CBCS SCHEME - Make-Up Exam

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BEE401

Fourth Semester B.E/B.Tech. Degree Examination, June/July 2025
Electric Motors

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
1	a.	Explain the various losses that occur in DC Machines. Derive the condition for maximum efficiency of DC motor.	10	L1	CO1
	b.	With a neat diagram, explain the swinburn's test on a DC motor. Mention the demerits of this test.	10	L1	CO1
		OR			
2	a.	What is back emf? Explain the significance of back emf in DC motor.	7	L1	CO1
	b.	Explain the different characteristics of DC shunt motor.	6	L2	CO1
	c.	A 230 V DC shunt motor runs at 800 rpm takes current of 50 A. Find the resistance to be added to the field circuit on increasing the speed from 800 rpm to 1000 rpm at an armature current of 80 A. Assume flux is proportional to field current. Armature resistance is 0.15 Ω and field resistance is 250 Ω.	7	L3	CO1
		Module – 2			
3	a.	Derive Torque equation for three phase Induction Motor.	4	L2	CO2
	b.	Explain with suitable sketches the construction of squirrel cage and ship ring induction rotor. State the advantages and disadvantage of each type.	8	L1	CO2
	c.	A 3-ϕ, 400 V, 50 Hz, 4 pole induction motor has star connected winding. The rotor resistance and reactance are 0.1 Ω and 1 Ω respectively. The full load speed is 1440 rpm. Find the torque developed on full load by the motor. Assume stator to rotor ratio as 2 : 1.	8	L2	CO2
		OR			
4	a.	How to change the direction of rotating magnetic field?	4	L1	CO2
	b.	Discuss the complete torque-slip characteristics of a 3-ϕ Induction motor including motoring, generating and braking regions.	8	L2	CO2
	c.	A 3-ϕ induction motor having 6-pole stator winding in Y-connected runs on 240 V, 50 Hz supply. The rotor resistance and stand still reactance are 0.12 Ω and 0.85 Ω/phase. The ratio of stator to rotor turns is 1.8 and full load slip is 4%. Find the developed torque at full load, maximum torque and the speed at maximum torque.	8	L2	CO2
		Module – 3			
5	a.	Explain the construction and working of double cage induction motor.	6	L2	CO3
	b.	Explain the phenomenon of cogging and crawling in a 3-ϕ induction motor.	8	L2	CO3
	c.	Write short notes on induction generator.	6	L2	CO3

		OR			
6	a.	Discuss the losses in three phase induction motor.	**10**	**L2**	**CO3**
	b.	Starting from the fundamentals, draw and explain the equivalent circuit diagram of 3-ϕ induction motor.	**10**	**L2**	**CO3**
		Module – 4			
7	a.	Explain double field revolving theory as applied to a single phase induction motor.	**10**	**L2**	**CO4**
	b.	With schematic connection diagram and phasor diagram, explain the construction, working and application of a capacitor start induction motor.	**10**	**L1**	**CO4**
		OR			
8	a.	Explain the Direct on line starter of 3-ϕ induction motor with a suitable circuit diagram.	**10**	**L1**	**CO4**
	b.	Enumerate the speed control methods of 3-ϕ induction motor and explain supply frequency control method.	**10**	**L2**	**CO4**
		Module – 5			
9	a.	With a neat sketch, explain the construction and working of linear induction motor.	**6**	**L2**	**CO5**
	b.	With a neat sketch, explain the construction and working of universal motor.	**8**	**L2**	**CO5**
	c.	With a neat diagram, explain the construction and working of switched reluctance motor.	**6**	**L2**	**CO5**
		OR			
10	a.	What is a Synchronous condenser and its uses?	**6**	**L2**	**CO5**
	b.	Explain the principle of operation of synchronous motor and constant load variable Excitation.	**8**	**L2**	**CO5**
	c.	With a neat sketch, explain 'V' and inverted 'V' curves of synchronous motor.	**6**	**L2**	**CO5**

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BEE402

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025
Transmission and Distribution

