| Reg. No. | | | | | | | | | | | | |
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| Question Paper Code | 12527 |
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**B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023**

Second Semester

**Electronics and Communication Engineering**

**20ECPC201 - CIRCUIT ANALYSIS**

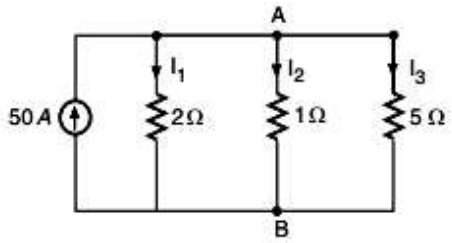
(Regulations 2020)

Duration: 3 Hours | Max. Marks: 100

**PART - A (10 × 2 = 20 Marks)**

Answer ALL Questions

| | | *Marks, K-Level, CO* |
|---|---|---|
| 1. | Determine the current in all the resistors of the circuit given. | *2,K2,CO1* |

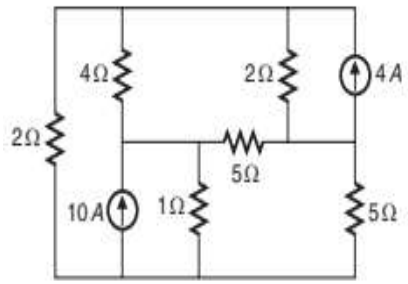



| | | |
|---|---|---|
| 2. | Define incidence matrix and tie-set matrix. | *2,K1,CO1* |
| 3. | Relate the expression for Millman's equivalent source of n number of parallel connected voltage sources. | *2,K2,CO3* |
| 4. | State maximum power transfer theorem. | *2,K1,CO3* |
| 5. | Determine the quality factor of a coil for the series resonant circuit consisting of R = 10 Ω, L = 0.1H, and C = 10μF. | *2,K3,CO4* |
| 6. | Relate the expression for impedance of an RLC series circuit at half-power frequencies. | *2,K1,CO4* |
| 7. | An RLC series circuit with L = 2 H and C = 5 mF. Determine the value of R to give critical damping. | *2,K2,CO5* |
| 8. | Define time constant of an RC circuit. | *2,K1,CO5* |
| 9. | Give the condition for reciprocity and symmetrical condition for ABCD parameter. | *2,K1,CO6* |
| 10. | State symmetrical properties of π networks. | *2,K1,CO6* |

**PART - B (5 × 13 = 65 Marks)**

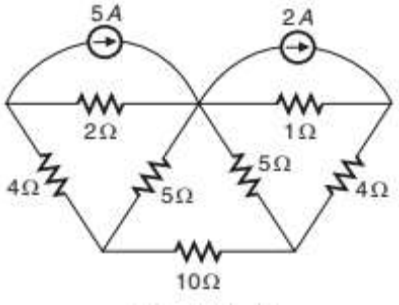
Answer ALL Questions

| | | | |
|---|---|---|---|
| 11. | a) | Determine the branch currents and voltages of the circuit given using a cut-set schedule. | *13,K2,CO1* |

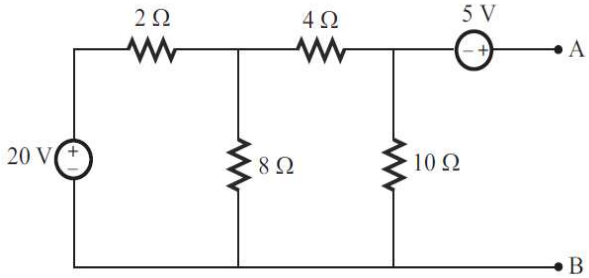



**OR**

b) Determine the cut-sets and cut-set matrix of the circuit shown in Fig. *13,K2,CO1*

