Reg. No.															

Question Paper Code	13733

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Second Semester

Electrical and Electronics Engineering

(Common to Electronics and Instrumentation Engineering & Instrumentation and Control Engineering)

20EEPC201 - ELECTRICAL CIRCUIT ANALYSIS

Regulations - 2020

Duration: 3 Hours Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	A 100 Ω resistor is connected across the terminals of a 2.5V battery. Find the power dissipation in the resistor. (a) 25W (b) 100W (c) 0.4W (d) 6.25W	1	K1	CO1
2.	The algebraic sum of voltages around any closed path in a network is equal to _____. (a) Infinity (b) 0 (c) 1 (d) Positive polarity	1	K1	CO1
3.	The maximum power is transferred to load when equivalent resistance of the circuit is equal to_____. (a) Thevenin's resistance (b) Source resistance (c) 1 ohm (d) Load resistance	1	K1	CO2
4.	The superposition theorem is valid only for _____. (a) Linear circuits (b) Non-linear circuits (c) Both linear and nonlinear (d) Neither of the two.	1	K1	CO2
5.	Power factor of a series RLC resonant circuit will be _____. (a) 0 (b) 1 (c) 0.5 (d) Cannot be determined	1	K1	CO3
6.	Value of electric current at resonance in a series RLC circuit is affected by the value of (a) R (b) L (c) C (d) R or L or C	1	K1	CO3
7.	An RLC circuit has a resonance frequency of 160 kHz and a Q-factor of 100. Its band width is _____. (a) 1.6 kHz (b) 0.625 kHz (c) 16 MHz (d) 0.16 MHz.	1	K1	CO4
8.	Transient current in an RLC circuit is oscillatory when (a) $(R/2L)^2>1/LC$ (b) $(R/2L)^2>1/LR$ (c) $(R/2L)^2<1/LC$ (d) $(R/2L)^2=1/LC$	1	K1	CO4
9.	In two wattmeter method of power measurement if the total power is measured by one wattmeter and other reading is zero then PF of the system is _____. (a) 0.5 (b) 1 (c) 0 (d) 0.3	1	K1	CO5
10.	A 3-phase delta connected symmetrical load consumes P watts of power from a balanced supply. If the same load is connected in star to the same supply then what is the power consumption? (a) P/3 (b) 3P (c) P (d) √3* P	1	K1	CO5

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

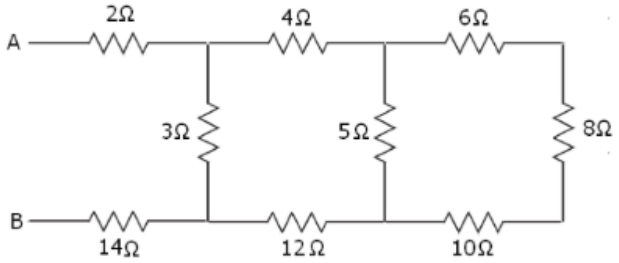
		Marks	K – Level	CO
11.	Sketch the circuit of a practical voltage source and its equivalent current source.	2	K2	CO1
12.	A certain sine wave has a positive going zero crossing at 0º and an rms value of 20V. Calculate its instantaneous value at an angle 33º.	2	K2	CO1
13.	Total current of 10A is flowing through the circuit of two equal resistances in parallel, then find the current flow through each resistor.	2	K2	CO2
14.	Summarize the applications of Millman's theorem.	2	K2	CO2
15.	Let a network has Thevenin's equivalent circuit with source of 5V RMS and impedance of 50-j30 Ω. Find optimum value of load to derive maximum power from the network.	2	K2	CO2
16.	State the super position theorem.	2	K1	CO2

17.	Define damping ratio. Give the damping ratio expressions for RLC series circuit.	2	K1	CO3
18.	Distinguish between natural and forced response.	2	K2	CO3
19.	Find the coupling coefficient if the mutual inductance is 20H, the inductance of coil 1 is 2H and the inductance of coil 2 is 8H.	2	K2	CO4
20.	An RLC circuit has a resonance frequency of 160 kHz and a Q-factor of 100. Calculate the band width.	2	K2	CO4
21.	Mention the advantages of three phase system over single phase system.	2	K2	CO5
22.	Indicate the expression for real, reactive, apparent power and power factor in a three phase AC circuit.	2	K2	CO5

PART - C (6 × 11 = 66 Marks)

