No. of Printed Pages : 05

Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 33409 | Roll No. | | | | | | | | | | |

B. Tech. Examination 2021-22

(Even Semester)

FUNDAMENTAL OF NETWORK ANALYSIS

Time : Three Hours]   *[Maximum Marks : 60*

Note :– Attempt all questions.

SECTION – A

1. Attempt all parts of the following : $8 \times 1 = 8$

    (a) Explain initial and final value theorem.

    (b) Show the efficiency of circuit is 50% under condition of maximum power transfer.

    (c) Define twigs of graph theory.

    (d) Explain cut-set matrix.

(e) Differentiate between lumped and distributed parameter.

(f) Give the statement of super position theorem.

(g) What are the condition for which network function to be stable?

(h) What are the condition for marginal stable in bode diagram.

SECTION – B

2. Attempt any two parts of the following : $2 \times 6 = 12$

(a) Explain Thevenin and Norton equivalent circuit and write the procedure to obtain Thevenin voltage (V_{TH}) and Norton's current (I_N) with respect to Z_{TH} and Z_N.

(b) Mention the steps to perform the stability of a given polynomial :

$$a_0 S^n + a_1 S^{n-1} + \ldots\ldots\ldots\ldots a_n = 0$$

by using Routh-Hurwitz criterion.

(c)   Obtain the Z parameter of the network shown in figure :
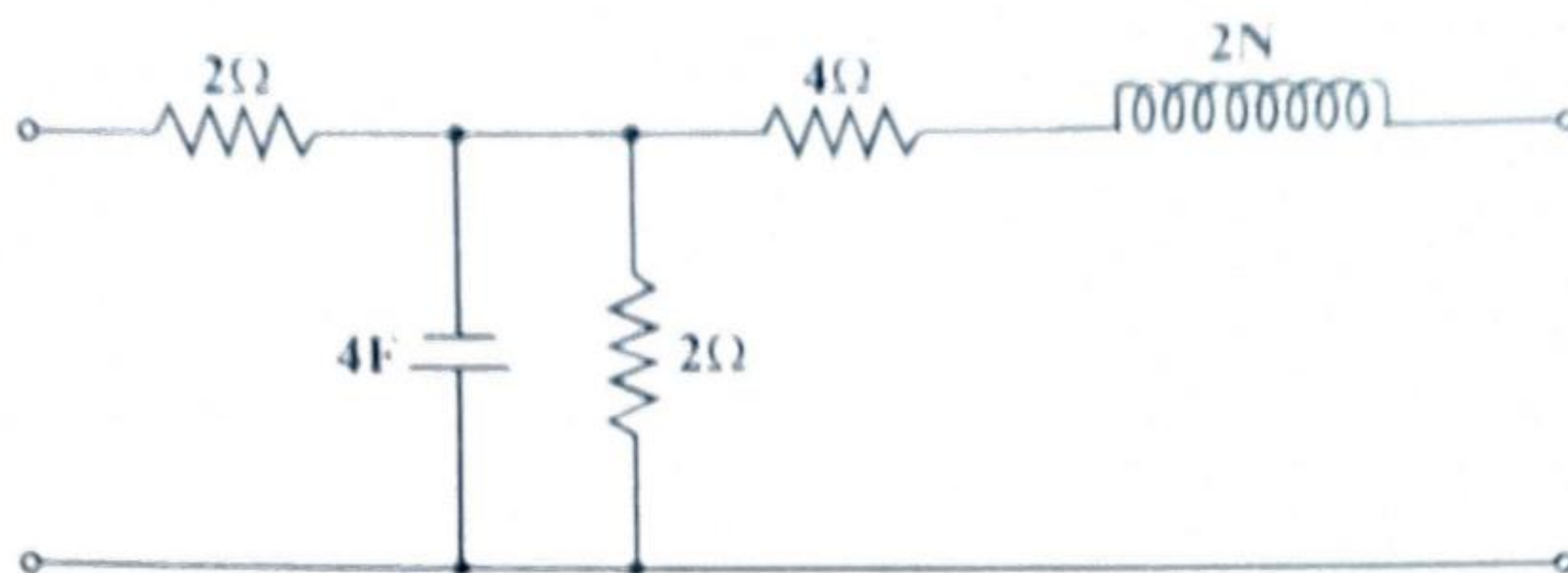
(d)   Explain positive real function and mention the properties and sufficient condition for rational function to be positive real function (P. R. F.) :
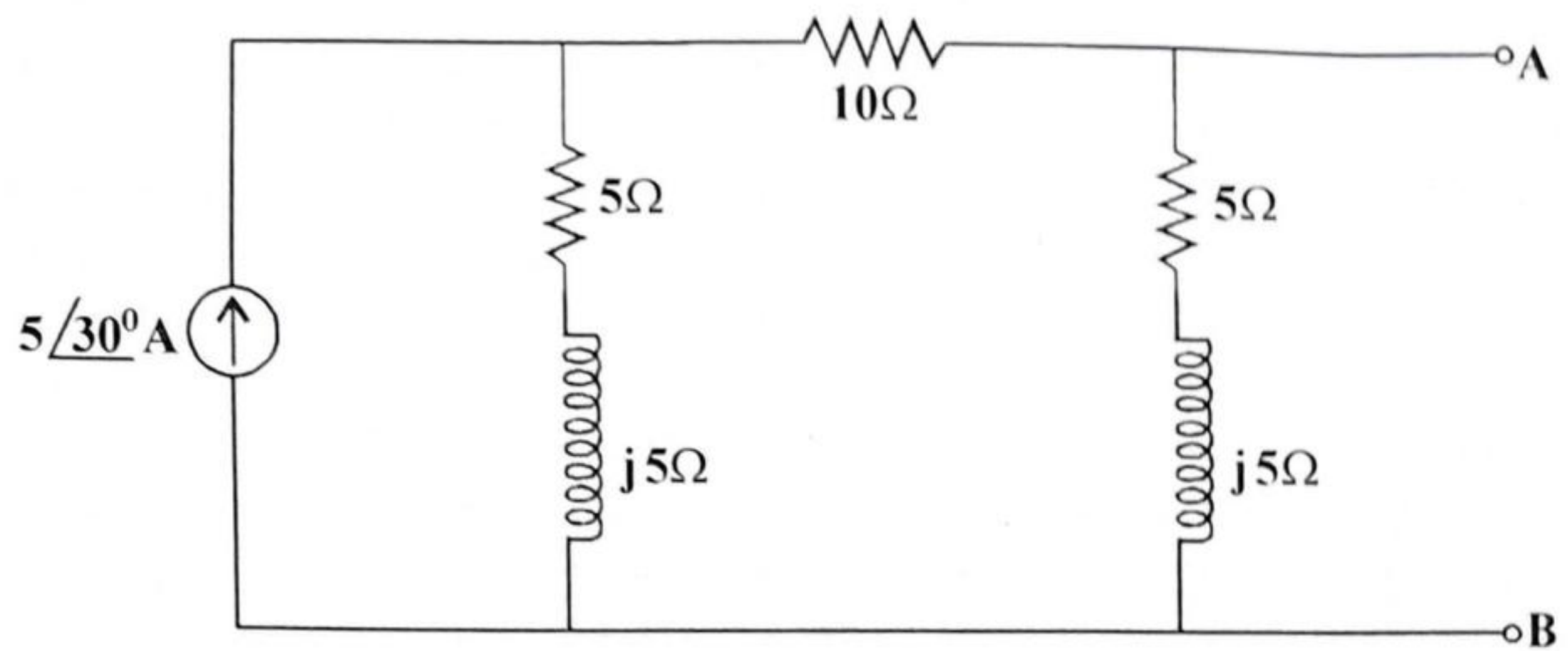
SECTION – C

Note :– Attempt all questions. Attempt any two parts from each questions. $5 \times 8 = 40$

