

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- SEMESTER-III (NEW) EXAMINATION – WINTER 2020****Subject Code:3131103****Date:05/03/2021****Subject Name:Network Theory****Time:10:30 AM TO 12:30 PM****Total Marks:56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

	<b>MARKS</b>
<b>Q.1</b> (a) Determine the Laplace transform of $f(t) = e^{-3t} \cos 4t$ .	<b>03</b>
(b) Explain the terms: 1) Tree 2) Bilateral 3) Oriented Graph 4) Linear	<b>04</b>
(c) In the circuit of Fig.1, switch k is closed at $t=0$ . For the elements values given, obtain the general solution and particular solution for current $i(t)$ . Obtain the value of current at time $t=0.1$ sec.	<b>07</b>
<b>Q.2</b> (a) Determine y-parameters in terms of z-parameters.	<b>03</b>
(b) How the following elements will behave at $t=0$ and $t=\infty$ . Draw equivalent network as well. A) Inductor B) Capacitor.	<b>04</b>
(c) State and explain maximum power transfer theorem. Also derive the condition for maximum power transfer to the load for DC and AC circuits.	<b>07</b>
<b>Q.3</b> (a) What is time constant? What is its significance?	<b>03</b>
(b) Briefly describe Millman's theorem.	<b>04</b>
(c) For the network of Fig.3, find the current through $R=1\text{ohm}$ by applying Thevenin's theorem. All resistances are in ohms.	<b>07</b>
<b>Q.4</b> (a) Derive the condition for network to be reciprocal for ABCD parameters.	<b>03</b>
(b) Explain characteristic of an ideal voltage source.	<b>04</b>
(c) In the network of Fig.4, the switch k is closed at $t=0$ , a steady state having previously been attained. Find the particular solution for the current.	<b>07</b>
<b>Q.5</b> (a) State and explain final value theorem of Laplace transform.	<b>03</b>
(b) Determine the current in $1\text{ohm}$ resistor of the network shown in Fig.5 using source transformation method.	<b>04</b>
(c) In the network of Fig.6, the switch k is closed at $t=0$ . Find the values of $i$ , $\frac{di}{dt}$ and $d^2i/dt^2$ at $t=0^+$ , if $V=100\text{V}$ , $R=10\text{ohm}$ , $L=1\text{H}$ and $C=10^{-5}\text{F}$ .	<b>07</b>
<b>Q.6</b> (a) What is network synthesis?	<b>03</b>
(b) Obtain step response to R-L series circuit using Laplace Transformation.	<b>04</b>
(c) Derive relationship between incidence matrix ( $A$ ), fundamental tie-set matrix ( $B_f$ ) and fundamental cut-set matrix ( $Q_f$ ).	<b>07</b>
<b>Q.7</b> (a) List advantages of Laplace transformation method over classical method.	<b>03</b>
(b) Briefly explain Positive Real Function (PRF).	<b>04</b>
(c) For the network of Fig.7, determine h-parameters.	<b>07</b>

- Q.8 (a) Define fundamental loop and cut-set. 03  
 (b) Derive the condition for network to be symmetrical for g-parameters. 04  
 (c) In Fig.8, the switch is in the position 1 long enough to establish steady state conditions and at  $t=0$  is switched to position 2. Find expression for current in the circuit. 07

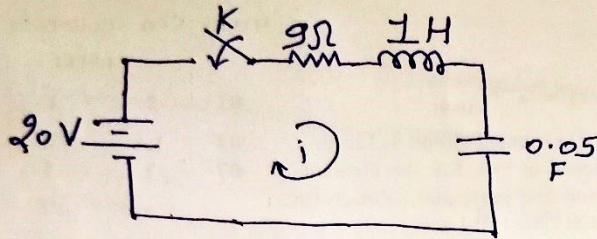


Fig. 1.

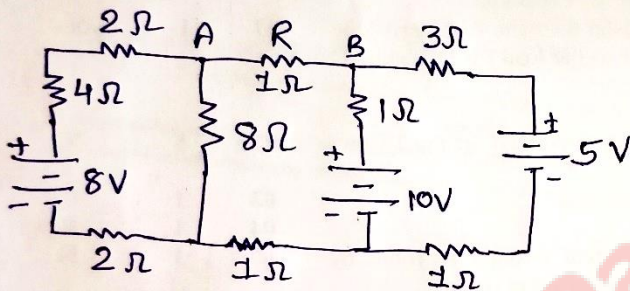


Fig. 3.

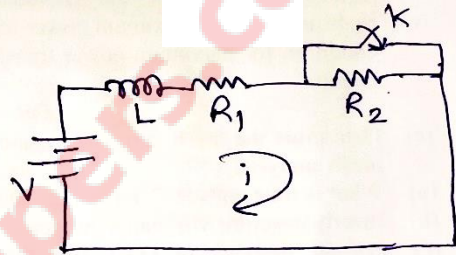


Fig. 4

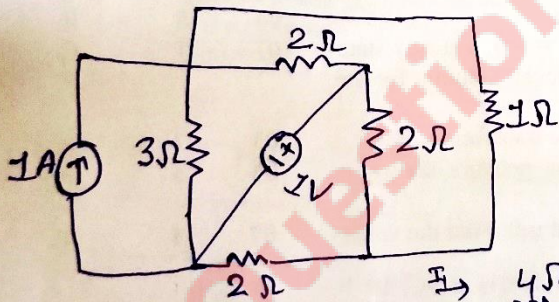


Fig. 5

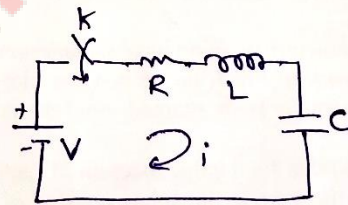


Fig. 6

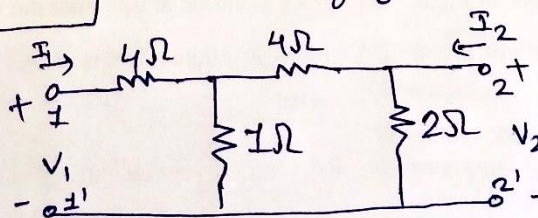


Fig. 7

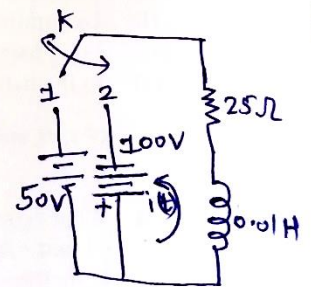


Fig. 8

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