Reg. No.																

Question Paper Code	13022

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

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) (20 × 1 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	In a closed circuit, the algebraic sum of voltages in a network is equal to _____ (a) zero (b) One (c) Infinity d) Negative polarity	1	K1	CO1
2.	The voltage division occurs in (a) When resistors are equal (b) Parallel connected resistors (c) Series connected resistors (d) Both series and parallel resistors.	1	K1	CO1
3.	For a parallel connected resistor R1, R2 and a voltage of V volts. Current across the second resistor is given by (a) I R2 (b) I R1 (c) I R2 / R1 + R2 (d) I R1 / R1 + R2	1	K1	CO1
4.	Mesh analysis is best suitable for _____ (a) Current sources (b) Voltage sources (c) Complex elements (d) Unilateral elements	1	K1	CO1
5.	Millman's theorem results in (a) equivalent resistance (b) equivalent impedance (c) equivalent voltage source (d) equivalent voltage or current source	1	K1	CO2
6.	The reciprocity theorem is applicable to (a) Non Linear networks only (b) Linear networks only (c) Liner / bilateral networks (d) Neither of the two	1	K1	CO2
7.	Norton's theorem application to a circuit results in (a) Equivalent current source and impedance in series (b) Equivalent current source and impedance in parallel (c) Equivalent impedance (d) Equivalent current source	1	K1	CO2
8.	For maximum transfer of power, internal resistance of the source should be (a) Equal to load resistance (b) Greater than the load resistance (c) Equal than the load resistance (d) None of the above	1	K1	CO2
9.	From the time domain to frequency domain, the value of resistance (a) does not change (b) increases (c) decreases (d) increases exponentially	1	K1	CO3
10.	In series RL circuit, the time constant is (a) LR (b) L/R (c) R/L (d) $e^{-R/L}$	1	K1	CO3
11.	The s-domain equivalent of the capacitor reduces to a capacitor with impedance? (a) sC (b) C (c) 1/C (d) 1/sC	1	K1	CO3
12.	The transient response occurs in (a) Only in resistive circuits (b) Only in capacitive circuits (c) Only in Inductive circuits (d) Both in (b) and (c)	1	K1	CO3
13.	Dot convection in coupled circuits is used (a) to measure the mutual inductance (b) to determine the polarity of the mutually induced voltage in coils (c) to determine the polarity of the self induced voltage in coils (d) to determine the direction of current	1	K1	CO4

14.	At resonant frequency, the voltage across capacitor and the voltage across inductor are (a) Greater than (b) Greater than or equal to (c) Equal to (d) Less than	*1*	*K1*	*CO4*
15.	If the value of C in a series RLC circuit is decreased, the resonant frequency (a) Is reduced to zero (b) Is not affected (c) Increases (d) None of these	*1*	*K1*	*CO4*
16.	The mutual inductance associated with (a) Only one coil (b) Two or more coil (c) Two or more coils with magnetic coupling (d) None of these	*1*	*K1*	*CO4*
17.	In two phase generator, the armature has two distinct windings that are displaced ---------- degrees apart. (a) 45 (b) 90 (c) 135 (d) 180	*1*	*K1*	*CO5*
18.	In three phase system, the three voltages (currents) differ in phase by -----electrical degrees from each other in a particular sequence. (a) 60 (b) 30 (c) 120 (d)90	*1*	*K1*	*CO5*
19.	In three phase system at any given instant, the algebric sum of three voltages must be (a) One (b) Two (c) Three (d) Zero	*1*	*K1*	*CO5*
20.	Phase sequence depends on (a) Armature (b) Rotation of the armature (c) Field (d) Rotation of the field	*1*	*K1*	*CO5*

PART - B (10 × 2 = 20 Marks)

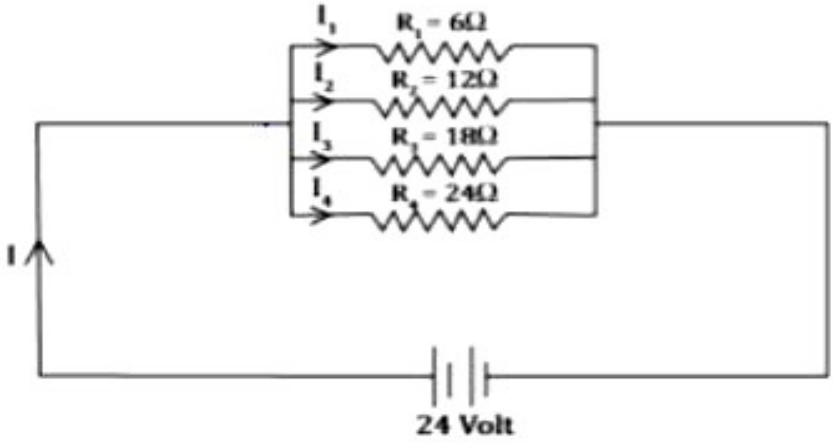
Answer ALL Questions

21.	Define Kirchhoff's Current Law and Voltage Law.	*2*	*K1*	*CO1*
22.	What is the resultant resistance produced by the parallel connection of two resistors of 10 Ω and 30 Ω?	*2*	*K1*	*CO1*
23.	Give the steps for reciprocity theorem.	*2*	*K1*	*CO2*
24.	State maximum power transfer theorem for DC circuits.	*2*	*K1*	*CO2*
25.	Compare between free and forced responses.	*2*	*K2*	*CO3*
26.	What is meant by transient time?	*2*	*K1*	*CO3*
27.	Define bandwidth of the resonant circuit.	*2*	*K1*	*CO4*
28.	Discuss co-efficient of coupling. Give the expression for coefficient of coupling.	*2*	*K1*	*CO4*
29.	Compare star and delta connected system.	*2*	*K2*	*CO5*
30.	What are positive sequence and negative sequence?	*2*	*K1*	*CO5*