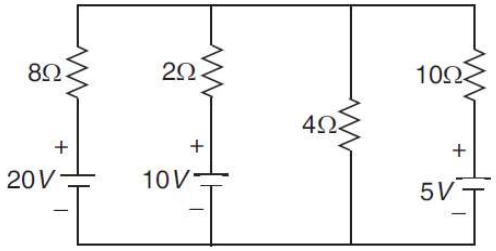



12. a) Determine the value of resistance that may be connected across terminals A and B so that maximum power is transferred from the circuit to the resistance. Also, estimate the maximum power transferred to the resistance. *13,K3,CO3*




**OR**

b) In the circuit of Fig. , use Millman's theorem to determine current through the 4Ω resistance. *13,K3,CO3*




13. a) Consider two coils A and B consisting of 500 turns and 1500 turns, respectively. A current of 5 A in coil-A produces a flux of $0.6 \times 10^{-3}$ *13,K3,CO4*

Wb and the flux linking coil-B is $0.3 \times 10^{-3}$ Wb. Determine the inductance, coefficient of coupling and mutual inductance of the coils.

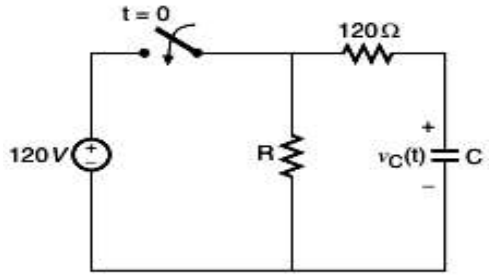
**OR**

b) A coil having an inductance of 100 mH is magnetically coupled to another coil having an inductance of 900 mH. The coefficient of coupling between the coils is 0.45. Calculate the equivalent inductance if the two coils are connected in a) series aiding, b) series opposing, c) parallel aiding and d) parallel opposing. *13,K3,CO4*

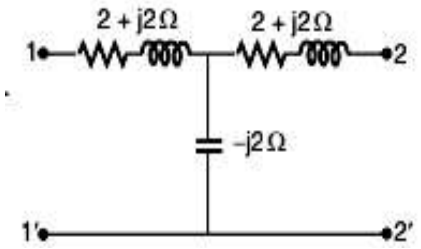
14. a) An RL series circuit excited by a sinusoidal source e(t) = 10 sin100t V by closing the switch at t = 0. Take R = 10Ω and L = 0.1H. Determine the current i(t) flowing through the RL circuit. *13,K2,CO5*

**OR**

b) In the circuit of fig, the switch is open for a long time. On closing the switch at t = 0, the capacitor voltage rises to 70V in 10 ms. After the steady state is reached, the switch is opened again and found that the capacitor voltage is 90V in 0.5second. Find the value of R and C. *13,K2,CO5*



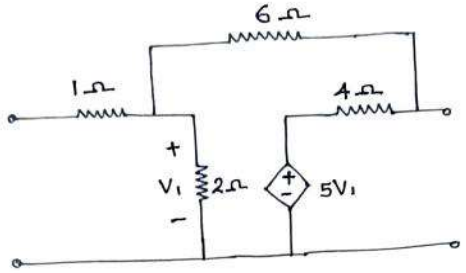

15. a) Determine the admittance parameters of the T-network shown in Fig. *13,K2,CO6*




**OR**

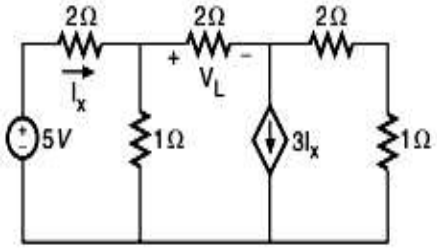
b) (i) Explain the method to find ABCD parameters of a 2 - port network. *5,K2,CO6*

(ii) Obtain the ABCD Parameters of the following two-port network. *8,K2,CO6*



## PART - C (1 × 15 = 15 Marks)

16. a) Determine the voltage $V_L$ in the circuit shown in Fig. 1, using mesh analysis. *15,K3,CO2*




**OR**

b) In the circuit shown in Fig, write mesh equations by inspection and solve $V_x$ and $I_x$. Verify the result by node analysis. *15,K3,CO2*