



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0325

Roll No.

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## B.Tech

(SEM III) ODD SEMESTER THEORY EXAMINATION 2009-10  
FUNDAMENTALS OF NETWORK ANALYSIS & SYNTHESIS

Time : 3 Hours]

[Total Marks : 100

**Note :** Attempt all five questions. All questions carry equal marks. Assume missing data if any.

1 Attempt any **four** parts of the following : **5×4=20**

- (a) With the help of mathematical expressions and characteristics curves, explain unit step, impulse and ramp signals used to analyse the network.
- (b) Synthesize the waveform as shown in Fig. 1(b).

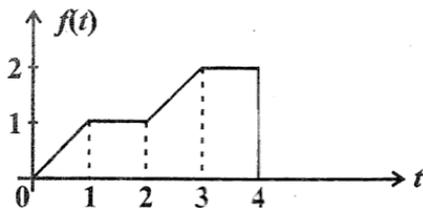


Fig. 1(b)

- (c) Explain the exponential function with suitable expression and curves.
- (d) Show that the derivative of a parabolic function is a ramp function and derivative of ramp function is a step function.



- (e) Discuss the concept of initial and final conditions in network analysis with suitable example.
- (f) Find the current  $i(t)$  in a series  $R-L-C$  circuit comprising  $R = 3\Omega$ ,  $L = 1H$  and  $C = 0.5 F$  when ramp voltage 12 volts is applied.

2 Attempt any **three** parts of the following :  $6\frac{2}{3} \times 3 = 20$

- (a) Define initial value theorem and final value theorem. Also find initial and final values of

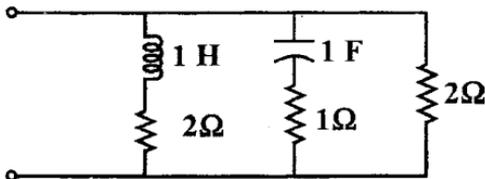
the function : 
$$F(s) = \frac{s^3 + 3s^2 + 3s + 1}{s^2 + 2s + 2}$$

- (b) Determine the impulse response of transfer function

$$G(s) = \frac{s^2 + 3}{s(s + 4)(s^2 + 4)}$$

of a system.

- (c) Find the driving point impedance function of the network shown in **Fig. 2(c)**. Also plot the poles and zeros of  $z(s)$  on s-plane.



**Fig. 2(c)**

- (d) For the two-port network shown in **Fig. 2(d)**. Determine the admittance matrix :



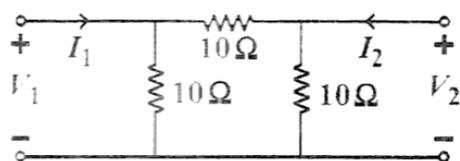


Fig. 2(d)

- (e) Prove that in a parallel-parallel interconnected two networks with admittance matrix  $[Y_A]$  and  $[Y_B]$  respectively, the overall Y-matrix is given as  $[Y] = [Y_A] + [Y_B]$ .

3 Answer any two parts of the following : 10×2=20

- (a) What is a positive real function? Also check whether the function

$$Z(s) = \frac{2s^2 - 3s - 1}{s^3 - 3s^2 - s - 2}$$

is a positive real function or not

- (b) Enlist the properties of RL admittance function. Check whether the function

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

is RL network or not

- (c) Realize the following LC impedance function as (i) Foster-II form (ii) Camer-I from

$$Z_{LC}(s) = \frac{(s^2 + 1)(s^2 + 3)}{s(s^2 + 2)}$$

4 Answer any two parts of the following : 10×2=20

- (a) Find the transfer function of the network shown in Fig. 4(a). Also sketch pole-zero configuration of the network.



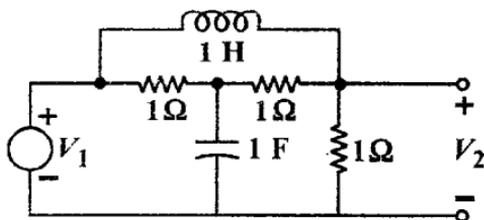


Fig. 4(a)

- (b) Enlist the properties of transfer function of a network. Obtain the zero of transmission of

$$\text{the function } Z(s) = \frac{(s+1)(s+4)}{(s+2)(s+3)}$$

- (c) Explain the term "zeros of transmission". Realize the network function

$$Y_{21}(s) = \frac{(s+2)(s+4)}{(s+1)(s+3)} \text{ with } 1\Omega \text{ termination.}$$

5 Answer any **two** parts of the following : 10×2=20

- (a) A function is given by  $Z(s) = \frac{s^4 + 7s^2 + 9}{s(s^2 + 4)}$  as active LC network.
- (b) Find the inverse transform of

$$F(s) = \frac{1}{(s^2 + a^2)^2} \text{ using convolution integral.}$$

- (c) Calculate the current flowing through the branch containing resistance  $R_1$  of Fig. 5(c) using Thevenin's theorem.

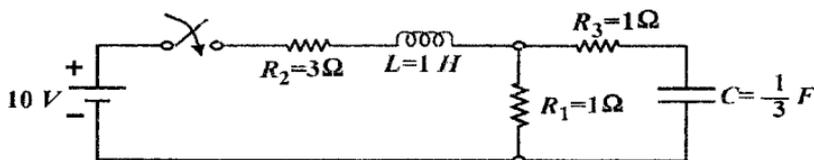


Fig. 5(c)

