

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (OLD) - EXAMINATION – SUMMER 2018

Subject Code: 130901

Date: 23/05/2018

Subject Name: Circuits and Networks

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.

- Q.1 (a)** Explain the terms (i) Charge (ii) Current (iii) Potential difference (iv) Node (v) Independent current source (vi) Dependent voltage source (vii) Lumped parameter **07**
- (b)** Using nodal analysis find the current and voltage drop of $5\ \Omega$ resistor. **07**

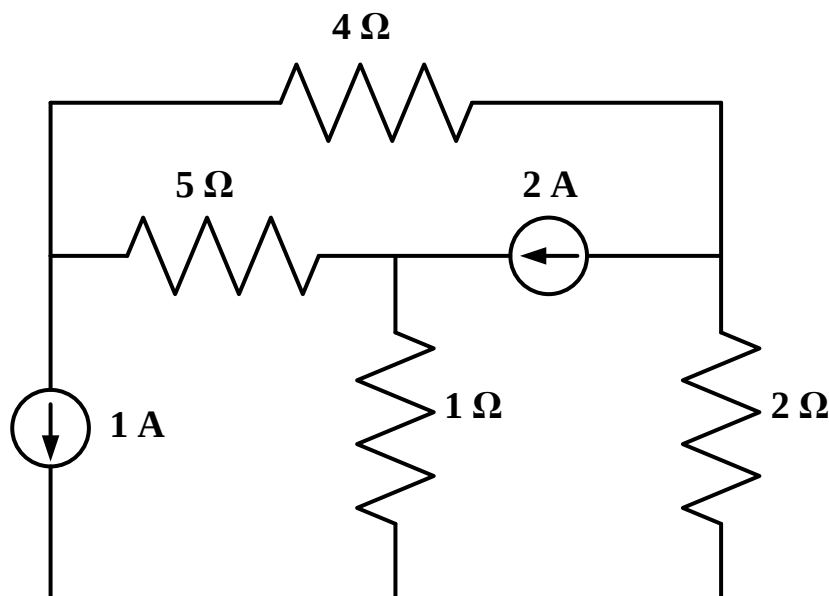


Figure 1 Network of Q. 1 (b)

- Q.2 (a)** Find the Norton's equivalent circuit across terminal a-b. **07**

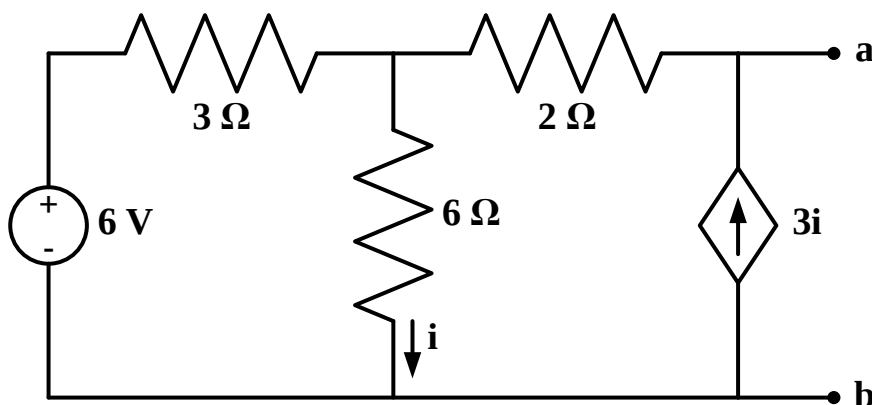


Figure 2 Network of Q. 2 (a)

- (b)** State Maximum Power Transfer Theorem. Also derive the condition for the maximum power transfer for the DC circuit. **07**

OR

- (b)** State and explain Millman's Theorem **07**

- Q.3 (a)** In series R-L-C circuit, $R = 5 \Omega$, $L = 1 \text{ H}$ and $C = 1 \text{ F}$. Obtain $i(t)$ when a DC voltage of 20 V is applied at $t = 0$. **07**
- (b)** Explain the Dot Convention Rule for the magnetically coupled network. **07**
Explain the method to put the Dots on different linked coils using suitable example.

OR

- Q.3 (a)** A $10 \mu\text{F}$ capacitor in RC circuit has initial charge of $100 \mu\text{C}$ with the polarities shown in circuit. At $t = 0$, the switch being closed, a DC voltage of 100 V is applied. Find the expression of current. **07**

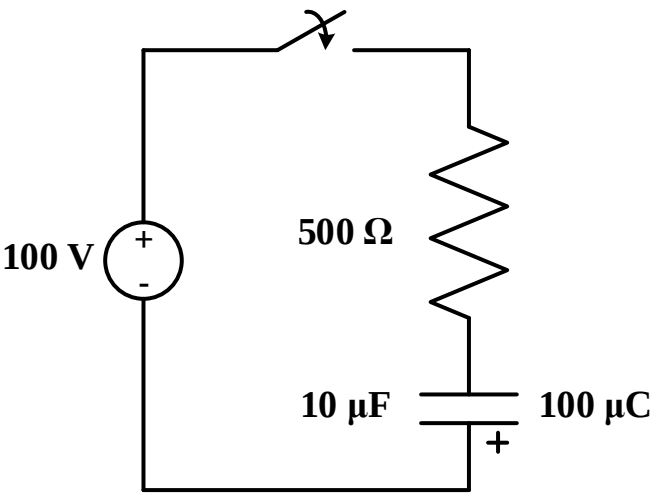


Figure 3 Network of Q. 3 (a)

