USN | | | | | | | | | | 15EC34

## Third Semester B.E. Degree Examination, Jan./Feb. 2023
## Networks Analysis

Time: 3 hrs. Max. Marks: 80

**Note:** ***1. Answer FIVE full questions, choosing ONE full question from each module.***
***2. Missing data, if any, may be suitably assumed.***



### Module-1

1 a. Briefly explain the classification of electrical networks. **(08 Marks)**

b. For the circuit shown in Fig.Q1(b), find the current through 30Ω resistance using mesh analysis.

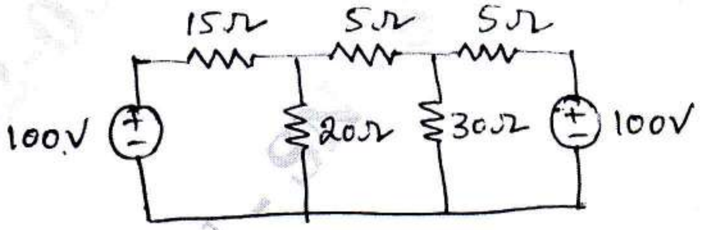


Fig.Q1(b) **(08 Marks)**

**OR**

2 a. Determine the current through 10Ω resistance in the network shown in Fig.Q2(a), by star-delta conversion.

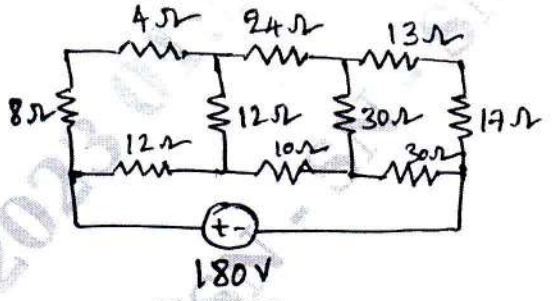


Fig.Q2(a) **(08 Marks)**

b. For the networks shown in Fig.Q2(b) determine the node voltages $V_1$. $V_2$, $V_3$ and $V_4$ using nodal analysis.

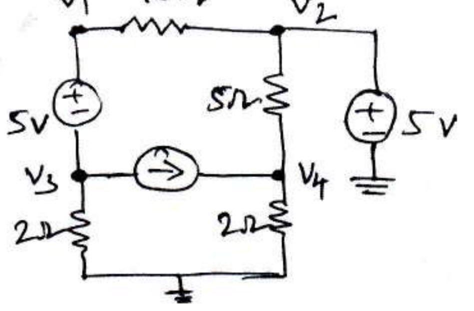


Fig.Q2(b) **(08 Marks)**

## Module-2

3 a. State superposition theorem. Determine the current through 2Ω resistor of the network shown in Fig.Q3(a) using super position principle.

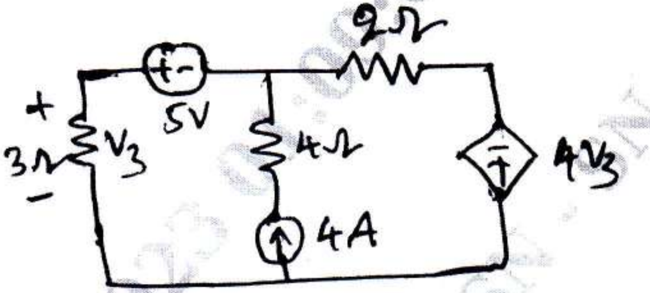


Fig.Q3(a) **(08 Marks)**

b. Use Millman's theorem to find the current through the 10Ω resistance in the circuit of Fig.Q3(b).

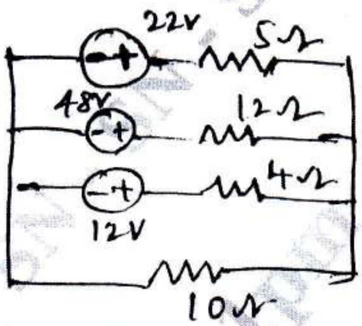


Fig.Q3(b) **(08 Marks)**

**OR**

4 a. Verify the reciprocity theorem for the voltage V and current I, in the network shown in Fig.Q4(a).

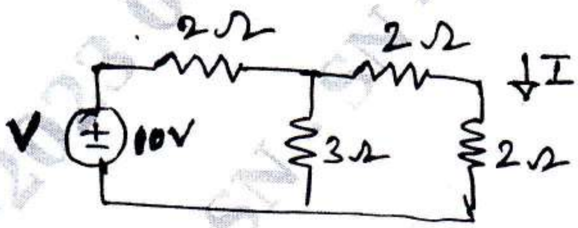


Fig.Q4(a) **(08 Marks)**

b. Obtain the Thevenin's equivalent circuits across terminals A and B for the circuit shown in Fig.Q4(b).

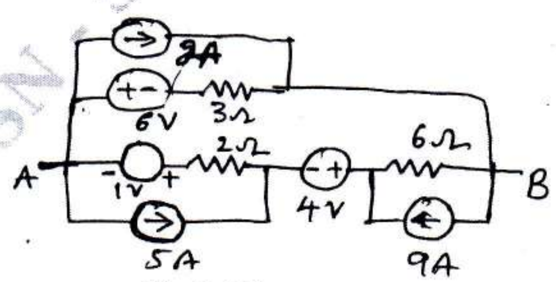


Fig.Q4(b) **(08 Marks)**

## Module-3

**5** a. In the circuit shown in Fig.Q5(a), the switch K is changed from position 1 to position 2 at t = 0. The steady state has been reached before switching. Find the values of,

$i$, $\frac{di}{dt}$ and $\frac{di^2}{dt^2}$ at $t = 0$.

