C **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: R3403

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Third Semester

Electronics and Communication Engineering

R21UEC303 – CIRCUIT THEORY

(Regulations R2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. The path between two nodes is a _____ CO1-U

   (a) Branch (b) Node (c) Tree (d) Co-tree

2. When the superposition theorem is applied to any circuit, the dependent voltage source in that circuit is always? CO1-U

   (a) Opened (b) Shorted (c)Active (d) None of the above

3. What is the phase angle of a series RLC circuit at resonance? CO1-U

   (a) Zero (b) 90^0 (c) 45^0 (d) 30^0

4. The time constant of a series RC circuit is_____ CO1-U

   (a) 1/RC (b) R / C (c) RC (d) e^{-RC}

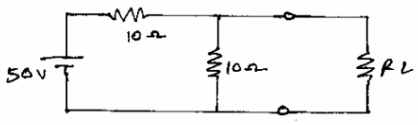
5. The number of possible combination generated by four variables taken two at a time in a two-port network is _____ CO1-U

   (a) four (b) two (c) six d) None of the above

PART – B (5 x 3= 15 Marks)

6. State Kirchhoff's Laws. CO1- U

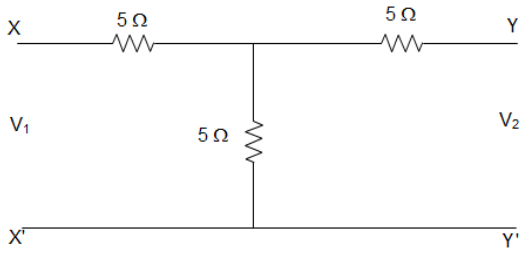
7. Calculate the value of load resistance, so that maximum power is transferred from battery. CO3 -App



8. What is resonant frequency and bandwidth of series RLC circuit? Given that R=5Ω, L=40mH, C=1μF. CO4 -App

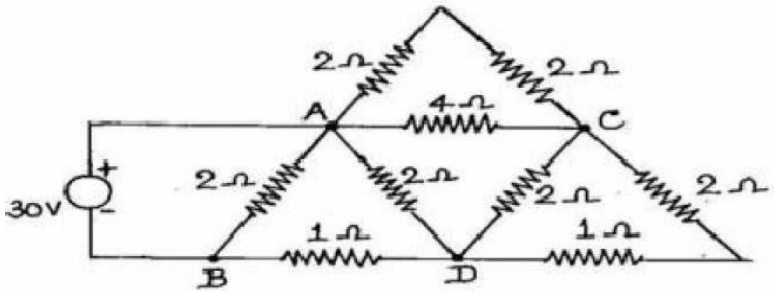
9. Write the expression for transient current for series RL and RC circuits. CO1 -U

10. Determine the value of the hybrid parameter h_{21} in the circuit given below. CO6-App



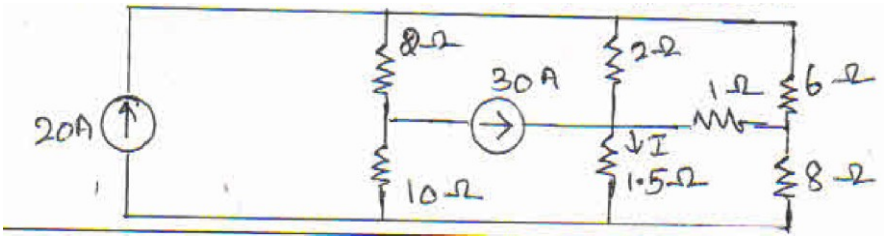
PART – C (5 x 16= 80 Marks)

11. (a) Interpret the current delivered by the source shown in the circuit below. CO2 - App (16)

