MAX. MARKS : 80 TIME : 3.45 HRS. DATE :- 25/06/2022****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.
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- 7) QN- Question No.. SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

		SECTION - I				Co EFF 402	Mar ks
QN	S Q N		R/ U/ A				
Q.1		Attempt any FOUR :					08
	a)	Write any two applications of 3-phase slip-ring Induction motor.	R	3			
	b)	Define : i) Slip speed ii) Skip	R	1			
	c)	State the function of end rings in squirrel cage induction motor.	U	1			
	d)	Why are the rotor bars of squirrel cage induction motor skewed?	U	1			
	e)	Write names of two devices used in DOL starter.	R	3			
	f)	What happens with the power factor when induction motor is loaded?	U	1			
Q.2		Attempt any TWO :					16
	a)	i) With neat sketch, Explain the working principle of 3-ph induction motor. ii) A 3-ph, 4-pole, 415V, 50Hz, induction motor is running on load with 4% slip. Calculate : 1) Speed of rotating magnetic field. 2) Rotor speed. 3) Frequency of rotor currents. 4) Frequency of rotor currents at standstill.	U	1			
			A	1			
	b)	i) Draw torque – slip (speed) characteristics of 3-phase induction motor and write equation for torque. Explain relationship between torque & slip. ii) With necessary equations, explain the effect of change in supply voltage and frequency on torque and speed of induction motor.	U	1			
			U	3			
	c)	i) 3-ph, 415V, 50Hz, 4-pole, star connected induction motor has rotor resistance and standstill reactance of 0.025Ω and 0.5Ω per phase respectively. Calculate : 1) Speed at maximum torque 2) Ratio of full – load torque to maximum torque, if full – load speed is 1440 rpm. ii) A 4-pole, 415V, 50Hz, 3-ph induction motor working with rated voltage and frequency, has a starting torque of 160% and a maximum torque of 200% of full – load torque. Determine 1) Full – load speed 2) Speed at maximum torque.	A	1			
			A	1			

Q.3		Attempt any TWO :			16
	a)	i) Explain why is the starter necessary for 3-phase induction motor.	U	3	
		ii) Draw power circuit and control circuit of fully automatic Star – Delta starter for 3-phase induction motor and explain its operation.	A	3	
	b)	i) 3-phase, delta-connected induction motor takes 10A and 450W with a line voltage of 110V during no-load test. If stator resistance / phase is 0.05Ω and friction and windage losses amount to 160W calculate the exciting branch parameters R_o and X_o .	A	1	
		ii) A 110V, 3-phase, star – connected induction motor takes 25A at a line voltage of 30V with rotor locked. With this line voltage, power input to motor is 440W and core loss in 40W. The dc resistance between a pair of stator terminals is 0.12Ω . If the ratio of a.c. to d.c. resistance is 1.6, find the equivalent leakage reactance per phase of the motor and the stator and rotor resistance per phase	A	1	
	c)	A 3 ϕ , 400V induction motor gave the following test reading No load test :- 400V, 1250 Watt, 9Amp Short cut test :- 150V, 4000W, 38 Amp Draw the circle diagram if the normal rating is 14.9 kw. Find from circle diagram. 1) Full load value of current. 2) P.F 3) Slip 4) Maximum output Power. 5) Maximum torque.	A	2	
QN	S Q N	SECTION - II	R/ U/ A	Co EEF 402	Mar ks
Q.4		Attempt any FOUR :			08
	a)	List the types of alternator according to the rotor construction.	U	4	
	b)	State the effect of hunting in synchronous motor.	U	5	
	c)	Define voltage regulation of 3 ϕ alternator.	R	4	
	d)	List the factors affecting the terminal voltage of alternator.	U	4	
	e)	State the reasons if a split – phase motor runs too slow.	U	6	
	f)	Define short pitch factor and distribution factor.	R	4	
Q.5		Attempt any FOUR :			16
	a)	Explain why single phase induction motor is not self starting.	U	6	
	b)	Discuss the advantages of rotating field of alternator.	A	4	
	c)	Describe the concept of load angle	U	5	
	d)	Draw and explain the shaded pole single phase induction motor.	U	6	
	e)	Derive the emf equation of an alternator.	A	4	
	f)	Define hunting. State effect of it on operation of synchronous motor.	U	5	
Q.6		Attempt any FOUR :			16
	a)	Discuss the methods of starting of synchronous motor.	U	5	
	b)	Describe the synchronous impedance method to finding out voltage regulation of 3 ϕ alternator.	A	4	
	c)	Explain double field revolving theory of single phase induction motor.			
	d)	Explain A.C. series motor with working principle & construction.	U	6	
	e)	Compare induction motor & synchronous motor.	R	5	
	f)	Discuss armature reaction at various power factor in 3 ϕ alternator.	U	4	

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EXAM SEAT NO.

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

COURSE CODE :- **EEG303/EEF302**

COURSE NAME **ELECTRICAL CIRCUITS**

MAX. MARKS : **80** TIME : **3.45 HRS.** DATE :- **24/06 / 2022**

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

QN	S	Q	N	R/ U/ A	Co CFG 306	Mar ks
Q.1				A		08
	a)	Attempt any FOUR : Define impedance of a.c. circuit and write down its equation for R.L.C series circuit.				3
	b)	If a series R.L.C circuit has $R=50\Omega$ $L=0.1\text{mH}$ & $C=50\mu\text{F}$ find its resonant frequency.				3
	c)	Write down equation of single phase A.C. supply.				2
	d)	Define phase and phase difference related to alternating quantity.				2
	e)	If $\vec{a} \rightarrow = 4 + j6$ & $\vec{b} \rightarrow = 6 - j8$ calculate $(\vec{a} \times \vec{b}) \rightarrow$				2
	f)	Write down equation for inductive reactance and also its unit.				3
Q.2						16
	a)	Attempt any FOUR : Find current through each branch using KCL & KVL in fig (1).				4
	b)	Using Norton's theorem find current through 1Ω resistance in fig. (2).				4
	c)	Derive equation of alternating voltage induced in an elementary alternator.				4
	d)	Explain terms - RMS value, Peak value, Average Value & Form factor related with alternating sinusoidal wave.				4
	e)	Explain resonance in R.L.C. series circuits and find equation for resonant frequency.				4
	f)	What are the different powers in A. C. circuit? Write down their equations for single phase and three phase circuits, Also write down their units.				4
Q.3						16
	a)	Find value of R_L such that it will absorb maximum power from source for the circuit shown in fig. (3).				2
	b)	Explain the terms wave form, peak value, cycle, frequency and time period related to single phase sinusoidal supply.				4
	c)	If $\vec{e_A} \rightarrow = 200\sin 40$ and $\vec{e_B} \rightarrow = 300\sin 60$ than find $\vec{e_C} \rightarrow = \vec{e_A} \rightarrow + \vec{e_B} \rightarrow$ and $\vec{e_d} \rightarrow = \vec{e_A} \rightarrow \times \vec{e_B} \rightarrow$				4
	d)	Explain Q factor in RLC series circuit.				3
	e)	Find current impedance, power factor & voltage drop across each component for the circuit shown in fig (4).				4
	f)	Find current through each branch in the circuit shown in fig. (1) using superposition theorem.				4

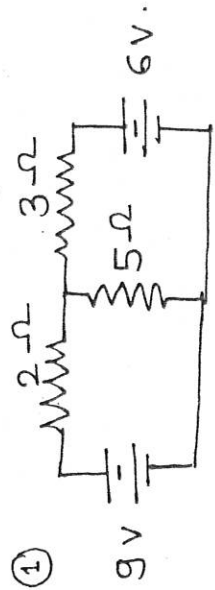
P.T.O.

Q.4	Attempt any FOUR :			08
	a) Define i) Admittance and ii). Conductance related to ac parallel circuits.	R	4	02
	b) Draw circuit diagram and phasor diagram for R-C parallel circuit supplied from single phase AC supply.	U	4	02
	c) State "Maximum Power Transfer Theorem" applied to a.c. networks.	R	5	02
	d) Draw Sinusoidal waveform of three phase emf and indicate the phase sequence.	U	6	02
	e) State two applications of delta connected Alternators.	R	6	02
	f) Draw neat labelled diagram of Power Triangle.	U	6	02
Q.5	Attempt any FOUR :			16
	a) A parallel circuit consist of a coil having $15\ \Omega$ resistance and 300mH inductance in parallel with a capacitor of capacitance $4\mu\text{F}$. Determine i) The resonant frequency (fr) & ii) Q- factor of a circuit at resonance.	A	4	04
	b) Draw complete circuit diagram and phasor diagram of voltage & currents for balanced delta connected load supplied by three phase a.c. supply.	U	6	04
	c) Explain in brief the "Norton's Theorem" applied to AC networks.	U	5	04
	d) An ac supply of 400V (line to line) is applied to three phase star connected identical impedance each consisting of $R = 4\ \Omega$ in series with $X_L = 3\ \Omega$. Find – i) The line current and ii) Total power supplied.	A	6	04
	e) State four advantages of three phase circuit over single phase circuits.	R	6	04
	f) Compare three phase balanced load with three phase unbalanced load on four points.	A	5	04
Q.6	Attempt any TWO :			16
	a) Two impedance given by $Z_1 = (10+j5)\ \Omega$ and $Z_2 = (8+j6)\ \Omega$ are joined in parallel and connected across a voltage of $V = (200+j0)$ volts. Calculate the circuit current, its phase and branch currents. Draw the Vector diagram.	A	4	04
	b) Apply the superposition theorem to the network shown in figure 6-b and obtain the current in the branch of $(3+j4)$ ohm impedance.	U	4	04
	c) Obtain Thevenin's equivalent circuit across AB for the given circuit shown in figure 6-c.	A	5	04

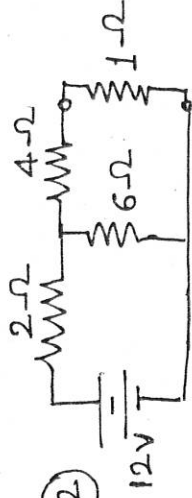
Circuit Diagrams.

