

Code No: 183BQ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year I Semester Examinations, February - 2024

NETWORK ANALYSIS AND SYNTHESIS

(Common to ECE, EIE)

Time: 3 Hours

Max. Marks: 60

Note: This question paper contains two parts A and B.i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.

- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of **ten questions** (numbered from 2 to 11) **carrying 10 marks each**. From each unit, there are two questions and the student should answer one of them. Hence, the student should answer five questions from Part-B.

PART- A**(10 Marks)**

- | | | |
|------|---|-----|
| 1.a) | What is the purpose of Dot convention? | [1] |
| b) | What are the characteristics of an ideal transformer? | [1] |
| c) | Define time constant of R-L series circuit. | [1] |
| d) | Define band width. | [1] |
| e) | Define Attenuator. | [1] |
| f) | What is meant by pole of network function? | [1] |
| g) | What is meant by band stop filter? | [1] |
| h) | What is meant by lattice attenuation? | [1] |
| i) | What are the Properties of Hurwitz Polynomial? | [1] |
| j) | Test whether $F(s) = \frac{s+3}{s+1}$ is positive real function or not. | [1] |

PART - B**(50 Marks)**

- 2.a) Explain about the concept of self-inductance.
- b) Two inductively coupled coils have self-inductances of 50mH and 200mH. Find the maximum possible value of mutual inductance between the coils. [5+5]

OR

- 3.a) Explain about the concept of basic tie-set matrix with an example.
- b) An ideal transformer has $N_1=10$ turns, and $N_2=100$. What is the value of impedance referred to primary if a 1000Ω resistor is placed across the secondary? [5+5]

- 4.a) Derive the expression for step response of a series RL circuit.
- b) Determine the quality factor of a coil for the series circuit consisting of $R=10\Omega$, $L=0.1H$ and $C=10\mu F$. [5+5]

OR

QA QA QA QA QA QA QA QA QA

- 5.a) Explain about the concept of parallel resonance.
 b) In the figure 1 given below, the switch is closed at $t = 0$ Find $V_C(t)$ for $t > 0$. [4+6]

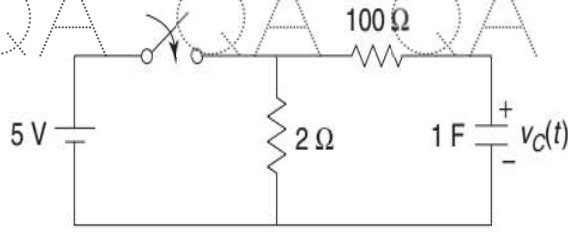


Figure 1

- 6.a) Explain about g- parameters with its equivalent circuit.
 b) Determine the Y-parameters for the network given below figure 2. [4+6]

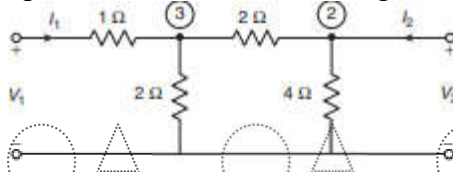


Figure 2

OR

- 7.a) Explain about hybrid parameters and also draw its equivalent circuit.
 b) Determine the driving-point impedance function of a network shown below figure 3. [4+6]

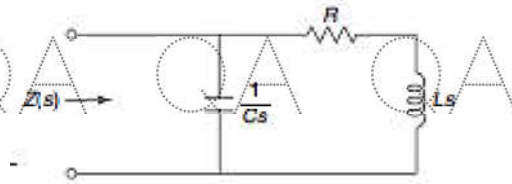


Figure 3

- 8.a) Classify the different types of filters and discuss them briefly.
 b) Design a constant-k high pass filter (T-section) having cut-off frequency of 1KHz with load resistance of 600 ohm. [3+7]

OR

9. Design a m-derived high pass filter having cut-off frequency of 10KHz, design impedance of 5 ohm and $m=0.4$. [10]

- 10.a) List the properties of RL driving point impedance function.
 b) Realize the Foster-II form of the impedance function $Z(s) = \frac{(s+1)(s+3)}{s(s+2)}$. [5+5]

OR

- 11.a) List the properties of LC driving point impedance function.
 b) Realize the Cauer-I form of the impedance function $Z(s) = \frac{(s+1)(s+3)}{s(s+2)}$. [5+5]

QA QA QA QA QA QA QA QA QA