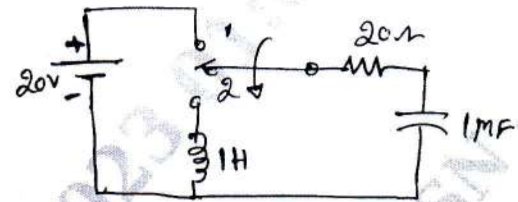


Fig.Q5(a) **(08 Marks)**

b. In the R – C series circuit shown in the Fig.Q5(b), the switch is closed at t = 0. Obtain the expression for the current.

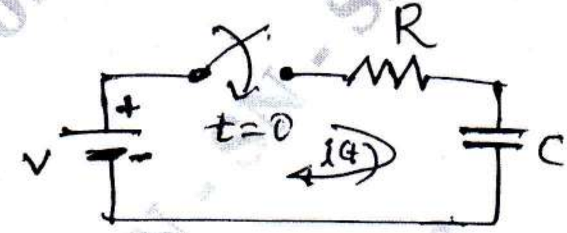


Fig.Q5(b) **(08 Marks)**

**OR**

**6** a. In the circuit shown in Fig.Q6(a) V = 10V, R = 10Ω, L = 1H, C = 10μF and $V_C = 0$. Find $i, \frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ if switch K is closed at t = 0.

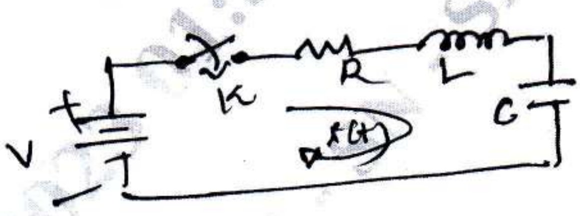


Fig Q6(a) **(08 Marks)**

b. For series RLC circuit, the capacitor is initially charged to 1V, find the current i(t) when the switch K is closed at t = 0. Use Laplace transform Fig.Q6(b).

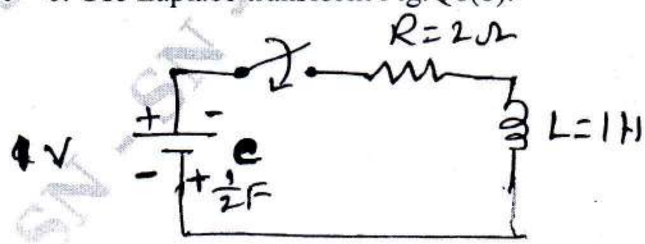


Fig.Q6(b) **(08 Marks)**

## Module-4

7 a. Derive the expressions of half power frequencies $w_1$ and $w_2$ and also bandwidth of a series resource circuit. **(08 Marks)**

b. A series RLC circuit consists of resistance of 1 KΩ and an inductance of 100mH in series with capacitance of 10pF. If 100V is applied as input across the combination determine :

i) The resonant frequency
ii) Maximum current in the circuit
iii) Q –factor of the circuit
iv) The half–power frequencies. **(08 Marks)**

**OR**

8 a. Derive the expression of resonance frequency of a parallel resonance circuit. **(08 Marks)**

b. For the parallel resonant circuit shown in Fig.Q8(b), find $I_0$, $I_L$, $I_c$ $f_0$ and dynamic resistance.

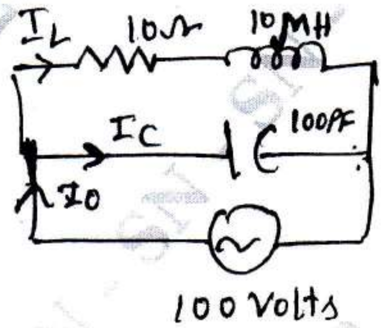


Fig.Q8(b) **(08 Marks)**

## Module-5

9 a. Derive the expression for z – parameters interms of y-parameters. **(08 Marks)**

b. Find the z-parameters for the network shown in Fig.Q9(b).

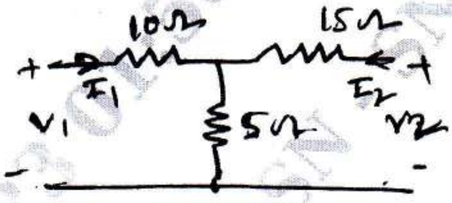


Fig.Q9(b) **(08 Marks)**

**OR**

10 a. Drive the expression of Y-parameters interms of transmission (ABCD) parameters. **(08 Marks)**

b. Find the y-parameters of the two port network shown in Fig,Q10(b).

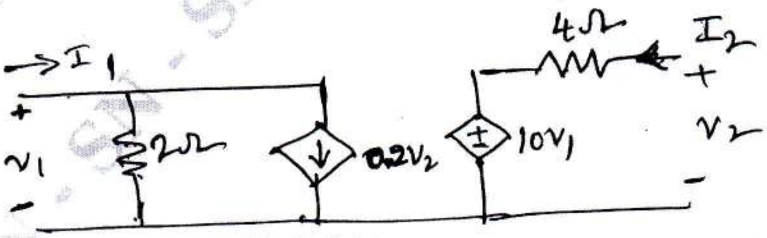


Fig.Q10(b) **(08 Marks)**

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