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Total number of printed pages – 4

B. Tech
BEES 2211

Third Semester Examination – 2011

NETWORK THEORY

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any **five** from the rest.

The figures in the right-hand margin indicate marks.

1. Answer the following questions in brief : 2×10
- (a) Give the phasor diagram of series resonance.
 - (b) State Tellegen's theorem.
 - (c) Explain dot convention in coupled coils.
 - (d) Find the Laplace transform of Ramp function.
 - (e) Define Lattice network.
 - (f) Write the ABCD parameter equations of a two port network.
 - (g) Give the conditions for reciprocity and symmetry in terms of various parameter of two port network.
 - (h) Write properties of incidence matrix
 - (i) Give conditions for a polynomial $P(s)$ to be Hurwitz.
 - (j) The current in the inductor is given by

$$i(t) = \frac{1}{L} \int_0^t v(t) dt + i(0)^+$$

What is equivalent circuit in s-domain ?

2. (a) Show for RLC series circuit $Q_o = \frac{\omega_o L}{R} = \frac{f_o}{\text{Bandwidth}}$. Where Q_o is quality factor, f_o = resonance frequency. 5

(b) Find the Laplace transform of the signal shown in Fig. 1. 5

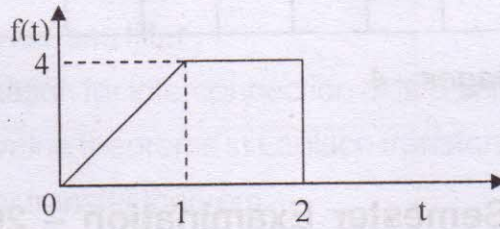


Fig. 1

3. In the circuit shown in Fig. 2, the switch is closed on position '1' at $t = 0$ and then at $t = t' = 50 \mu\text{sec}$ it is moved to position '2'. Find the transient currents for $0 < t < t'$ and $t > t'$. 10

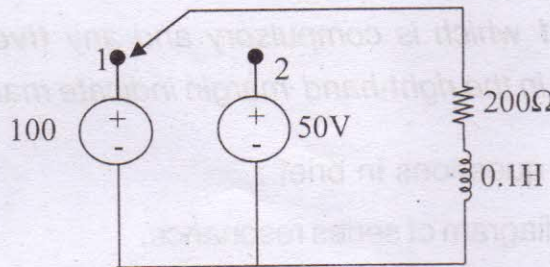


Fig. 2

4. (a) Obtain the transmission parameter of the network shown in Fig. 3. 5

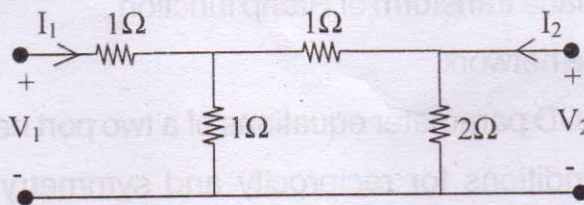


Fig. 3

(b) Obtain Y parameter of the network shown in Fig. 4. 5

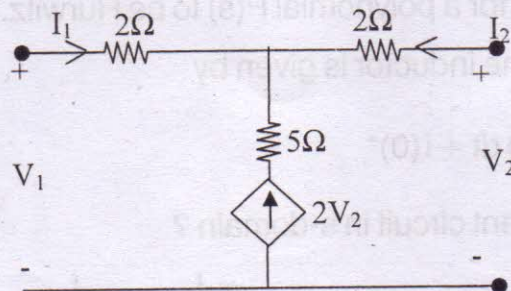


Fig. 4

5. Find the Fourier series of a given waveform shown in Fig. 5.

10

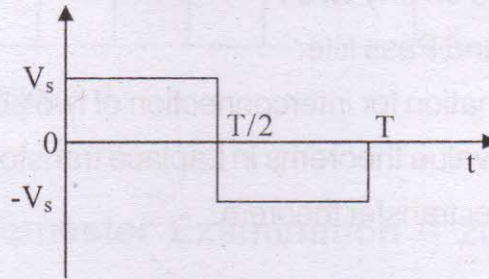


Fig. 5

6. A function is given by $(s) = \frac{(s^2 + 1)(s^2 + 16)}{s(s^2 + 4)}$. Realise it in the first and second form of Foster LC form.

10

7. (a) Using Millman's theorem find the voltage across the $10\ \Omega$ resistor shown in fig.6.

5

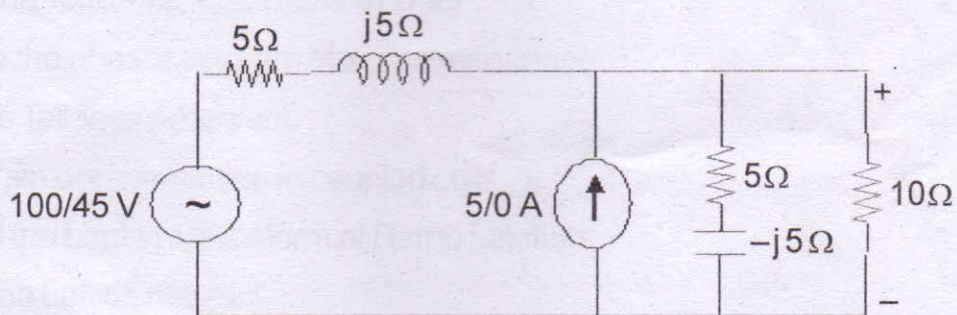


Fig. 6

(b) Draw the graph of a network shown in Fig. 7 and find the branch currents using tie-set schedule.

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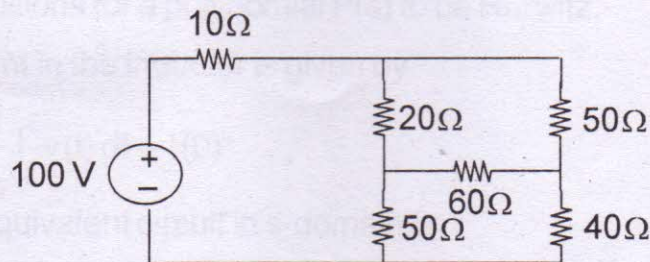


Fig.7

8. Write the short notes on any **two** :

5x2

- (a) Analyses of Band Pass filter
- (b) Parallel combination for interconnection of two port network
- (c) Initial and final value theorems in Laplace transform
- (d) Maximum power transfer theorem.