(Pages : 4) **E – 2306**

Reg. No. : .....

Name : .....

Third Semester B.Tech. Degree Examination, May 2018
(2013 Scheme)
13.303 : NETWORK ANALYSIS (AT)

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions. **Each** question carries **2** marks :

1. Three equal resistances of 3Ω are connected in star. What is the resistance in one of the arms in an equivalent delta circuit ?

2. State Reciprocity theorem.

3. Give the dual of a circuit containing RLC elements connected in series and excited by voltage V.

4. Sketch the response of RC network for a unit step input.

5. Define time constant of a RL network.

6. State initial and final value theorem of Laplace Transform.

7. A resistance 5Ω, inductance 0.02H and capacitor 5μF are connected in series. Find the resonance frequency.

8. Two capacitances C_1 and C_2 of values 10μF and 5μF are connected in series. What is the equivalent capacitance of this combination ?

9. Define propagation constant.

10. Give the expression of h-parameters in terms of Z-parameters.

P.T.O.

PART – B

Answer **any one** question from **each** Module. **Each full** question carries **20** marks :

Module – I

11. a) Determine the current flowing through the load impedance 3 + j4 using mesh analysis for the network shown in Fig. 11. a). **10**

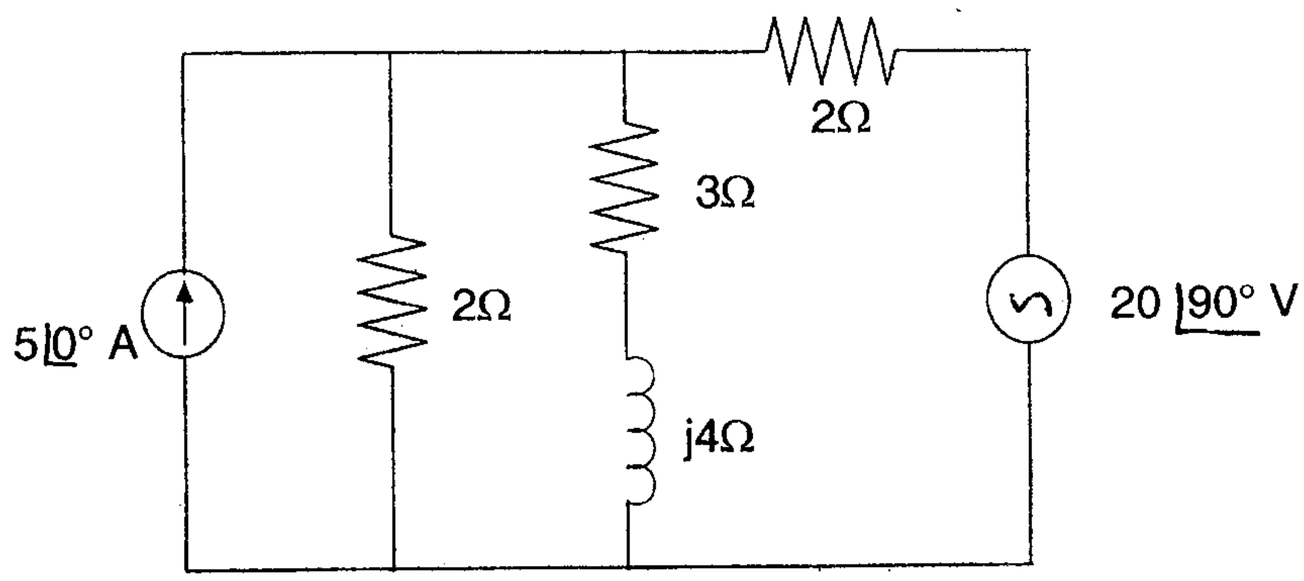

Fig. 11. a)

b) Explain the following terms as applied to network topology : **10**

i) Oriented graph,

ii) Tree,

iii) Link and

iv) Planar graph and non-planar graph.

12. a) Using superposition theorem, find the current flowing through the load resistance $R_L = 10\Omega$ in the circuit shown in Fig. 12. a). **10**

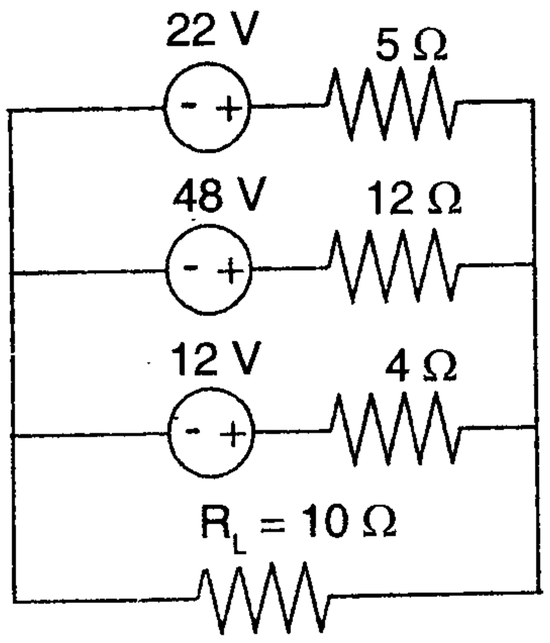

Fig. 12. a)

b) Obtain the expression for a set of equivalent :
   i) Star connected impedance to replace a set of delta connected impedances.
   ii) Delta connected impedance to replace a set of star connected impedances. **10**