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	**a.**	Draw a single line diagram of a typical transmission and distribution system. Indicate all the voltage levels and explain.	**10**	**L1**	**CO1**
	b.	Explain various types of line conductors used for overhead line.	**6**	**L2**	**CO1**
	c.	An overhead line has a span of 150 m between level supports. The conductor has a cross – sectional area of 2 cm^2. The ultimate strength is 5000 kg/cm^2 and safety factor is 5. The specific gravity of the material is 8.9 gm/cc. The wind pressure is 1.5 kg/m. Calculate the height of the conductor above the ground level at which it should be supported if a minimum clearance of 7 m is to be left between the ground and the conductor.	**4**	**L3**	**CO1**
		OR			
Q.2	**a.**	Draw a neat diagram of interconnection of component of distribution system and explain.	**8**	**L1**	**CO1**
	b.	Define Sag. With usual notations derive an expression for the sag of a transmission line when the supports are at equal level.	**8**	**L1**	**CO1**
	c.	Compare pin and suspension insulators.	**4**	**L2**	**CO2**
		Module – 2			
Q.3	**a.**	Derive an equation for inductance of 3 phase un-symmetrically spaced but transposed transmission line / km.	**8**	**L2**	**CO2**
	b.	Fig. Shows the spacings of a double circuit 3 phase – double circuit overhead line. The conductor radius is 1.3 cm and line is transposed. Calculate the inductance per phase per kilometer.	**6**	**L3**	**CO2**

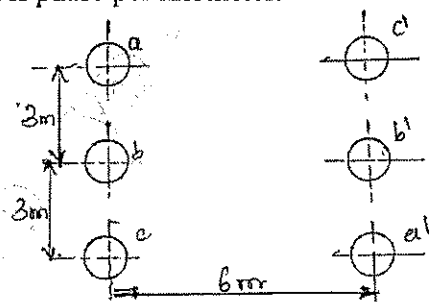
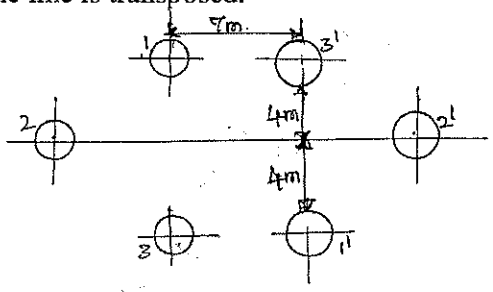
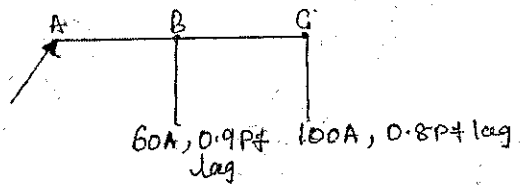


Fig. Q3(b)

	c.	The six conductors of a double circuit three phase line are shown in Fig. Q3(c). The diameter of each conductor is 2.5 cm. Find the capacitance to neutral assuming that the line is transposed.  Fig. Q3(c)	6	L3	CO3
		OR			
Q.4	a.	Derive an expression for capacitance of a 3 phase single circuit line with equilateral spacing.	8	L3	CO3
	b.	Calculate the loop inductance per km of a single phase line. Comprising of 2 parallel conductors 1 meter apart and 1 cm in diameter , when the material of conductor is i) Copper and ii) Steel of relative permittivity 50. Prove the formula used.	8	L3	CO3
	c.	Compare single circuit and double circuit arrangement of transmission lines.	4	L2	CO3
		Module – 3			
Q.5	a.	Deduce an expression for voltage regulation and transmission efficiency of single phase short transmission line by developing the vector diagrams.	10	L3	CO4
	b.	A 110 KV , 50 Hz , 3 phase transmission line delivers a load of 40 MW at 0.85 lag p.f at the receiving end. The generalized constants of the transmission line are A = D = 0.95 $\underline{\vert 1.4^\circ}$, B = 96 $\underline{\vert 78^\circ}$ Ω C = 0.0015 $\underline{\vert 90^\circ}$ mho regulation of the line and charging current. Apply nominal T method.	10	L3	CO4
		OR			
Q.6	a.	Derive expression for the generalized A , B, C, D constants for equivalent T network.	10	L3	CO4
	b.	Determine the efficiency and regulation of a 3 phase , 100 km , 50 Hz , transmission line delivering 20 MW at a power factor of 0.8 lag and 66 KV to a balanced load. The conductors are of copper , each having resistance of 0.1Ω per km , 1.5 m outside diameter spaced equilaterally 2 meters between centers. Neglect leakage , use normal π method.	10	L2	CO4
		Module – 4			
Q.7	a.	Explain the phenomena of Corona. List the factors affecting Corona.	10	L2	CO4
	b.	A 33 KV , 3 phase underground cable, 4 km long uses three core cables. Each of the conductor has a diameter of 2.5 cm and the radial thickness of insulation 0.5 cm. the relative permittivity of the dielectric is 3. Calculate 1. Capacitance of the cable / ph 2. Charging current / phase 3. Total charging KVAR.	10	L3	CO4

