Reg. No. : .....

Name : .....

Third Semester B.Tech. Degree Examination, April 2015
(2013 Scheme)
13.303 : NETWORK ANALYSIS (AT)

Time : 3 Hours Max. Marks : 100

PART – A

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

1. State maximum power transfer theorem.

2. Draw the oriented graph of the network shown in Fig.1

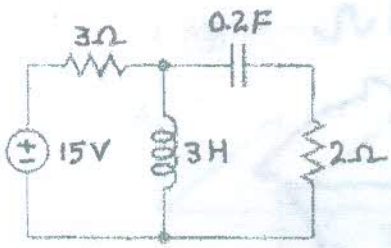


Fig. 1.

3. State and represent reciprocity theorem.

4. List all the properties of driving point functions.

5. Define and write the importance of characteristic impedance.

6. Show that an ideal transformer is reciprocal using transmission parameters.

7. Test whether the given polynomial p(s) is Hurwitz.

$P(s) = S^4 + 7S^3 + 4S^2 + 18S + 6.$

8. A waveform equation f(t) is given, draw the waveform $f(t) = \frac{A}{T}r(t) - \frac{A}{T}r(t-T)$.

9. List the conditions for the realizability of a function.

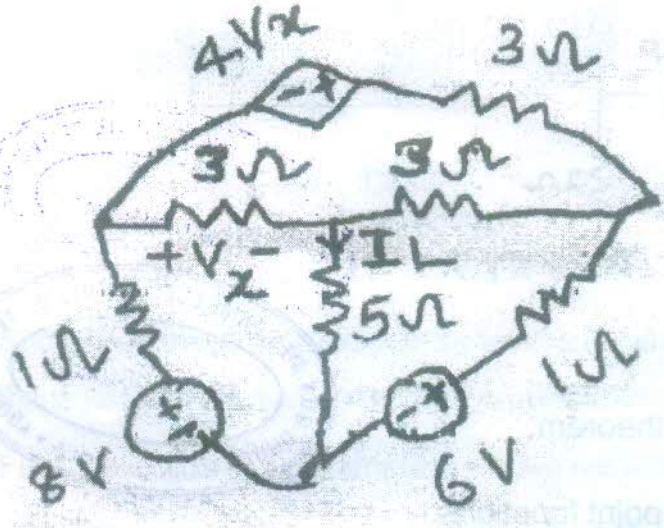
10. Find the total inductance of the three series connected coupled coils. Where $L_1 = 1H$, $L_2 = 2H$, $L_3 = 5H$, $M_{12} = 0.5$ H, $M_{13} = 1H$ and $M_{23} = 1$ H. (Assume the dots are in the left side of the coils). **(10×2=20 Marks)**

PART – B

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

Module – I

11. a) Determine I_L using mesh analysis. **8**



b) Draw the waveform of unit impulse, step and ramp function. Write down their mathematical expression and relationship between them. **12**

OR

12. a) AC source of 20 $\angle 90°$ V with internal resistance of 10Ω and 30 $\angle 0°$ V with internal resistance 12Ω are connected in parallel across an 8 Ω load. Use superposition theorem to determine. **8**

1) Current in 8Ω load.

2) Current in each voltage source.

b) State Thevenin's and Norton's theorem. Obtain the Thevenin's and Norton's equivalent circuit about the terminal xy of the network given in Fig. 3. 12

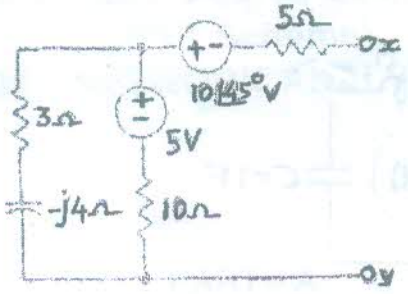


Fig. 3

Module – II

13. a) Find the Laplace transform of the waveform given in Fig. 4. 8

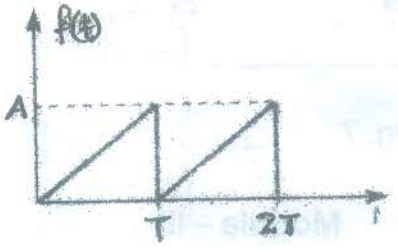


Fig. 4

b) A voltage pulse of 10 V magnitude and 5 microseconds duration is applied to the circuit shown in Fig. 5. Find the expression for the current i(t) and sketch the current waveform, if R = 100 Ω and C = 0.05 μ F. 12

