

K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Nov – Dec 2023

Program: B.Tech Scheme III

Examination: FY Semester: I

Course Code: BSC105 and Course Name: Basics of Electrical Engineering

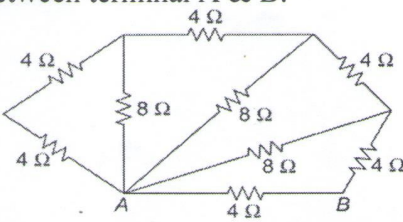
Date of Exam:

Duration: 2.5 Hours

Max. Marks: 60

Instructions:

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	Solve any six questions out of eight:	12		
i)	State Thevenin's theorem and draw Thevenin's equivalent circuit.	2	CO1	R
ii)	A voltage of 125 V at 50 Hz is applied across a non-inductive resistor connected in series with a capacitor. The current is 2.2 A. The power loss in the resistor is 96.8 W. Calculate the resistance and capacitance.	2	CO2	Ap
iii)	Find the resistance between terminal A & B. 	2	CO1	Ap
iv)	What are the applications, advantages, disadvantages of a three phase induction motor.	2	CO5	U
v)	What is the phase line relation in balanced star and delta connected load.	2	CO3	U
vi)	Three identical coils each of $(4.2 + j5.6)$ ohms are connected in star across a 415 V, 3-phase, 50 Hz supply. Determine (i) V_{ph} , (ii) I_{ph} .	2	CO3	Ap
vii)	An 80 kVA, 3200/400 V, 50 Hz single-phase transformer has 111 turns on the secondary winding. Calculate (i) number of turns on primary winding, (ii) secondary current.	2	CO4	Ap
viii)	Explain principle of operation of single phase Induction Motor.	2	CO6	U
Q.2	Solve any four questions out of six.	16		

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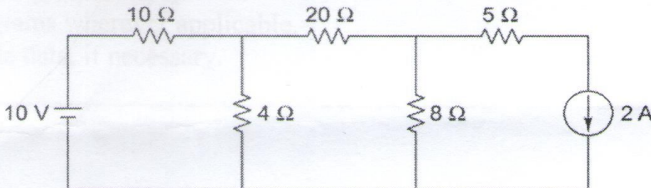
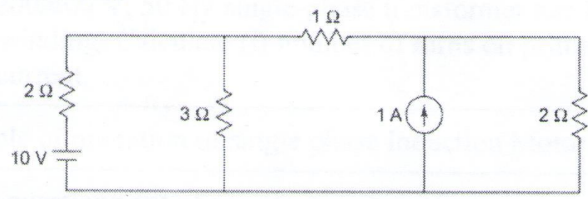
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i)	<p>Using mesh analysis find the current through 20Ω resistors.</p> 	4	CO1	An
ii)	<p>An alternating current of frequency 50 Hz has a maximum value of 12A. Find the following: (i) Angular frequency in radians/sec; (ii) Equation of instantaneous value of current; (iii) Value of current after 5msec; (iv) RMS value of current.</p>	4	CO2	Ap
iii)	<p>A balanced star-connected load is supplied by a 415 V, 50 Hz three-phase system. The current in each phase is 20 A and lags 30° behind its phase voltage. Find the (i) phase voltage, (ii) power, and (iii) circuit parameters. Also, find power consumed when the same load is connected in delta across the same supply.</p>	4	CO3	Ap
iv)	<p>Draw the phasor diagram of a single-phase transformer on resistive load. (Unity power factor)</p>	4	CO4	U
v)	<p>Briefly explain the principle of operation of the three phase Induction motor. What are the types of three phase Induction Motor?</p>	4	CO5	U
vi)	<p>Explain permanent magnet stepper motor</p>	4	CO6	U
Q.3	<p>Solve any two questions out of three.</p>	16		
i)	<p>State Superposition Theorem and find the current 1Ω through by using Superposition Theorem.</p> 	8	CO1	An

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ii)	A coil connected across a 250 V, 50 Hz supply takes a current of 10 A at 0.8 lagging power factor. What will be the power taken by the choke coil when connected across a 200 V, 25 Hz supply? Also calculate resistance and inductance of the coil.	8	CO2	An
iii)	Explain Open Circuit / Short Circuit Test of Transformer and solve- A 5 kVA, 200/400 V, 50 Hz, single-phase transformer gives the following test results: OC test (LV side) 200 V, 0.7 A, 60 W SC test (HV side) 22 V, 16 A, 120 W Draw the equivalent circuit of the transformer and insert all parameter values.	8	CO4	Ap
Q.4	Solve any two questions out of three.	16		
i)	A coil of 10Ω resistance and 0.1 H inductance is connected in series with a capacitor of $200\mu\text{F}$ capacitance. Calculate the current, the coil voltage, and the capacitor voltage. The supply is 230V at 50Hz. At what frequency will the circuit resonate. Calculate the voltage at resonant frequency across the coil and the capacitor. For this assume that the supply voltage is 230V of variable frequency.	8	CO2	An
ii)	State maximum power transfer theorem. Find maximum power in the circuit given. <div style="text-align: center;"> </div>	8	CO1	An
iii)	With the help of a phasor diagram, prove that two wattmeter method can measure the power in a three phase star connected circuit.	8	CO3	U
