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Total Pages : 5

**017304**

**December 2023**

**B.Tech. (EEOT/ENC) IIIrd Semester  
CIRCUIT ANALYSIS AND SYNTHESIS (ECP-305)**

Time : 3 Hours]

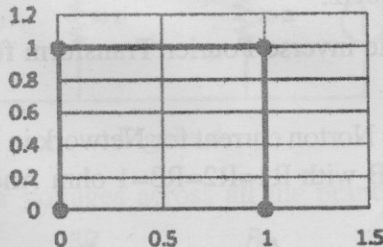
[Max. Marks : 75

*Instructions :*

1. It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.
2. Answer any four questions from Part-B in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.

**PART-A**

1. (a) Find the laplace transform of following waveform: (CO2) (1.5)



- (b) In a series combination of R and L, the Inductor is having current  $I_{\max}$  amp flowing through it at time  $t = 0$ . Derive an expression for current for time  $t > 0$ . (CO1) (1.5)
- (c) Find the laplace transform of  $\sinh(at)$ . (CO2) (1.5)

- (d) Find out the transfer admittance  $Y_{12}(s)$  of the following network with  $R_1 = R_2 = R_3 = 1 \text{ ohm}$  (CO3) (1.5)

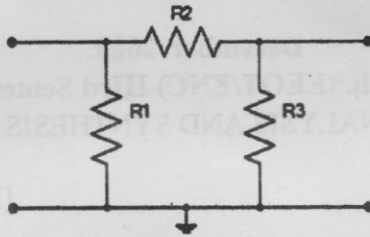


Figure 1.

- (e) Calculate Current transfer ratio  $I_{21}(s)$  for the network in Figure 1. (CO3) (1.5)
- (f) Calculate the C parameter (part of ABCD) for network in Figure 1. (CO4) (1.5)
- (g) State necessary conditions for function to be driving point immittance function. (CO) (1.5)
- (h) Calculate the value of attenuation constant for T section of low pass filter having  $R_0 = 600 \text{ Ohm}$ ,  $f = 1600 \text{ Hz}$ ,  $f_c = 1000 \text{ Hz}$ . (CO5) (1.5)
- (i) Calculate inverse Fourier Transform  $f(t)$  for  $F(\omega) = 1$ . (CO2) (1.5)
- (j) Find the Norton current for Network in Figure 2 between point AB with  $R_1 = R_2 = R_3 = 1 \text{ ohm}$  And  $V_1 = 10 \text{ V}$  (CO1) (1.5)

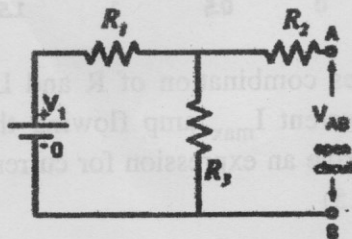


Figure 2.

## PART-B

2. (a) Derive necessary relations for compensation theorem for AC circuit. Also state what is the utility of this theorem? (CO1) (7.5)
- (b) Obtain the value of voltage  $v(t)$  across C in the parallel circuit of R & C to which parallel current source of pulse of height 1 ampere and duration 1 sec is applied. (CO2) (7.5)

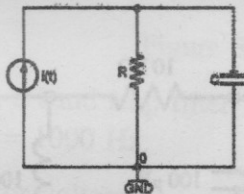


Figure 3.

3. (a) Verify the superposition theorem for current in 5 ohm resistance: (CO1) (7.5)

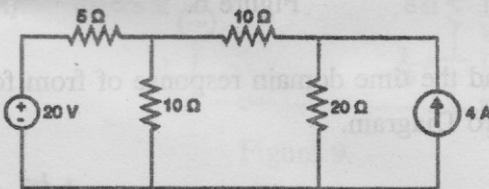


Figure 4.

- (b) Solve for voltages across all the branches. (CO1) (7.5)

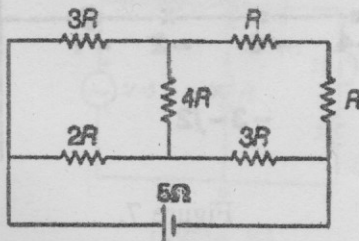


Figure 5.

4. (a) Prove condition for symmetry in terms of ABCD parameters. (CO4) (7.5)
- (b) Prove condition for reciprocity in terms of G parameters. (CO4) (7.5)
5. (a) Calculate the  $Z_{12}$  and  $Z_{11}$  for the circuit in Figure 6 in s domain. (CO3) (7.5)

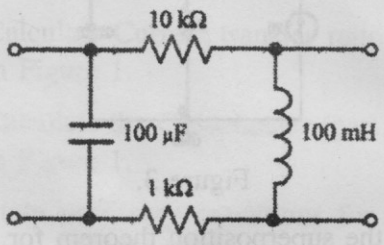
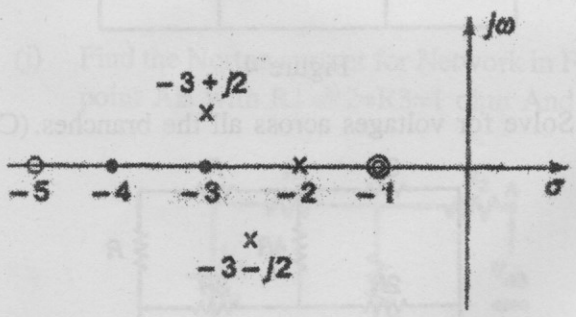


Figure 6.

- (b) Find the time domain response of from following pole Zero Diagram. (CO3) (7.5)



(I.)

Figure 7.

6. (a) Find the Current transfer function  $I_2(s)/V_i(s)$  of following diagram: (CO3) (7.5)

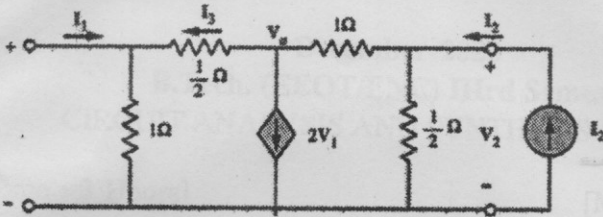


Figure 8.

- (b) Design a band stop filter with  $R_0 = 800$  ohm,  $f_1 = 500$  Hz,  $f_2 = 1000$  Hz. (CO5) (7.5)
7. (a) Solve for voltages  $V_1$  and  $V_2$ . (CO1) (7.5)

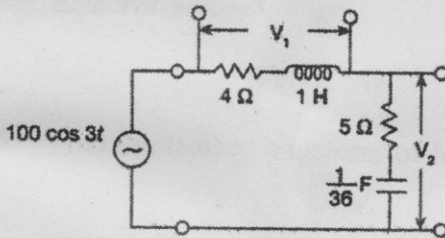


Figure 9.

- (b) Verify the superposition theorem for the given circuit: (CO1) (7.5)

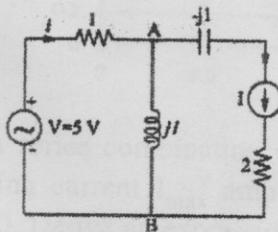


Figure 10.