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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: EE201

Course Name: CIRCUITS AND NETWORKS (EE)

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks.

Marks

- 1 Explain reciprocity theorem. Verify reciprocity theorem for the network shown in fig.(1) (5)

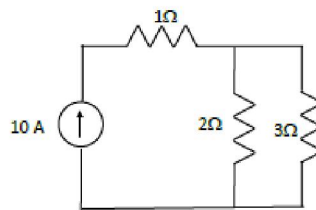


Fig.(1)

- 2 Express KVL equations for any circuit using the fundamental tie set matrix. (5)
- 3 The series RL circuit in fig. (2) is connected to 100V source at $t=0$. Determine the expression for the current $i(t)$ in the circuit. (5)

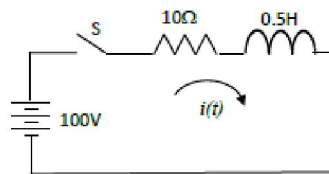


Fig.(2)

- 4 Explain how the conductively coupled equivalent circuit of a given magnetically coupled circuit can be derived. (5)
- 5 Find the equivalent network when two port networks are connected in parallel. (5)
- 6 What are T parameters? Express T parameters in terms of Y parameters. (5)
- 7 Write down the properties of the driving point impedance function of RL networks. (5)
- 8 What are positive real functions? What are the necessary conditions to be satisfied by a driving point function to be positive real? (5)

PART B

Answer any two full questions, each carries 10 marks.

- 9 a) Determine the value of Z_L in the circuit shown in fig.(3) so that the power delivered to the load (Z_L) is maximum. (5)

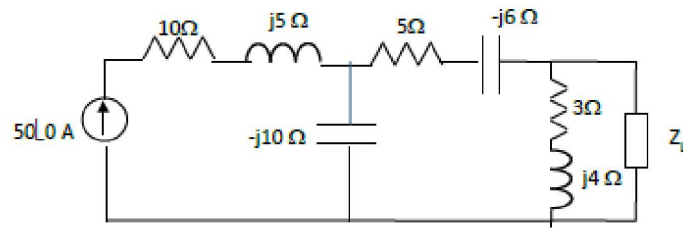
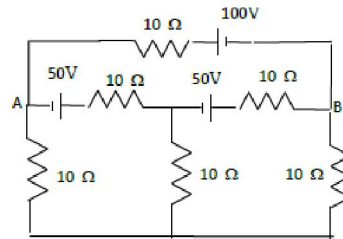


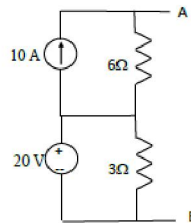
Fig.(3)

- b) Determine the current supplied by the 100V source shown in fig.(4) using Thevenin's theorem. (5)



Fig(4)

- 10 a) Find the Norton's equivalent network across terminals AB for the circuit shown in fig. (5) (5)



Fig(5)

- b) Explain node pair analysis as referred to topological analysis of electrical networks. (5)
- 11 Find the power delivered by the current sources in the given network shown in fig. (6) using node analysis by graphical method. (10)

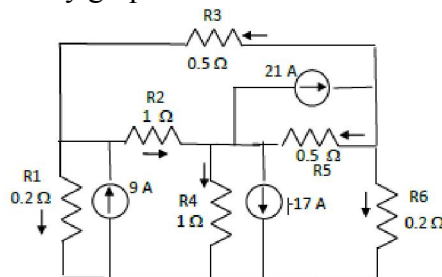


Fig.(6)

PART C

Answer any twofull questions, each carries10 marks.

- 12 A series RLC circuit consists of a resistance $20\ \Omega$, inductance 0.05H and capacitance $20\mu\text{F}$ in series with a 100 V constant voltage source when the switch is closed at $t=0$. Find the expression for the current in the circuit. Also find the current at $t=3\text{ms}$. (10)
- 13 In the given circuit shown in fig.(7), 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)

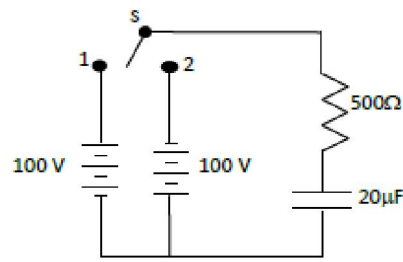


Fig.(7)

- 14 Find the voltage across the 5Ω resistor in the circuit shown in fig. (8). (10)

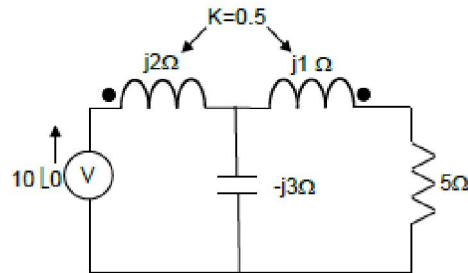


Fig.(8)

PART D

Answer any twofull questions, each carries 10 marks.

- 15 a) The ABCD parameters of a two port network are $A=3$, $B=160$, $C=0.05$, $D=3$. (5)
Find the equivalent T and π network.
- b) Check whether the given polynomial $P(s) = s^3 + 3s^2 + 6s + 18$ is Hurwitz or not. (5)
- 16 The driving point impedance of a network is given by (10)

$$Z(s) = \frac{2(s^2 + 4s + 3)}{(s+2)(s+6)}$$

Obtain the first Foster form and second Cauer form of the network.

- 17 Obtain the Foster I and II forms of a network whose driving point function is given as (10)

$$Z(s) = \frac{4s(s^2 + 4)}{(s^4 + 17s^2 + 16)}$$