Que. 2. (A) } Fig. ①

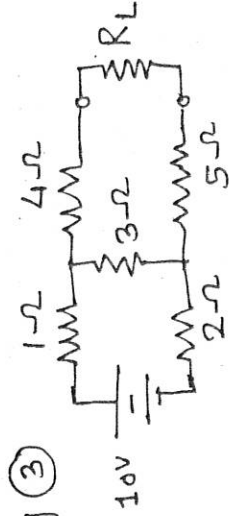
Que. 3 (B) } →



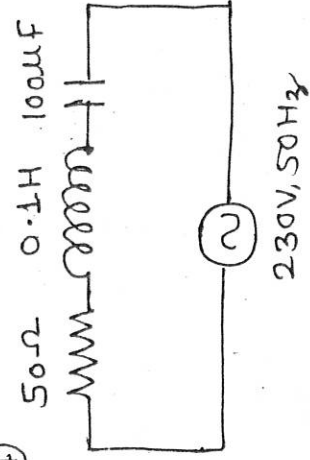
Que. 2 (B) Fig. ②



Que. 3 (a) Fig. ③



Que. 3 (b) Fig. ④



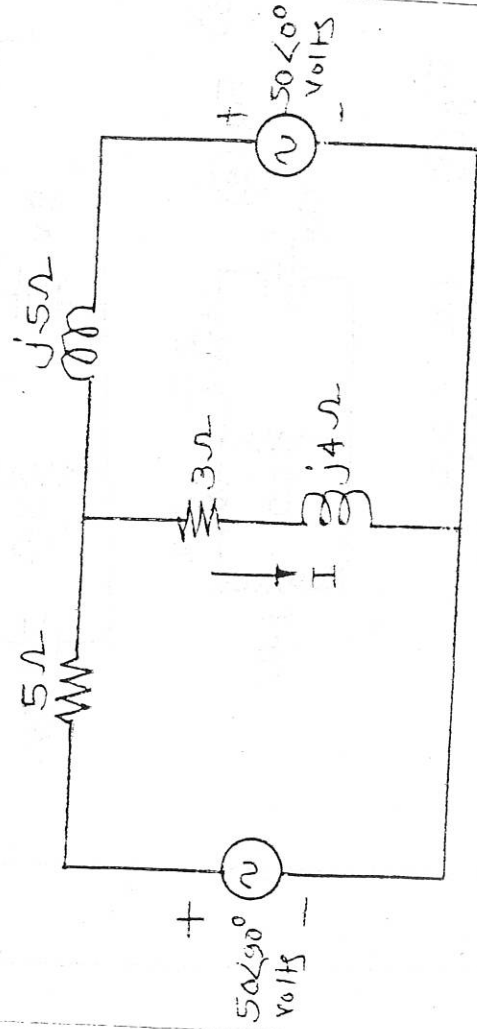


Figure 6-b

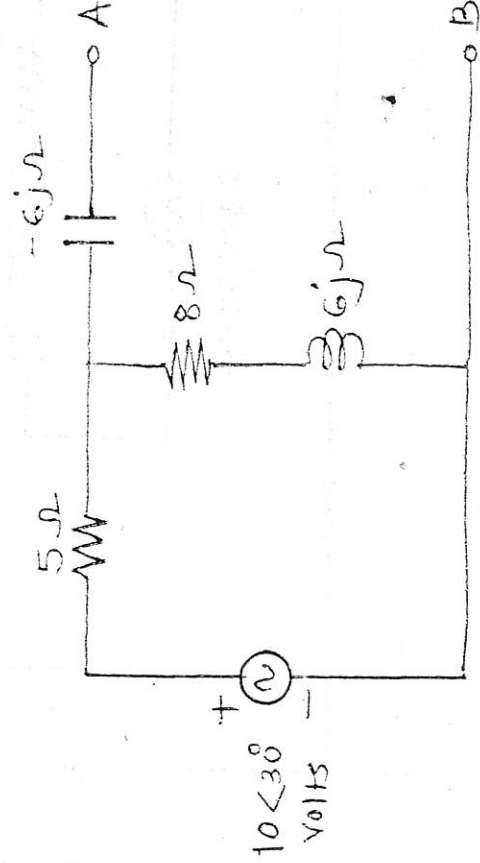


Figure 6-c

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO.

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LEVEL :- FIFTH PROGRAM : ELECTRICAL ENGINEERING

COURSE CODE :- EEF501/EE413

COURSE NAME TESTING & MAINTENANCE OF ELECTRICAL EQUIPMENTS

MAX. MARKS : 80 TIME : 03.45 HRS. DATE :- 23/06 / 2022

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
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- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	S Q N	SECTION -I	R/ U/ A	Co MEF 312	Mar ks
Q.1		Attempt any FOUR :			08
	a)	Draw any two safety symbols.	R	1	
	b)	State any four effects of misalignment on the performance of machine.	R	1	
	c)	State any four objectives of the preventive maintenance of electrical machines.	R	2	
	d)	What is meant by tolerance? Write the value of tolerance level of any two quantities of power transformer.	R	2	
	e)	Draw a neat circuit diagram to perform direct loading test on 3 ϕ induction motor (if generator is coupled with induction motor)	R	3	
	f)	Give list of routine test of 1 ϕ induction motor.	R	3	
Q.2		Attempt any FOUR :			16
	a)	Explain the procedure to be followed to rescuing a person, who have received an electric shock?	U	1	
	b)	Explain the procedure for developing preventive maintenance schedule.	U	2	
	c)	Explain correct procedure of conducting i) High voltage test ii) Quite running test on a single phase induction motor.	U	3	
	d)	Explain factors involved in designing the machine foundation.	A	1	
	e)	Compare direct and indirect method of testing on the basis of i) Nature of loading ii) Suitability iii) Power consumption iv) Time period v) Calculation vi) Accuracy vii) Safety viii) Example.	A	2	
	f)	In a brake test on a DC shunt motor, the effective load on the brake pulley was 265N. the effective diameter of the pulley is 65cm and the speed is 720 rpm. The motor takes 35 Amperes at 220 Volts. Calculate the output power and efficiency at this load.			
Q.3		Attempt any FOUR :			16
	a)	Explain the basic requirements of foundation for i) State equipments ii) Rotating equipments	U	1	

P.T.O.

	b)	Explain the indirect method of testing. State its advantages and drawbacks?	U	4
	c)	Explain maintenance schedule for synchronous machine as per IS 4884-1968.	U/ A	3
	d)	Compare preventive maintenance and breakdown maintenance on the basis of :- i) Objective ii) Definition iii) When to execute iv) Delay.	U	2
	e)	Draw the modified equivalent circuit of induction motor referred to stator side. Explain each component.	A	3
	f)	A three phase 400 Volt induction motor gave following test results:- No load test :- 400V, 9A, 1260 Watt. Blocked rotor test :- 140V, 38A, 4000 Watt. Draw the circle diagram and find i) Current ii) P.F. and slip at full load, if motor rating is 14.9 kw. (Assume rotor copper losses = stator copper losses at standstill)	A	3
QN	S Q N	SECTION -II	R/ U/ A	Co MEF 503 Mar ks
Q.4		Attempt any FOUR :		08
	a)	Write four reasons for deterioration insulation.	U	5
	b)	State the use of the dial indicator in electrical machine installation/ maintenance activity.	A	6
	c)	Write the formula for the correction factor when measuring temperature of internal parts of machines.	R	5
	d)	Explain two uses of the filter gauge in maintenance activity of machines.	A	6
	e)	Define vacuum impregnation.	R	5
	f)	Write the range/ value for setting the ELCB trip in a domestic installation.	A	6
Q.5		Attempt any TWO :		16
	a)	i) Give a 3 phase, 400 V/230V, 20KVA transformer of class B insulation, explain with neat labelled circuit/connections the determination of its insulation resistance to check its healthiness for use. Explain the significance of the polarization index in insulation resistance by Megger. ii) Reason out the possible causes & the remedial measures for the following symptoms separately seen in the induction motors (three phase motors) - excessive vibrations, - Varying stator current drawn at full load.	A	5
	b)	i) Name the different contaminants in insulating oils. Explain the method of purifying them. ii) A three phase transformer over heats under normal load conditions. State the possible causes and remedies.	A	6
	c)	i) Describe with simple sketches /flow diagram of the vacuum impregnation process. ii) Describe the measurement of earth resistance using the earth tester with the help of relevant circuit diagrams/ sketches.	A	5
			A	6