		OR			
Q.8	**a.**	Explain 1. Disruptive critical voltage 2. Visual critical voltages 3. Corona loss.	**10**	**L2**	**CO5**
	b.	Analyze grading of cables using capacitance grading method.	**6**	**L4**	**CO5**
	c.	The inner and outer diameters of a cable are 3 cm & 9 cm respectively. The cable is insulated with the two materials having permittivities of 5 and 4 respectively with corresponding maximum permissible stresses of 30 KV/cm and 20 KV/cm respectively. Calculate the radial thickness of each insulating layer and the safe working voltage of the cable.	**4**	**L3**	**CO5**
		Module – 5			
Q.9	**a.**	Explain 1. Radial distribution system 2. Ring main distribution system along with neat diagrams.	**10**	**L2**	**CO6**
	b.	Define Reliability. Explain different probability distributions.	**10**	**L2**	**CO6**
		OR			
Q.10	**a.**	A two wire distributor 1200 m long is loaded as shown in Fig. Q10(a) 'B' is the midpoint. The power factors at the two load points refer to the voltage at 'C'. The impedance of each line is (0.10 + j0.2) Ω. Calculate the sending end voltage, current and power factor. The voltage at point 'C' is 220 V. Fig. Q10(a) 	**10**	**L3**	**CO6**
	b.	Analyze the effect of disconnection of neutral in 3 phase 4 wire system.	**6**	**L4**	**CO6**
	c.	Explain any 4 limitations of distribution system.	**4**	**L3**	**CO6**

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CBCS SCHEME - Make-Up Exam

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BEE403

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025
Microcontrollers

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	With a neat diagram explain the internal architecture of 8051 microcontroller.	12	L1	CO1
	b.	List the special function registers and their address in 8051 micro controller.	8	L1	CO1
		OR			
Q.2	a.	Explain with example various addressing modes of 8051 μc.	8	L2	CO1
	b.	Compare Microprocessor and Microcontroller.	6	L2	CO1
	c.	Mention address of the registers and contents of RAM locations after the following program: SETB PSW·4 MOV R_0, # 10H MOV R_1, # 0ABH MOV R_2, # 2FH MOV R_5, #11H	6	L2	CO1
		Module – 2			
Q.3	a.	What will be the content of the A and B register after executing the following code: CLRC MOV OEOH, # OFFH MOV OFOH, # OFH DIV AB	4	L1	CO2
	b.	What are assembler directives? Explain any 4 of them with an example.	8	L1	CO2
	c.	Differentiate between the following restrictions of 8051 microcontroller: i) SWAP & XCH ii) MOVX & MOVC iii) LCALL and ACALL iv) Bit level ANL and byte level ANL	8	L2	CO2
		OR			
Q.4	a.	A switch is connected to pin P1.7. Write a program to check the status of the switch and make the following decision. If SW = 0, then send OOH to P2. If SW = 1 then send FFH to p2.	6	L1	CO2

