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BIEE-014

B.Tech. – VIEP – ELECTRICAL ENGINEERING (BTELVI)

Term-End Examination

December, 2014

BIEE-014 : NETWORK THEORY

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any* ***five*** *questions. All questions carry equal marks.*

1. (a) Distinguish between 7

(i) tree and co-tree

(ii) mesh and loop

(iii) planar and non-planar graph

(iv) incidence matrix and reduced incidence matrix

(b) Draw the graph of the network shown in the Fig. 1. Select a suitable tree to write tie-set schedule. Hence find the three loop currents. 7

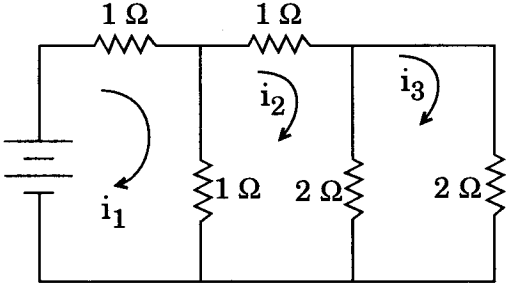

Fig. 1

2. (a) (i) Explain maximum power transfer theorem for ac circuit.

(ii) In the network shown in Fig. 2 two voltage sources act on the load Z_L. If the load is variable, for what value load Z_L will receive maximum power ? 7

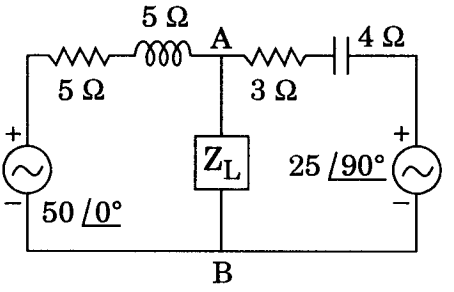

Fig. 2

(b) State and prove Millman's Theorem. 7

3. (a) What is driving point impedance ? Determine the driving point impedance $Z_{11}(s)$ of the network shown in the Fig. 3. 7

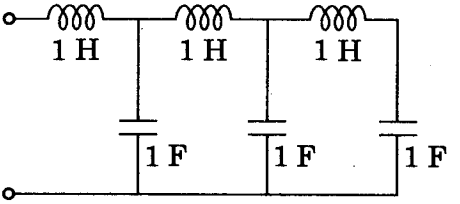

Fig. 3

(b) What are poles and zeroes ? Explain the significance of the poles and zeroes in the network functions. 7

4. (a) (i) Derive the condition of reciprocity for Z-parameters.

(ii) Check whether the network shown in the Fig. 4 is reciprocal or not. 7

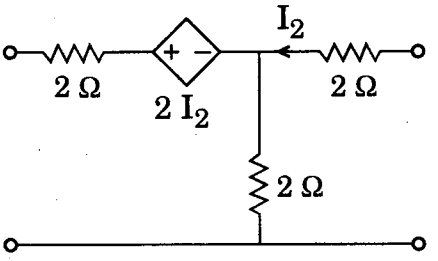

Fig. 4

(b) Why are ABCD parameters known as transmission parameters ? Two identical sections of the network shown in the Fig. 5 are cascaded. Calculate the transmission parameters of the resulting network. 7

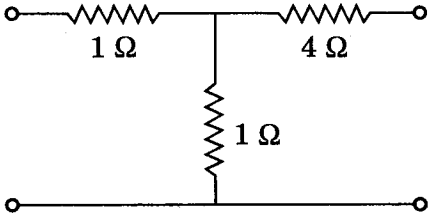

Fig. 5

5. (a) (i) State clearly the conditions to be fulfilled for a function to be positive real.

(ii) Justify $F(s) = s + \sqrt{s^2 + 1}$ is a positive real function. 7

(b) Realise the following RC driving point impedance function in Foster-I form

$$Z(s) = \frac{s^2 + 4s + 3}{s^2 + 2s}$$ 7

6. (a) The image impedances of the network shown in the Fig. 6 are $Z_{i1} = 100\ \Omega$ and $Z_{i2} = 50\ \Omega$. Calculate the values of impedances Z_1 and Z_2. 7

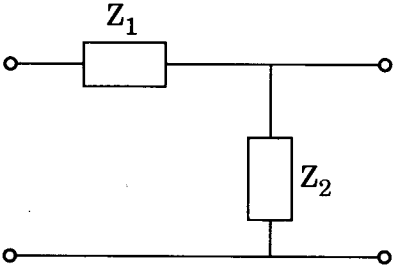

Fig. 6

(b) What is high pass filter ? Prove the cut-off frequency $f_c = \frac{1}{4\pi\sqrt{LC}}$ for constant-K high pass filter (T-section). 7

7. Write short notes on any ***two*** of the following : *2×7=14*

(a) Compensation Theorem

(b) Transfer function and its properties

(c) Interconnections of two port networks

(d) Procedure for testing positive real functions