

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (Old) EXAMINATION – WINTER 2019

Subject Code: 130901

Date: 28/11/2019

Subject Name: Circuits And Networks

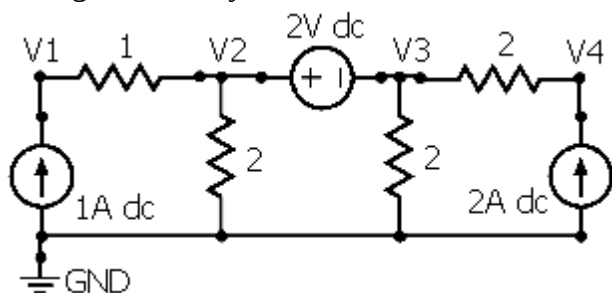
Time: 02:30 PM TO 05:00 PM

Total Marks: 70

Instructions:

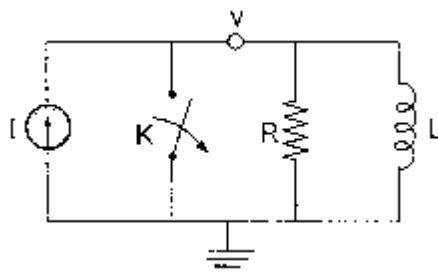
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) State and explain Thevenin's and Norton's theorem with suitable examples. **07**
 (b) What are Y parameters and Z parameters? Derive the expression for Z parameters in terms of Y parameters and vice versa. **07**
- Q.2** (a) Define following terms: (i) Linear and Nonlinear networks (ii) Lumped and Distributed Networks (iii) Passive and Active Networks (iv) Dependent Source **07**
 (b) State and explain initial value and final value theorem. **07**
- OR**
- (b) Obtain the laplace transform for $f_1(t)=t$ and $f_2(t)=te^{-at}$ **07**
- Q.3** (a) State and explain principle of duality. **07**
 (b) Solve for the nodal voltages V1, V2, V3 and V4 as shown in the network in figure, using nodal analysis. **07**

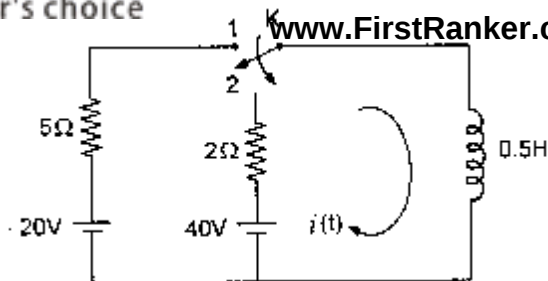


OR

- Q.3** (a) State the procedure to obtain solution of a network using laplace transform technique. State its advantages over classical method. **07**
 (b) In the network shown in fig. the switch K is opened at $t=0$. find the value of V, dV/dt , d^2V/dt^2 at $t=0^+$ if $I=10$ A, $R=10 \Omega$ and $L=1$ H **07**



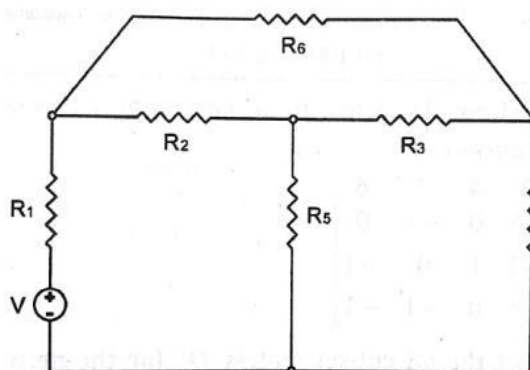
- Q.4** (a) State and explain maximum power transfer theorem. derive the condition for maximum power transfer to the load for d.c. circuits. **07**
 (b) In the network shown in fig. the switch K is moved from 1 to 2 position at $t=0$, steady state having previously been attained. Determine the current $i(t)$ **07**



OR

- Q.4 (a)** What is meant by poles and zeros of a transfer function? what is significance of poles and zeros? Discuss the restrictions on locations of poles and zeros of transfer functions. **07**
- (b)** Derive expression for rise of current and decay of current in RL series circuit excited by DC voltage source. Discuss the role of time constant in each. **07**
- Q.5 (a)** What are the procedure for formulation of graph, tree and incidence matrix? Hence discuss the procedure of forming reduced incidence matrix and its advantages. **07**

- (b)** For the network shown in fig. draw the oriented graph. Also obtain incidence matrix (A), fundamental tie-set matrix (B_f) and fundamental cut-set matrix (Q_f) **07**



OR

- Q.5 (a)** Write and explain initial conditions for the inductor and capacitor at $t=0_+$ and $t=\infty$ **07**
- (b)** Find the current passing through the 2 Ohm resistor using Mesh analysis for the circuit shown in the following figure. **07**

