Printed Pages : 4 **EEC304**

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

PAPER ID : 0325 Roll No. | | | | | | | | | | |

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)**.

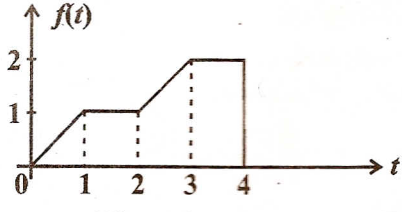

Fig. 1(b)

(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 : $F(s) = \dfrac{s^3 + 3s^2 + 3s + 1}{s^2 + 2s + 2}$.

(b) Determine the impulse response of transfer function

$$G(s) = \frac{s^2 + 3}{s(s+4)(s^2+4)} \text{ of a system.}$$

(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.

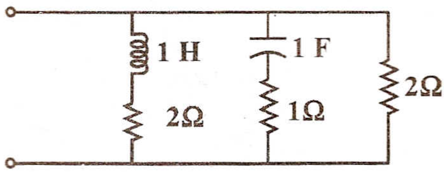

Fig. 2(c)

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

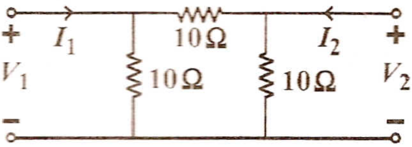

Fig. 2(d)

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

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.

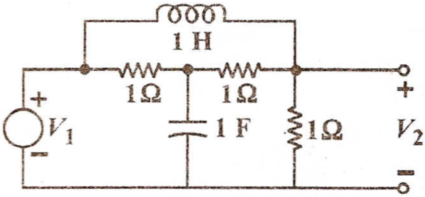

Fig. 4(a)

(b) Enlist the properties of transfer function of a network. Obtain the zero of transmission of the function $Z(s) = \frac{(s+1)(s+4)}{(s+2)(s+3)}$.

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

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

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.

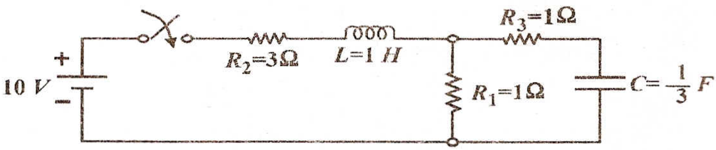

Fig. 5(c)