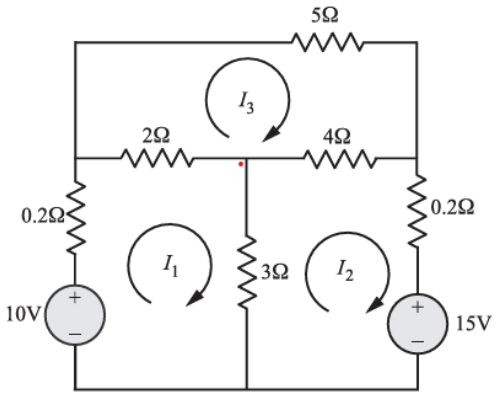
Answer ALL Questions

23.	a)	Determine the total power consumed by the supply when 100 V is applied across A and B shown in Fig.	11	K3	CO1

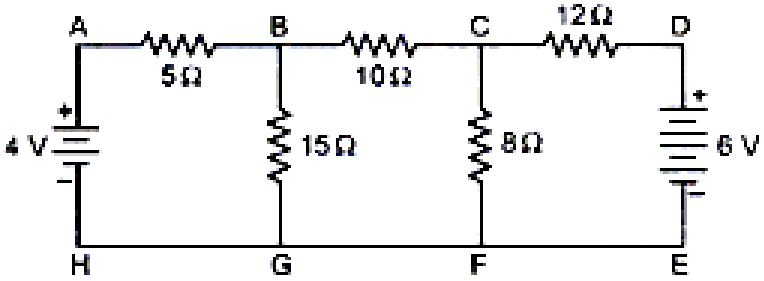


OR

	b)	For the electrical network shown in Fig. determine the loop currents and all branch currents.	11	K3	CO1

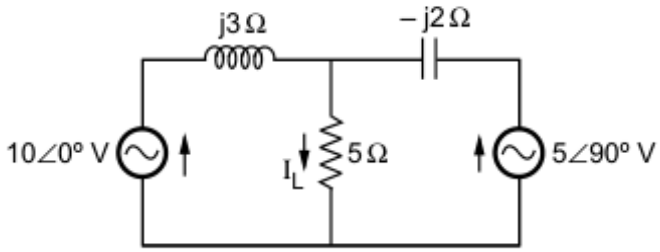


24.	a)	Apply Thevenin's theorem calculate the current through 10 Ω resistor for the given circuit Fig.	11	K3	CO2



OR

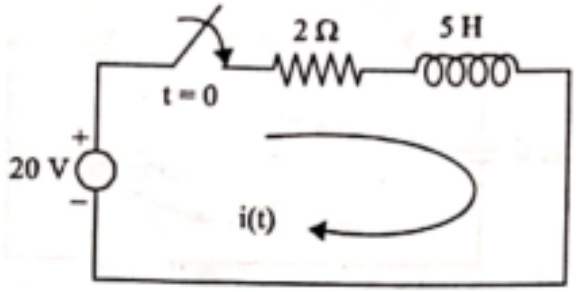
b) Determine the current flowing through branch I_L of the given network Fig. using Norton's theorem. *11 K3 CO2*



25. a) Determine the transient current expression of the RL transient circuit with DC excitation. *11 K3 CO3*

OR

b) In a circuit shown in figure Fig. determine the expression for transient current after the switch is closed at t = 0, assuming zero initial conditions. *11 K3 CO3*



26. a) Derive an expression for Resonant frequency, Q - Factor, bandwidth and half power frequency for a RLC series resonance circuit *11 K3 CO4*

OR

b) Solve the series RLC circuit parameters with R = 15 Ω, L = 0.54 H and C = 40 μF has an applied voltage of 150 V at resonant frequency. Find the resonant frequency, quality factor, upper and lower half power frequencies, bandwidth, current at resonance, current at half-power points and voltage across the inductance at resonance. *11 K3 CO4*

27. a) Illustrate and discuss the steps involved in calculating power for a three-phase circuit using the two-wattmeter method. *11 K3 CO5*

OR

b) Each phase of a three-phase alternator generates a voltage as 3500 volts and Carries a Maximum Current of 250 amps. Analyze the given data find the line current, line voltage and total kVA Capacity if (i) Delta connected (ii). Star connected. *11 K3 CO5*

28. a) (i) Explain briefly about the concept of parallel resonance. *6 K2 CO4*

(ii) Discuss in detail about the three phase 3-wire circuits with star connected balanced loads. *5 K2 CO5*

OR

b) (i) Explain in detail in the concept of co-efficient coupling. *6 K2 CO4*

(ii) Three inductive coils each having resistance of 16Ω and reactance of 12Ω are connected in star across a 400V, three-phase 50 Hz supply. Calculate: (i) line current (ii) line voltage. *5 K2 CO5*