Total No. of Questions – [4]

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MAY 2023 (INSEM+ ENDSEM) EXAM

F.Y. B. TECH. (SEMESTER - II)

COURSE NAME: BASIC ELECTRICAL ENGINEERING

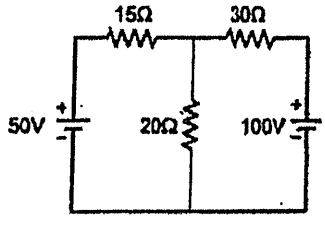
COURSE CODE: ET10203A

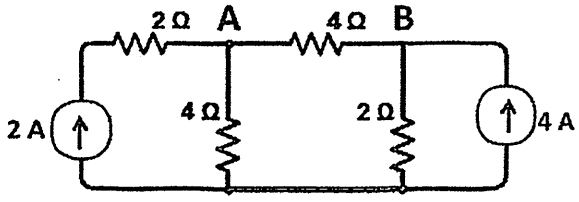
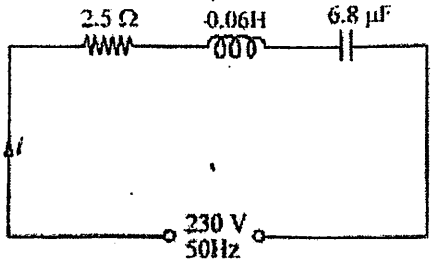
(PATTERN 2020)

Time: [2Hr] [Max. Marks: 60]

(*) Instructions to candidates:

1) **Figures to the right indicate full marks.**
2) **Use of scientific calculator is allowed**
3) **Use suitable data where ever required**

Question No.	Question Description	Marks	CO mapped	Blooms Taxonomy Level
Q.1	**Solve the following** i) For a circuit shown in Fig. 1 with 20 Ω as a load branch resistance, the equivalent resistance viewed from the open terminals after removing the load branch and shorting the voltage sources will be  Fig. 1 a) 45 Ω b) 75 Ω c) 10 Ω d) 4.5 Ω	[2]	1	Apply
	ii) For the circuit shown in Fig. 1 with 30 Ω as a load branch resistance, the equivalent resistance viewed from the open terminals after removing the load branch and shorting the voltage sources will be a) 65 Ω b) 8.57 Ω c) 35 Ω d) 16.15 Ω	[2]	1	Apply
	iii) For a circuit shown in Fig. 1 the current flowing through 20 Ω resistance will be a) 1.11 A b) 2.22 A c) 3.33 A d) 0 A	[2]	1	Apply

	iv) For a circuit shown in Fig. 1, the power consumed by 20 Ω resistance is a) 0 W b) 86.92 W c) 48.76 W d) 98.56 W	[2]	1	Apply
	v) For the circuit shown in Fig. 2, the current in branch AB with only 2 A current source acting alone will be  Fig. 2 a) 2 A b) 0.2 A c) 3.75 A d) 0.8 A	[2]	1	Apply
	vi) For the circuit shown in Fig. 2, the current in branch AB with only 4 A current source acting alone will be a) 2 A b) 0.2 A c) 3.75 A d) 0.8 A	[2]	1	Apply
	vii) For a circuit shown in Fig. 2 the current flowing through branch AB will be a) 0.4 A b) 0 A c) 1.6 A d) 0.8 A	[2]	1	Apply
	viii) In the application of Superposition theorem to a given network, a voltage source is considered acting independently while the current source in the network is _____ a) shorted b) opened c) removed d) undisturbed	[2]	1	Understand
	ix) For the circuit shown in Fig. 3, inductive reactance and capacitive reactance of the circuit is respectively  Fig. 3 a) 188.5 Ω, 6.48 Ω b) 6.48 Ω, 188.5 Ω c) 18.85 Ω,648 Ω d) 648 Ω, 18.85 Ω	[2]	2	Apply
	x) For the circuit shown in Fig. 3, impedance of the circuit is a) 4.492 Ω b) 44.92 Ω c) 449.2 Ω d) 4492 Ω	[2]	2	Apply
	xi) For the circuit shown in Fig. 3, current of the circuit is a) 0.512 A b) 5.12 A c) 15.2 A d) 0.152 A	[2]	2	Apply
	xii) For the circuit shown in Fig. 3, if the power factor of the circuit is 0.8 lagging, the reactive power of the circuit is a) 94.20 VAR b) 70.65 VAR c) 117.76 VAR d) 0 VAR	[2]	2	Apply

	xiii) A coil has a resistance of 3 Ω and inductance of 12 mH. The value of capacitance that must be connected in series with this coil so that the circuit resonates at a frequency of 9 kHz is a) 0.26 nF b) 2.6 nF c) 26 nF d) none	[2]	2	Apply
	xiv) If A= 6.928+ j4 and B= 2∠15°, then multiplying A and B we get a) 4∠15° b) 16∠30° c) 4∠45° d) 16∠45°	[2]	2	Apply
	xv) Dividing 30-j10 by 10.54∠60° we get a) 3∠-78.43° b) 3∠-41.56° c) 333.27∠ 41.56° d) none	[2]	2	Apply
Q2	**Solve any three out of four** a) At full-load, the copper and iron losses in a 100-kVA transformer are each equal to 2.5 kW. Find the efficiency at a load of 65 kVA, power factor 0.8.	[5]	3	Apply
	b) A 40-kVA, 6600V/230V, 50 Hz, single-phase transformer has 30 turns on its secondary winding. Calculate the number of turns of the primary winding. Also calculate the primary and secondary winding full load currents.	[5]	3	Apply
	c) A 100-kVA, single-phase transformer has an iron loss of 600 W and a copper loss of 1.5 kW at full-load current. Calculate the efficiency at (i) 100 kVA output at 0.8 p.f. lagging (ii) 50 kVA output at unity power factor.	[5]	3	Apply
	d) A 230/460 V, single-phase transformer has a primary resistance of 0.2 Ω and a leakage reactance of 0.5 Ω. The corresponding values for the secondary are 0.75 Ω and 1.8 Ω respectively. Find the secondary terminal voltage when 10 A is supplied at 0.8 p.f. lagging.	[5]	3	Apply
Q.3	**Solve any three out of four** a) Draw a neat phasor diagram for a three-phase balanced delta-connected resistive load in each phase across a symmetrical three-phase ac supply and hence derive the relationship between the line current and phase current. Also write relation between line voltage and phase voltage.	[5]	4	Apply
	b) Three similar coils, connected in star, take a total power of 3 kW at a p.f. of 0.8 lagging from a 3- phase, 400 V, 50 Hz supply. Calculate the resistance and reactance of each coil.	[5]	4	Apply
	c) A 440-V, DC motor is used to drive an irrigation pump. The efficiency of motor is 85% and the efficiency of pump is 66%. The pump is required to lift 240 tonne of water per hour to a height of 30 meters. Calculate the current taken by the motor. Take gravitational acceleration 'g' as 9.81 m/s^2.	[5]	4	Apply

	d) An electric motor is driving a train weighing 100 thousand kilograms upon an inclined track of 1 in 100 at a speed of 60 km/ hour. The tractive resistance is 10 kg per 1000 kg of its weight. If the motor operates on 11 kV, find the current taken by the motor assuming the overall efficiency of the system as 70%. Take gravitational acceleration 'g' as 9.81 m/s^2.	[5]	4	Apply