Q.6	Attempt any FOUR:		16
a)	List any four types tests on 3 phase power transformers and explain any one of them using proper circuit diagram mentioning the accuracy class of the instruments used.	Λ	4
b)	Describe using proper circuit diagrams the separate source voltage withstand test to be conducted on a 33 KV/11KV, 1.5MVA, 50HZ, 3phase transformer.	Λ	4
c)	Describe the open delta test on 3 phase power transformers using proper diagrams.	Λ	4
d)	Prepare the hourly, daily, monthly and quarterly inspection and preventive maintenance schedule for a 800 KVA transformer.	Λ	4
e)	Prepare the daily, quarterly, half yearly and two yearly inspection and preventive maintenance schedule for 2000 KVA transformer.	Λ	4
f)	Describe using relevant circuit diagram the Sumpner's test on two single phase transformers. Illustrate its applications for pre-determining their performance before actually putting them on load.	Λ	4

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EVEN TERM END EXAM JUNE – JULY 2022**EXAM SEAT NO.**

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LEVEL :- THIRD**PROGRAM : ELECTRICAL ENGINEERING****COURSE CODE :- EEF404/EEE508****COURSE NAME :- ELECTRIC POWER UTILISATION & TRACTION****MAX. MARKS : 80 TIME : 3.45 HRS. DATE :- 22/06/2022****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.
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- 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 ITF 409	Mar ks
Q.1			Attempt any FOUR :					08
		a)	What is electric traction.			R	1	
		b)	Define neutral sections.			U	2	
		c)	State the use of pantograph .			R	3	
		d)	What is section insulators?			U	2	
		e)	List the supply system of electric traction.			A	1	
		f)	State the need of locomotive maintenances.			U	3	
Q.2			Attempt any FOUR :					16
		a)	With suitable fig explain Arno converter auxiliary circuit equipment of electric locomotive .			A	3	
		b)	Explain section insulator with neat diagram.			U	2	
		c)	With suitable diagram explain method of obtaining uni-directional polarity in train lighting .			R	3	
		d)	With suitable diagram explain Faiveley type pantograph.			U	2	
		e)	Draw layout diagram of a typical traction substation & explain in brief.			U	1	
		f)	With a suitable diagram explain automatic weight tension.			A	4	
Q.3			Attempt any FOUR :					16
		a)	List & explain the miscellaneous equipment at control post or switching substation.			U	1	
		b)	List the power circuit equipment in an electric locomotive show it with suitable diagram.			A	3	
		c)	State the reasons why the distance between the overlaps is limited.			U	2	
		d)	With suitable diagram, explain BOW collector.			U	2	
		e)	Elaborate maintenance & inspection planning with their checklist used for maintenance of one of traction.					

P.T.O.

QN		S Q N	SECTION II			R/ U/ A	Co ITF 409	Mar ks
Q.4			Attempt any FOUR :					08
		a)	State the principle of Arc welding.			R	4	
		b)	Give properties of Resistance welding.			U	4	
		c)	State the importance of electrical characteristic of motors.			U	5	
		d)	Define electric drive.			R	5	
		e)	State different modes of heat transfer.			U	6	
		f)	State the properties of heating elements.			U	6	
Q.5			Attempt any FOUR :					16
		a)	Explain the construction and working of resistance oven.			A	4	
		b)	Explain the construction and working of Ajax – Wyatt vertical core type furnace.			A	6	
		c)	Explain the term load equalization.			U	6	
		d)	Draw a typical Speed – Time curve for main traction line service, show different time periods on it.			U	5	
		e)	State advantage of electric heating.			U	6	
		f)	Compare AC and DC welding.			U	4	
Q.6			Attempt any FOUR :					16
		a)	State any six application of dielectric heating.			A	6	
		b)	Explain principle of working of induction arc furnace .			A	6	
		c)	Compare between metal arc and carbon arc welding.			A	4	
		d)	State the factors governing selection of electric drives.			A	5	
		e)	Explain advantages and disadvantages of electric drives.			A	5	
		f)	State and explain electrical characteristic of motors used in Electric drives.			A	5	

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EXAM SEAT NO.

LEVEL :- **THIRD** PROGRAM : **ELECTRICAL ENGINEERING**
COURSE CODE :- **EEG-311 / EEF411**
COURSE NAME :- **ELECTRICAL ESTIMATION CONTRACTING**
MAX. MARKS : **80** TIME : **3.45 HRS.** DATE :- **22/06/2022**

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
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- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

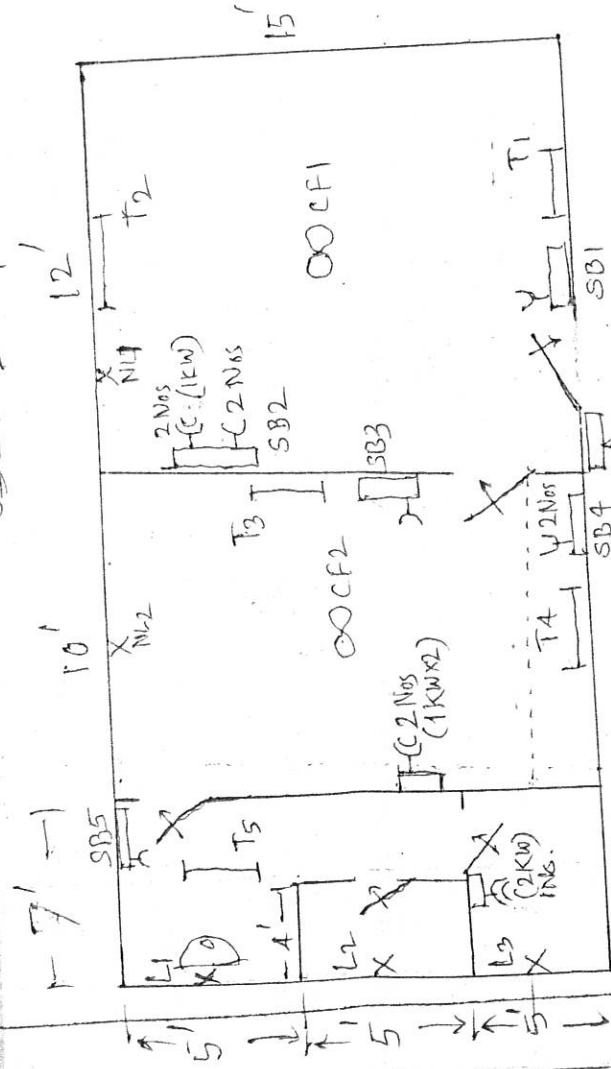
QN	S		R/ U/ A	Co ITF 409	Mar ks
Q.1		Attempt any FOUR :			08
	a)	State IE rule related to specification & rating useful in the electrification work.	R	1	
	b)	Explain briefly how estimation with cost can be prepared	R	1	
	c)	Select rating of ICDP for the residential load of 4.2kw	A	2	
	d)	Explain guidelines for earthing arrangement for residential load electrification work	R	2	
	e)	State types of building for commercial electrical installation work & their supply systems.	R	3	
	f)	State various clearances of switch & socket (5A,15A) boards in Auditorium & Hospital buildings.	U	3	
Q.2		Attempt any FOUR :			16
	a)	Enlist & briefly explain essential terms of preparation of estimation & costing of electrification work	U	1	
	b)	State & discuss briefly guide lines of residential wiring work related to positioning of wiring elements & equipments	U	2	
	c)	Sketch labeled diagram of MCB & Explain working briefly	A	2	
	d)	Date :- Light circuit :- 3 Tube set, 4 Lamps, 1 NL, 2 Ceiling fans, 2 Sockets (5A), 1 Socket (5A) on switch board, draw wiring diagram & single line diagram for the given light circuit data for residential house.	A	2	
	e)	Prepare estimate & cost for 3 Phase Main MCB DB for the given data of connected load circuits (3 Phase) i) SMDB-3 Nos each. 1 Phase gkw load, ii) 3 Phase 3kw electric motors load iii) Spare – 2 Nos each 3 kw, 3 Phase capacity for the hospital building (Supply 3 Phase, 415 V)	A	3	
	f)	Prepare estimate & cost for l/c 3 Phase SMDB for the given data of connected load circuits (1Phase) i) Light circuits = 10 Nos, ii) Power circuits = 10 Nos each 2 kw rating iii) Spare – 2 Nos. (Rating each 2 kw) (Use supply 3 Phase 415V & 1 Phase 230V)	A	3	
Q.3		Attempt any FOUR :			16
	a)	Explain sequence of procedure to prepare estimation & costing report for commercial building electrification	U	3	

P.T.O.

