Roll No. ..... Total Pages : 6

008303

December 2023

B.Tech. (ECE) IIIrd SEMESTER

Network Theory (EC-304)

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) Synthesize the following half cycle of sine wave in terms of standard signals (CO5) (1.5)

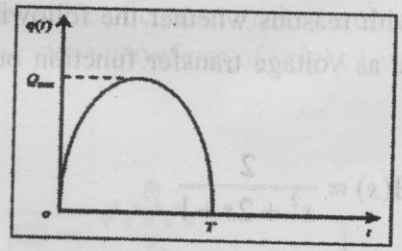


Figure 1

(b) In a parallel combination of R and C, the capacitor is initially charged to a voltage V. Derive and expression for voltage across this capacitor for time $t > 0$. (CO1) (1.5)

(c) Find the Laplace transform of cosh $(at) * u(t)$. (CO3) (1.5)

(d) Find out the transfer impedance $Z_{21}(s)$ of the following network. (CO4) (1.5)

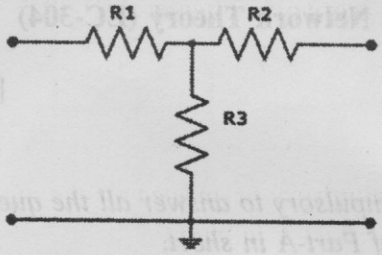


Figure 2

(e) Find out the voltage transfer ratio $V_{21}(s)$ of the network in Figure 2. (CO4) (1.5)

(f) Calculate the B parameter for network in Figure 2. (CO4) (1.5)

(g) State with reasons whether the following functions are suitable as voltage transfer function or not? (CO4) (1.5)

(i) $H(s) = \dfrac{2}{s^2 + 2s + 1}$

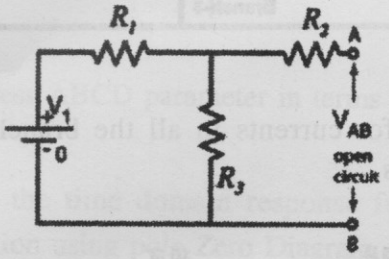
(ii) $H(s) = \dfrac{2s^2}{s^2 + 2s + 1}$

(iii) $H(s) = \dfrac{s}{s^2 + 0.2s + 100}$

(h) Calculate the value of characteristics impedance, Z of T section of low pass filter having R_0 = 600 Ohm, f = 600 Hz, f_c = 1000 Hz. (CO5) (1.5)

(i) Calculate inverse Fourier Transform f(t) of $\delta(w)$. (CO5) (1.5)

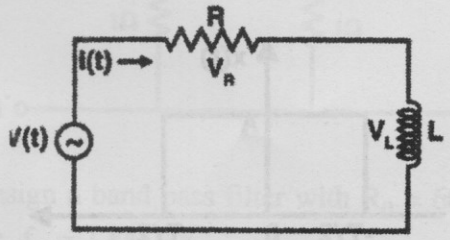
(j) Find the Thevenin voltage for following circuit between point AB with $R_1 = R_2 = R_3 = 1$ ohm. (CO2) (1.5)



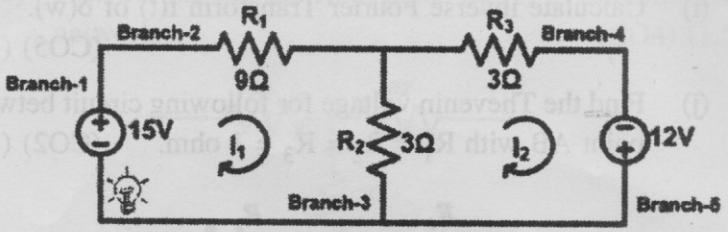
PART–B

2. (a) State and prove maximum power transfer theorem for AC circuit. (CO2) (7.5)

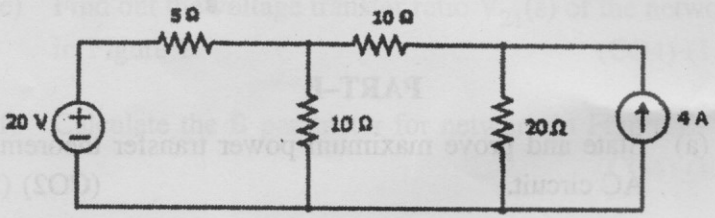
(b) Obtain the value of current $i(t)$ in the circuit given below to $v(t)$, the pulse waveform of height 1 volt and duration 1 sec. (CO2) (7.5)



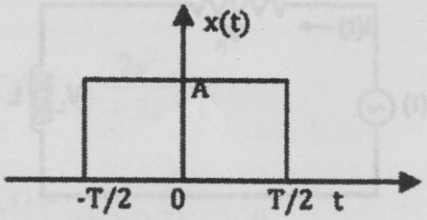
3. (a) Verify the Tellegen Theorem for the following network: (CO2) (7.5)



(b) Solve for currents in all the branches using nodal analysis. (CO1) (7.5)

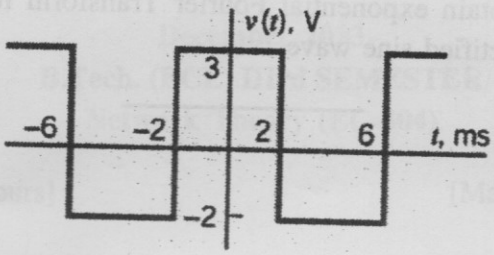


4. (a) Calculate Fourier transform of following waveform (CO5) (7.5)



(b) Find Fourier series of following waveforms.

(CO5) (7.5)



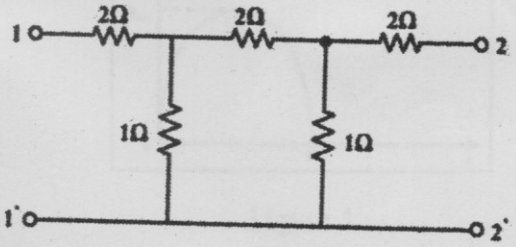
5. (a) Express ABCD parameter in terms of Z parameters.

(CO4) (7.5)

(b) Find the time domain response f(t) from following function using pole Zero Diagram. (CO3) (7.5)

$$F(s) = 10 \cdot \frac{(s+1)(s+2)}{(s+4)(s+5)(s+8)}.$$

6. (a) Find the voltage transfer function $V_2(s)/V_1(s)$ with output open circuited. (CO4) (7.5)



(b) Design a band pass filter with R_0 = 600 ohm, f_1 = 600 Hz, f_2 = 1200 Hz. (CO5) (7.5)

7. (a) For a T type filter, derive condition for pass band. (CO5) (7.5)

(b) Obtain exponential Fourier Transform for half wave rectified sine wave. (CO3) (7.5)
