# GUJARAT TECHNOLOGICAL UNIVERSITY <br> 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 Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

MARKS
Q. 1 (a) State and explain Reciprocity theorem. 03
(b) State and explain Maximum power transfer theorem with suitable 04 example.
(c) Obtain Thevenin's equivalent resistance of the circuit given in fig. $1 \quad 07$
to the left of the terminals a-b.
Q. 2 (a) In the fig.2, the switch k is first kept at position 1 and steady state
condition is reached. At $t=0$, switch is moved to position 2. Find the current in both the cases.
(b) Explain time constant in case of series R-L and series R-C circuit.
(c) In the fig. 3 , the switch is closed at $t=0$. Find value of $\mathrm{i}, \mathrm{di} / \mathrm{dt}, \mathrm{d}^{2} \mathrm{i} / \mathrm{dt}^{2} \quad 07$
at $\mathrm{t}=0^{+}$. Assume initial current of inductor to be zero.

OR
(c) Explain in detail about transient response in series R-C circuit having

07 DC excitation.
Q. 3 (a) Explain the importance of Dot convention in coupled circuit with 03 suitable example.
(b) Draw impedance triangle and explain related terms. $\mathbf{0 4}$
(c) For the network shown in fig.4, find the node current I using node 07
voltage technique.
OR
Q. 3 (a) In the fig.5, an unknown impedance of $Z \Omega$ is connected in series 03 with $(5+j 8) \Omega$ coil. If $I=2.5 \angle-15^{0} \mathrm{~A}$, find value of $Z$.
(b) Find the current in a series $\mathrm{R}-\mathrm{L}$ circuit having $\mathrm{R}=2 \Omega$ and $\mathrm{L}=10 \mathrm{H}$
while a DC voltage of 100 V is applied. What is the value of this current after 5 seconds of switching on?
(c) The circuit shown in fig. 6 is operating in the sinusoidal steady state.

Find $I_{1}$ and $I_{2}$ by loop analysis and determine ratio $V_{0} / V_{s}$. Assume $\omega=10^{3} \mathrm{rad} / \mathrm{sec}$.
Q. 4 (a) Find driving point impedance of the given network shown in fig.7. 03
(b) Find inverse Laplace of given $\mathrm{F}(\mathrm{s})$. $\mathbf{0 4}$
$F(s)=\frac{(s+2)}{s(s+3)(s+4)}$
(c) Obtain the step response for the R-L series circuit shown in fig.8. 07
Q. 4 (a) Explain characteristics of unit ramp function. Www.FirstRanker.co
(b) Determine the transfer function $\mathrm{H}(\mathrm{s})=\mathrm{V}_{0}(\mathrm{~s}) / \mathrm{I}_{0}(\mathrm{~s})$ of the circuit in 04
fig.9.
(c) Find $\mathrm{v}_{0}(\mathrm{t})$ in the circuit of fig.10, assuming zero initial condition.
Q. 5 (a) What is the condition of symmetry of all different two port 03 parameters?
(b) Briefly describe h parameters for a two port network. $\mathbf{0 4}$
(c) Obtain Z-parameters of the circuit shown in fig.11. $\mathbf{0 7}$

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. $\mathbf{0 4}$
(c) Determine Z-parameters of the circuit shown in fig.13. $\mathbf{0 7}$



