BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

SEMESTER : I
SESSION : MO/2023

CLASS: B.TECH/IMSC
BRANCH: BT/CIVIL/CHEMICAL/MECH/PIE/FT/PHYSICS

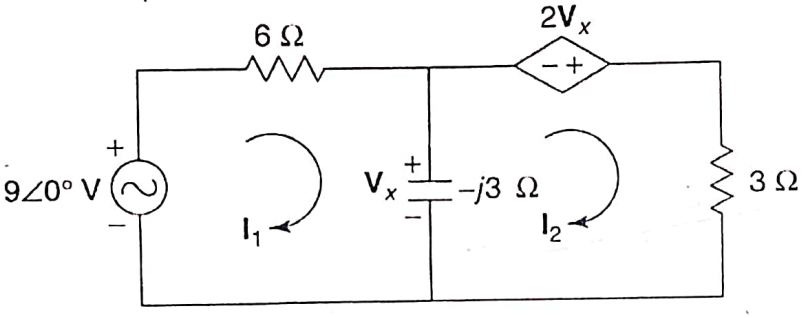
SUBJECT: EE101 BASICS OF ELECTRICAL ENGINEERING

FULL MARKS: 50

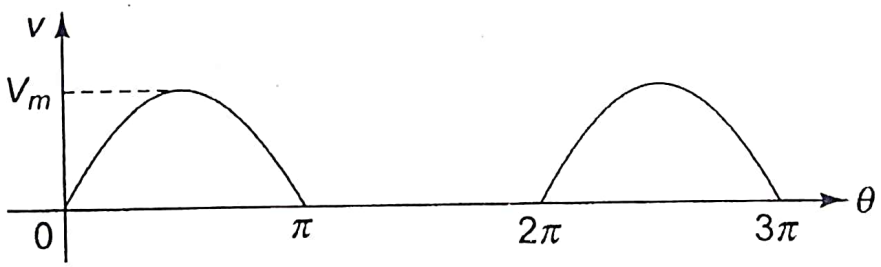
TIME: 3 Hours

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Define (i) independent and dependent source, (ii) Hysteresis, (iii) Eddy current, (iv) linear and non-linear elements, and (v) reluctance	[5]	1	1
Q.1(b)	Apply mesh analysis to calculate the currents I_1 and I_2 in the circuit shown below. Also, estimate the power loss in the 3 ohm resistor.	[5]	1	3



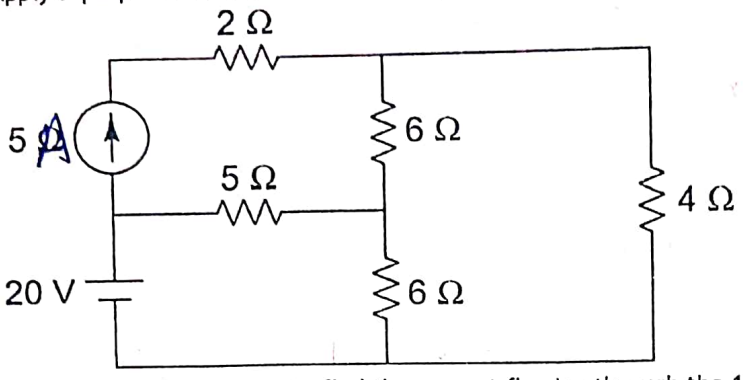
Q.2(a)	For the sinusoidal voltage signal shown below, calculate the RMS value, average value, form factor and peak factor.	[5]	2	3



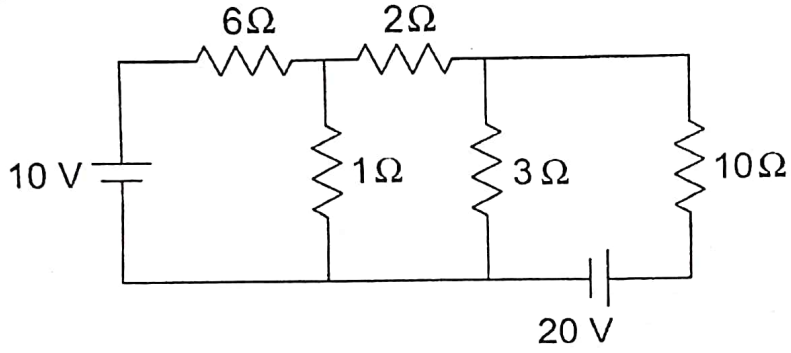
Q.2(b)	A circuit consists of a pure resistor and coil in series. Power dissipated in the resistor and in the coil are 1000 W and 250 W respectively. The voltage drops across the resistor and the coil are 200 V and 300 V respectively. Determine (i) value of pure resistance, (ii) resistance and reactance of the coil, (iii) combined resistance of the circuit, (iv) combined impedance, and (v) supply voltage.	[5]	2	3
Q.3(a)	For the two-wattmeter method of power measurement of a three-phase system, prove that the sum of the two-wattmeter readings W_1 and W_2, equals the active power of the three-phase system. Draw the phasor diagram.	[5]	3	3
Q.3(b)	Three coils, each having a resistance and an inductance of 8 ohm and 0.02 H respectively, are connected in star across a three-phase, 230 V, 50 Hz supply. Find the (i) power factor, (ii) line current, (iii) power, (iv) reactive volt-amperes, and (v) total volt-amperes.	[5]	3	3

PTO

Q.4(a) Apply superposition theorem to find the power loss in the 4 ohm resistor. [5] 4 3



Q.4(b) Apply thevenin's theorem to find the current flowing through the 10 ohm resistor and the power loss in it. [5] 4 3



Q.5(a) Explain the working principle of a transformer. Enumerate the different types of transformers. [5] 5 2

Q.5(b) Explain the construction and working principle of an induction type wattmeter. [5] 5 2

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