PAPER CODE- 51033

University Institute of Engineering & Technology

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Kurukshetra University, Kurukshetra

Roll No.- 25180123

THEORY EXAMINATION – DECEMBER 2019 **TIME- 3 HRS**

B. Tech (Electronics & Communication Engineering) 3rd Semester **M.M. -75**

COURSE NO.: EC-213 **COURSE TITLE: Network Theory**

PART-A (15 Marks)

1. Answer the following multiple-choice questions. **15**

1. What is incidence matrix?

2. In an electric circuit, the dual of resistance is:

   (a) conductance (b) inductance

   (c) capacitance (d) open circuit

3. If v_s changes from 2 V to 4 V at $t = 0$, we may express v_s as:

   (a) $\delta(t)$ V (b) $2u(t)$ V

   (c) $2u(-t) + 4u(t)$ V (d) $4u(t) - 2$ V

4. Define the transient response of a circuit.

5. If the input to a linear system is $\delta(t)$ and the output is $e^{-2t}u(t)$, the transfer function of the system is:

   (a) $\frac{1}{s+2}$ (b) $\frac{1}{s-2}$ (c) $\frac{s}{s+2}$ (d) $\frac{s}{s-2}$

6. A zero of the transfer function

$$H(s) = \frac{10(s+1)}{(s+2)(s+3)}$$

   is at

   (a) 10 (b) −1 (c) −2 (d) −3

7. The impedance of a 10-F capacitor is:

   (a) $10/s$ (b) $s/10$ (c) $1/10s$ (d) $10s$

8. In the circuit of Fig.1., draw the Laplace equivalent circuit.

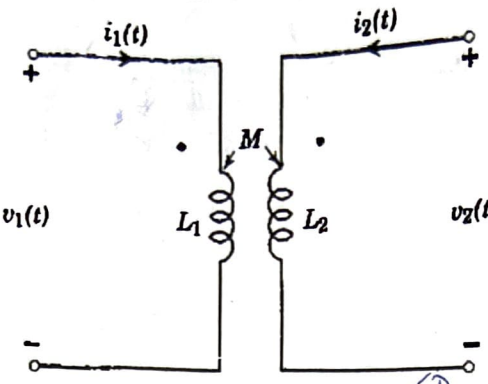


Fig. 1

9	A two-port is described by the following equations: $V_1 = 50I_1 + 10I_2$ $V_2 = 30I_1 + 20I_2$ Which of the following is *not* true? (a) $z_{12} = 10$ (b) $y_{12} = -0.0143$ (c) $h_{12} = 0.5$ (d) $A = 50$	
10	If a two-port is reciprocal, which of the following is *not* true? (a) $z_{21} = z_{12}$ (b) $y_{21} = y_{12}$ (c) $h_{21} = h_{12}$ (d) $AD = BC + 1$	
11	What are the specifications of Low Pass and High Pass Filters?	
12	An m derived low pass filter has fc = 2000 Hz and m = 0.3. This filter will have infinite attenuation at f_∞ = _____ Hz.	
13	List the demerits of constant-k filters?	
14	Define positive real functions.	
15	List various properties of R-C impedance functions.	

PART B (20 Marks)

Answer the following questions, one from each unit & all question carrying equal marks. 5x4=20

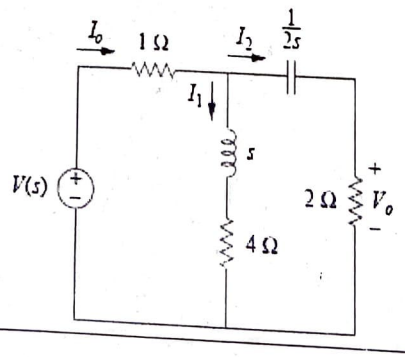
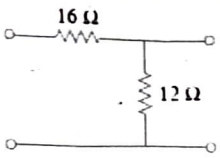
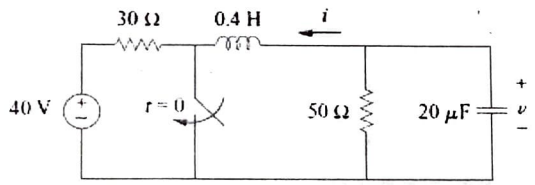
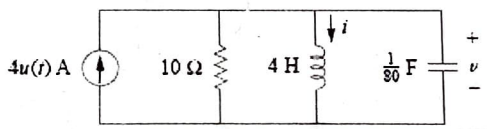
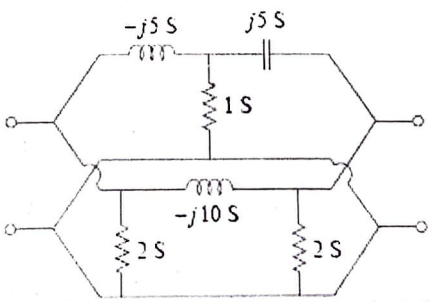
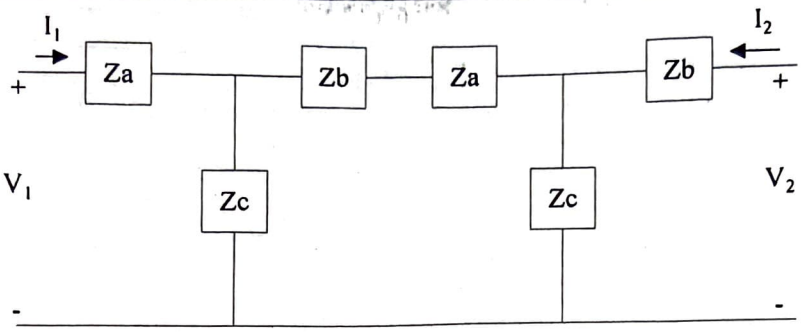
	UNIT-I	
2	Derive and explain the Step Response of RC circuit.	5
	UNIT-II	
3	Determine the transfer function $H(s) = \frac{V_0(s)}{I_0(s)}$ of the circuit as shown in Fig. 2. 	5

	Fig 2	
	UNIT-III	
4	Determine the Z parameters of the circuit as shown in Fig. 3.  Fig 3	5
	UNIT-IV	
5	Explain the concept of causality & stability in network synthesis.	5

PART-C (40 Marks)

Students are required to attempt four question, by selecting at least one question from each unit & all question carrying equal marks. 10x4=40

	UNIT-I	
6	Derive and explain the step response of parallel RLC circuit.	10
7	Find $v(t)$ for $t > 0$ in the *RLC* circuit of Fig. 	10
	UNIT-II	
8	Consider the parallel *RLC* circuit. Using Laplace Transform, find $v(t)$ and $i(t)$ given that $v(0)= 5V$ and $i(0)= -2$ A. . 	10
9	Describe various restrictions on pole-zero locations for transfer functions.	10
	UNIT-III	
10	Determine the Y parameters for the two-port shown in Fig. 	10
11	Determine the ABCD parameters for the two-port shown in Fig.	10



UNIT-IV

12	Design m-derived T-sections HPFs for R_0= 600 ohms, f_c= 1800 Hz and f_∞ = 2000Hz.	10
13	An impedance is given by $Z(s) = \frac{3s^2+18s+24}{s^2+3s}$. Realize the network in Foster-I form.	10

$3(s^2+6s$