Hall Ticket Number:

Code No. : 21301

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. II Year (E.C.E.) I-Semester (Main) Examinations, December – 2015

Basic Circuit Analysis

Time: **3** hours Max. Marks: **70**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** questions from **Part-B***

Part-A (10 × 2= 20 Marks)

1. State and explain Norton's theorem.
2. Draw the Thevenin's equivalent circuit for the circuit shown in Fig.1 across the terminals A and B.

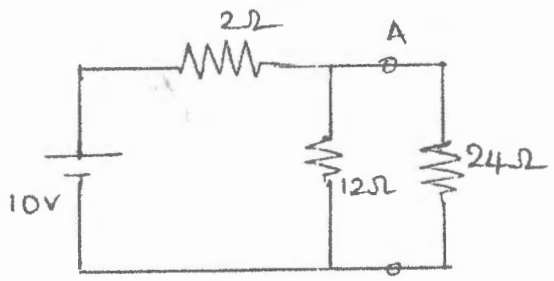

Fig.1

3. Distinguish between transient and steady state responses in an electrical network.
4. Sketch the variation of the voltage drop across an R-L circuit. Also write the necessary expressions.
5. Define and relate the terms i) average power and ii) apparent power.
6. Obtain the Norton equivalent admittance across the terminals A and B for the network shown in Fig.2.

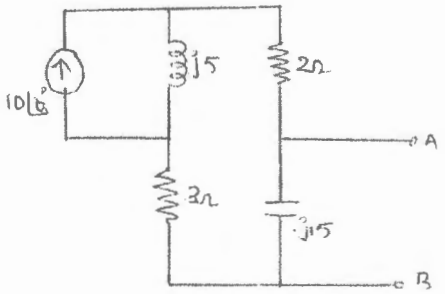

Fig.2

7. Give the significance of bandwidth.
8. State the rules of placing dots in coupled circuits.
9. How are the Poles and Zeroes related to a network function?
10. Distinguish between cut-set and tie-set matrix with reference to a linear network.

Contd… 2

Code No. : 21301

Part - B (5 × 10 = 50 Marks)

11. a) State superposition theorem. Determine the current through resistor R_1 in the network shown in Fig.3 using superposition theorem. [5]

    b) Find node voltages and hence find current through 1Ω. (Fig.4) [5]

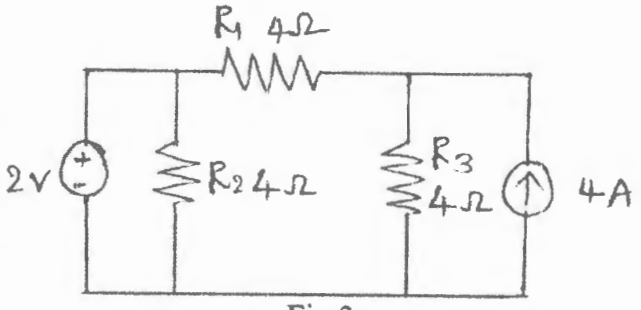

Fig.3

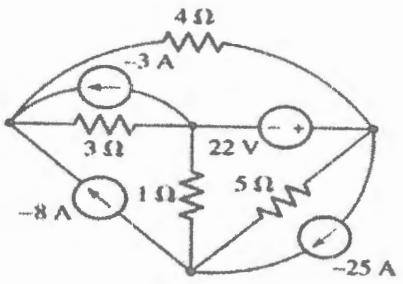

Fig.4

12. a) Explain the response of a series R-C circuit to a step voltage input and also sketch the variation of resulting current with time. [5]

    b) With the switch 'S' closed, the circuit shown in Fig.5 is in the steady state condition. If the switch 'S' is open at t=0 determine the voltage across the inductor. [5]

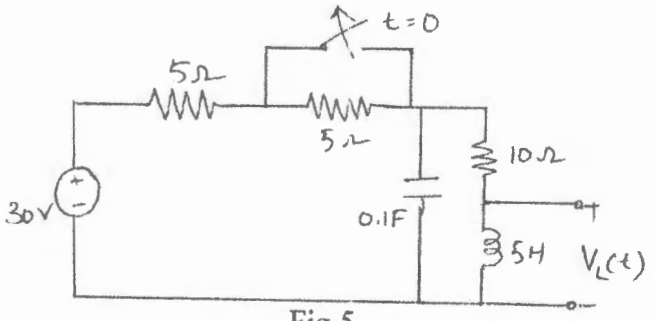

Fig.5

13. a) State maximum power transfer theorem for AC circuits. [3]

    b) For the circuit shown in Fig.6 find Norton's equivalent circuit across AB and verify the results using Thevenin's theorem. [7]