b)	Describe various qualities of a good estimator	U	1
c)	Enlist residential loads standard rating considered for total power & current calculation for design & estimation with cost	A	2
d)	Prepare & design estimation with costing for Mains meter board & MCBDB for given 1 RK flat layout in fig (1) with marking of Light 5 A sockets, 15A Power sockets & other loads with switch board	A	2
e)	Prepare & design estimation with costing for Mains meter board for 24 kw, 1Phase, 230V Load & 8 kw, 3 Phase, 415 V Electrical Motors load in a Auditorium building, Estimate the schedule of material with cost	A	3
f)	Select rating of SP/TP-MCB & ICDP or ICTP for following type of loads in any commercial building i) 1 Phase 3 kw lighting load ii) 3Phase 5kw Motor load Attempt any FOUR :	U	3
Q.4			08
a)	State the function of busbar and which material is used for busbar?	R	4
b)	State the function of starter & ELCB.	R	4
c)	Define following terms in street (road) lighting i) span ii) spacing	R	5
d)	Define the term tender	R	6
e)	State any two requirements of valid contract.	R	6
f)	Define the term earnest money deposit (EMD).	R	6
Q.5	Attempt any FOUR :		16
a)	Predict the type of starter required for the following i) IM of fractional HP rating ii) IM of rating upto 15 HP iii) IM with High rating iv) Slip ring IM of High rating	U	4
b)	Explain how decide fuse rating in factory unit.	U	4
c)	Explain the procedure to calculate motor current in any industrial installations	U	4
d)	Explain how lighting scheme should be designed for Hall.	U	5
e)	Explain complete procedure of submission and opening of tender.	U	6
f)	Explain the procedure for execution of work.	U	6
Q.6	Attempt any TWO :		16
a)	Estimate the cost of installation for workshop shown in fig No. 01	A	4
b)	A 1HP, 3 Phase 400 V Motor, 5 HP 3 Phase 400 V Motor, 0.75 HP 1 Phase 230 V Motor, 3 HP 3 Phase 400 V motor are proposed to be connected to ac supply. Calculate full load current, starting current, rating of main switch and selection of cable, also draw single line diagram for the same.	A	4
c)	i) Prepare list of lamps used for street lighting. ii) Prepare a tender notice with details for supply of 3 Phase, 200 KVA, 11 KV/400V transformer to your polytechnic.	A	6

Hand-drawn diagram of a power distribution system. A main horizontal line has three segments: 2m, 5m, and 10m. A 12m vertical line is connected to the 2m segment. At the end of the 12m line is a box labeled '17B DB'. At the end of the 5m segment is a box labeled '10HP' with '3Φ 11kV' written below it. At the end of the 10m segment is a box labeled '5HP' with '3Φ 11kV' written below it.

Use - I Q - 3 - D



U.
K.O.
P.

Tubefest - 40W
 SA socket - 100W
 C fan - 70W
 1SA socket - 2KW & 1KW.
 NL - 5W
 L1 to L3 - 15W

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MAX. MARKS : 80 **TIME : 3.45 HRS.** **DATE :- 30/06/2022**

- 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 EFF 504	Mar ks
Q.1		Attempt any FOUR :	A		08
	a)	Compare microprocessor and microcontroller (Any two points)	U	1	
	b)	List the family member of 8051 Microcontroller.	R	1	
	c)	State any four Features of 8051 micro-controller.	R	2	
	d)	Drawn the format of TMOD register.	R	2	
	e)	Explain Function of following instructions. i) DAA ii) ANL	R	3	
	f)	Write the operation of CJNEA, direct, rel instruction.	R	3	
Q.2		Attempt any FOUR :			16
	a)	Explain any four factors considered for selection microcontroller.	U	1	
	b)	Draw and label architecture of 8051 micro-controller.	U	2	
	c)	Drawn and explain format PCON register.	U	2	
	d)	Explain format of program status word.	U	2	
	e)	Write assembly language program to multiply two 8-bit numbers, store result at 55H _p . Write comments.	A	3	
	f)	Write assembly language program to transfer a block 10 data bytes stored in internal RAM location 40H to location 50H.	A	3	
Q.3		Attempt any FOUR .			16
	a)	Compare between 8051, 8052, 8031 and 8751 w.r.t. following points. i) RAM ii) ROM iii) No. of timer / counter iv) I/O pins	U	2	
	b)	Draw internal memory organization of 8051 and explain.	U	2	
	c)	Draw the format of IE register and explain.	U	2	
	d)	Explain any four directives with examples.	U	3	
	e)	Identify the addressing modes of following instructions. i) ADD A, R ₁ ii) NOV A, @R ₁ iii) MOVX A, @DPTR iv) DA A	A	3	
	f)	Write assembly language program to subtract two 16-bit numbers. Store result at R ₀ and R ₁ . Assume numbers as 1234H and 4321H	A	3	

P.T.O.

SECTION - II					
QN	S Q N		R/ U/ A	Co EFF 504	Mar ks
Q.4		Attempt any FOUR :			08
	a)	Draw the format of following SFR's i) TMOD ii) SCON	R	4	
	b)	Enlist the Interrupts in 8051 with their vector locations.	U	4	
	c)	Draw the Address map table for interfacing 4KX8, External DATA ROM.	U	5	
	d)	Explain absolute decoding technique	R	5	
	e)	Draw labelled Interfacing diagram of 4X4 matrix keyboard to 8051 microcontroller.	A	6	
	f)	Define step angle. Find out no of setups required for one revolution for step angles i) 1.8° ii) 5.0°	A	6	
Q.5		Attempt any FOUR :			16
	a)	Draw labelled Interfacing diagram of 8K X 8 external program memory ROM to 8051 microcontroller, with address mapping table.	R	5	
	b)	Develop ASM program to generate square wave of 50% duty cycle on pin pl.5 use timer 0, mode-1 to generate time delay,	R	4	
	c)	Develop ASM program using Interrupt switch is connected to pin P3.2 when switch is pressed, turn on all LED's connected to port 0.	A	4	
	d)	Explain mode 1 and mode 2 of Timer.	A	4	
	e)	Develop ASM program to turn ON LED connected to pin pl.2 for 1 sec, when switch connected to pin P2.2 is closed.	A	5	
	f)	Draw labelled Interfacing diagram of stepper motor with 8051. Develop ASM program to rotate motor clockwise with a step angle of 1.8°.	R	6	
Q.6		Attempt any FOUR :			16
	a)	Develop ASM program to generate a square wave of 10k Hz on pin pl.2 using timer 0. Assume XTAL = 22MHZ	A	4	
	b)	Develop ASM program to transfer letter 'Y' serially at 9600 baud rate continuously port 0.	A	4	
	c)	Draw labelled Interfacing diagram of 1k X 8, External data RAM to 8051 microcontroller with address mapping table.	U	5	
	d)	Draw labelled Interfacing diagram of Relay to 8051 microcontroller. Develop ASM program to ON relay for delay of 1 sec.	A	5	
	e)	Draw labelled Interfacing diagram of DAC 0808 to 8051 microcontroller. Develop an ASM program to generate a square wave.	A	6	
	f)	Develop ASM program to display message 'welcome' on LCD display.	U	6	

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM JUNE – JULY 2022

EXAM SEAT NO.

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LEVEL :- THIRD PROGRAM : ELECTRICAL ENGINEERING

COURSE CODE :- EEG307/EEF307

COURSE NAME :- DC MACHINES & TRANSFORMERS

MAX. MARKS : 80 TIME : 3.45 HRS. DATE :- 29/06/2022

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		R/ U/ A	Co EEG 307	Mar ks
Q.1		Attempt any FOUR :			08
	a)	State the working principle of DC generator.	R	1	
	b)	State the classification of DC generator.	R	1	
	c)	Compare LAP winding & wave winding of armature (any two)	R	1	
	d)	State the working principle of DC motor.	R	2	
	e)	State the need of starter for DC motor.	U	2	
	f)	State the function of Transformer.	R	3	
Q.2		Attempt any FOUR :			16
	a)	Derive EMF equation of DC generator.	U	1	
	b)	State the application of different types of DC generator.	A	1	
	c)	A four pole DC generator having wave wound armature winding has total 1020 conductors. Determine the EMF generated when driven at 1500 rpm assuming flux per pole to be 7 mwb.	A	1	
	d)	State the classification of DC motor and also state its applications.	R	2	
	e)	What is back EMF? Explain the significance of back EMF.	U	2	
	f)	Compare core type and shell type transformer.	R	3	
Q.3		Attempt any FOUR .			16
	a)	State the function of no volt coil of starter and over load coil.	A	2	
	b)	Explain the different losses takes place in transformer.	U	3	
	c)	Draw the phasor diagram of i) Ideal Transformer. ii) Transformer on No load & O_n load.	U	3	
	d)	Transformer rating is in KVA. True or False? Justify.	A	3	
	e)	A 3KVA, 220/110V transformer has 500 turns on its primary. Find its transformation ratio and secondary turns.	A	3	
	f)	Draw a speed torque characteristics of DC shunt motor and explain in detail.	A	2	
Q.4		Attempt any FOUR :			08
	a)	State the condition for maximum efficiency of 1 Φ transformer.	R	4	
	b)	Define voltage regulation of transformer.	R	4	
	c)	Define all day efficiency of transformer.	R	4	
	d)	State any two advantages of parallel operation of transformer.	U	5	
	e)	List out 3 Φ transformer connection.	R	6	
	f)	Define harmonics.	U	6	

Q.5	Attempt any FOUR :		16
a)	Draw the equivalent circuit of transformer referred to primary side of transformer as load.	A	6
b)	State the conditions to be satisfied for parallel operation of 3 ϕ transformer.	A	6
c)	Give any four selection criteria for 1) Distribution transformer. 2) Power transformer.	U	7
d)	State the need of parallel operation of transformer.	U	5
e)	Draw connection diagram to find efficiency of a transformer by direct loading in laboratory. Explain in briefly.	A	7
f)	Derive the condition for maximum efficiency of transformer.	A	7
Q.6	Attempt any FOUR :		16
a)	Two single phase transformers with equal turns have impedance of $(0.5+j3)$ ohm and $(0.6+j10)$ ohm with respect to the secondary. If they operate in parallel, determine how they will share a total load of 100kw at P.F. 0.8 lagging.	A	5
b)	Discuss working principle of isolation transformer and state its function.	U	4
c)	Identify the following vector group i) Dd0 ii) Dy5 iii) Yy6 iv) Yz11	A	4
d)	A 20 KVA, 1000/250 volt, 50Hz, single phase transformer gave following test results O.C. test (with L.V : open): 1000V, 2Amp, 250 watt. S.C. test (with H.V. Shorted): 5 volt, 50 Amp, 200 watt calculate percentage regulation & efficiency at half load 0.8 P.F. lagging.	A	4
e)	Explain working principle of single phase auto transformer. List any four advantages of 1 ϕ auto transformer.	U	4
f)	State the overall effects of harmonic as a transformer.	U	6

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO.

