Total No. of Questions – [4]

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PRN. No.	

PAPER CODE	U114-303A (Backlog)

DECEMBER 2024 (Backlog) EXAM Sem-I

F.Y. B. Tech. (Common)

(PATTERN 2020)

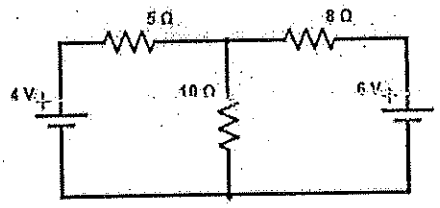
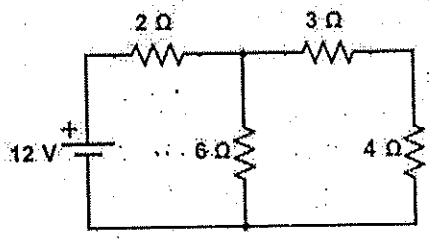
COURSE NAME: Basic Electrical Engineering

COURSE CODE: ET10203A

Time: [2 Hrs.] **[Max. Marks: 60]**

(*) Instructions to candidates:

1) **Use of scientific calculator is allowed**
2) **Use suitable data where ever required**
3) **All questions are compulsory. Solve any THREE sub questions from EACH question**

Que. No.	Question Description	Max. Marks	CO mapped	BT Level
Q1.	**Solve any three sub questions from the following**			
	A) Calculate the current in 10 Ω in the circuit as shown in figure 1 using Norton's theorem.  Figure 1	[5]	CO1	Apply
	B) Find the voltage drop across 4 Ω resistance in the circuit as shown in figure 2 using Thevenin's theorem.  Figure 2	[5]	CO1	Apply
	C) Calculate power consumed by 4 Ω resistance in the circuit as shown in figure 2 using Norton's theorem.	[5]	CO1	Apply
	D) State and explain Kirchhoff's Current law (KCL) and Kirchhoff's voltage law (KVL) along with sign conventions used.	[5]	CO1	Under stand

Q2.	**Solve any three sub questions from the following**			
	A) A resistance of 20 Ω, inductance of 0.2 H and capacitance of 150 μF are connected in series and are fed by a 230V, 50Hz single-phase ac supply. Find: i) inductive and capacitive reactance ii) impedance and admittance of circuit and iii) power factor of circuit.	[5]	CO2	Apply
	B) A series RLC circuit undergoing resonance has R=5 Ω, L= 0.2 H and C= 50 μF. The applied voltage to circuit is 200 V. Calculate: - i) resonant frequency ii) current at resonance and iii) voltage across inductance at resonance.	[5]	CO2	Apply
	C) A circuit consists of resistance of 4Ω, inductance of 0.5H and a variable capacitance in series across 100V, 50Hz supply. Calculate: i) the value of capacitance to produce resonance ii) current flowing through the circuit and iii) voltage across capacitance at resonance.	[5]	CO2	Apply
	D) Derive an expression for current drawn and the average power consumed by a circuit consisting of a pure capacitor of capacitance 'C' connected across an ac source of $v = V_m \sin\omega t$.	[5]	CO2	Under stand
Q3.	**Solve any three sub questions from the following**			
	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]	CO3	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]	CO3	Apply
	C) A 55 kVA, 50 Hz single- phase transformer has primary winding of 460 turns and secondary winding of 160 turns. The input side of the transformer is supplied with 2500 V. Calculate: i) Secondary voltage ii) primary and secondary full load current and iii) maximum flux in the core.	[5]	CO3	Apply
	D) A 45 kVA, 6000/200 V, single- phase transformer has primary and secondary resistance of 8 Ω and 0.01 Ω respectively. The leakage reactance referred to primary side is 30 Ω. Determine the percentage voltage regulation at full-load, 0.6 power factor lagging.	[5]	CO3	Apply
Q4.	**Solve any three sub questions from the following**			
	A) Draw a neat phasor diagram for a three-phase balanced star-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]	CO4	Apply
	B) Calculate the phase and line currents in a balanced delta- connected load taking 75 kW at a power factor of 0.8 lagging from a 3-phase, 440 V supply. Also calculate the total reactive power in the circuit.	[5]	CO4	Apply
	C) A 440-V, DC motor is used to drive an irrigation pump. The efficiency of the motor is 85% and that of the pump is 66%. The pump is required to lift 240 kilo- litres of water per hour to a height of 30 meters. Calculate the current taken by the motor. Take 'g' as 9.81 m/s^2. Assume 1 litre = 1kg of water.	[5]	CO4	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]	CO4	Apply