Printed Pages : 7

EEC-304

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

PAPER ID : 131307

Roll No.

B. Tech.

(SEM. III) (ODD SEM.) THEORY EXAMINATION, 2014-15

FUNDAMENTALS OF NETWORK ANALYSIS AND SYNTHESIS

Time : 3 Hours] [Total Marks : 100

Note : Attempt **all** questions.

1 Attempt any **four** parts : 5×4=20

(a) Evaluate the value of

$$\int_{-3}^{4} \delta(t-4)\,(t^2+2t+3)dt .$$

(b) If the response of a time-invariant system $h(t)$ is $e^{-t}u(t)$ then determine the response due to excitation of

$$e(t) = 2\delta(t-1) + 3\delta(t-4) - 3\delta(t+1).$$

(c) Define the following terms :

(i) Network Analysis

(ii) Network Synthesis

(iii) Complex Frequency.

(d) If initial conditions are $x(0^+)=+1$ and $x'(0^+)=-1$ then determine the value of $x'(t)+4x'(t)+3x(t)=0$.

(e) Describe the following signals :

(i) Unit Step

(ii) Exponential

(iii) Ramp Signal

(iv) Unit Impulse.

2 Attempt any **four** parts : **5×4=20**

(a) Find the initial and final value of the function

$$x(s)=\frac{(s+1)(s+4)}{s(s+2)(s+3)}$$

(b) Find current in 4Ω resistance of Fig. 1 using Thevenin theorem.

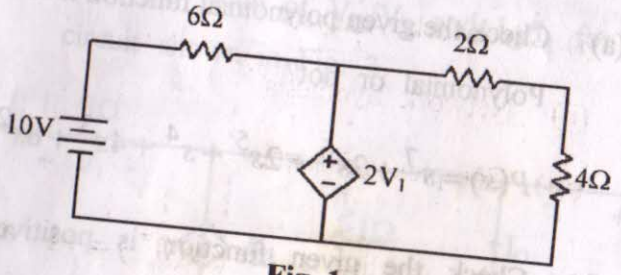

Fig. 1

(c) Determine the Y parameters of the network shown in Fig. 2.

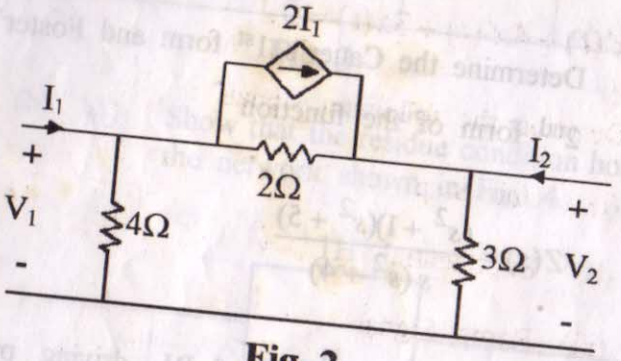

Fig. 2

(d) Represent Y-parameters in terms of h-parameters.

(e) Find the inverse Laplace transform of

$$X(s)=\frac{s}{(s+1)((s+2)^2+1)}$$

3 Attempt any **four** parts : 5×4=20

(a) Check the given polynomial function is Hurwitz Polynomial or not?

$$P(s)=s^7+2s^6+2s^5+s^4+4s^3+8s^2+8s+4.$$

(b) Check the given function is positive real function or not? $f(s)=\dfrac{(s+1)(s+4)}{(s+2)(s+3)}$.

(c) Determine the Cauer's 1st form and Foster's 2nd form of the function

$$Z(s)=\frac{(s^2+1)(s^2+5)}{s(s^2+4)}.$$

(d) Write the properties of RL driving point impedance.

(e) Draw the Cauer's 2nd form of the function

$$Z(s)=\frac{s(s+3)}{(s+1)(s+5)}.$$

4 Attempt any **two** parts :

(a) Find the value of V_O/V_1 and I_O/I_1 for the circuit shown in Fig. 3.

