

B.E. (Electrical and Electronics Engineering)
Third Semester
ES-EE-301: Network Analysis and Synthesis

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part. Assume any missing data.

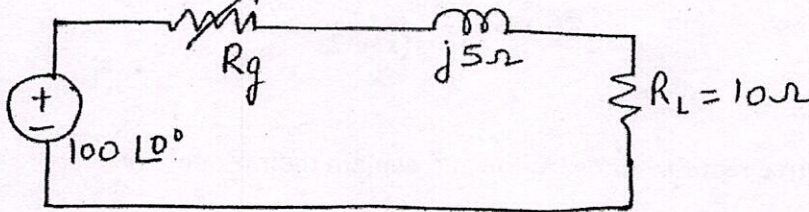
x-x-x

1. (a) Define tree, twigs, links as in graph theory, with example.
- (b) Find δ and ω_n for $T = \frac{1}{s^2 + 5s + 10}$
- (c) What is significance of super mesh in networks?
- (d) State and prove differentiation theorem of Laplace Transform.
- (e) Write limitations of maximum power transfer theorem.

(5*2)

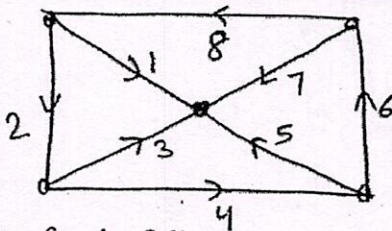
PART-A

2. (a) A current $I = 2\angle 0^\circ$ A flows between terminals 1 and 2 in network, when $V = 10\angle 90^\circ$ is applied between terminals 3 and 4. If voltage $V = 25\angle 45^\circ$ is applied between 1 and 2, what current will flow between terminals 3 and 4. State the theorem used.
- (b) R_g is variable resistance between 2Ω and 55Ω . What value of R_g results in maximum power transfer to load R_L ?

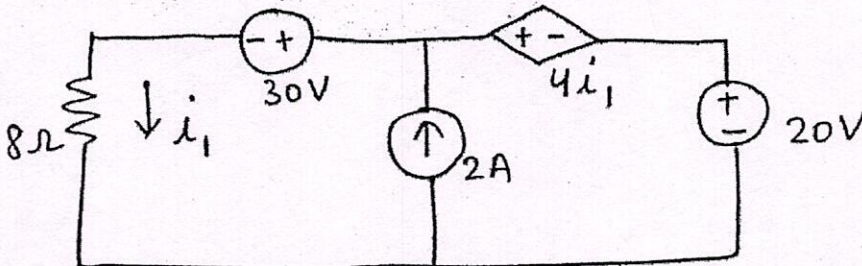


(5, 5)

3. (a) What is isomorphic graph? Show the following graph to be isomorphic.



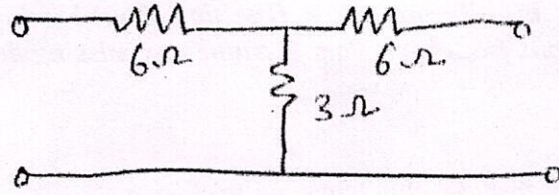
- (b) Draw a tree for the following network and find i_1 .



(5, 5)

(2)

4. (a) Determine z-parameters of the network shown. An identical network is connected in series with this. Determine z-parameters for the overall network and verify the results by direct computation.



- (b) Derive y-parameters in terms of h parameters. For two-port networks.

(5, 5)

PART-B

5. (a) Find stability using R-H criterion:

$$s^4 + s^3 + 2s^2 + 2s + 3 = 0$$

- (b) Write properties and necessary conditions for transfer function.

(5, 5)

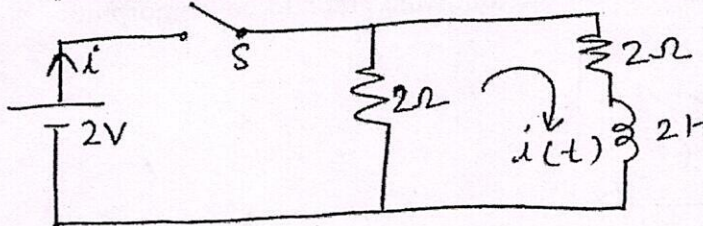
6. Synthesis electric network using Cauer and Foster forms:

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

(10)

7. (a) What are positive real functions? Write and explain their properties.

- (b) The circuit was initially in steady state with switch S closed. At the instant when S is opened, find value of $i(t)$.



(5, 5)

x-x-x