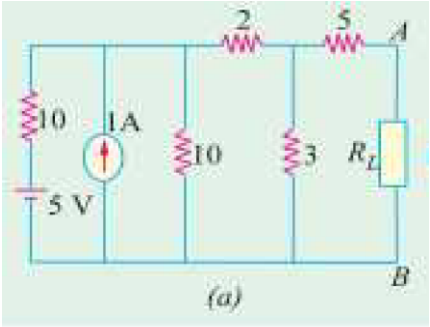


Or

(b) Determine the current I in the circuit by using loop analysis method CO2 - App (16)

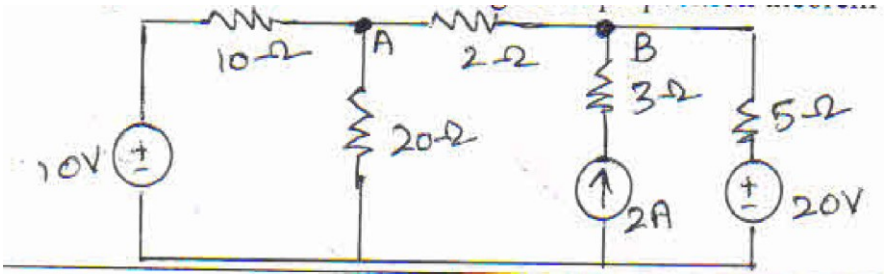


12. (a) In the circuit shown in the figure obtain the condition from maximum power transfer to the load RL. Hence determine the maximum power transferred. CO3 - App (16)



Or

(b) Find the voltage across the 2Ω resistor using the superposition theorem — CO3 - App — (16)



13. (a) A series RLC circuit has R=20 ohm, L= 0.005H and C = 0.2 x 10-6 F. It is fed from a 100V variable frequency source. Find (i) frequency at which current is maximum (ii) impedance at this frequency and (iii) voltage across inductance at this frequency. — CO4 - App — (16)

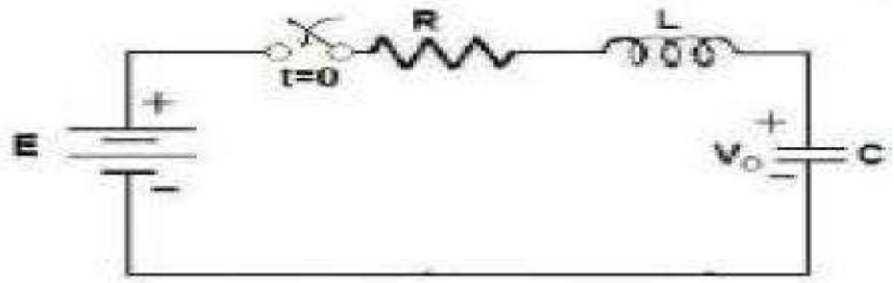
Or

(b) Derive bandwidth for a series RLC circuit as a function of resonant frequency. — CO4 - App — (16)

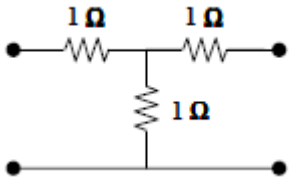
14. (a) A series RL circuit with R= 100Ω and L = 20H has a DC voltage of 200v applied through a switch at t=0. Find (a) the equation for the current and voltage across the different elements. (b) Analyze the current at t = 0.5 secs and the current at t = 1 sec. — CO5 - Ana — (16)

Or

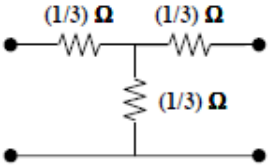
(b) A step voltage V(t) = 100 u(t) is applied to a series RLC circuit with L=10H, R=2ohm and C=5F. The initial current in the circuit is zero but there is an initial voltage of 50V on the capacitor in a direction which opposes the applied source. Find the expression for the current in the circuit. If the initial voltage is 100V what will be the change in current. — CO5 - Ana — (16)



15. (a) Determine the Z parameter of the given circuit. (8) CO6- App (16)



Determine the Y parameter of the given circuit. (8)



Or

(b) Determine the Z parameter of the two port circuit show in the figure. CO6- App (16)