	b.	Write an ALP to find the average marks of a student scored in six subjects. Assume that the marks are stored from location 40h and the average is to be stored at location 50h.	8	L1	CO2
	c.	Explain bit Jump instructions with an example.	6	L2	CO2
		Module – 3			
Q.5	a.	Explain different data types supported by 8051C microcontroller.	8	L1	CO3
	b.	Write an 8051 C program to send the value 44 H serially one bit at a time via P1.0 the LSB should go out first.	8	L1	CO3
	c.	Explain the bit pattern of TMOD register.	4	L1	CO3
		OR			
Q.6	a.	Assume that crystal frequency XTAL = 12 MHz and write a program to generate a square wave of 50 Hz frequency on pin 1.2. Use timer – 1 and operate the timer – 1 in mode – 1.	8	L4	CO4
	b.	Write a program for counter – 1 in mode – 2 to count the pulses and display the state of TL_1 count on P_2. Assume that clock pulses are feed into pin T1.	8	L1	CO4
	c.	Explain the bit pattern of TCON register.	4	L1	CO4
		Module – 4			
Q.7	a.	Compare polling and interrupts. What are the steps a microcontroller performs upon activation of interrupts?	8	L3	CO5
	b.	Write an 8051 C program that continuously gets data from P1.7 and sends it to P1.0 while simultaneously creating a square wave of period 200 μs on pin P2.5. Assume crystal frequency = 11.0592 MHz and use Timer '0' to create square wave.	12	L3	CO5
		OR			
Q.8	a.	Explain the importance of TI and RI flags.	8	L1	CO6
	b.	If the crystal frequency is 22 MHz, what will be the band rate if i) $TH_1 = -3$ ii) $TH_1 = -12$ with SMOD = 0 and SMOD = 1	4	L1	CO6
	c.	Write an 8051C program to transfer the message "HELLO" serially at 9600 baud rate 8-bit data, 1-stop bit. Do this continuously.	8	L4	CO6
		Module – 5			
Q.9	a.	Explain how DAC 0808 can be interfaced to 8051 microcontroller and also write an assembly language program to generate triangular wave.	10	L1	CO5
	b.	A switch is connected to P2.7. Write an assembly language program to monitor the status of the switch 'SW'. If SW = 0, DC motor moves clockwise and If SW = 1, DC motor moves anticlockwise.	10	L3	CO5
		OR			
Q.10	a.	Show the interfacing of a stepper motor to 8051 and write a program to rotate the stepper motor clockwise/anticlockwise continuously with full step sequence.	10	L3	CO6
	b.	Explain how to interface 4 x 4 matrix key board to 8051 microcontrollers.	10	L1	CO6

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BEE405A

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025
Electrical Power Generation and Economics

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain the factors to be considered for the selection of site for hydro electric power plant.	06	L2	CO1
	b.	Explain the classification of hydro power plants.	06	L2	CO1
	c.	With a neat schematic diagram, explain the essential elements of hydroelectric power plant.	08	L2	CO1
		OR			
Q.2	a.	What are differences between Impulse turbine and Reaction turbine?	06	L2	CO1
	b.	Discuss the utility of hydrograph, flow duration curve and mass curve for the hydro power plant.	06	L2	CO1
	c.	Explain the governing mechanism of hydraulic Impulse turbine and reaction turbine with neat sketches.	08	L2	CO1
		Module – 2			
Q.3	a.	Explain the function of air preheater, super heater and economizer in thermal plant.	06	L2	CO2
	b.	What are the advantages and disadvantages of steam power plant?	06	L1	CO2
	c.	With a neat sketch, explain fluidized bed combustion.	08	L2	CO2
		OR			
Q.4	a.	Explain with a neat sketch the closed cycle gas turbine power plants.	06	L2	CO2
	b.	Discuss the application of diesel power plant.	06	L2	CO2
	c.	Discuss the following in diesel power plant : i) Fuel Supply System ii) Air Intake System iii) Lubricating System iv) Engine Starting System	08	L2	CO2
		Module – 3			
Q.5	a.	Explain the advantages and disadvantages of Nuclear Power Plant.	06	L2	CO3
	b.	Give the various classification of nuclear reactor and explain any one.	06	L1	CO3
	c.	Draw the schematic diagram of a Nuclear Power Station and discuss its operation.	08	L2	CO3

