Code No.: R22EC302PC | R22 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Regular) - December- 2024
NETWORK ANALYSIS AND SYNTHESIS
(ECE)

[Time: 3 Hours] **[Max. Marks: 60]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 10 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(10 Marks)**

1. a) How many closed paths are available in a tree? [1M]
   b) Define co efficient of coupling. [1M]
   c) What is the time constant of a series RC circuit? [1M]
   d) What do you mean by overdamped and under damped? [1M]
   e) What is driving point function? [1M]
   f) Define characteristic impedance. [1M]
   g) List any two applications of band pass filter. [1M]
   h) Draw the basic configuration of symmetrical lattice network. [1M]
   i) What is Hurwitz polynomial? [1M]
   j) Define positive real function. [1M]

PART-B **(50 Marks)**

2. In the graph shown in Figure(1), the ideal voltage source e = 1V. For the remaining branches each has a resistance of 1 Ω with O as the reference. Obtain the node voltage e1, e2 and e3 using network topology. [10M]

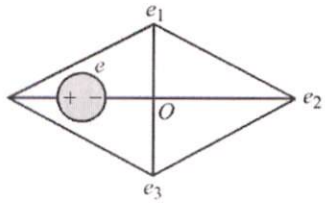

Fig 1.

OR

3.a) Explain dot convention for coupled circuits. [5M]
   b) Explain incidence matrix, Tie-set matrix and cut-set matrix. [5M]

4. Discuss the transient analysis of RLC series circuit excited by D.C. voltage. [10M]

OR

5.a) A sinusoidal voltage v(t) = 20 sin(75t) is applied suddenly to a series RL circuit with R = 20Ω and L = 4 H. Find the time instant at which transient current becomes zero. [6M]
   b) Define the quality factor. What is its significance? [4M]

6. Find the Z- parameters for the following circuit. [10M]

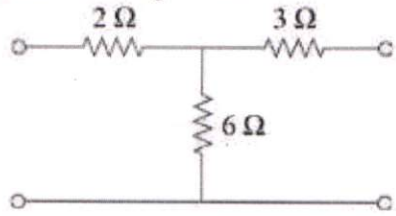

Fig 2

OR

7.a) Explain the concept of poles, zeros, their significance and necessary conditions for driving point functions and transfer functions? [5M]

b) Design Π- attenuator with 50 Ω characteristic impedance and attenuation of 6 dB. [5M]

8. Design an m-derived LPF (T- and π-Section) having a design impedance of 500Ω and cut-off frequency 1500 Hz and an infinite attenuation frequency of 2000 Hz [10M]

OR

9. Derive the equation of characteristic impedance and attenuation constant of a symmetrical T network. [10M]

10.a) What are the properties of LC driving point functions? [4M]

b) Test the following polynomial are Hurwitz [6M]

i) $P(S)= S^3+4S^2+5S+2$ ii) $P(S)= S^4+S^3+S^2+2S+12$

OR

11. The driving point impedance of a one-port reactive network is given by [10M]

$$Z(S) = \frac{5(S^2+4)(S^2+25)}{S(S^2+16)}$$

Obtain Foster I &II networks.

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