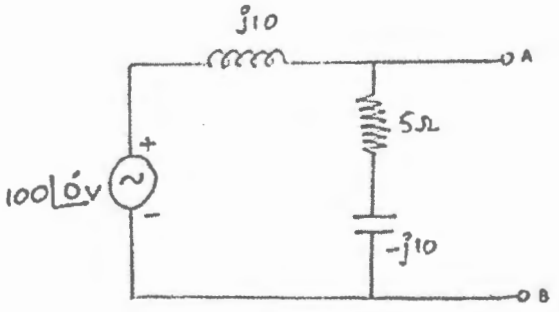

Fig.6

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Code No. : 21301

14. a) Prove that, resonant frequency in a series RLC resonant circuit is the geometric mean of cut-off frequencies. Also obtain the expression for bandwidth and selectivity of the circuit. [5]

b) Two coils A (R_1 = 50 ohm and L_1= 0.2 H) and B (R_2 = 200 ohm and L_2 = 0.5 H) are coupled by a mutual inductance of 0.25 H (Fig.7). Find the voltage at a frequency of $\frac{1000}{2\pi}$ Hz that must be maintained across the terminals of A in order that a current of 10 mA may flow in B when terminals of B are connected to a resistance of 50 ohm. [5]

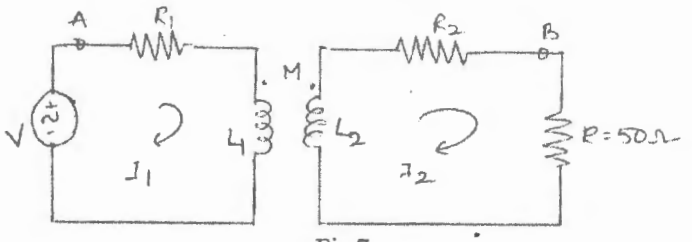

Fig.7

15. a) State the principle of duality and find dual for the circuit shown. (Fig.8) [5]

b) For the resistive network shown in Fig.9, set up the corresponding tie set matrix and obtain KVL equations. [5]

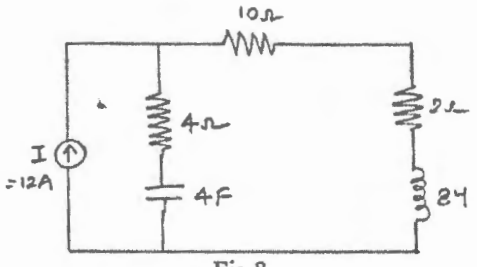

Fig.8

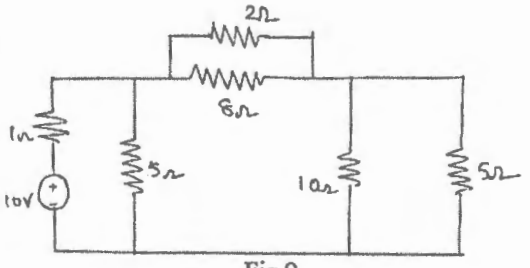

Fig.9

16. a) Find the current through each branch in the network shown in Fig.10. [5]

b) In the circuit shown in Fig.11, the switch 'S' is closed at position-1 at t = 0 and moved to position-2 at t = 1 ms. Find the time at which the circuit current is zero while reversing its direction. [5]

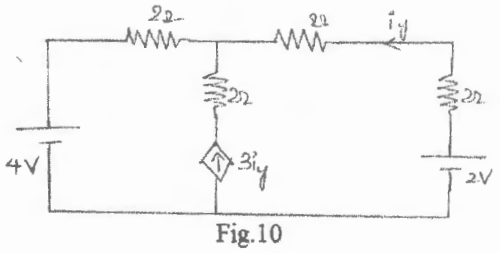

Fig.10

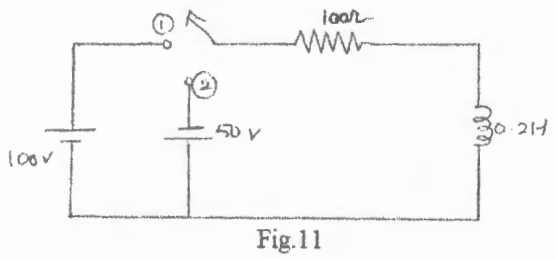

Fig.11

17. Write short notes on any ***two*** of the following:

a) Complex power [5]

b) Self and mutual inductance [5]

c) Pole- Zero cancellation [5]