		OR			
Q.6	**a.**	Discuss the disposal of nuclear waste in nuclear power station.	**06**	**L2**	**CO3**
	b.	Explain the following with respect to nuclear power plant: (i) Moderator (ii) Control rods (iii) Reflector	**06**	**L2**	**CO3**
	c.	Discuss the factor to be considered for selecting site for nuclear power plant.	**08**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	What is Substation? Discuss the main components of substation.	**08**	**L2**	**CO4**
	b.	Discuss the classification of substation.	**06**	**L2**	**CO4**
	c.	Discuss the factors to be considered for site selection of substation.	**06**	**L2**	**CO4**
		OR			
Q.8	**a.**	With a neat sketch, explain the grounding system through earthing transformer.	**06**	**L2**	**CO4**
	b.	A 230 V, 3ϕ, 50 Hz, 200 Km transmission has a capacitance to earth of 0.01 mF/Km per phase. Calculate the inductance and KVA rating of Peterson coil used for earthing the above system.	**06**	**L3**	**CO4**
	c.	Explain double bus without sectionalisation with neat diagram and advantages.	**08**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain the following terms as applied to power station: i) Average Load ii) Maximum Load iii) Diversity Factor iv) Plant Use Factor	**08**	**L2**	**CO5**
	b.	Explain Two Part tariff and Power Factor tariff.	**06**	**L2**	**CO5**
	c.	Discuss the various methods of Power Factor Improvement.	**06**	**L2**	**CO5**
		OR			
Q.10	**a.**	Explain any two methods of determination of depreciation.	**06**	**L2**	**CO5**
	b.	Explain the factors affecting tariff.	**06**	**L2**	**CO5**
	c.	A generating station has 3×50 MW units. The station output is 876×10^6 KWH per annum. The maximum demand is 120 MW. Calculate i) Average Load on Station ii) Annual Load Factor iii) Annual Capacity Factor iv) Utilization Factor	**08**	**L3**	**CO5**

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BEE405C

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025
Engineering Materials

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Briefly explain Quantum and Classical mechanics and Wave practicle duality De Broglies equation.	10	L2	CO1
	b.	Derive the one dimension Schrodinger's equation : $\frac{\partial^2\Psi}{\partial x^2}+\frac{2m}{h^2}(E-V)=0$	10	L2	CO1
		OR			
Q.2	a.	Briefly explain energy well model of metal and derive the normalized wave function $\psi=(2/L)^{1/2}\sin\left(\frac{n\pi}{L}\right)x$.	10	L2	CO1
	b.	Write a note on Finite potential barrier.	10	L2	CO1
		Module – 2			
Q.3	a.	Determine the packing density of a face centered cubic unit cell with brief explanation.	10	L2	CO2
	b.	Explain the Band theory of solids in detail.	10	L2	CO2
		OR			
Q.4	a.	Derive the packing density of a body centered cubic unit cell and also briefly explain.	10	L2	CO2
	b.	Define the following terms : i) Unit cell ii) Atomic radius iii) Co-ordination number iv) Packing density.	10	L1	CO2
		Module – 3			
Q.5	a.	Explain in detail gaseous insulating materials.	10	L2	CO3
	b.	Explain in detail liquid insulating materials.	10	L2	CO3
		OR			

