GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–III (NEW) EXAMINATION – WINTER 2021

Subject Code:3130906   **Date:19-02-2022**
Subject Name:Electrical Circuit Analysis
Time:10:30 AM TO 01:00 PM   **Total Marks:70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	(a)	State and explain Superposition theorem for the solution of electrical network.	03
	(b)	State and explain Reciprocity theorem for the solution of electrical circuits.	04
	(c)	Determine the current through j5Ω using superposition theorem of network shown in Fig.1	07
Q.2	(a)	State and explain Thevenin theorem for the solution of complicated networks.	03
	(b)	What is the significance of Maximum Power transfer theorem? State and explain with example.	04
	(c)	In the network shown in Fig.2, determine the Thevenin equivalent circuit for the load R_L.	07

OR

	(c)	Find the current through branch "b-e" using Norton theorem for the network as shown in Fig.3.	07
Q.3	(a)	Why the current in inductor and voltage in capacitor cannot change simultaneously?	03
	(b)	Explain and derive the step response to R-L series circuit using Laplace Transformation method	04
	(c)	Construct the exact dual of the network of Fig-4	07

OR

Q.3	(a)	Point out the relations between voltage and current for the following passive elements. (1) Resistor (2) Capacitor.	03
	(b)	Give details of the procedure to obtain sinusoidal steady state response of a circuit	04
	(c)	The circuit shown in Fig.5 consists of a resistor and a relay with inductance (L). The relay is adjusted in such a way that it is actuated when the current through the coil is 8 mA. The switch is closed at t=0 and it is observed that the relay is actuated when t = 0.1 sec. Determine (a) the value of L and (b) the equation of current.	07
Q.4	(a)	Enlighten significance of poles and zeros in network functions.	03
	(b)	As shown in Fig.6, the switch K is opened at time t = 0. Obtain the particular solution for voltage v(t) across the parallel circuit using Laplace transformation.	04
	(c)	The switch is open at t = 0 for the circuit shown in Fig.7. Steady state condition has been achieved before switching. Find the expression for the current i(t) using Laplace transformation.	07

Q.4 **(a)** Explain concept of Laplace transformation. What are the advantages and disadvantages of Laplace transformation? **03**

(b) What are the properties of Laplace transformation? Explain in detail. **04**

(c) Obtain current equation i(t) for t ≥ 0 using Laplace Method for Fig.8. **07**

Q.5 **(a)** Derive condition of Symmetry of h-Parameter. **03**

(b) Derive relationship of z-Parameter in terms of ABCD Parameter **04**

(c) Obtain h-Parameters of the network shown in Fig.9 **07**

Q.5 **(a)** Derive condition of reciprocity of y-Parameters. **03**

(b) Derive relationship of h-Parameter in terms of g-Parameters **04**

(c) Obtain Transmission Parameters of the network shown in Fig.10. Find whether the network is (i) symmetrical (ii) reciprocal **07**

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Fig.1

Fig.2

Fig.3

Fig.4

Fig.5

Fig.6

Fig.7

Fig.8

3

Fig.9

Fig.10