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

COURSE CODE :- **EEG306/EEF306**

COURSE NAME **ELECTRICAL POWER GENERATION**

MAX. MARKS : **80** TIME : **03.45 HRS.** DATE :- **01/07 / 2022**

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	Question Text	R/ U/ A	Co EEG 306	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Define i) Cold reserve capacity and ii) Hot reserve capacity.	R	2	
	b)	State four safe practices to be followed in Hydro power Station.	A	3	
	c)	Define i) Plant Use Factor and ii) Plant Capacity Factor.	R	2	
	d)	State the classification of Hydro power plants on the basis of water head.	U	3	
	e)	Enlist nuclear fuels used in Nuclear Power Plant.	R	3	
	f)	State four advantages of Nuclear Power Plants.	R	3	
Q.2		Attempt any FOUR :			16
	a)	Explain in brief the importance of the electrical power in day-to-day life.	U	1	
	b)	Compare conventional sources of power generation with nonconventional sources of power generation on four points	R	1	
	c)	A generating station has a connected load of 43MW and maximum demand of 20MW, the units generated being 61.5×10^6 per annum. Calculate i) Demand factor and ii) Load factor (For a year)	A	2	
	d)	With neat diagram, explain in brief i) Load duration curve and ii) Integrated duration curve.	U	2	
	e)	State four advantages and four disadvantages of "National Grid".	R	2	
	f)	List four thermal power plants with their capacities and location in India.	R	3	
Q.3		Attempt any TWO :			16
	a)	Explain in brief eight factors on which the selection of site for a thermal power plant depends.	A	3	
	b)	Explain the energy convention process for Hydro Power Station with plant layout diagram.	U	3	
	c)	With respect to Nuclear Power plants, explain in brief- i) Procedure for disposal of nuclear waste and ii) Nuclear Shielding iii) chain reaction.	A	3	

P.T.O

Q.4	Attempt any FOUR:			08
	a) Define i) Tilt angle ii) Maximum power point tracking (MPPT)	R	4	
	b) Enlist the sources of Geothermal energy.	U	6	
	c) State basic principle of electricity generation from tidal power.	R	5	
	d) Write composition of Bio-gas.	U	5	
	e) Give two basic types of ocean thermal Electric conversion (OTEC)	A	5	
	f) State classification of wind power plant.	U	4	
Q.5	Attempt any FOUR:			16
	a) With neat sketch discuss the photo voltaic cell construction.	R	4	
	b) Draw the basic components block diagram and explain functions of each for wind power plant.	A	4	
	c) List the advantages and disadvantages of geothermal energy.	A	6	
	d) Explain the KVIC type digester in detail.	R	5	
	e) Compare Horizontal axis and vertical axis wind machine on the basis of i) Power captured for same tower height. ii) Noise problem iii) Complexity of design and yaw mechanism. iv) Effect of fatigue arising from numerous resonance in structure.	A	4	
	f) Draw and explain open cycle turbine system in ocean thermal electric conversion (OTEC)	A	5	
Q.6	Attempt any FOUR:			16
	a) Write down the advantages of tidal power plant.	A	5	
	b) Describe site requirements of tidal power plant.	U	5	
	c) Write applications of magneto hydro dynamic (MHD)	A	6	
	d) Explain the Geothermal power plant in detail.	U	6	
	e) Explain the construction and working of basic induction generator.	U	4	
	f) Draw and explain construction and working of fuel cell.	U	6	

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO.

LEVEL :- FIRST

PROGRAM : ELECTRICAL ENGINEERING

COURSE CODE :- EEG102

COURSE NAME BASIC ELECTRONICS

MAX. MARKS : 40 TIME : 02.30 HRS. DATE :- 28/06 / 2022

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	Question Text	R/ U/ A	Co EEG 102	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Define i) Intrinsic semiconductor. ii) Extrinsic semiconductor.	R	1	
	b)	Compare PN junction diode with Zener diode (any two points)	U	1	
	c)	State the different types of filters.	U	2	
	d)	Classify rectifier. Give its working principle.	R	2	
	e)	State the modes of operation of transistor.	R	3	
	f)	Define Binary and Octal number system.	R	4	
Q.2		Attempt any FOUR :			16
	a)	Describe the difference between P type and N type semiconductor. <i>Differentiate</i>	U/ A	1	
	b)	Explain the process of breakdown of PN junction diode due to i) Avalanche effect ii) Zener effect.	A	1	
	c)	Draw and explain V-I characteristics of Zener diode.	U	1	
	d)	Draw and explain block diagram of regulated power supply.	R/ U	2	
	e)	Define the terms with respect to rectifier. i) Ripple factor ii) Average output voltage iii) Rectifier efficiency iv) PIV.	R	2	
	f)	Give the comparison between Half Wave Rectifier and Full Wave Rectifier. <i>compare</i>	A U	2	
Q.3		Attempt any FOUR :			16
	a)	Define α and β for transistor. State any four applications of transistor.	A	3	
	b)	With circuit diagram, explain input and output characteristics of CE configuration.	U/ A	3	
	c)	Derive the equation showing relation between α and β .	U	3	
	d)	Convert :- i) $(2856)_{10} - (?)$ 8. ii) $(4538)_{10} - (?)_{16}$.	A	4	
	e)	With suitable example explain the process of conversion of decimal number to octal number.	U/ A	4	
	f)	Explain working principle of CLC filter with circuit diagram.	A	2	

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EVEN TERM END EXAM JUNE – JULY 2022**EXAM SEAT NO.**

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LEVEL :- FIFTH**PROGRAM : ELECTRICAL ENGINEERING****COURSE CODE :- EEF502/EEE305/EEE503****COURSE NAME :- ELECTRIC MACHINE CONTROL & AUTOMATION****MAX. MARKS : 80 TIME : 3.45 HRS. DATE :- 27/06/2022****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			R/ U/ A	Co EEF 502	Mar ks
Q.1		Attempt any FOUR :				08
	a)	Distinguish clearly between power circuit & control circuit.		R	1	
	b)	State the concept of magnetic control.		U	1	
	c)	State the use of control transformer		U	2	
	d)	Draw circuit symbol of (i) Pressure switch (ii) Temperature switch		R	2	
	e)	State the need of under-voltage protection of motor.		U	3	
	f)	State the necessity of phase reversal protection.		U	3	
Q.2		Attempt any FOUR :				16
	a)	Develop and draw 3-wire control circuit and explain its features.		A	1	
	b)	State any four disadvantages of manual control.		U	1	
	c)	Compare Rewirable – fuse with HRC fuse on the basis of any four points.		A	2	
	d)	Explain the operation of Lock-out type contactor.		U	2	
	e)	With neat diagram, explain any one application of limit- switch.		A	2	
	f)	With neat diagram, explain the application of solenoid valve.		A	2	
Q.3		Attempt any FOUR :				16
	a)	State any four advantages of magnetic control using contactor in motor control.		U	1	
	b)	Explain the remote control application for motor in industry using temperature transducers.		A	1	
	c)	Explain the criteria of selection of fuse and over-load relay in motor feeder circuit.		A	3	
	d)	Elaborate over-temperature protection of AC motors.		U	3	
	e)	Explain thermistor characteristics employed in protection of AC motors.		A	3	
	f)	Distinguish clearly between over-load & short-circuit.		U	3	
QN	S Q N			R/ U/ A	Co EEF 502	Mar ks
Q.4		Attempt any FOUR :				08
	a)	Differentiate between the power circuits and control circuit of electric motors.		U	4	
	b)	State two areas for application of lifting magnets.		R	5	
	c)	Draw the EXOR gate & explain it.		R	6	
	d)	Define dynamic braking of induction motor Explain briefly.		R/ U	4	

	e)	Differentiate the time limit and current limit acceleration of slip ring induction motor on any two points.	U	4
	f)	Name four control components used in the overhead crane systems.	R	5
Q.5		Attempt any FOUR :		16
	a)	Draw the control and power circuits (of a 3-phase induction motor) DOL starter with random reversing.	A	4
	b)	Draw the power & control circuit diagrams (for a 3 phase squirrel cage induction motor) of the semi-automatic star - delta starter.	A	4
	c)	Draw the power & control circuit for plugging of 3 phase induction motor.	A	4
	d)	Draw control and power circuits for definite time limit acceleration of 3-phase slip ring motors.	A	4
	e)	Draw the power and control circuit diagram for the dynamic braking of AC motors.	A	4
	f)	Draw the power and control circuit diagrams for the induction motor using the auto transformer starter.	A	4
Q.6		Attempt any TWO :		16
	a)	i) Write any three requirements of controls in a planer machine. ii) Explain with neatly labeled block diagram the working of the PLC.	A A	5 6
	b)	i) Write the requirements of the control circuit of electric ovens. (3 requirements). ii) Draw a simplified AC input module circuit with indicator light for an input terminal of the PLC module. Explain its operation.	A A	5 6
	c)	i) Write three control circuit requirements for operation of overhead crane. ii) Draw a labeled simplified DC input module circuit and describe its working.	A A	5 6