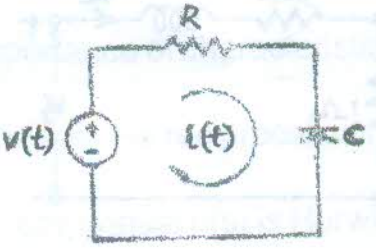


Fig. 5

OR

14. a) In a series LC circuit shown in Fig. 6, the supply voltage being $V = V_m \cos(t)$., find i(t) at $t = 0+$ following the switching at $t = 0$ with zero initial conditions. Assume L = 1H and C = 1F. 12

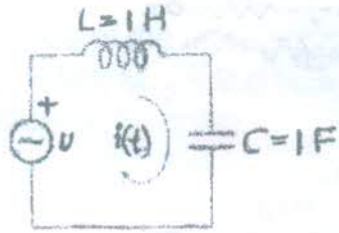


Fig. 6

b) Find and plot the pole zero locations of the current transfer function I_2/I_1 in S domain of the circuit given in Fig. 7. 8

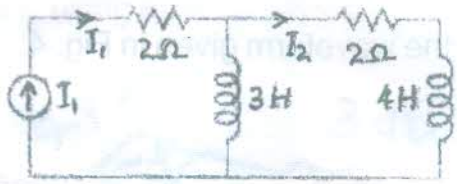


Fig. 7

Module – III

15. a) Show that when two two-port networks N_1 and N_2 are connected in parallel, the equivalent Y-parameter of the combined network is $Y_{eq} = Y_{N_1} + Y_{N_2}$. 5

b) Find the z, y and T parameters for the network shown in Fig. 8. 15

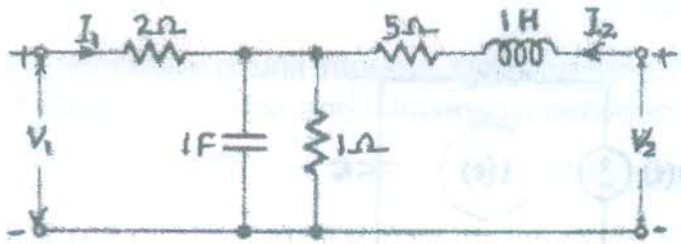


Fig. 8

OR

16. a) Describe the dot convention used in the coupled circuits and list the types and applications of tuned circuits. 8

b) List the properties of resonant circuits and show that the circuit shown in Fig. 9 can have more than one resonant condition. Assume C to be variable. 12

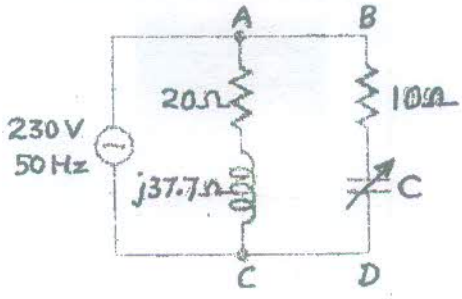


Fig. 9

Module – IV

17. a) Describe the properties positive real functions and test the positive realness of the function.

$$\frac{S^2+2S+20}{S+10}.$$ 10

b) Realize the first form of Cauer network for the function $Z(s)=\frac{S^2+5S+4}{S^2+2S}$. 10

OR

18. a) A driving point function is given by $F(s)=\frac{(S+4)(S+6)}{(S+3)(S+5)}$. Realize the function using both the Foster forms and any one Cauer form. 20