

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**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.*

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

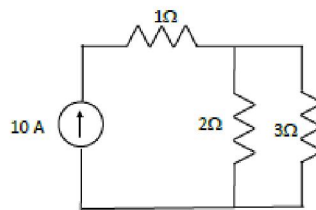


Fig.(1)

- 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)

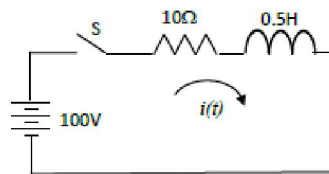


Fig.(2)

- 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)

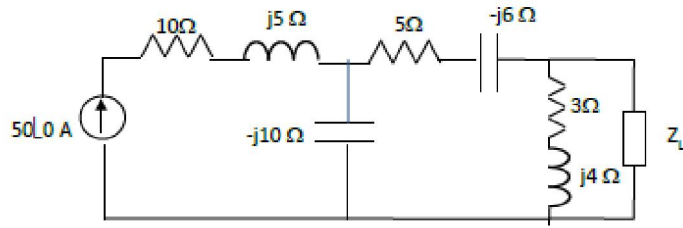
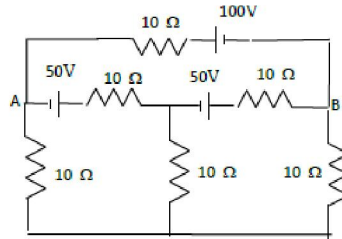


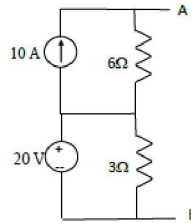
Fig.(3)

- 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)

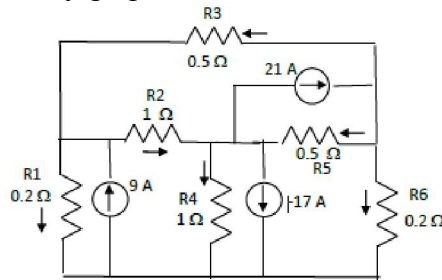


Fig.(6)

**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  $20\mu F$  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  $t=3ms$ . (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)

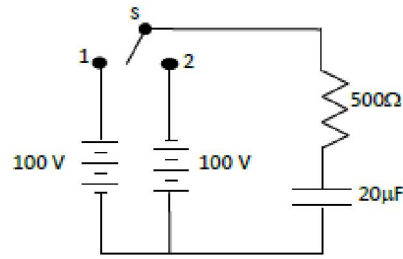


Fig.(7)

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

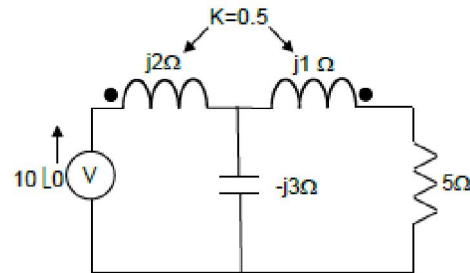


Fig.(8)

### 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  $\pi$  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)

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

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