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EVEN TERM END EXAM JUNE/JULY-2022**EXAM SEAT NO.**

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LEVEL :- THIRD**PROGRAM : ELECTRICAL ENGINEERING****COURSE CODE :- EEG309/EEF309****COURSE NAME APPLIED ELECTRONICS****MAX. MARKS : 80 TIME : 03Hrs.45 min.****DATE :- 07/07 / 2022****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	Question Text	R/ U/ A	Co EEG 309	Ma rks
Q.1		Attempt any FOUR :			08
	a)	State the applications of single stage CE amplifier (Any two)	R	1	
	b)	Draw the circuit diagram of transformer coupled Amplifier.	R	1	
	c)	State features of IC 723 voltage regulator.	R	3	
	d)	Draw the pin diagram of IC 723 voltage regulator.	R	3	
	e)	State the classification of oscillators.	R	2	
	f)	State features of IC 555.	R	2	
Q.2		Attempt any FOUR :			16
	a)	Explain with circuit diagram the operation of Direct Coupled Amplifier.	U	1	
	b)	Explain the operation of class B push pull amplifier with circuit diagram.	U	1	
	c)	Calculate the frequency of oscillations of Colpitt's oscillator with $C_1 = C_2 = 500\text{pF}$ and $L = 1\text{ mH}$.	A	2	
	d)	Explain the operation of crystal oscillator with the help of neat circuit diagram.	U	2	
	e)	Compare between Fixed and Variable Voltage Regulator.	U	3	
	f)	Draw the circuit diagram of Positive voltage Regulator (DC) using IC 7812 and explain it.	U	3	
Q.3		Attempt any FOUR :			16
	a)	Explain with circuit diagram of the High voltage Regulator by using IC 723.	U	3	
	b)	Draw the pin diagram of the following IC's. i) IC 7812 ii) IC 7912	U	3	
	c)	Explain the following terms by drawing the output characteristics of CE amplifier. i) Load Line - DC Load Line ii) Q Point.	U	3	
	d)	Explain single stage CE Amplifier with the help of circuit diagram and Input Output waveforms.	U	1	
	e)	Explain the operation of monostable multivibrator by using IC 555.	U	2	
	f)	Explain the block diagram of IC 555.	U	2	

P.T.O

Q.4	Attempt any FOUR :			08
	a) Draw a block diagram of OP-amp.			
	b) Define i) Input offset voltage ii) Input bias current.	R	4	
	c) Calculate gain of inverting amplifier if $R_f = 20k\Omega$ & $R_1 = 4k\Omega$	R	4	
	d) Draw a circuit diagram of OP-amp as non inverting amplifier.	A	4	
	e) Add the given binary number i) 1011 + 1100 ii) 1001 + 1111.	R	5	
	f) State any two laws of boolean algebra.	A	6	
		A	6	
Q.5	Attempt any FOUR :			16
	a) Explain level shifting stage of operational amplifier with circuit diagram.	U	4	
	b) Define parameters of IC 741 i) CMRR ii) SVRR iii) Slew rate iv) Output voltage swing.	R	4	
	c) Explain with diagram Successive Approximation ADC.	U	6	
	d) Draw a circuit diagram of OP-amp as a subtractor. Derive equation for output voltage.	U	5	
	e) Explain concept of virtual ground in OP-amp.	U	5	
	f) Perform following operation using 2's complement method. i) 7 - 5 ii) 5 - 7	A	6	
Q.6	Attempt any FOUR :			16
	a) Draw and explain practical transfer curve of OP-amp.	U	4	
	b) Draw a pin diagram of OP-amp IC 741, state function of each pin.	U	4	
	c) Compare integrator and differentiator. (four points)	U	5	
	d) Design the circuit diagram to get the output expression. $V_0 = - (2V_1 + V_2 + 5V_3)$	A	5	
	e) Derive the expression for the output voltage of basic integrator circuit.	A	6	
	f) Explain with circuit diagram R-2R ladder DAC converter.	A	6	

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EVEN TERM END EXAM JUNE – JULY 2022

EXAM. SEAT NO.

LEVEL: -FOURTH PROGRAM: ELECTRICAL ENGINEERING

COURSE CODE: - EEF508

COURSE NAME: - NON NONCONVENTIONAL POWER GENERATION

MAX. MARKS: 80 TIMES: 3Hrs.45 Min. DATE: - 07/07/2022

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 508	Mar ks
Q.1		Attempt any FOUR :					08
	a)	State any four renewable energy sources.			R	1	
	b)	Define Zenith angle.			R	1	
	c)	State advantages of flat plate collector (any two)			R	1	
	d)	Define : i) Hour angle ii) Declination			R	1	
	e)	Classify Wind energy conversion system on the basis of i) Based on axis ii) According to size.			R	2	
	f)	Define :- i) Lift force ii) Drag force			R	2	
Q.2		Attempt any FOUR :					16
	a)	Draw a neat labelled diagram of solar pond and explain its zone.			U	1	
	b)	Compare HAWT and VAWT with eight points.			A	2	
	c)	Draw a neat labelled diagram of flat plate collector and explain its working. Also state its applications.			A	1	
	d)	Explain basic principle of wind energy conversion on following points: i) Nature of Wind energy ii) Power in Wind			R	2	
	e)	Draw a neat labelled diagram of pyranometer which is used to measure solar radiation and explain its working.			A	1	
	f)	State advantages and limitation of WECS. (any two each)			U	2	
Q.3		Attempt any FOUR .					16
	a)	Explain solar photo voltaic electric conversion with neat diagram.			A	1	
	b)	Draw a neat diagram of following :- i) Solar distillation ii) Solar Pumping			R	1	
	c)	State selection factors for 5 Rte of wind mill.			R	2	
	d)	Draw a neat diagram of WECS and state function of each parts / components.			U	2	
	e)	Explain space heating and cooling with suitable diagram.			A	1	
	f)	State and explain safely systems and environmental aspects of Wind mill.			A	2	

P.T.O.

SECTION – II

QN	S Q N		R/ U/ A	Co EFF 508	Mar ks
Q.4		Attempt any FOUR :			08
	a)	Name the four waste materials used for Bio-mass generation.	C	3	
	b)	State the different methods of the ocean thermal electric power generation.	K	4	
	c)	List the sites requirements for ocean thermal electric conversion system (any 4)	K	4	
	d)	Name the main components of Tidal Power Plant.	K	4	
	e)	List any 04 important geothermal sites available in India.	C	5	
	f)	Classify Fuel cell.	C	5	
Q.5		Attempt any FOUR :			16
	a)	Discuss the KVIC digester type Biogas plant with neat diagram.	K	3	
	b)	Discuss the Energy Plantation for Biomass energy.	A	3	
	c)	Discuss the single basin operation method for tidal power plant with neat diagram.	C	4	
	d)	Discuss the advantages and limitation of Tidal Power Generation.	A	4	
	e)	Write about design consideration for Mini Hydel projects.	K	5	
	f)	With neat diagram discuss the principle of operation of Fuel Cell.	A	5	
Q.6		Attempt any FOUR :			16
	a)	Write site selection consideration for Biogas Plant installation.	K	3	
	b)	Draw and explain Pragati Biogas Plant	A	3	
	c)	Discuss closed cycle OTEC system.	C	4	
	d)	Write about the components of SHP system	K	5	
	e)	Explain working principle of Geo – thermal Energy.	K	5	
	f)	Draw and explain the open cycle MHD power generation system	A	5	

EXAM. SEAT NO.						

