

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-III • EXAMINATION – WINTER • 2014

Subject Code: 2130901

Date: 01-01-2015

Subject Name: CIRCUITS AND NETWORKS

Time: 02.30 pm - 05.00 pm

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Define Charge, Current, Potential difference, Lumped parameter, Time invariant, Branch and Tree. **07**
- (b) Calculate the node voltages for all the nodes shown in figure: 1 using nodal analysis. **07**
- Q.2** (a) State and explain the Maximum Power Transfer Theorem. Drive the condition for maximum power transfer to the load for DC and AC circuit. **07**
- (b) Draw the dual network shown in figure : 2. **07**
- OR**
- (b) Explain the dot convention rule for the magnetically coupled Network shown in figure: 3. Also formulates KVL equations. **07**
- Q.3** (a) For the circuit shown in figure: 4 find the voltages and currents for all circuit elements using mesh analysis. **07**
- (b) State and explain (1) Norton's theorem (2) Millman's theorem. **07**
- OR**
- Q.3** (a) Find current in 20 ohm resistance in the circuit shown in figure: 5 using superposition theorem. **07**
- (b) State Thevenin's theorem. Calculate current passing through 60Ω resistance in the circuit shown in figure: 6, using thevenin's theorem. **07**
- Q.4** (a) In the circuit shown in figure: 7, the switch 'K' is closed at t=0. Assuming no initial current through inductor. Find current at t = 0.3 sec. Also find instant of time at which voltage across R equals voltage across L. **07**
- (b) Find laplace transform of $f_1(t) = \sin \omega t$ $f_2(t) = e^{-at} \cos \omega t$. **07**
- OR**
- Q.4** (a) In a circuit shown in figure: 8, the switch has been at position A for a long time and is moved to position B at t = 0. Obtain current i(t) at t > 0. **07**
- (b) Explain the concept of Poles and zeros and their significance. **07**
- Q.5** (a) Find h-parameters of the circuit shown in figure: 9 **07**
- (b) Derive expression of ABCD parameters in terms of Z and Y parameters. **07**
- OR**
- Q.5** (a) Derive relationship between incidence matrix (A), fundamental cut-set matrix (Q_f) and fundamental tie-set matrix (B_f). **07**
- (b) For the network shown in figure: 10 draw the oriented graph and Obtain (1) the incidence matrix (2) tieset matrix and (3) f-cutset matrix. **07**

Circuits and Networks (2130901)

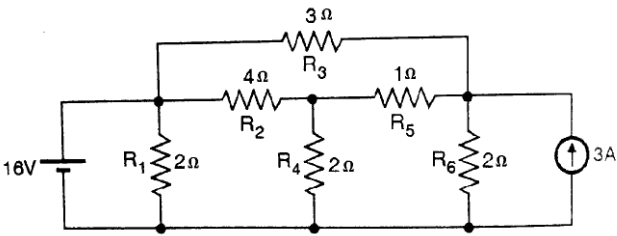


FIGURE : 1

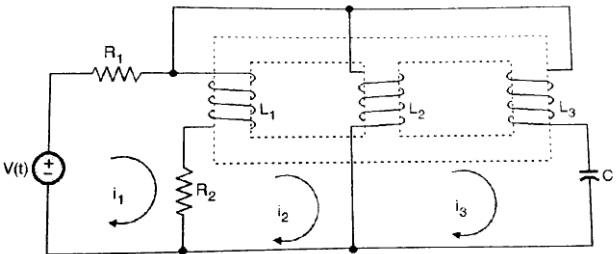


FIGURE : 3

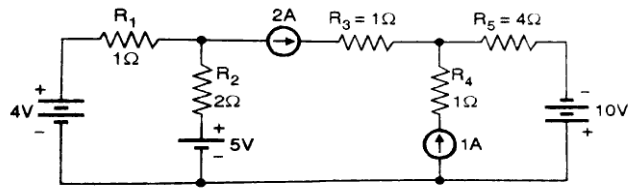


FIGURE : 4

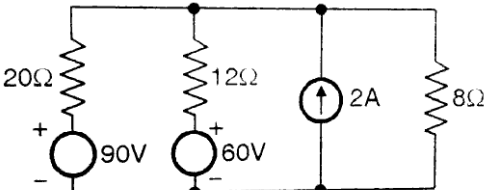


FIGURE : 5

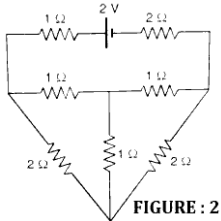


FIGURE : 2

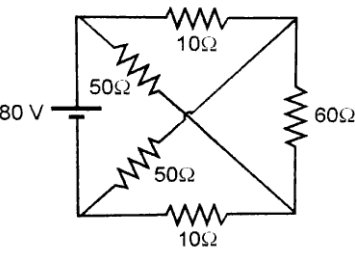


FIGURE : 6

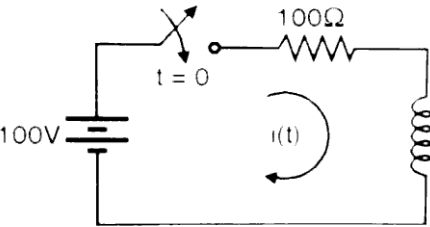


FIGURE : 7

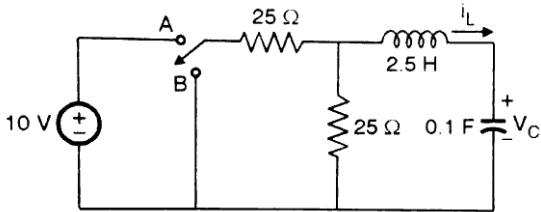


FIGURE : 8

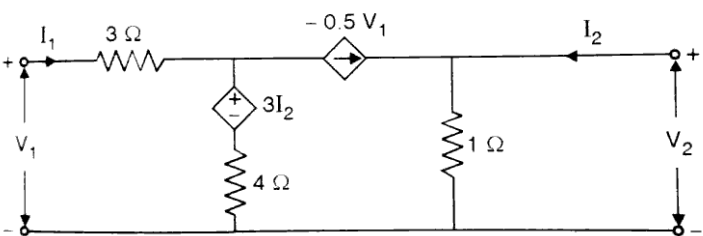


FIGURE : 9

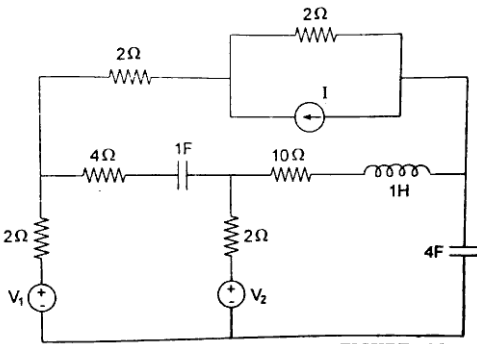


FIGURE : 10