PART - C (6 × 10 = 60 Marks)

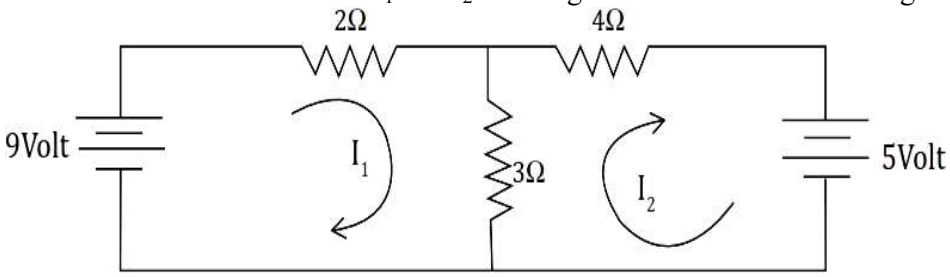
Answer ALL Questions

31.	a)	The Four resistors 6 ohms, 12 ohms,18 ohms and 24 ohms are connected in parallel with 24 Voltage supply. Show (i) Current through the branch of network (ii) Supply current (iii) Total resistance of the circuit.	*10*	*K2*	*CO1*

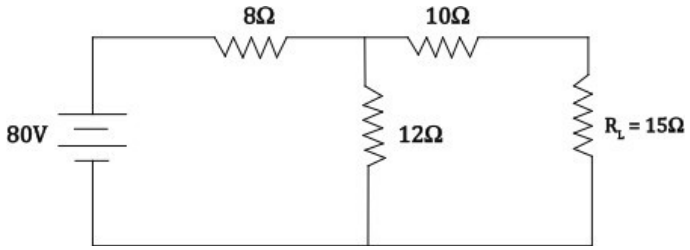


OR

b) Show the value of Mesh Current I_1 and I_2 for the given circuit as shown in Fig. *10 K2 CO1*

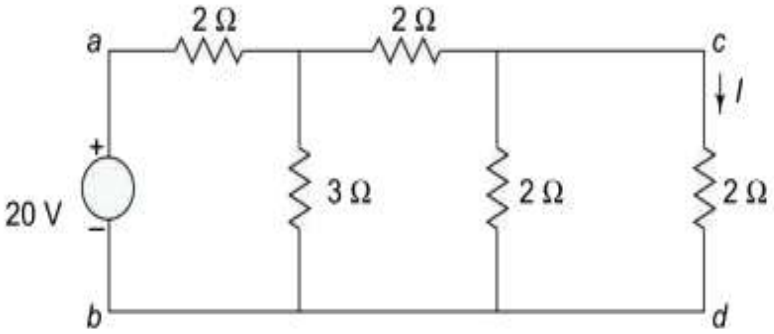


32. a) By applying Norton's Theorem, Identify the current through 15 Ohm as shown in Fig. *10 K3 CO2*



OR

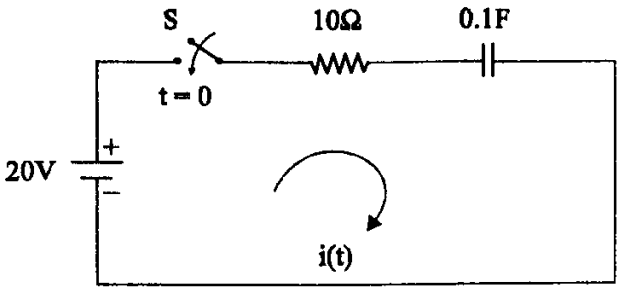
b) Utilize the reciprocity theorem for the given circuit across the terminals ab and cd. *10 K3 CO2*



33. a) Derive the transient response of series R-L circuit, with AC input, using Laplace transform and also sketch the transient response curve. *10 K2 CO3*

OR

b) In a series RC circuit consists of resistor of 10 ohms and a capacitor of 0.1 F connected across a constant voltage of 20 V applied at t=0. Obtain the current equation. Determine the voltage across the resistor and the capacitor. *10 K2 CO3*



34. a) Explain briefly about the concept of parallel resonance. *10 K2 CO4*

OR

b) What is magnetic coupling and its effect? Explain in detail in the Concept of co-efficient coupling. *10 K2 CO4*

35.	a)	A balanced star connected load having an impedance 15+j20Ω per phase is connected to 3Ø, 440V, 50Hz. Find the line current and power absorbed by the load.	*10*	*K2*	*CO5*
		OR			
	b)	The two wattmeter produces wattmeter readings P_1=1560W and P_2=2100 W When connected to delta connected load. If the line voltage is 220V, Calculate (1) the per phase average power (2) total reactive power (3) Power factor (4) the phasor impedance. Is the impedance inductive or Capacitive? Justify.	*10*	*K2*	*CO5*
36.	a) i)	Two coupled coils of self inductance L_1 = 2H and L_2 = 4 H are coupled in (i) series aiding (ii) series opposing.	*5*	*K2*	*CO4*
	ii)	Discuss in detail about the three phases 3-wire circuits with star connected balanced loads.	*5*	*K2*	*CO5*
		OR			
	b) i)	Express the term mutual inductance for the coupled circuits.	*5*	*K2*	*CO4*
	ii)	A three phase balanced delta-connected load of 4+j8Ω is connected across a 400V, 3Ø balanced supply. Determine the phase currents (Phase sequence in RYB).	*5*	*K2*	*CO5*