LEVEL: -**FOURTH** PROGRAM: **ELECTRICAL ENGINEERING**
COURSE CODE: - **EEG405/EEF406/EE410**

COURSE NAME: - POWER ELECTRONICS

MAX. MARKS: 80 TIMES: 3Hrs.45 Min. DATE: - 06/07/2022

Instruction:-

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- Appli

QN	S Q N	SECTION - I	R/ U/ A	Co EEG 405	Mar ks
Q.1		Attempt any FOUR :			08
	a)	Draw symbol of i) IGBT ii) SCR			
	b)	Draw the VI characteristics of i) UJT ii) Diac	R	1	
	c)	Draw the circuit diagram of single phase half wave controlled rectifier with RL load and free wheeling diode.	R	1	
	d)	Draw circuit diagram of 3Φ full converter with R load.	U	2	
	e)	Explain the circuit operation of step down chopper.			
	f)	Classify choppers	R	3	
Q.2		Attempt any FOUR :			
	a)	Draw V1 characteristics of SCR and explain.			16
	b)	Enlist and define turn ON methods of SCR.	R	1	
	c)	Draw neat circuit diagram of bridge converter symmetrical configuration. Explain its working operation with output waveforms.	U	1	
	d)	Draw the circuit diagram and input output waveforms of 3Φ Half converter with RL load for $\alpha = 45^\circ$	R	2	
	e)	Draw and explain midpoint converter with R load.	A	2	
	f)	Explain the circuit operation of Jone's chopper.	A	2	
Q.3		Attempt any FOUR .	U	3	
	a)	Define i) Natural commutation ii) Forced commutation.			16
	b)	Draw and explain Resistance-Capacitance firing circuit.	R	1	
	c)	Draw and explain single phase full wave controlled rectifier with RL load.	U	1	
	d)	Explain circuit operation of three phase full converter with RL load.	U	2	
	e)	Explain circuit operation of Morgan's chopper.	A	2	
	f)	Draw and explain asymmetrical bridge converter with RL load.	A	3	
			U	2	

QN		S	SECTION - II			R/ U/ A	Co EEG 405	Mar ks
Q.4			Attempt any FOUR :					08
	a)		Define: Inverter.					
	b)		State any two methods of voltage control in inverter by external control of AC output voltage.		R	4		
	c)		State any two application of cyclo-converter.		R	4		
	d)		Classify cyclo-converters on the basis of change in frequency.		R	5		
	e)		State on difference between On-line UPS and Off-line UPS.		R	6		
	f)		State basic concept of SMPS.		R	6		
Q.5			Attempt any TWO :					
	a)		i) With neat circuit diagram, explain in detail the operation of Emergency lighting system using SCR. ii) Draw diagram of battery charger using SCR.		U	6		16
	b)		i) With neat circuit diagram, explain in detail the operation of speed control of separately excited DC motor using half – controlled bridge rectifier. ii) Draw circuit diagram of single phase half wave converter drive		U	6		3
	c)		i) With neat circuit diagram, explain in detail the operation of three – phase to single – phase cyclo – converter. ii) Draw three phase to 3 phase cyclo - converter diagram.		U	5		5
Q.6			Attempt any TWO :					3
	a)		For parallel inverter – i) Draw neat circuit diagram. ii) Explain operation in detail. iii) Draw wave forms.		U/ A	4		16
	b)		For improved series inverter – i) Draw neat circuit diagram. ii) Describe circuit operation in detail. iii) Explain the feature by which the performance is improved than series inverter.		U/ A	4		
	c)		i) With neat circuit diagram, explain the operation of single phase midpoint cyclo – converter. ii) Draw a neat block diagram of On – line UPS and explain its operation.		U	5		
					U	6		

EVEN TERM END EXAM JUNE – JULY 2022

EXAM. SEAT NO.					
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LEVEL: -FIRST

COURSE CODE: - EEG101

PROGRAM: ELECTRICAL ENGINEERING
EEEC104

COURSE CODE: _____
COURSE NAME: _____

COURSE NAME: -
FUNDAMENTALS OF ELECTRICITY & MAGNETISM
MAX. MARKS: 80
TIMES: 3 HRS. 45 M.

MAX. MARKS: 80
TIMES: 3Hrs.45 Min.
DATE: - 05/07/2022

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- Applying

QN	S	R/ U/ A	Co EEG 101	Mar ks
Q.1	Attempt any FOUR :	A		08
	a) Define EMF and state its unit	R	1	
	b) Define capacitance and state its unit.	R	3	
	c) State the property of equipotential surface.	U	1	
	d) Explain resistivity and state its unit.	U	1	
	e) State the expression for the current division method of two resistances connected in parallel across the source.	U	2	
	f) Calculate the charge stored in the capacitor if the capacitance of capacitor is 2F and voltage applied across it is 20V.	A	3	
Q.2	Attempt any FOUR :			16
	a) State the difference between DC and AC using suitable sketch state at least four points.	U	1	
	b) State and explain the factors affecting the capacitance of the capacitor.	R	3	
	c) Calculate the capacitance, charge, electric flux density and energy stored in parallel plate capacitor of two metal plates of area 50cm x 50cm separated by dielectric of 2mm with relative permittivity is 4. The potential difference of 150V is applied across it.	A	3	
	d) The field coil of generator has 14.1Ω at 25° C and 20.2Ω at 42°C of resistance at 0°C and also resistance at 0°C.	A	1	
	e) State the expression for the conversion of star resistive network into delta resistive network.	U	2	
	f) Calculate the current and power across the resistance of 8Ω by using any desired method (See fig No.1)	A	1	
Q.3	Attempt any FOUR .			16
	a) Three capacitors 15μF, 36μF and 24μF are connected in a circuit find equivalent capacitance when they are connected in. i) Series ii) Parallel	A	3	
	b) Draw the symbol and characteristic of ideal voltage source and practical voltage source.			
	c) Explain the terms related to the electrostatic. i) Electric field strength ii) Potential Gradient State its unit.			

	d)	i) Convert the voltage source of Fig No.2 into equivalent current source. ii) Convert the current source of Fig.3 into equivalent voltage source		1
	e)	Calculate voltage across each capacitor if three capacitor's are connected in series $C_1=2\mu\text{F}$, $C_2=2\mu\text{F}$ and $C_3=3\mu\text{F}$. The supply voltage is 100V.		3
	f)	Calculate the resistance R_{AB} (See fig. No. 4)		2
Q.4		Attempt any FOUR :		08
	a)	Define and explain magnetic flux density and magnetic field strength.	U	4
	b)	Define absolute permeability . Give its unit.	R	4
	c)	What do you mean by magnetic circuit?	R	5
	d)	State and explain Lenz's law to determine direction of induced EMF.	R	6
	e)	Explain the term statically induced EMF.	R	6
	f)	What is Solenoid?	R	4
Q.5		Attempt any FOUR :		16
	a)	Explain the generation of magnetic field due to current carrying conductor.	R	4
	b)	Compare magnetic circuit and electric circuit on any 4 points.	R	5
	c)	State Faraday's first and second law of electromagnetic induction.	R	6
	d)	A wooden ring has mean length of 20cm and uniform cross – section 3cm^2 , it is uniformly wound with a coil of 600 turns. Find:- i) Magnetic field strength produced within the coil by a current of 2.5 A. ii) Flux density produced by this coil. Assume $\mu_r=300$	A	4
	e)	Explain hysteresis loop of magnetic material with neat diagram.	U	5
	f)	Give expression for coefficient of self induced EMF.	U	6
Q.6		Attempt any FOUR :		16
	a)	Define :- 1) MMF 2) Reluctance And also give their unit.	R	5
	b)	Compare statically induced EMF and dynamically induced EMF on any 4 points.	R	6
	c)	An iron ring of mean length 50cm has 500 turns of winding. The relative permeability of iron is 600. When a current of 3A flows in the winding determine flux density.	A	4
	d)	Find reluctance, flux, mmf required and exciting current for an iron ring with 200 turns having diameter of 15cm and 10sqcm cross sectional area if flux density is 1 wb per sq.m. and permeability of 500.	A	5
	e)	A conductor of 1.5m length moves right angle to a uniform magnetic field of flux density 1.2 T with a velocity of 100m/s. Calculate the value of induced EMF in the conductor. If conductor moves at an angle of 30° with the direction of field, calculate value of induced EMF.	A	6
	f)	Define following terms related to alternating quantity i) Amplitude ii) Frequency iii) Time period iv) Average value.	U	6

f) $I_{AB} = ?$ $P_{AB} = ?$

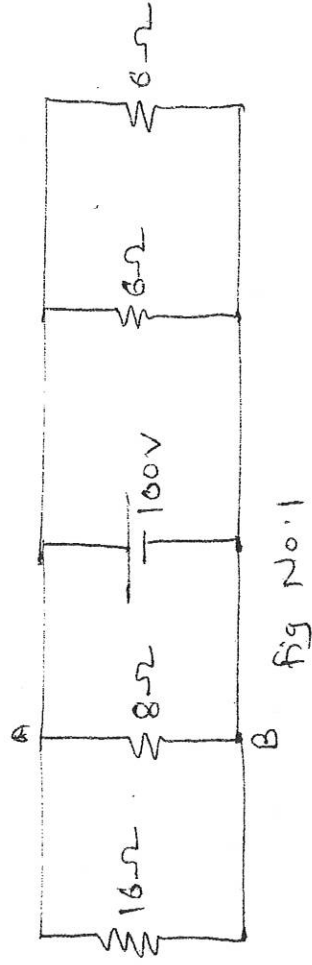


Fig No. 1

Q 3d)

