

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

April – May 2023

(B.Tech) Program: All Branches

Examination: FY Semester: I Subject: Basic Electrical Engineering

Date of Exam: 03/7/23

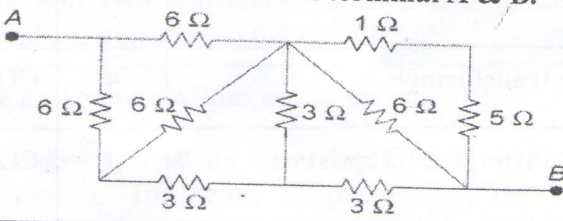
Duration: 2.50 Hours

Max. Marks: 60

BSC105

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 maximum power transfer theorem.	2	CO1	1
ii)	A capacitor of 35 μF is connected in series with a variable resistor. The circuit is connected across 50 Hz mains. Find the value of the resistor for a condition when the voltage across the capacitor is half the supply voltage.	2	CO2	2
iii)	Find the resistance between terminal A & B. 	2	CO1	2
iv)	Derive the condition for resonance in a series circuit.	2	CO2	1
v)	In a balanced three phase circuit, the power is measured by two wattmeter's the ratio of wattmeter reading is 4: 1. Determine load power factor.	2	CO3	3
vi)	What is the phase line relation in star connected system.	2	CO3	1
vii)	Explain losses in the transformer.	2	CO4	2
viii)	A 250 kVA, 50 Hz single-phase transformer has ratio of secondary to primary turns as 0:1. The secondary voltage at no-load condition is 240 V. Calculate primary voltage.	2	CO4	2
Q.2	Solve any four questions out of six.	16		

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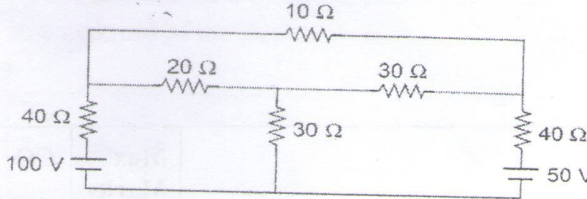
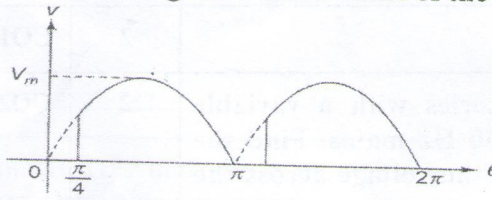
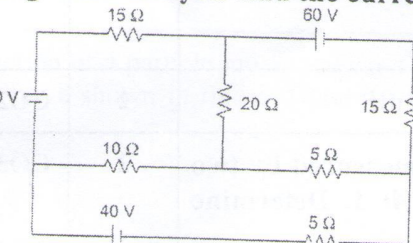
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Duration: 2.30Hours

Max. Marks: 60

i)	<p>Find the value of current flowing through the 10 Ω resistor by using Thevenin's theorem.</p> 	4	CO1	3
ii)	<p>Find the average and RMS value of the following waveform.</p> 	4	CO2	3
iii)	<p>What are the advantages, disadvantages, and applications of three phase induction motor.</p>	4	CO5	1
iv)	<p>Derive emf equation for single phase transformer.</p>	4	CO4	2
v)	<p>Using mesh analysis find the current through 20Ω resistors.</p> 	4	CO1	3
vi)	<p>A balanced 3-phase load consists of 3 coils, each of resistance 4Ω and inductance 0.02 H. It is connected to a 440 V, 50 Hz, 3 phase supply. Find the total power consumed when the load is connected in star and the total reactive power when the load is connected in delta.</p>	4	CO3	3

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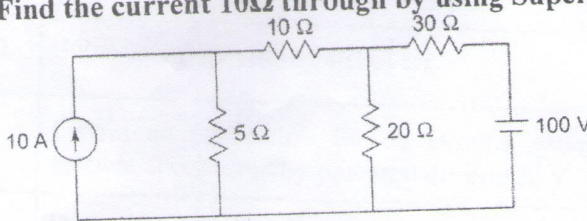
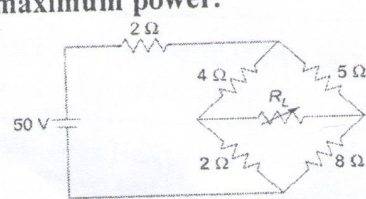
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Duration: 2.50 Hours

Max. Marks: 60

Q.3	Solve any two questions out of three.	16		
i)	Find the current 10Ω through by using Superposition theorem. 	8	CO1	3
ii)	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	2
iii)	Prove that two wattmeter method can measure the power in three phase star connected circuit.	8	CO3	2
Q.4	Solve any two questions out of three.	16		
i)	A voltage $v(t) = 10 \sin \omega t$ is applied to a series R-L-C circuit. At the resonant frequency of the circuit, the voltage across the capacitor is found to be 500 V. The bandwidth of the circuit is known to be 400 rad/s and the impedance of the circuit at resonance is 100Ω . Determine inductance and capacitance resonant frequency, upper and lower cut-off frequencies.	8	CO2	3
ii)	Find the value of the load resistance R_L and calculate the maximum power. 	8	CO1	3
iii)	Briefly explain the principle of operation of the three phase Induction motor. What are the types of three phase Induction Motor?	8	CO5	2