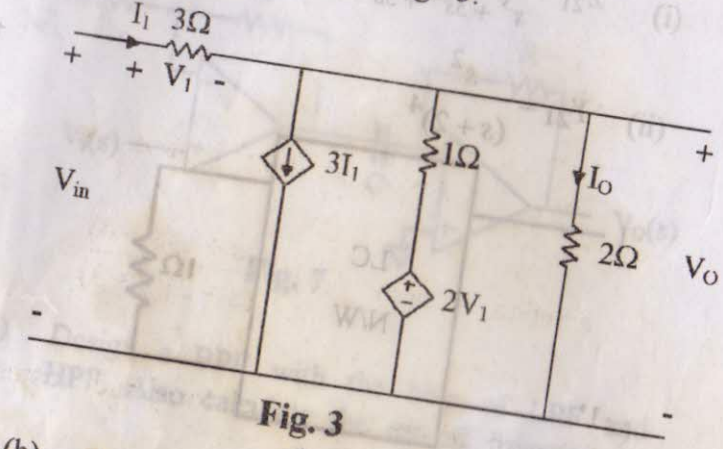

Fig. 3

(b) (i) Show that the residue condition hold for the network shown in Fig. 4.

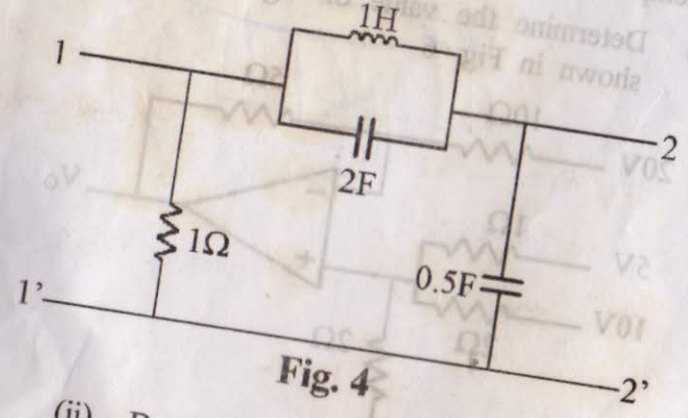

Fig. 4

(ii) Draw the circuit of a network that has multiple poles on the jw axis.

(c) Synthesize the following terms into the term shown in Fig. 5.

(i) $Z_{21} = \dfrac{1}{s^3 + 3s^2 + 3s + 2}$

(ii) $Y_{21} = \dfrac{s^2}{(s+2)^4}$

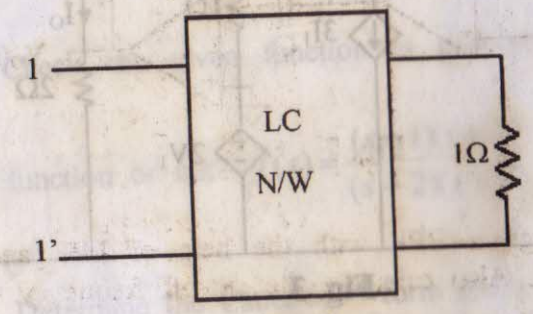

Fig. 5

5 Attempt any **two** parts : **10×2=20**

(a) Determine the value of V_O for the circuit shown in Fig. 6

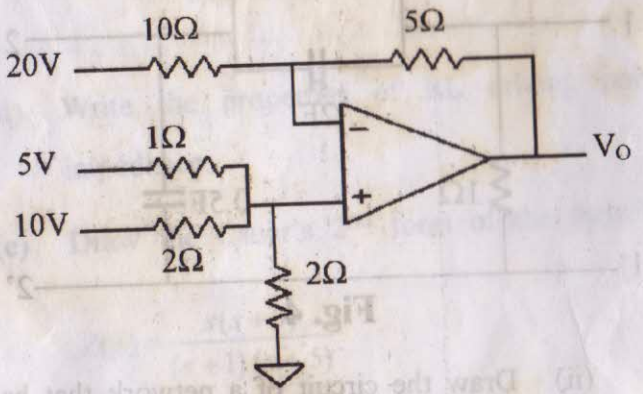

Fig. 6

(b) Determine the value $\dfrac{V_O(s)}{V_i(s)}$ for the circuit shown in Fig. 7.

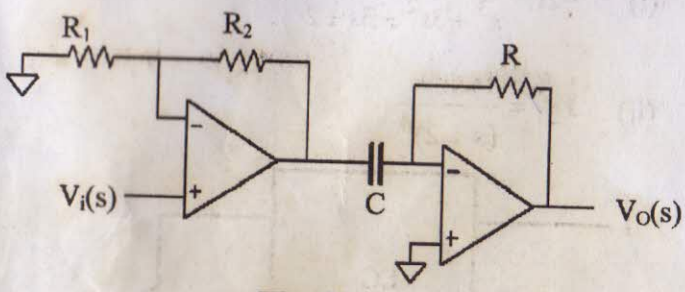

Fig. 7

(c) Design a BPF with the help of LPF and HPF. Also calculate the cut-off frequency.