Q.6	a.	What is relative dielectric constant? Mention the expression for the dielectric susceptibility.	10	L2	CO3
	b.	Define the following terms : i) Electric susceptibility. ii) Dielectric constant iii) Polarizability iv) Dielectric Polarization	10	L1	CO3
		Module – 4			
Q.7	a.	Explain in detail Intrinsic and Extrinsic semiconductors.	10	L2	CO4
	b.	With neat diagram explain Hall effect.	10	L2	CO4
		OR			
Q.8	a.	Distinguish between intrinsic and extrinsic semiconductors.	10	L2	CO4
	b.	Sketch the energy band diagram and explain n-type and p-type semiconductor.	10	L2	CO4
		Module – 5			
Q.9	a.	Explain the different types of energies that are responsible for growth of domains in a ferromagnetic material.	10	L2	CO5
	b.	Differentiate soft and hard magnetic materials.	10	L2	CO5
		OR			
Q.10	a.	Plot an B-H curve and explain the magnetic hysteresis loop formation on the basis of domain theory of ferromagnetism.	10	L2	CO5
	b.	Derive the relation between relative permeability (μ) and susceptibility (χ).	10	L2	CO5

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CBCS SCHEME

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BEE405A

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025
Electrical Power Generation and Economics

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define the terms with graph : i) Hydrograph ii) Flow duration curve iii) Mass curve	06	L1	CO1
	b.	Explain with neat sketch the working of hydroelectric power plant station and explain the functions of each components in it.	10	L2	CO1
	c.	List out the merits and demerits of Hydro power plant.	04	L1	CO1
		OR			
Q.2	a.	Discuss with a schematic diagram. i) Low head hydro power plant ii) Medium head power plant iii) High head hydro power plant iv) Pumped storage hydro power plant.	12	L2	CO1
	b.	With a neat sketch, explain the function of governor used to control the speed of hydraulic turbine.	08	L2	CO1
		Module – 2			
Q.3	a.	With a neat sketch, explain overfeed and underfeed stokers.	07	L2	CO2
	b.	Explain the working of steam power plant with neat diagram.	07	L2	CO2
	c.	Discuss the advantages and disadvantages of diesel power plant.	06	L2	CO2
		OR			
Q.4	a.	Draw a layout of diesel power plant and explain its operation with its important components.	08	L2	CO2
	b.	Discuss in brief the methods of improving thermal efficiency of gas turbine power plant.	08	L2	CO2
	c.	With a flow diagram, explain the fuel handling system.	04	L2	CO2
		Module – 3			
Q.5	a.	Draw a neat diagram of pressurized water reactor and explain its advantages and disadvantages.	08	L2	CO3
	b.	Write briefly about Nuclear Waste Disposal.	06	L2	CO3
	c.	What is nuclear reactor? How are nuclear reactor classified?	06	L3	CO3
		OR			
Q.6	a.	With a neat sketch, explain main parts of Nuclear Reactor.	10	L2	CO3
	b.	Explain the construction and working of 'Gas-cooled reactor'. What are its advantages and disadvantages.	10	L2	CO3

		Module – 4			
Q.7	**a.**	Draw the line diagram of 66/11 KV substation.	**06**	**L3**	**CO4**
	b.	Explain resonant grounding with a neat diagram and also list the advantages and disadvantages.	**08**	**L2**	**CO4**
	c.	Define substation and mention different types of substation.	**06**	**L1**	**CO4**
		OR			
Q.8	**a.**	Explain Earthing transformer with neat diagram.	**06**	**L2**	**CO4**
	b.	Draw a neat single bus bar system and explain it.	**08**	**L2**	**CO4**
	c.	Write short notes on : i) Resistance grounding ii) Reactance grounding	**06**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Define Tariff. Explain different types of tariffs. (Any two type)	**06**	**L2**	**CO5**
	b.	Explain the main disadvantages and causes of poor power factor.	**06**	**L2**	**CO5**
	c.	Discuss the measures by which low power factor can be avoided.	**08**	**L2**	**CO5**
		OR			
Q.10	**a.**	Define the following terms applied to power system. i) Load factor ii) Demand factor iii) Plant capacity factor	**06**	**L1**	**CO5**
	b.	An industrial undertaking has connected load of 200KW. The maximum demand is 150KW. On average each machine works for 70% of time. Find yearly expenditure on electricity if the tariff is Rs. 3000 + Rs. 700 per KW of maximum demand per year + Rs. 0.60 per KWh.	**08**	**L4**	**CO5**
	c.	Explain the concept of load sharing and choice of size and number of generating plants.	**06**	**L2**	**CO5**

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