Motilal Nehru National Institute of Technology Allahabad

Class: B. Tech. (EE), 3rd Semester

Subject: Network and Systems (EE-1301)

Session: Odd Semester (2014-15). Examination: End-Sem. Exam

Max. Time: 3 Hours **Max. Marks:** 60 marks

Note: All questions are compulsory and marks carried by them are indicated next to them.

1. (a) Obtain the current through 1 Ω resistor using Thevenin's theorem in Fig. 1a1. 4

Or

In the circuit of Fig. 1a2. find Norton's equivalent at x-y terminals.

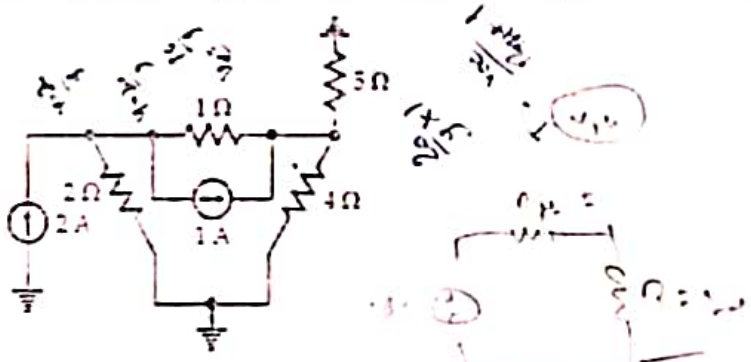

Fig. 1a1

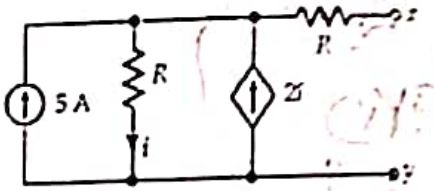

Fig. 1a2

(b) Find v_0 in the network of Fig. 1b, using superposition theorem. 6

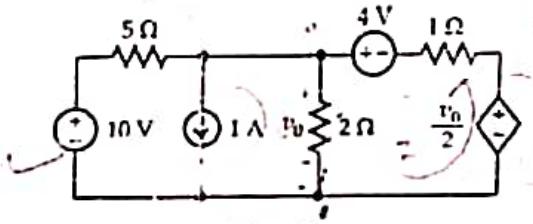

Fig. 1b

2. (a) Find $v_c(t)$ and $i_L(t)$ in the circuit of Fig. 2a assuming zero initial conditions. 4

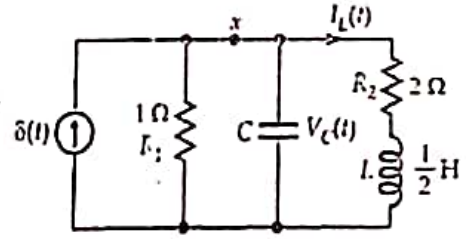

Fig. 2a

(b) A function in s-domain is given by $F(s)=\frac{s^2+3s+1}{s(s^2+3s+2)}$. Find $f(t)$ and the steady state solution using final value theorem. 6

3. Write short-notes with relevant plots and Laplace transform on: 10

i) Unit step function

ii) Sinusoidal function

iii) Ramp function

iv) Parabolic function

v) Exponentially damped sinusoidal function

4. (a) Determine the Z-parameters of the network shown in Fig. 4a.

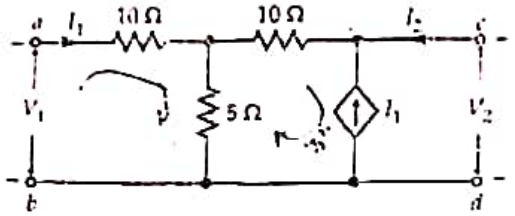

Fig. 4a

(b) Find the driving point admittance function and the respective pole-zero plot for network Fig. 4b1. 6

Or

Obtain the transfer impedance for the circuit given in Fig. 4b2

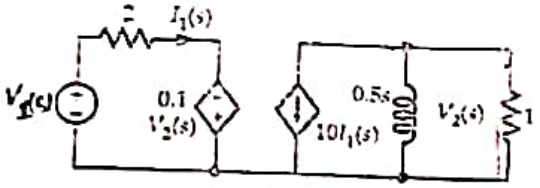

Fig. 4b1

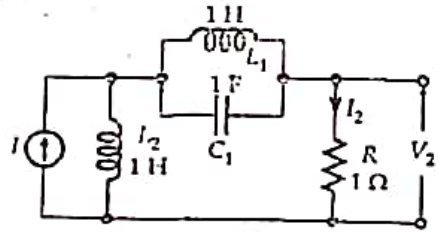

Fig. 4b2

5. (a) Check whether $P(s) = 4s^6 + 2s^5 + 17s^4 + 8s^3 + 16s^2 + 6s + 3$ is Hurwitz or not? 4

(b) Investigate positive realness of the function given by $Z(s) = \dfrac{s^3 + 5s^2 + 9s + 3}{s^3 + 4s^2 + 7s + 9}$. 6

(c) An impedance is given by $Z(s) = \dfrac{8(s^2+1)(s^2+3)}{s(s^2+2)(s^2+4)}$. Realize the network in both of Foster forms. 10