Module – II

13. a) Find the Laplace transform of full wave rectified output as shown in Fig. 13. a). **8**

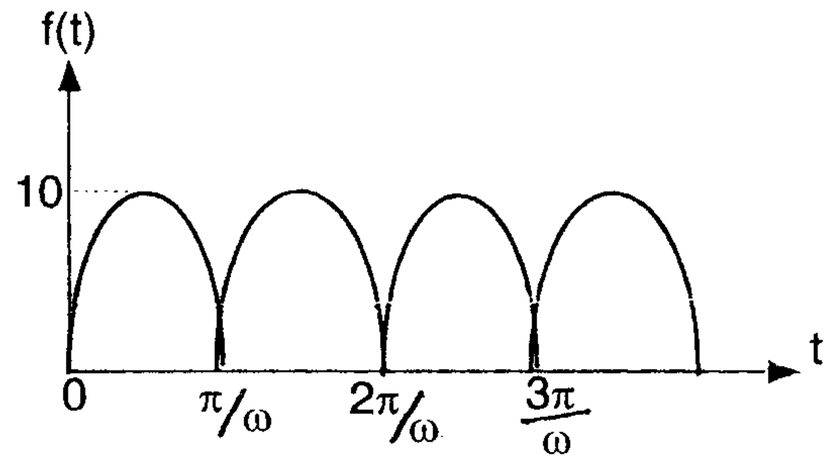

Fig. 13. a)

b) For the network function I(s), draw the pole zero diagram and hence obtain the time domain response i(t).

$$I(s) = \frac{5s}{(s+1)(s^2+4s+8)}.$$ **12**

14. a) For the circuit shown in Fig. 14. a), determine the current delivered by the source when the switch is closed at t = 0. Assume there is no initial charge on the capacitor and no initial current through the inductor. **10**

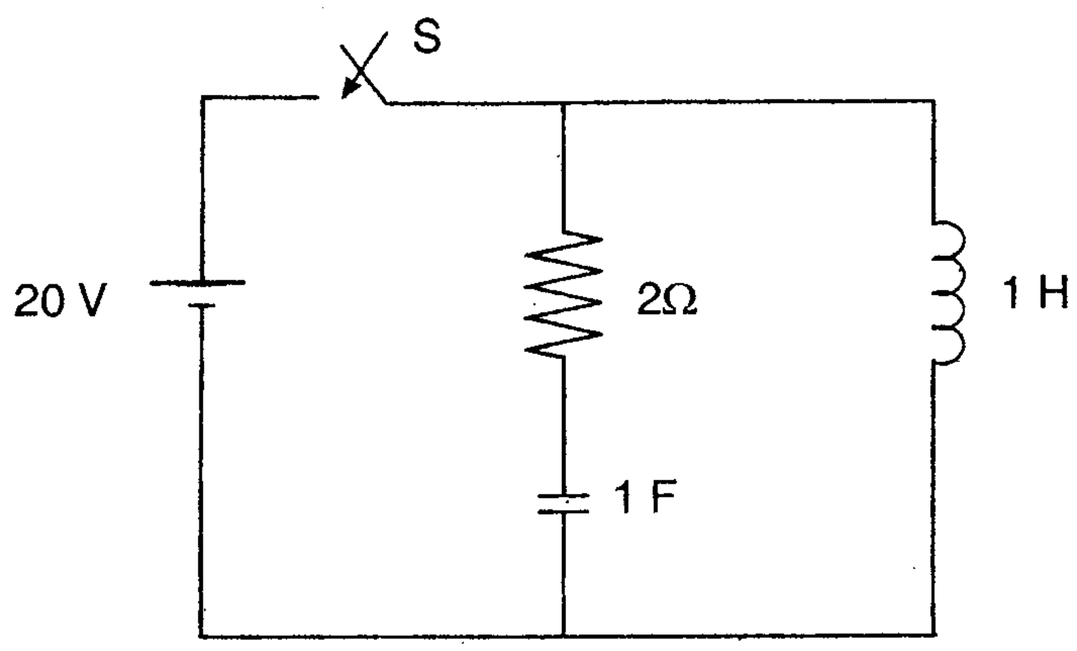

Fig. 14. a)

