Code No: 53020 **R09**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**B.Tech II Year I Semester Examinations, November - 2015**

**ELECTRIC CIRCUITS**

**(Common to ECE, ETM)**

**Time: 3 hours** **Max. Marks: 75**

**Answer any five questions**

**All questions carry equal marks**

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1.a) Differentiate between ideal sources and practical sources.

b) Find the equivalent voltage and current source representation of the following network across AB (figure 1). [7+8]

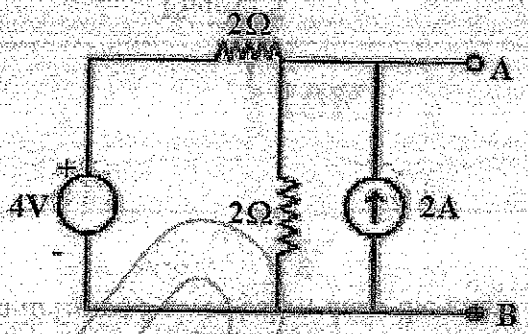


**Figure: 1**

2.a) Find the node voltages $V_1$, $V_2$ and $V_3$ in the network of figure 2, and find the current $I_x$.

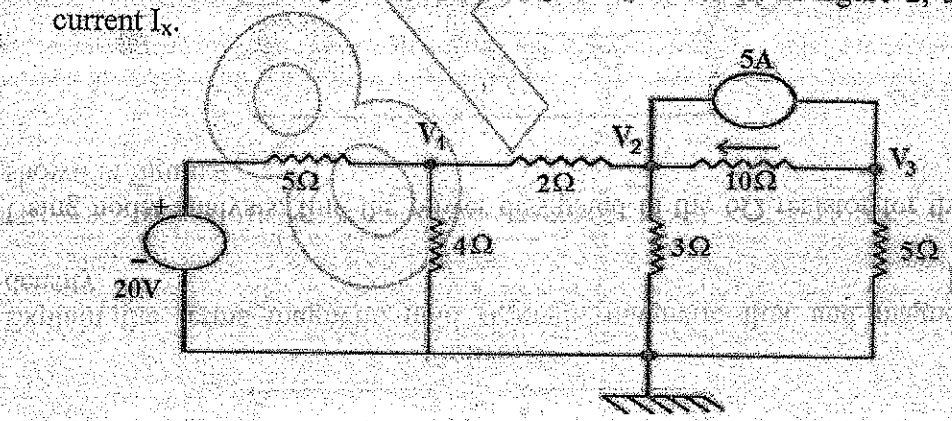


**Figure: 2**

b) Two resistances when they are in series have an equivalent resistance of 9 ohms and when connected in parallel have an equivalent resistance of 2 ohms. Find the resistance and the ratio of the voltage and current sharing between these elements if supply voltage is 100v. [7+8]

3.a) Derive the expression for power in 1-φ A.C. Circuits.

b) A 50Hz sinusoidal voltage applied to a single phase circuit has its RMS value of 200V its value at t=0 is 28.3 volt positive. The current drawn by the circuit is 5A RMS and lags behind the voltage by one sixth of a cycle. Write the expressions for instantaneous values of voltage and current. [7+8]

4.a) A RLC series circuit consists of R=50 Ω, L=0.16H and C=4μF. Calculate resonant frequency, quality factor, band width and half power frequencies.

b) For the RLC series circuit R=5Ω, L=0.03H, C=100 μF. Determine the Frequency at which the circuit resonates. Also find the quality factor, voltage across the inductance, voltage across capacitance, at resonance. [7+8]

5.a) The combined inductance of two coils connected in series are 0.6 H and 0.1 H in series aiding and Series opposing connections. If the self inductance of each coil is 0.2H, find the coefficient of coupling.

b) In the network shown in Figure 3, $L_1$=1H, $L_2$=2H, M=1.2 H. Assuming the inductance coils to be ideal find the amount of energy stored after 0.1 sec of the circuit connected to a d.c. source of 10v.

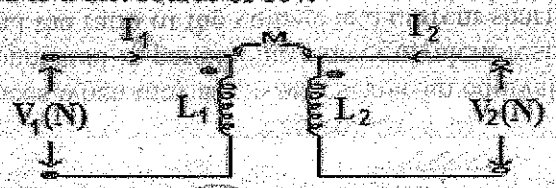


**Figure: 3**

c) Explain the terms magnetic field strength, magnetic flux and magnetic flux density. [5+5+5]

6.a) Using nodal analysis, find the power dissipated in the 6Ω resistor for the circuit shown in figure 4.

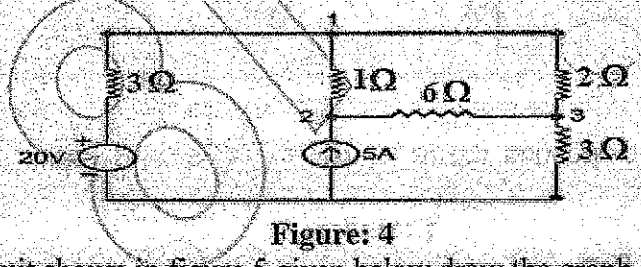


**Figure: 4**

b) For the circuit shown in figure 5 given below draw the graph and tree. [8+7]

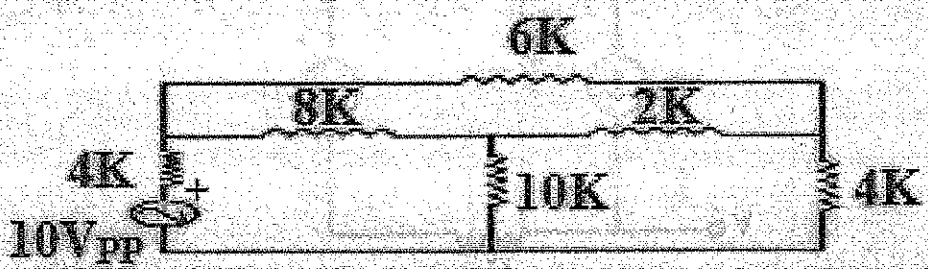


**Figure: 5**

7.a) State and explain Thevinin's and Norton's theorems.

b) Calculate the current I shown in figure 6 using Millman's theorem. [7+8]

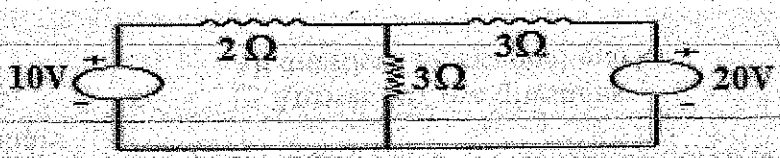


**Figure: 6**

8.a) State and explain Tellegen's Theorem.

b) In the network shown in the Figure 7. Find the value of $Z_L$ so that the power transfer from the source is maximum. Also find $P_{max}$. [7+8]

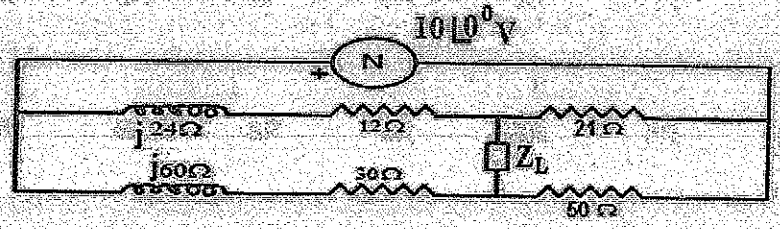


**Figure: 7**

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