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Question Paper Code	14199
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B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Second Semester

Electronics and Communication Engineering

20ECPC201 - CIRCUIT ANALYSIS

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

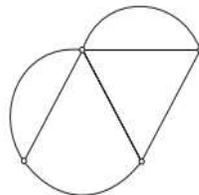
Answer ALL Questions

	<i>Marks</i>	<i>K-Level</i>	<i>CO</i>
1. Mesh analysis is based on (a) KCL (b) KVL (c) Ohm's law (d) none of the above	1	K1	CO1
2. A point where multiple component terminals meet is called as (a) Component (b) Node (c) Circuit (d) Mesh	1	K1	CO1
3. A mesh is a loop that contains ____ number of loops within it. (a) 1 (b) 2 (c) 3 (d) no loop	1	K1	CO2
4. Mesh analysis is generally used to determine (a) Voltage (b) Current (c) Resistance (d) Power	1	K1	CO2
5. A Thevenin AC equivalent circuit always consists of an equivalent AC voltage source and an equivalent capacitance. (a) True (b) False	1	K1	CO3
6. In applying the superposition theorem, (a) The sources are considered one at a time with all others replaced by their internal impedance (b) All sources are considered independently (c) All sources are considered simultaneously (d) The sources are considered one at a time with all others replaced by their internal resistance	1	K2	CO3
7. Which of the following is inductive reactance of series RLC circuit? (a) ωL (b) $1/\omega L$ (c) ωC (d) RLC	1	K1	CO4
8. Which of the following is the relation between XL and XC of a series RLC circuit when circuit is said to be capacitive? (a) $X_L > X_C$ (b) $X_C > X_L$ (c) $1/X_C > 1/X_L$ (d) $X_L > 1/X_C$	1	K1	CO4
9. At steady state, the current in the inductor is? (a) Maximum (b) Minimum (c) Zero (d) Infinity	1	K1	CO5
10. In two-port networks the parameter h_{22} is called (a) Short circuit input impedance (b) Short circuit Current gain (c) Open circuit reverse voltage gain (d) Open circuit output admittance	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

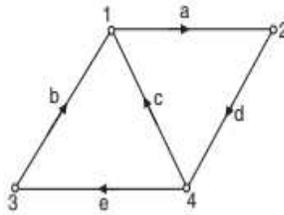
Answer ALL Questions

11. Determine the dual graph for the graph given.	2	K2	CO1
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12. Determine the incidence matrix of the graph shown in Fig.

2 K2 CO1

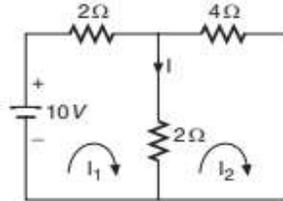


13. Define open circuit and short circuit.

2 K1 CO2

14. Find the current I in the circuit shown in Fig.

2 K2 CO2



15. State the reciprocity theorem.

2 K1 CO3

16. Relate the expression for Millman's equivalent source of n number of parallel connected voltage sources.

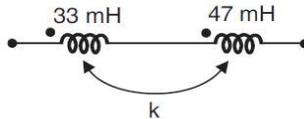
2 K2 CO3

17. Define coupled coils.

2 K1 CO4

18. Determine the equivalent inductance of the circuit shown in Fig., if the coefficient of coupling (k) between the two coils is 0.6.

2 K2 CO4



19. An RL series circuit with $R = 10 \Omega$ is excited by a dc voltage source of 30V by closing the switch at $t = 0$. Determine the current in the circuit at $t = 2\tau$.

2 K2 CO5

20. Define time constant of an RL circuit.

2 K1 CO5

21. The Z-parameters of a two-port network are $Z_{11} = Z_{22} = 4 \Omega$ and $Z_{12} = Z_{21} = 1 \Omega$. Determine the transmission parameter, B of the network.

2 K2 CO6

22. Define ABCD Parameter.

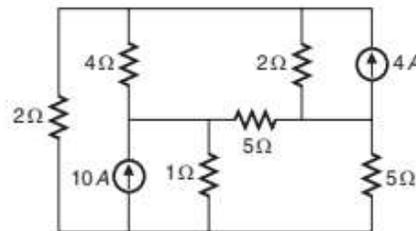
2 K1 CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23. a) Determine the branch currents and voltages of the circuit given using a cut-set schedule.

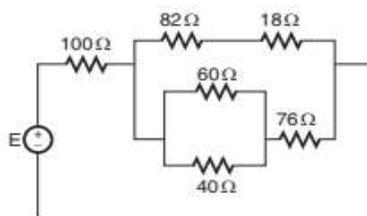
11 K2 CO1



OR

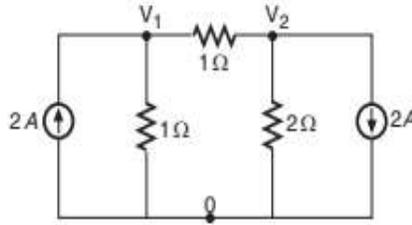
b) In the circuit shown in Fig., determine the total resistance across the supply voltage.

