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

Term-End Examination

00525   June, 2019

BIEE-014 : NETWORK THEORY

Time : 3 hours   Maximum Marks : 70

Note : Attempt any **five** questions. All questions carry
equal marks. Use of scientific calculator is allowed.

1. (a) In graph theory, determine the relation
         between Branch voltage matrix $[V_b]$, Twig
         voltage matrix $[V_T]$ and Node voltage
         matrix $[V_n]$.   7

    (b) Define the following terms with an example
         of each :   7

         (i)   Fundamental tie set matrix

         (ii) Planar and Non-planar graph

2. (a) State and prove Tellegen's theorem. 7

(b) What are the values of Norton's equivalent current source (I_N) and equivalent resistance (R_N) across the load terminal of the circuit shown in the figure below ? 7
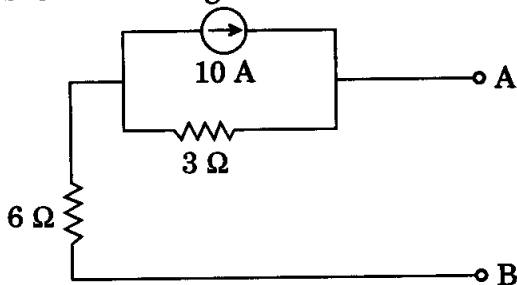
3. (a) How can stability of the network be obtained with the help of pole-zero plot ? 7

(b) Explain various properties and necessary conditions for transfer functions. 7

4. (a) Show that when two networks N_1 and N_2 are connected in series, the equivalent z-parameters of combined network is the sum of z-parameters of each individual two-port network. 7

(b) The currents I_1 and I_2 at the input port and the output port respectively of a two-port network are given by

$$I_1 = 6V_1 - V_2 \text{ and } I_2 = -V_1 + 2V_2.$$

Find the equivalent π-network, and the input impedance when a load of $(4 + j7)$ ohm is connected across the output port. 7

5. (a) Synthesize the function

$$z(s) = \frac{s(s^2 + 12)}{(s^2 + 2)(s^2 + 20)}$$

using the Foster form-II. 7

    (b) Check whether the polynomial

$s^4 + s^3 + 7s^2 + 4s + 6$ is Hurwitz or not. 7

6. (a) Discuss the general characteristics of a Low Pass filter. 7

    (b) What are the limitations of passive filters ? Draw the schematic diagram of a High Pass filter. 7

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

2×7=14

    (a) Reciprocity Theorem

    (b) Transform Impedance Function

    (c) Interconnection of Two-port Network