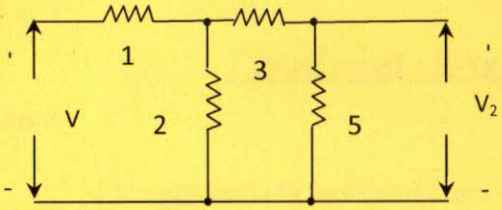
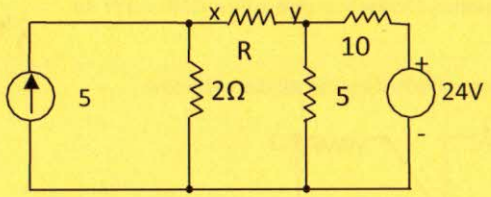
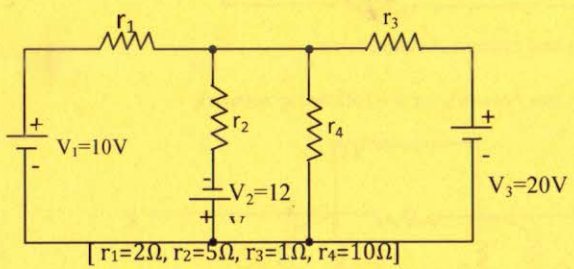


6. **a.** What should be the value of R such that maximum power transfer can take place from the rest of the network to R in the figure below? Obtain amount of this power. 4+2+4 =10

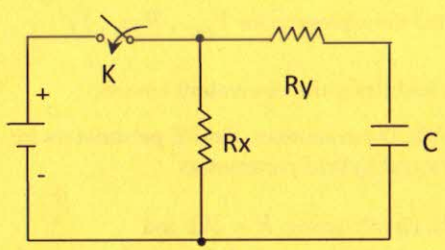


b. Classify different types of Network. Write the mathematical expression for series RL circuit having DC excitation.

7. **a.** In the network of figure below, find the current through 10Ω resistor using Thevenin's theorem 5+5=10



b. In the figure below, switch K is closed. Find the time when the current from the battery reaches $500mA$



8. Write short note on : *(any two)* 3+3+4 =10
   a. Norton's theore b. Y parameter c. Millmen's theorem
   b. Define node, junction points, branch and mesh with proper diagram

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M. SC. ELECTRONICS
SECOND SEMESTER
NETWORK THEORY AND ANALYSIS
MSE – 202

(Use Separate Answer Scripts for Objective & Descriptive)

Duration: 3 hrs. **Full Marks: 70**

[PART-A : Objective]

Time: 20 min. Marks: 20

Choose the correct answer from the following: ***1×20=20***

1. Load current in Thevenin's equivalent circuit is given by
   a. $\frac{V_{o.c}}{R_{Th}+R_L}$ b. $\frac{V_{s.c}}{R_{Th}+R_L}$ c. $\frac{V_{o.c}}{R_{Th}}$ d. $\frac{V_{o.c}}{R_L}$

2. Thevenin's and Norton's theorem provide method for
   a. source transformation b. source distribution
   c. both a) and b) d. none of the above

3. Norton's equivalent resistance is in ..... to current source
   a. series b. parallel
   c. series and parallel d. all of above

4. Power in a inductive element is given as
   a. $Li\frac{di}{dt}$ b. $Li^2\frac{di}{dt}$ c. $L^2i\frac{di}{dt}$ d. Li

5. Transmission parameters are
   a. $V_1 = AV_2 - BI_2$, $I_2 = CV_2 - DI_2$
   b. $V_1 = AI_2 - BV_2$, $I_2 = CI_2 - DV_2$
   c. $V_1 = BV_2 - AI_2$, $I_2 = DV_2 - CI_2$
   d. $V_1 = CV_2 - DI_2$, $I_2 = AV_2 - BI_2$

6. The algebraic sum of currents at any node of a circuit is zero is known as
   a. Kirchhoff's current law b. Kirchhoff's voltage law
   c. Superposition theorem d. Millman's theorem

7. Maximum power transfer is given by
   a. $\frac{{V_0}^2}{4R_{Th}}$ b. $\frac{{V_0}^2}{R_{Th}}$ c. $\frac{V_0}{R_{Th}}$ d. $\frac{V_0}{R^2{}_{Th}}$

8. In open circuit impedance parameter, dependent variables are
   a. V_1, V_2 b. I_1, V_2 c. I_1, I_2 d. V_1, I_2

9. Short circuit impedance parameter h_{11} is given by
   a. $\left.\frac{V_1}{V_2}\right|_{I_1=0}$ b. $\left.\frac{V_1}{V_2}\right|_{I_2=0}$ c. $\left.\frac{V_1}{I_1}\right|_{V_2=0}$ d. $\left.\frac{V_1}{I_2}\right|_{V_2=0}$