11 K2 CO1



24. a) Solve the node voltage equations for the circuit shown in Fig.

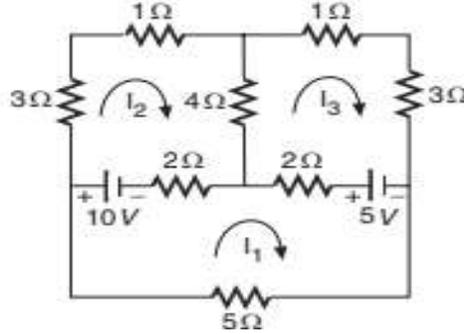
11 K3 CO2



OR

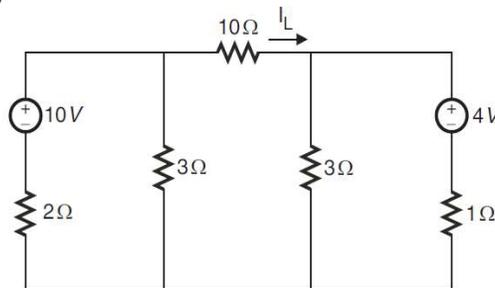
b) Determine the mesh currents shown in the circuit.

11 K3 CO2



25. a) Using Thevenin's theorem, determine the current I_L in the Circuit shown in Fig.

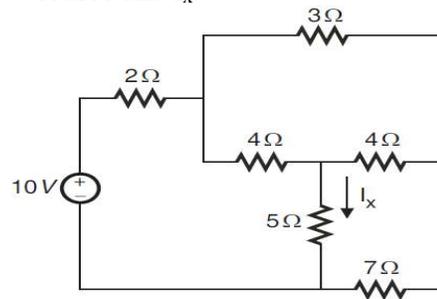
11 K3 CO3



OR

b) In the circuit of Fig., calculate I_x . Prove the reciprocity theorem by interchanging the position of the 10 V source and I_x .

11 K3 CO3



26. a) Draw the circuit of parallel RLC circuit and derive the formula for resonant frequency, half power frequencies, bandwidth and quality factor.

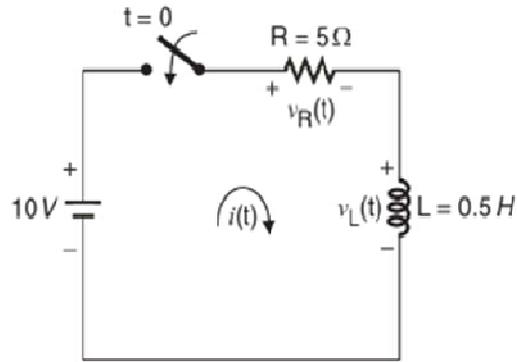
11 K2 CO4

OR

b) Obtain the expression for secondary current, output voltage and critical mutual coupling at resonance for a single tuned coupled circuit.

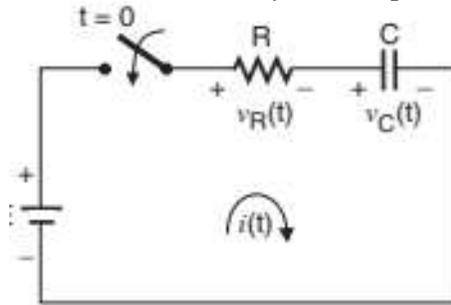
11 K2 CO4

27. a) In the RL circuit of Fig., the switch is closed at $t = 0$. Find the current $i(t)$ and the voltage across resistance and inductance. 11 K2 CO5

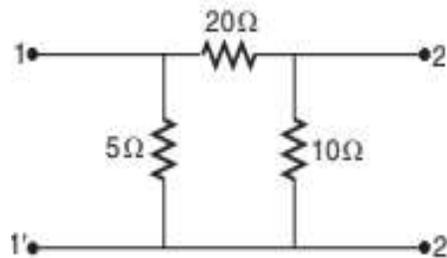


OR

- b) Consider the RC circuit with no initial capacitor voltage and excited by a step voltage of E volts as shown in fig. Let the switch be closed at $t = 0$. Obtain the expression for voltage and current in each element. Comment on its initial conditions, final conditions, transient / steady state response. 11 K2 CO5



28. a) Determine the admittance parameters of the π -network shown in Fig. 11 K2 CO6



OR

- b) Determine the h-parameters of the bridged-T network shown in Fig. 11 K2 CO6

