

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(EE) PT (Sem.-1)

CIRCUIT THEORY

Subject Code : BTEE-301

Paper ID : [A2224]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. Answer briefly :

- a. Differentiate between loop analysis and nodal analysis.
- b. State reciprocity theorem.
- c. What do you mean by independent and dependent sources? Explain.
- d. Find the Laplace transform of a unit step function.
- e. List the advantages of m derived filters.
- f. List the various conditions for transfer function.
- g. What do you mean by network functions? Explain.
- h. Discuss the classification of the filters.
- i. What do you mean by propagation constant? Explain.
- j. Differentiate between analysis and synthesis.

SECTION-B

2. State and prove Thevenin's theorem by citing a suitable example.
3. Obtain the Laplace transform of the signal shown below in Figure.

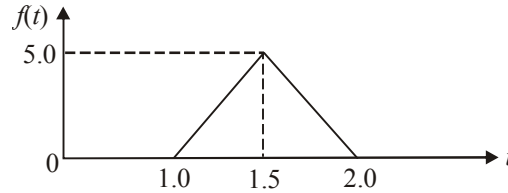


Figure - 1

4. Discuss the concept of poles and zeros in a network function. Also discuss the restrictions on the location of poles and zeros in the driving point functions.
5. In a RC series circuit $R = 1$ ohm and $C = 0.5$ farad. Find the current $i(t)$ if an exponential voltage $v(t) = 10e^{-t}$ is suddenly applied at $t = 0$. Assume no initial charge in the capacitor.

SECTION-C

6. Design a constant-k band pass filter with cut off frequencies of 2 kHz and 5 kHz and nominal characteristic impedance of 600 ohm.
7. Find the first and second forms of Cauer network for the function

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

8. Use Norton's theorem to find out the current in 5 ohm resistor across a-b terminals of the network as shown in Figure 2.

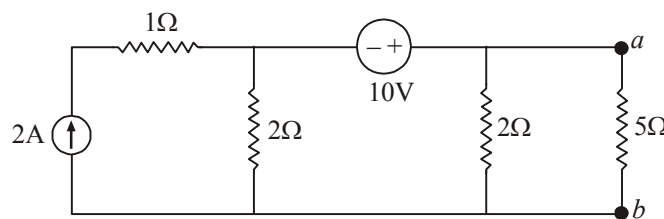


Figure - 2

9. Explain the following :
 - a. Design of m-derived filters.
 - b. Composite Filters.