

Reg No.: _____

Name: _____

08000EE201122001

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree (SFE) Examination December 2022 (2015 scheme)



Course Code: EE201
Course Name: CIRCUITS AND NETWORKS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks.

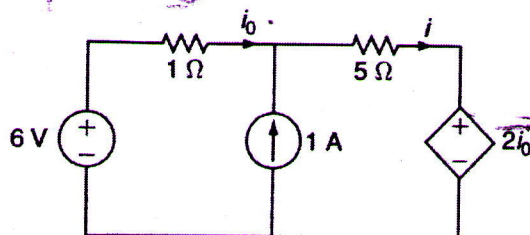
Marks

- | | | |
|---|--|-----|
| 1 | State and explain Thevenin's theorem | (5) |
| 2 | List any three properties of incidence matrix | (5) |
| 3 | Obtain the expression for the voltage across a capacitor discharging through a resistor of resistance R. Assume that the initial voltage of the capacitor is V_0 . | (5) |
| 4 | Explain the term dot convention in magnetic coupling circuits. | (5) |
| 5 | Derive the condition for reciprocity and symmetry of Y parameters. | (5) |
| 6 | Show that the overall admittance parameter matrix for parallel connected two port network is the sum of admittance parameters of each individual two port network in parallel. | (5) |
| 7 | Check whether the polynomial $S^4 + 3S^3 + 4S^2 + 3S + 1$ is Hurwitz. | (5) |
| 8 | List any three properties of RL admittance function. | (5) |

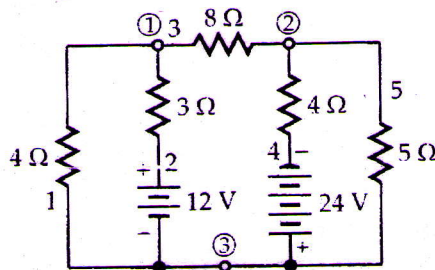
PART B

Answer any two full questions, each carries 10 marks.

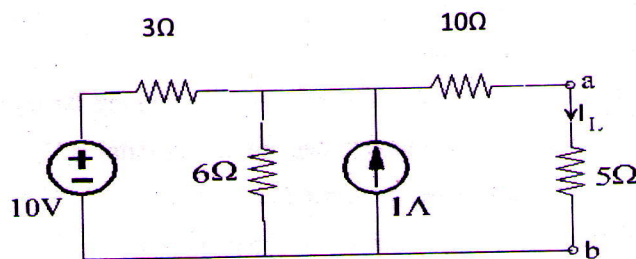
- 9 Find current, ' i ' in the network shown in Fig. using super position theorem (10)



- 10 For the circuit shown in figure, determine all branch voltages, using cut set analysis. (10)



- 11 a) Determine Norton equivalent circuit for the network shown in figure and hence find the current I_L through 5Ω resistor. (7)



- b) Draw the oriented graph for the reduced Incidence matrix given below. (3)

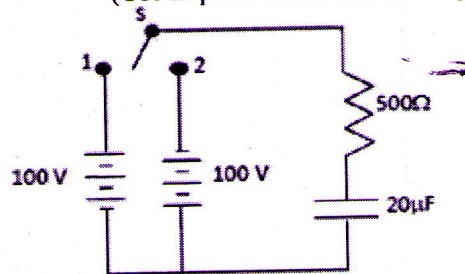
$$A = \begin{bmatrix} 1 & 1 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & -1 & -1 & 0 \end{bmatrix}$$

PART C

Answer any two full questions, each carries 10 marks.

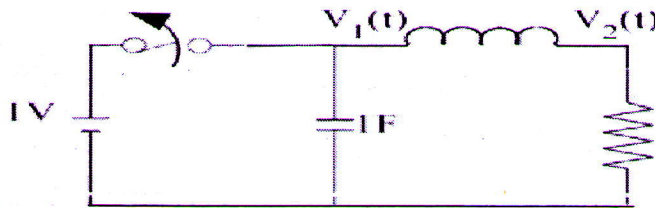
- 12 In the given circuit shown in fig, the switch is closed to position 1 at $t=0$ and after a time equal to one time constant it is moved to position 2. Find the expression for current after moving to position 2. Assume zero initial charge on the capacitor. (10)

(Use Laplace transform technique)

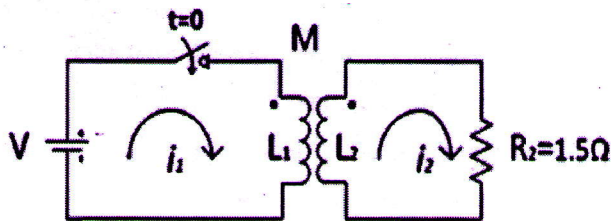


- 13 In the network shown in fig., the switch is opened at $t=0$. Find out the current through the 1Ω resistor after opening the switch. (10)

0.5H



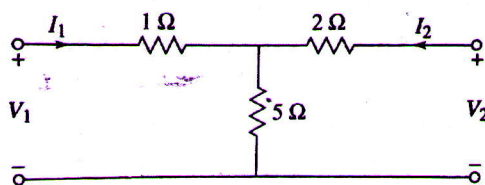
- 14 a) If an RLC series circuit is energised by a 10V DC source at $t=0$ sec. Draw the expected graph of the following circuit variables under different damping conditions: (5)
- i) The current through the circuit ii) Voltage across the capacitor.
- b) Write the mesh equations in s-domain for the network in figure, when a 10 V source is switched on. The primary and secondary self-inductances are $L_1 = L_2 = 1$ H and $M = 0.5$ H (5)



PART D

Answer any two full questions, each carries 10 marks.

- 15 Discuss the series and cascade connection of two port networks. (10)
- 16 a) Find the transmission parameters for the network shown. (5)



- b) Find the first Cauer form of RC network $Z(s) = \frac{(s+3)(s+6)}{(s+1)(s+5)}$ (5)
- 17 Realize the given impedance function $Z(s)$ as a First and second Foster forms. (10)
- $Z(s) = \frac{(s+1)(s+3)}{s(s+2)}$