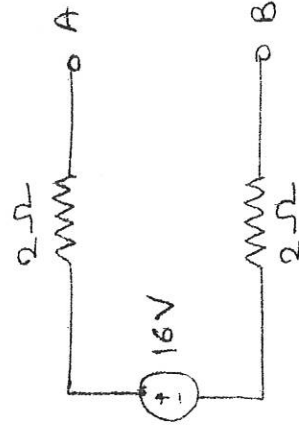


Fig No. 2

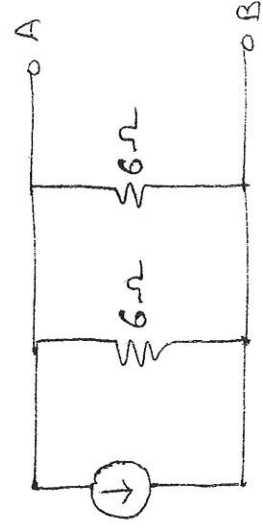
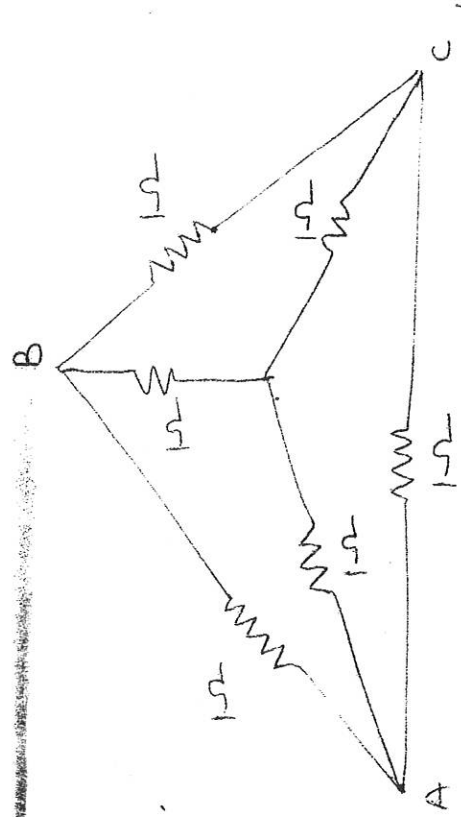


Fig No. 3

Q 3f)



(Fig No. 4)

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EVEN TERM END EXAM JUNE – JULY 2022

EXAM. SEAT NO.						
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LEVEL: -FIFTH PROGRAM: ELECTRICAL ENGINEERING**COURSE CODE: - EEF505****COURSE NAME: - ELECTRIC DRIVES****MAX. MARKS: 80 TIMES: 3Hrs.45 Min. DATE: - 04/07/2022****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				Co EEF 505	Mar ks
Q.1		Attempt any FOUR :		R/ U/ A			08
	a)	State type drives		R	1		
	b)	Justify group drives have more losses.		R	1		
	c)	Comment on electrical characteristics of drive as a factor of drive selection.		R	2		
	d)	State types of braking methods of electric motor drive.		R	2		
	e)	Describe starting of synchronous motor as drive.		R	3		
	f)	Enlist methods to control speed of 3 phase induction motor.		R	3		
Q.2		Attempt any FOUR :					16
	a)	Give advantages comparative of electric drives.		U	1		
	b)	State various mechanical characteristics of electric drives.		U	1		
	c)	Sketch characteristics of 3 phase induction motor and comment on it.		A	2		
	d)	Sketch characterization of 3 phase synchronous motor and comment on it.		A	2		
	e)	Explain with neat sketch starter voltage control for speed control method of 3 phase induction motor.		A	3		
	f)	Enlist starting methods and explain briefly with necessary circuit diagram of 3 phase induction motor.		U	3		
Q.3		Attempt any FOUR .					16
	a)	Compare 3 phase synchronous motor and 3 phase induction motor on basis of speed control and applications.		A	2		
	b)	State various types of single phase induction motor with their symbolic circuit diagram.		U	2		
	c)	Sketch characteristics of DC shunt and series motor and compare on basis of speed and torque value at starting and F.L. conditions.		A	2		
	d)	Explain frequency control speed control method for 3 phase induction and 3 phase synchronous motor in brief.		U	3		
	e)	State advantages of slip energy recovery system during speed control process.		U	3		
	f)	Sketch block diagram / circuit diagram of variable frequency converter of 3 phase induction motor.		A	3		

P.T.O.

QN		SECTION - II		R/ U/ A	Co EEF 505	Mar ks
Q.4	S Q N	Attempt any FOUR :				08
	a)	State the feature of power MOSFET which makes it suitable for low and medium power applications.		R	4	
	b)	Define: Duty cycle of chopper.		R	4	
	c)	State one difference between chopper and rectifier.		R	5	
	d)	State the concept of semi converter.		R	5	
	e)	List any two features offered by microprocessor based control		R	6	
	f)	List any two drive motors used in paper mills.		R	6	
Q.5		Attempt any TWO :				16
	a)	i) Elaborate the situation where four quadrant chopper drive is suitable with the help of neat circuit diagram. ii) With neat circuit diagram explain the operation of First – quadrant chopper drive.		U/ A U	4 4	
	b)	i) With neat circuit diagram, illustrate frequency control inverter using power MOSFET. ii) With the help of output voltage waveforms illustrate the difference between single phase semi converter (unsymmetrical configuration) and single-phase full converter.		A A	4 5	
	c)	Draw circuit diagram and output voltage waveforms of Three-phase semi converter drive. Explain its operation.		U	5	
Q.6		Attempt any TWO :				16
	a)	i) Compare the performance of single phase converter DC drive and three phase converter DC drive. ii) Elaborate the concept of phase locked loop control.		A U	5 6	
	b)	Draw a neat diagram and elaborate the scheme of microcomputer based DC drive.		U	6	
	c)	With the help of neat block diagram, explain sequence of stages and drives required at each stage in cement mill.		A	6	

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO.

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LEVEL :- THIRD

PROGRAM : ELECTRICAL ENGINEERING

COURSE CODE :- EEG304/EEF304

COURSE NAME ELECTRICAL AND ELECTRONICS MEASUREMENT

MAX. MARKS : 80 TIME : 03 hrs.45min. DATE :- 02/07 / 2022

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	Question Text	R/ U/ A	Co EEG 304	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Define the following terms with respect to measuring instrument i) Accuracy ii) Sensitivity.	R	1	
	b)	Draw constructional diagram of moving iron type instrument.	U	1	
	c)	State the classification of electrical measuring instruments.	R	1	
	d)	List the applications of LCR meter.	U	2	
	e)	Draw the diagram of dynamometer type wattmeter showing constructional details.	U	3	
	f)	Describe applications of Maximum demand Indicator.	U	3	
Q.2		Attempt any FOUR :			16
	a)	Draw and explain the operating mechanism of PMMC instruments.	R	1	
	b)	Explain with neat sketch the measurement of capacitance by schering bridge.	U	2	
	c)	List the various errors occurred in dynamometer type wattmeter and describe the way of compensating any one type of error.	U	3	
	d)	Explain the loading effect in ammeter and voltmeter.	A	1	
	e)	Explain the measurement of inductance by Anderson bridge.	U	2	
	f)	In a circuit, power is to be measured with a wattmeter having connections of 10A/300V, 1500 Watts full scale deflection. The reading of wattmeter was 750 Watts. State the value of actual power consumed by the load.	A	3	
Q.3		Attempt any FOUR :			16
	a)	State the types of errors in measuring instruments and reasons of occurrence of errors.	U	1	
	b)	Explain significance of sensitivity in measuring instrument.	A	1	
	c)	Three identical coils each of $(4 + j5)$ ohm are connected in star across 415V, 3-phase 50Hz supply find i) V_{ph} ii) I_{ph} iii) Wattmeter readings $W1, W2$. Explain two wattmeter methods for measurement of power in three phase circuit.	A	3	
	d)	Explain the measurement of reactive power of three phase balanced load by using single wattmeter method..	U	3	

P.T.O

	c)	Explain with neat sketch; the construction and working principle of Repulsion type moving iron instrument.	U	1	
	f)	Explain Kelvin double bridge method for the measurement of low resistance with neat circuit diagram.	A	2	
Q.4		Attempt any FOUR :			08
	a)	State the classification of transducer based on transduction principle.	U	5	
	b)	State the examples (any four) of passive transducers.	U	5	
	c)	State any four factors influencing the choice of transducer.	A	5	
	d)	State the piezoresistive effect of conductor.	U	5	
	e)	Draw the schematic diagram of CRO.	U	6	
	f)	Describe measurement of voltage using CRO.	U	2	
Q.5		Attempt any FOUR :			16
	a)	Distinguish between RTD and thermistor. (Any four points)	A	5	
	b)	Explain the working principle Electrical resonance type frequency meter.	A	4	
	c)	Draw constructional diagram of LVDT and list four features of LVDT.	R	5	
	d)	Explain the measurement of phase angle between two signals using CRO with the help of Lissajous pattern.	A	6	
	e)	Describe working principle of Weston type frequency meter.	U	4	
	f)	Explain the working principle of synchroscope.	A	4	
Q.6		Attempt any FOUR :			16
	a)	Explain the application of CT and PT for measurement in single phase AC circuit.	A	4	
	b)	Explain the construction of induction type watt hour meter with the help of diagram.	U	4	
	c)	Explain working principle of three phase digital energy meter with the help of block diagram.	A	4	
	d)	Explain construction of three phase power factor meter with the help of diagram.	R	4	
	e)	Explain working principle of digital multimeter.	A	6	
	f)	Explain the working principle of prepaid energy meter.	A	4	