b) Derive the Laplace transform of unit step, ramp and impulse functions. **10**

Module – III

15. Find the Z and Y parameters for the RC ladder network shown in Fig. 15. **20**

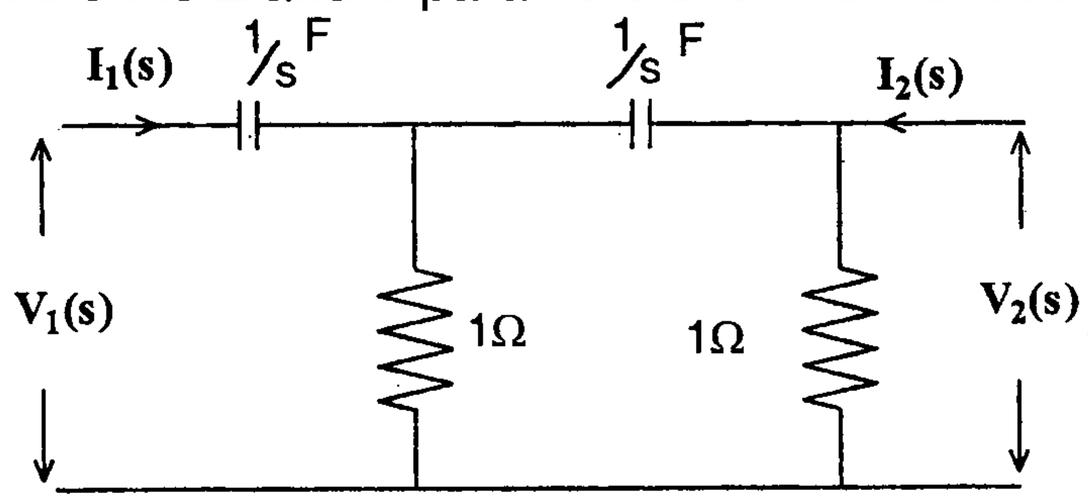

Fig. 15

16. a) Derive the bandwidth for a series RLC circuit as a function of resonant frequency. **12**

    b) The resonant frequency of the tuned circuit shown in Fig. 16. b) is 1000 rad/sec. Calculate the self inductances of the two coils and the optimum value of the mutual inductance. **8**

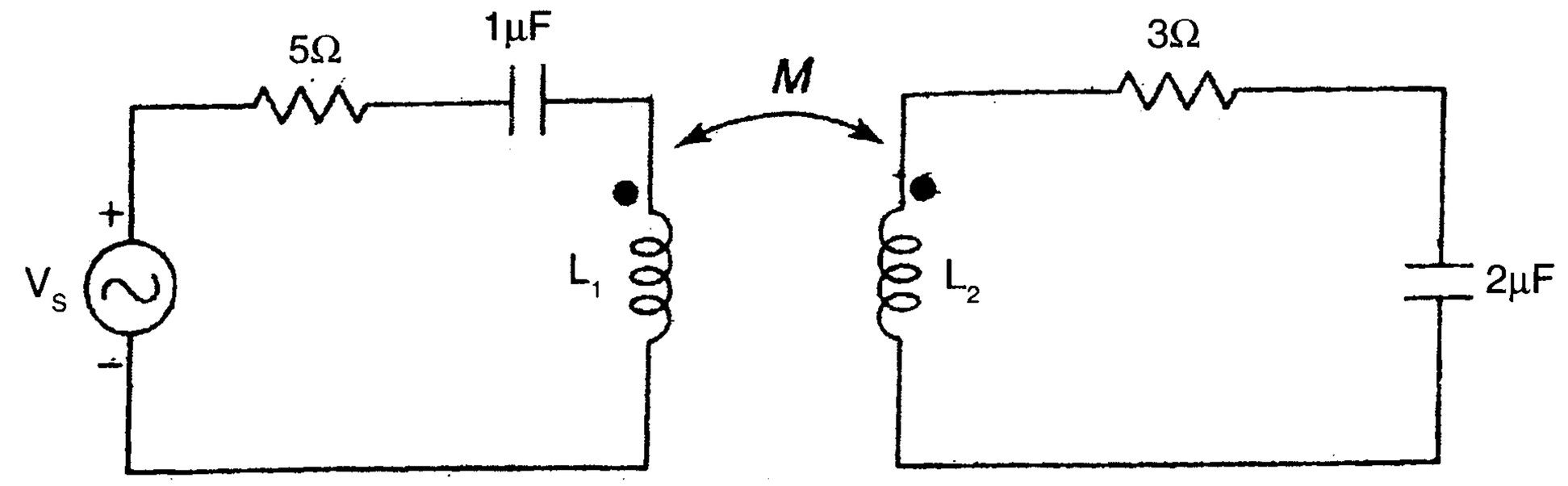

Fig. 16 b)

Module – IV

17. a) Explain the conditions verified for a function N(s) to be a positive real function. **8**

    b) Find the two Cauer form realizations of driving point function given by

$$Z(s) = \frac{10s^4 + 12s^2 + 1}{2s^3 + 2s}.$$ **12**

18. a) Find the two Foster form realizations of Z(s)

$$Z(s) = \frac{4(s^2 + 1)(s^2 + 16)}{s(s^2 + 4)}.$$ **12**

    b) Check whether $P(s) = S^5 + 3S^3 + 2S$ is a Hurwitz polynomial or not. **8**