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GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER- III (New) EXAMINATION - WINTER 2019 Subject Code: 3130906 Date: 28/11/2019 **Subject Name: Electrical Circuit Analysis** Time: 02:30 PM TO 05:00 PM **Total Marks: 70** Instructions: 1. Attempt all questions. 2. Make suitable assumptions wherever necessary. 3. Figures to the right indicate full marks. MARKS Q.1 State and explain Reciprocity theorem. **(a)** State and explain Maximum power transfer theorem with suitable **(b)** example. Obtain Thevenin's equivalent resistance of the circuit given in fig.1 (c) to the left of the terminals a-b. Q.2 In the fig.2, the switch k is first kept at position 1 and steady state **(a)** condition is reached. At t = 0, switch is moved to position 2. Find the current in both the cases. Explain time constant in case of series R-L and series R-C circuit. **(b)** (c) In the fig.3, the switch is closed at t = 0. Find value of i, di/dt, d^2i/dt^2 at $t=0^+$. Assume initial current of inductor to be zero. OR Explain in detail about transient response in series R-C circuit having 07 (c) DC excitation. Explain the importance of Dot convention in coupled circuit with Q.3 **(a)** suitable example. Draw impedance triangle and explain related terms. **(b)** For the network shown in fig.4, find the node current I using node (c) voltage technique. OR Q.3 In the fig.5, an unknown impedance of Z Ω is connected in series (a) with $(5 + i8) \Omega$ coil. If I = 2.5 \angle -15⁰ A, find value of Z. Find the current in a series R-L circuit having $R = 2 \Omega$ and L = 10 H**(b)** while a DC voltage of 100 V is applied. What is the value of this current after 5 seconds of switching on? The circuit shown in fig.6 is operating in the sinusoidal steady state. 07 (c) Find I_1 and I_2 by loop analysis and determine ratio V_0 / V_s . Assume $\omega = 10^3$ rad / sec. Find driving point impedance of the given network shown in fig.7. **Q.4 (a)** Find inverse Laplace of given F(s). **(b)** F(s) = (s+2)s (s+3) (s+4) Obtain the step response for the R-L series circuit shown in fig.8. (c) OR



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Q.4	(a)	Explain characteristics of unit ramp function.	03	
-	(b)	Determine the transfer function $H(s) = V_0(s) / I_0(s)$ of the circuit in fig.9.	04	
	(c)	Find $v_0(t)$ in the circuit of fig.10, assuming zero initial condition.	07	
Q.5	(a)	What is the condition of symmetry of all different two port parameters?	03	
	(b)	Briefly describe h parameters for a two port network.	04	
	(c)	Obtain Z-parameters of the circuit shown in fig.11.	07	
		OR		
Q.5	(a)	Find Y-parameters of the circuit shown in fig.12	03	
	(b)	Derive expression of ABCD parameters in terms of Z parameters.	04	
	(c)	Determine Z-parameters of the circuit shown in fig.13.	07	

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