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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Third Semester, B.E. - Electronics and Communication Engineering

Semester End Examination; Dec - 2017 / Jan - 2018

Electrical Network Analysis

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. Distinguish the following with suitable examples: 10

i) Linear and non-linear elements ii) Independent and dependent sources.

b. Write the equation for the circuit shown in Fig-1b. Determine mesh currents using mesh analysis. 10

2 a. Develop a general model equation for a general network in the form [Y] [V] = [I], where [Y] = Admittance matrix, [V] = Node voltage matrix and [I] = Source current matrix. 10

b. Find the power delivered by the 5 A current source in the circuit shown in Fig-2b, using the node analysis method. 10

UNIT - II

3 a. Define the following with suitable examples : 10

i) Planar and non-planar graphs ii) Twigs and links iii) Incidence matrix.

b. For the circuit shown in Fig.-3b, write the graph of the network and obtain the tie-set schedule considering J_1, J_2, J_3 as tree branches. Calculate all the branch currents. 10

4 a. Explain with example the principle of duality. 10

b. Find the maximum possible number of tree for the network shown in Fig-4b. 10

UNIT - III

5 a. Find the condition for the maximum power transfer in the following Fig-5a, network type AC source, complex source impedance and complex load impedance but only load resistance varying. 10

b. Obtain the Thevenin's equivalent of the network shown in Fig-5b, between the terminals *X* and *Y*. 10

6 a. Shown that the resonant frequency of series resonant circuit is equal to the geometric mean of two half power frequencies. 10

b. A series RLC circuit consists of a 50 Ω resistance, 0.2 H inductance and 10 μF capacitor with an applied voltage of 20 V. Determine the resonant frequency. Find the Q factor of the circuit. Compute the lower and upper frequency limits and also find the bandwidth of the circuit. 10

UNIT - IV

7 a. Establish the procedure for evaluating the initial conditions with suitable examples. 10

Contd.... 2

b. In the circuit shown in Fig-7b, V = 10 V, R = 10 Ω, L = 1 H, C = 10 μF and V_c = 0, find *i(0+), di (0+) /dt* and $d^2i(0+)/dt^2$. Assume switch is closed at *t* = 0. 10

8 a. Obtain the Laplace transformation of the waveform shown in Fig.-8 a. 10

b. State and prove convolution theorem. Using the same find *f(t)* when $F(s) = (1)/(s^2(s+1))$. 10

UNIT - V

9 a. Test whether the following polynomial is Hurwitz: $P(S) = S^4 + S^3 + 5S^2 + 3S + 4$. 10

b. Realize Cauer-II form of LC network for the following function: 10

$$Z_{LC}(S) = \frac{S(S^4 + 3S^2 + 1)}{3S^4 + 4S^2 + 1}.$$

10 a. Define h-parameters. Show that the transmission parameter matrix of a cascade of two port networks is the product of the transmission parameter matrices of the individual two port networks. 10

b. Determine the y-parameter of the two-port network shown in Fig.-10 b. 10

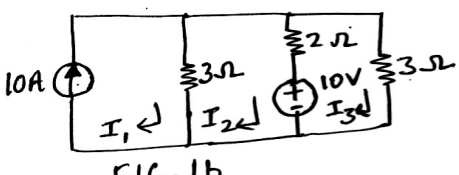

FIG-1b

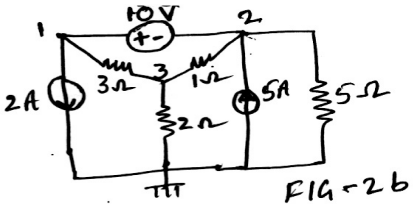

FIG-2b

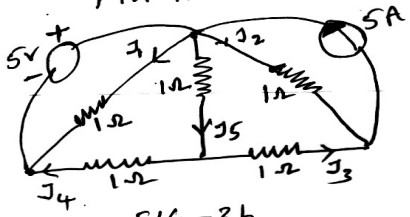

FIG-3b

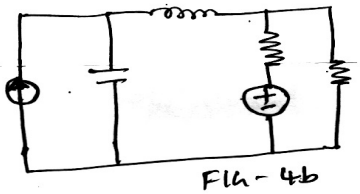
FIG-4b

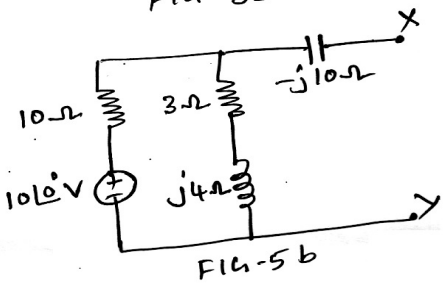

FIG-5b

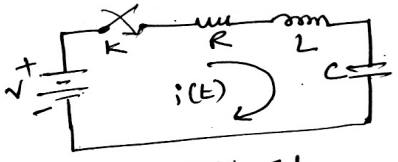

FIG-7b

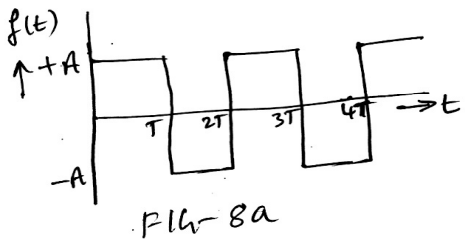

FIG-8a

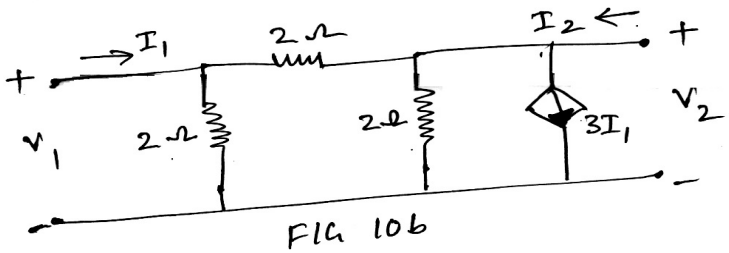

FIG 10b

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