3.   (a)   State and prove convolution theorem in Laplace transform.
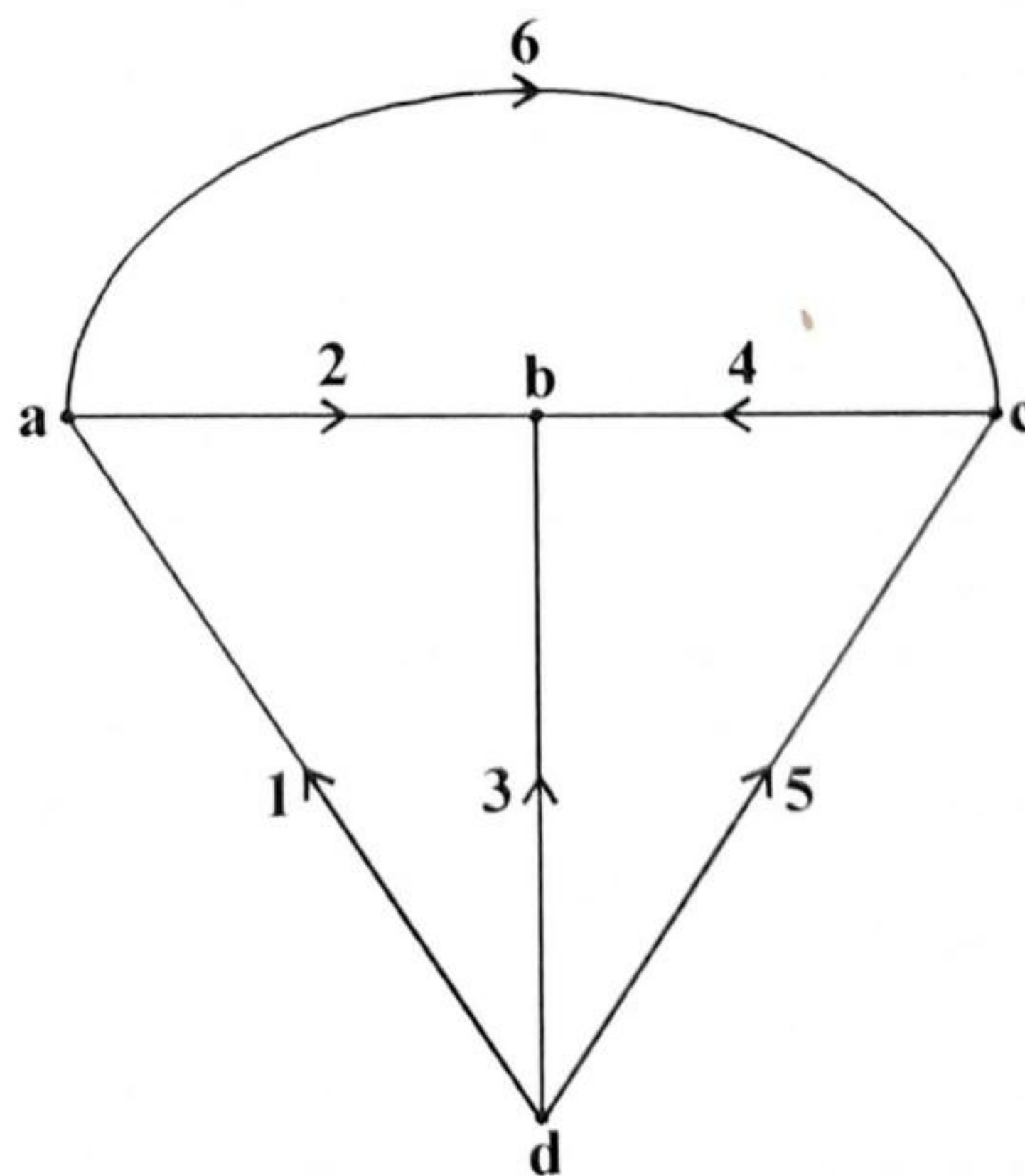
     (b)   Determine initial value $f(0^+)$, if

