

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (OLD) - EXAMINATION – SUMMER 2017

Subject Code: 130901

Date: 02/06/2017

Subject Name: Circuits and Networks

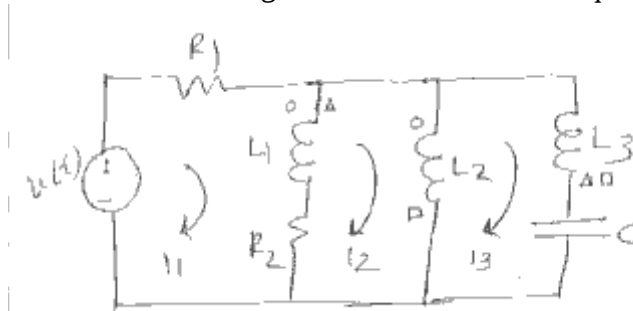
Time: 10:30 AM to 01:00 PM

Total Marks: 70

Instructions:

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

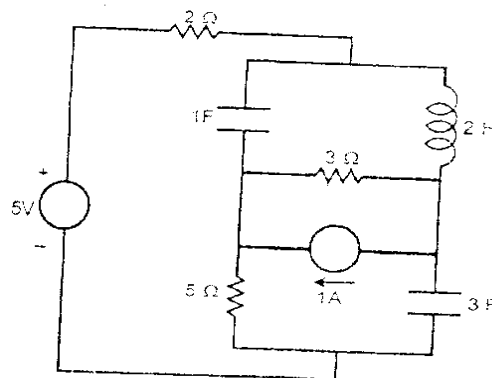
- Q.1 (a) Explain the “Dot Convention Rule” for the magnetically coupled Network using network shown in Fig-1. Also formulate KVL equations. 06



FIGURE_1

- (b) State and explain various Two port parameters and Network functions in brief. 08

- Q.2 (a) Explain the duality & Draw the dual of the Network for Figure _2 06



FIGURE_2

- (b) Define : Charge, Current, Potential difference, Voltage, Node, Loop and Independent source and Dependent sources. 08

OR

- (b) State the procedure to obtain solution of a network using Laplace transform method. Explain with suitable example. State advantage of Laplace method over classical method. 08

- Q.3 (a) Define the time-constant of RL and RC networks and explain the significance of the time-constant, with calculation and sketches. 06

- (b) For a resistive network shown in Figure _3, draw graph and tree of the network. Also develop the fundamental cut-set matrix. Assume suitable data and notation if required by mentioning it clearly. 08

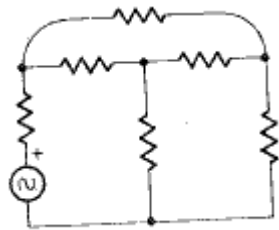


FIGURE _3

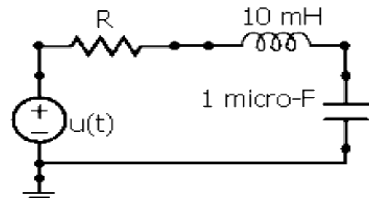


FIGURE _4

OR

- Q.3

(a)

Determine the voltage across the capacitor in the RLC circuit as shown in Figure. 4, if $R=400\text{ Ohm}$ using Laplace transform.

06

(b)

State and explain Norton's theorem, with suitable network & prove it.

08
- Q.4

(a)

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.

08

(b)

Explain various source transformation techniques. Using Source transformation techniques find current " i_1 " in the network shown in Figure-5..

06

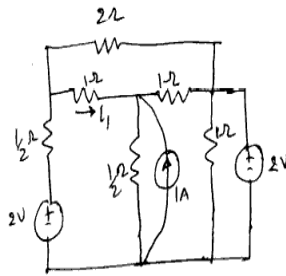


FIGURE _5

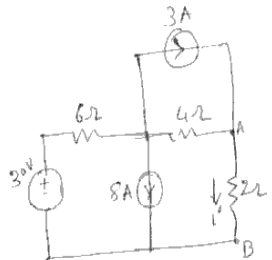


FIGURE _6

OR

- Q.4

(a)

State and explain Superposition Theorem. Hence using this find V_{ab} in Figure-6.

08

(b)

Explain incident matrix of a linear oriented graph with example.

06
- Q.5

(a)

Derive formulae to convert given 'Y' parameters into 'h' parameters.

06

(b)

For the network shown in Figure_7 , switch K is closed at time $t = 0$ with zero inductor current and zero capacitor voltage. Solve for

08
- (i)

V_1 and V_2 at $t = 0+$

(ii)

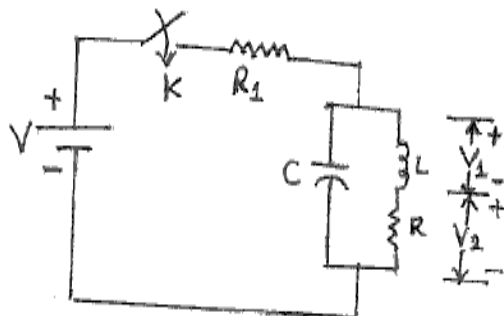
V_1 and V_2 at $t = \infty$

(iii)

dV_1/dt and dV_2/dt at $t = 0+$

(iv)

d^2V_2/dt^2 at $t = 0+$



FIGURE_7

OR

- Q.5

(a)

Find the equivalent inductance for the series and the parallel connections of L_1 and L_2 if their mutual inductance is M .

06

(b)

Discuss concept of poles and zeros in a network function. Also mention its significance in circuit analysis.

08