- (b)** What is time-constant of R-L circuit? Derive the circuit equations for a series R-L circuit connected to a DC supply. **07**
- Q.4 (a)** Obtain the pole zero plot in the s-plane of driving point impedance function for the given network. **07**

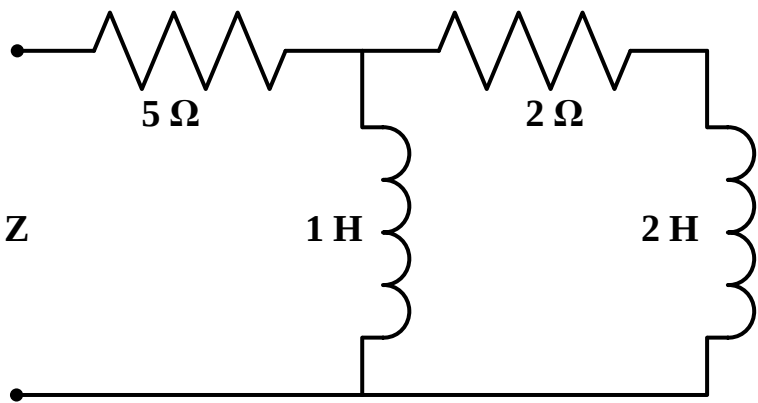


Figure 4 Network of Q. 4 (a)

- (b)** Explain the procedure to obtain the solution of Laplace transform technique. State its advantages over classical method. **07**
- OR**
- Q.4 (a)** Using Laplace transformation techniques, obtain the complete expression of current after closing the switch. Battery voltage is applied for a steady state period. Assume $R_1 = 1 \Omega$, $R_2 = 2 \Omega$, $L = 1 \text{ H}$, $E = 10 \text{ V}$. **07**

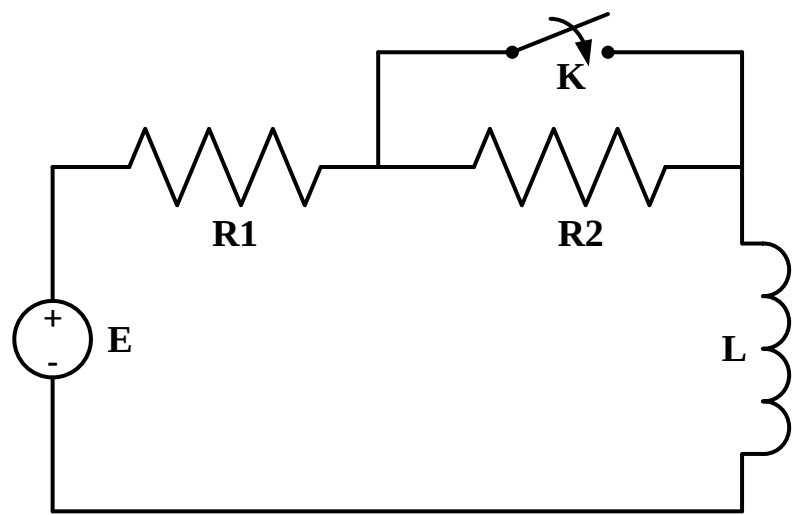


Figure 5 Network of Q. 4 (a)

- Q.4 (b)** Write down voltage and current relationships in resistor, inductor and capacitor. Also mention the initial and final condition for R, L and C components in the different cases. **07**
- Q.5 (a)** Explain the various two port parameters in brief. Hence derive the expression of ABCD parameters in terms of Z parameters. **07**
- (b)** Find the Y parameter of the given network. **07**

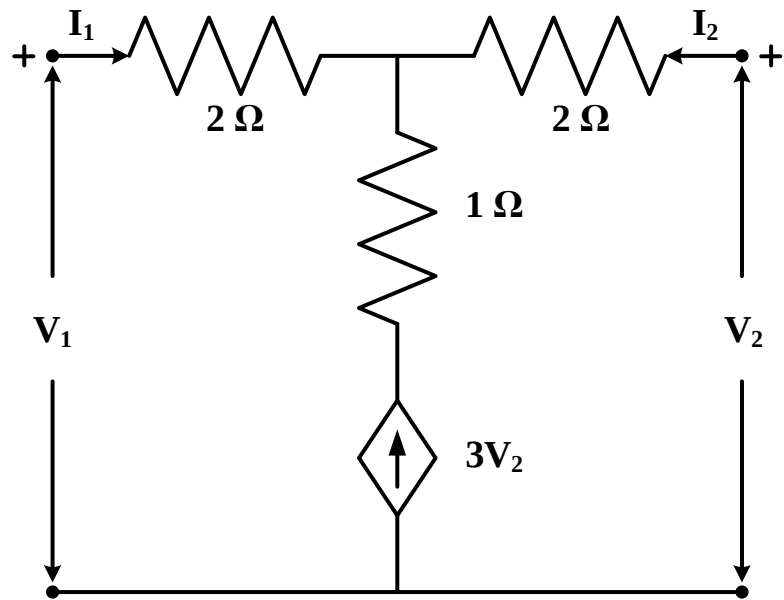


Figure 6 Network of Q. 5 (b)

OR

- Q.5 (a)** Derive inter relationship between incidence matrix (A), fundamental tie set matrix (Bf) and fundamental cut set matrix (Qf). **07**
- (b)** Define the following with suitable example (i) Graph (ii) Planner Graph **07**
(iii) Non-planner Graph (iv) Tree (v) Co-tree (vi) Twig (vii) Path