     $$f(s) = \frac{2(s+1)}{s^2 + 2s + 5}$$

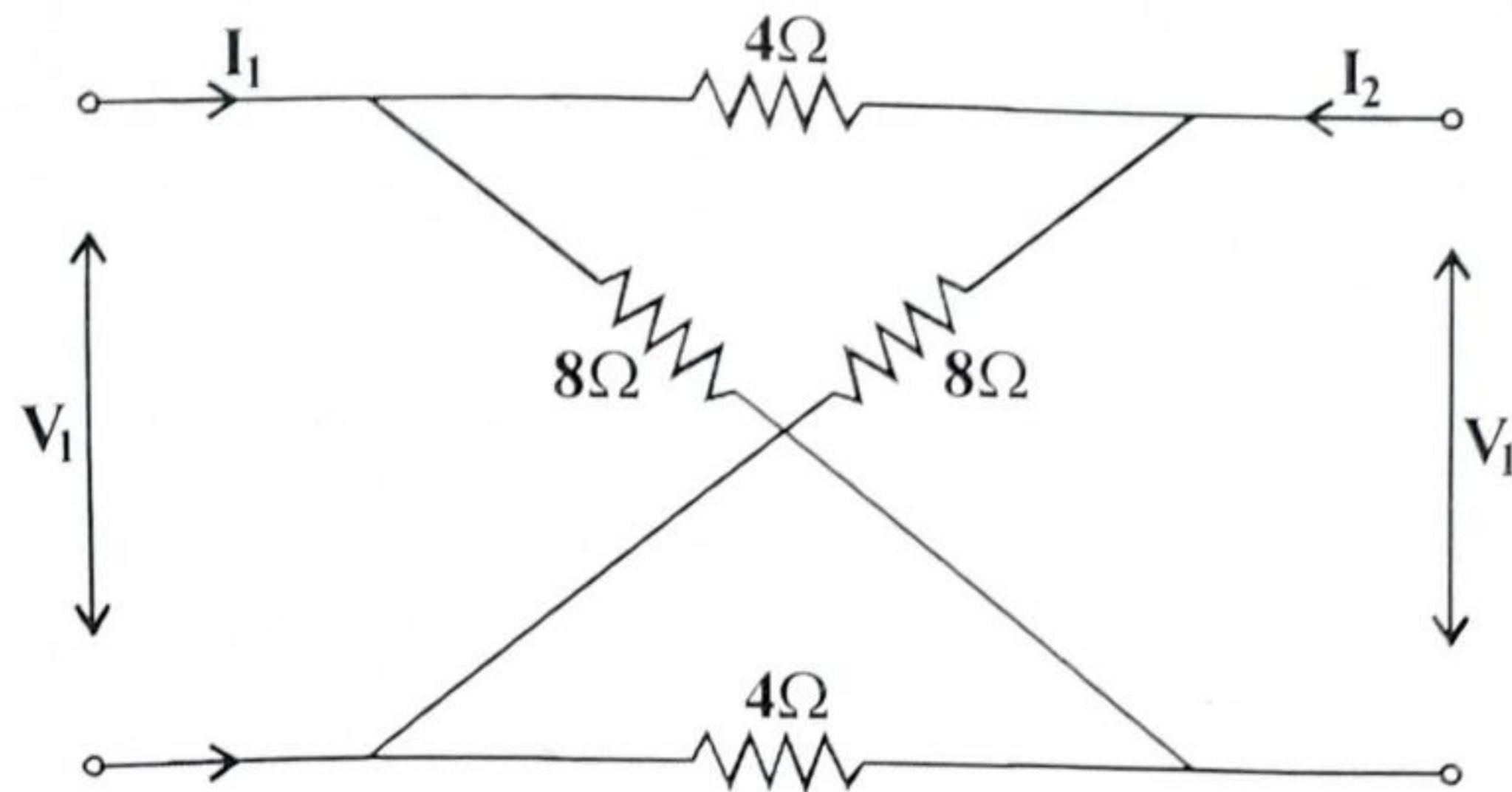   (c)   Obtain the Thevenin's equivalent parameters for the circuit :

4. For the graph shown in figure, consider the formed by the branches (2, 3, 4), using this tree calcualte :

(a) Compute incidence and reduce incidence matrix.

(b) Tie-set matrix (B_F)

(c) Cut-set matrix (Q_f)

5. (a) For the given lattice network, find Z-parameter:

(b) Explain the transformation of $T - \pi$ and $\pi - T$ representation.

(c) Define characteristics impedence Z_0, progpagation constant γ and alternation a for filter made by T network.

6. (a) Check whether the given polynomial :

$$P(s) = s^4 + s^3 + 2s^2 + 4s + 1$$

is Hurwitz or not?

(b) Test for the positive real function :

$$F(s) = \frac{2s^2 + 2s + 1}{s^3 + 2s^2 + s + 2}$$

(c) An impedence function given by :

$$Z(s) = \frac{(s+1)(s+4)}{s(s+2)(s+5)}$$

Find R-C representation of Foster I and II form.

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