

**B. Tech.**  
**(SEM. IV) THEORY EXAMINATION 2017-18**  
**NETWORK ANALYSIS AND SYNTHESIS**

Time: 3 Hours

Total Marks: 70

**Note: 1.** Attempt all Sections.

**SECTION A**

**1. Attempt all questions in brief. 2 x 7 = 14**

- a. Write two properties of Complete Incidence matrix.
- b. Write Hybrid parameters in terms of Z parameters.
- c. State two properties of the R-L driving point Impedance Function
- d. Describe the following: Tree, Co-Tree, Twig, Link, Cut-set and Tie set.
- e. State and describe the properties of RL and RC DPI Network.
- f. State and describe thevenin theorem with suitable example.
- g. Describe complex frequency in brief.

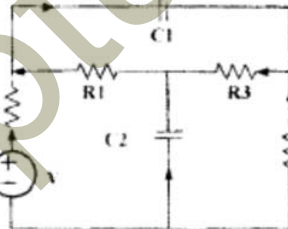
**SECTION B**

**2. Attempt any three of the following: 7 x 3 = 21**

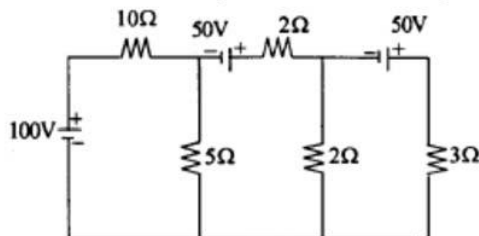
- a. For the given reduced incidence matrix. Draw the graph and hence obtain the f-cutset matrix

$$\begin{bmatrix} 0 & 0 & 1 & 1 & 1 & 0 & -1 \\ 0 & 1 & 0 & 0 & -1 & 1 & 1 \\ -1 & 0 & 1 & 0 & 0 & -1 & 0 \end{bmatrix}$$

- b. For the network shown in Fig below draw the directed graph. And also find number possible tree.

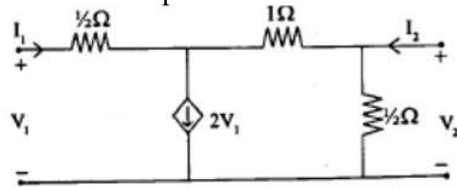


- c. Find current through 50 resistor using Thevenin's theorem.



- d. Test whether the polynomial P(s) is Hurwitz or not.
  - (i)  $s^5 + 3s^2 + 2s$
  - (ii)  $s^4 + 5s^3 + 5s^2 + 4s + 10$

- e. Find Y and Z parameters of the network.



### SECTION C

3. Attempt any *one/two* part of the following: 7 x 1 = 7

- (a) State the properties of RL driving point impedance function. Also realize the given network impedance function using Foster form I  
 $Z(s) = \frac{(s+1)(s+3)}{(s+2)(s+4)}$
- (b) Explain the advantage of active filter in comparison to passive filter in detail.

4. Attempt any *one/two* part of the following: 7 x 1 = 7

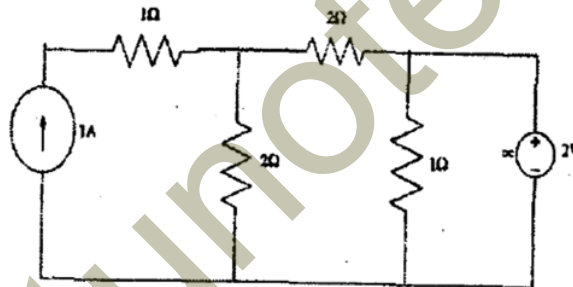
- (a) For the given network function, draw the pole zero diagram and hence obtain the time response  $I(t)$

$$I(s) = \frac{5s}{(s+1)(s^2+4s+8)}$$

- (b) Design constant K low pass T and  $\pi$  section filters to be terminated in  $600 \Omega$  having cut-off frequency 3 kHz.

5. Attempt any *one/two* part of the following: 7 x 1 = 7

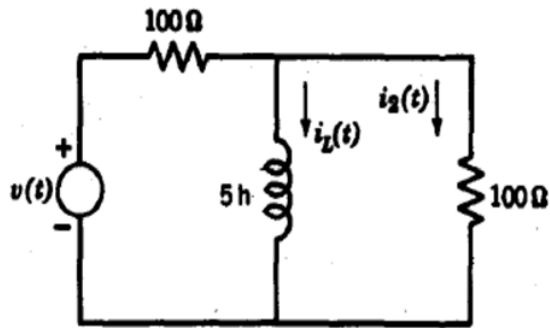
- (a) Determine the currents in all the 'branches of the network shown in fig. using node analysis method of the graph theory.



- (b) Explain following terms with reference to network topology
- (i) Tree
  - (ii) Co-tree
  - (iii) Incidence matrix
  - (iv) Oriented graph
  - (v) Twig and link

6. Attempt any *one/two* part of the following: 7 x 1 = 7

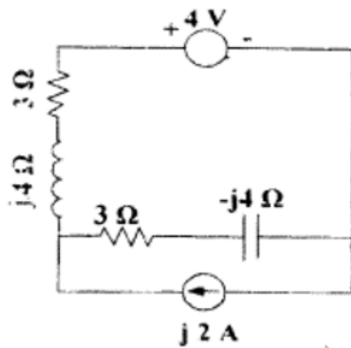
- (a) Sketch the following signals:-
- i).  $t^2[U(t-1)-U(t-3)]$
  - ii).  $(t-4)[U(t-1)-U(t-4)]$
- (b) In the circuit shown  $v(t) = 2u(t)$  and  $i_L(O^-) = 2$  amps. Find and sketch  $i_L(t)$ .



7. Attempt any *one/two* part of the following:

7 x 1 = 7

- (a) State and prove the maximum power transfer theorem applied to the AC circuits.
- (b) Determine the current in capacitor C by the principle of superposition of the network shown below



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