10. Kirchhoff's current law is used for
    a. mesh analysis
    b. loop analysis
    c. both a) and b)
    d. none of the above

11. Dependent variables for measuring Y parameters in two port network analysis are
    a. I_1, I_2 b. I_1, V_2 c. V_1, V_2 d. I_1, V_1

12. To define two port networks, dependent and independent variables are
    a. voltage
    b. current
    c. current and voltage
    d. none of these

13. Steady state current in series R-L network is
    a. $i_{ss} = \frac{V}{\sqrt{R^2+\omega^2L^2}}\cos\left(\omega t - \tan^{-1}\frac{\omega L}{R^2}\right)$
    b. $i_{ss} = \frac{V}{\sqrt{R^2+L^2}}\cos\left(\omega t - \tan^{-1}\frac{L}{R^2}\right)$
    c. $i_{ss} = \frac{V}{\sqrt{\omega^2L^2}}\cos\left(\omega t - \tan^{-1}\frac{1}{R^2}\right)$
    d. $i_{ss} = \frac{V}{\sqrt{R^2+\omega^2L^2}}\cos\left(\omega t - \tan^{-1}\frac{L}{R}\right)$

14. Voltage developed across a capacitor is given by
    a. $v = \frac{1}{C}\int idt$ b. $v = \frac{1}{C}\int i^2 dt$ c. $v = \frac{1}{C}\int dt$ d. $v = \frac{1}{C}\int Ldt$

15. Algebraic sum of voltage or (voltage raises) in any set of branch or loop is equal to zero is known as
    a. Kirchhoff's voltage law
    b. superposition theorem
    c. Kirchhoff's current law
    d. Millmen's theorem

16. Z_{12} parameter in terms of $ABCD$ parameter is
    a. $Z_{12} = \frac{AD-BC}{C}$ b. $Z_{12} = \frac{AD+BC}{C}$ c. $Z_{12} = \frac{AD-BC}{B}$ d. $Z_{12} = \frac{AD-BC}{A}$

17. v_{av} is given by
    a. $v_{av} = \frac{v_m}{\pi}$ b. $v_{av} = \frac{2v_m}{\pi}$ c. $v_{av} = \frac{v_m}{2\pi}$ d. $v_{av} = \frac{v_m}{2}$

18. Energy stored by capacitor is
    a. $\frac{1}{2}Cv^2$ b. $\frac{1}{2}Cv$ c. $\frac{1}{2}C^2v$ d. $\frac{1}{2}C^2$

19. Part of network that lies between junction points is called
    a. node
    b. branch
    c. loop
    d. mesh

20. Point of a network where two or more circuit elements are joined are called
    a. mesh
    b. node
    c. branch
    d. network element

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Contd....

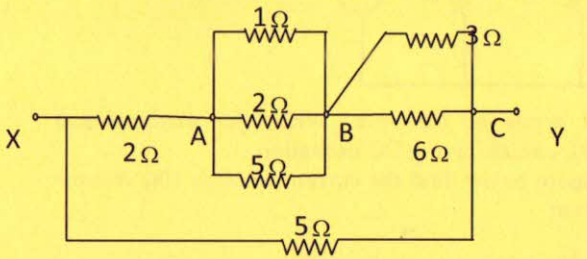
(PART-B : Descriptive)

Time: 2 hrs. 40 min. **Marks : 50**

[Answer question no.1 & any four (4) from the rest]

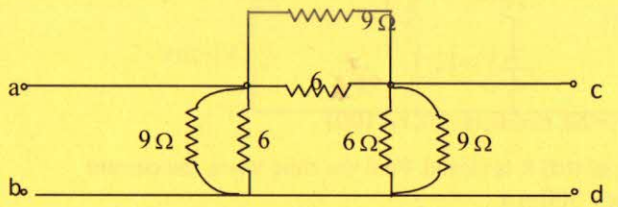
1. Explain star delta connection of resistances. A current of 10 A flows into a circuit consists of 2, 4, 10, and 20 Ω resistances respectively in parallel. Determine the current in each resistance. Define Average value, RMS value for sinusoidal voltage source. 4+3+3 =10

2. **a.** Find the equivalent resistance across X-Y of the circuit drawn below 5+5=10



b. Explain voltage and current division laws.

3. **a.** Find equivalent star network for the following network 4+6 =10



b. Define Thevenin's theorem. Find the expression for V_{oc} , R_{Th} , I_L

4. **a.** Define hybrid parameters and draw the equivalent circuit. 5+5 =10

b. Write the expressions for ABCD parameters. Find Z parameters in terms of ABCD parameters and hybrid parameters

5. **a.** Find the current in a series RL circuit having $R = 2\Omega$ and $L = 10H$ while a d.c. voltage of $100V$ is applied. What is the value of this current after 5secs of switching? 4+6=10

b. Find the Z parameters for the circuit below