

Roll No



**PRESIDENCY UNIVERSITY  
BENGALURU**

**SET - B**

**SCHOOL OF ENGINEERING  
END TERM EXAMINATION - FEB 2023**

**Semester :** Semester I - 2022

**Course Code :** ECE2004

**Course Name :** Sem I - ECE2004 - Network Theory

**Program :** B.Tech - (All Programs)

**Date :** 23-FEB-2023

**Time :** 1.00PM - 4.00PM

**Max Marks :** 100

**Weightage :** 50%

**Instructions:**

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

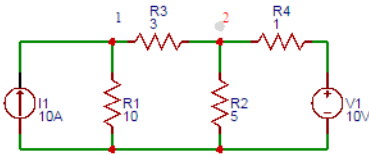
**PART A**

**ANSWER ALL THE FIFTEEN QUESTIONS**

**15 X 2 = 30M**

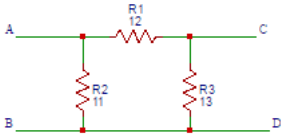
1. Condition of reciprocity in Y-parameter representation is and condition of symmetry observed in z-parameters?  
(CO2,CO1,CO3,CO4) [Knowledge]
2. Find out the energy stored in an inductor of 5 milli henry through which a current of 10 micro amperes is flowing.  
(CO4,CO3,CO2,CO1) [Knowledge]
3. Once the circuit is transformed from voltage source to current source where will the resistance be connected?  
(CO2,CO1,CO3,CO4) [Knowledge]
4. The expression of current in R-C circuit is?  
(CO3,CO2,CO4,CO1) [Knowledge]
5. A two-port network (a kind of four-terminal network or quadripole) is an electrical network (circuit) or device with two pairs of terminals to connect to external circuits. The two port parameter  $Z_{12}$  is called as  
(CO2,CO5,CO4,CO1,CO3) [Knowledge]
6. Vth using thevenin's is found across the \_\_\_\_\_ terminals of the network.  
(CO4,CO1,CO2,CO3) [Knowledge]

7. Find the voltage at node 1 of the circuit shown below



(CO4,CO3,CO2,CO1) [Knowledge]

8. Find the resistance at node A in the delta connected circuit shown in the figure below.



(CO1,CO2,CO3,CO4) [Knowledge]

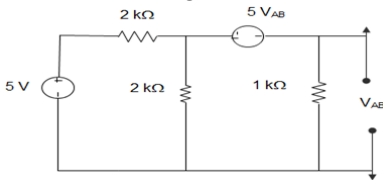
9. If I am having a balanced star connection of 50 ohm in each branch. Find the equivalent delta resistance.

(CO3,CO2,CO4,CO1) [Knowledge]

10. While computing the Norton's equivalent resistance and the Norton's equivalent voltage, which of the following steps are undertaken?

(CO3,CO4,CO1,CO2) [Knowledge]

11. For the circuit given below, the Thevenin voltage across the terminals A and B is



(CO5,CO3,CO2,CO4,CO1) [Knowledge]

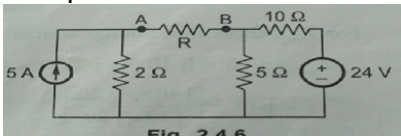
12. Z parameters are also called open circuit parameters and Y parameters are also called short circuit parameters. What may be the reason for the same?

(CO4,CO1,CO2,CO3,CO5) [Knowledge]

13. Convert the current source of 50 amperes with internal resistance of 10 ohms to an equivalent voltage source.

(CO3,CO2,CO1,CO4) [Knowledge]

14. For the circuit shown below, what should be the value of R such that the maximum power transfer can take place from the rest of the network to R. obtain the amount of maximum power.



(CO4,CO2,CO1,CO3) [Knowledge]

15. A two port network is the one having one input and one output port. There are many parameters governing these two port networks. List the different parameters along with their importance.

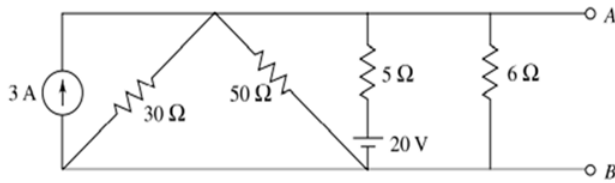
(CO4,CO3,CO2,CO1) [Knowledge]

## PART B

ANSWER ALL THE TWO QUESTIONS

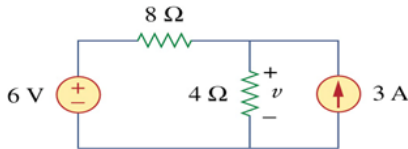
2 X 15 = 30M

16. A voltage source with a series resistance can be converted into an equivalent current source with a parallel resistance. Conversely, a current source with a parallel resistance can be converted into a voltage source with a series resistance. Replace the circuit between A and B with a voltage source in series with a single resistor.

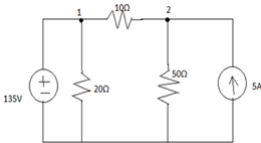


(CO4,CO3) [Comprehension]

17. Superposition theorem states that in any linear, bilateral network where more than one source is present, the response across any element in the circuit is the sum of the responses obtained from each source considered separately.
- a. Find out the value of  $v$  by using the Superposition theorem.



- b. Nodal analysis or Node-Voltage method is done by identifying the nodes in the circuit and thereby forming equations. By using nodal analysis find out the voltages at nodes 1 & 2.



(CO4,CO3) [Comprehension]

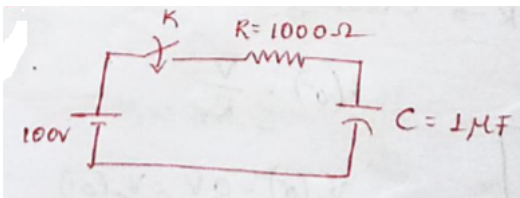
### PART C

ANSWER ALL THE TWO QUESTIONS

2 X 20 = 40

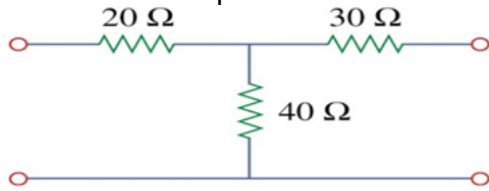
18. a. Mr Ram is working on RC network in the laboratory. He experiences a change in the network when the switch is closed at  $t=0$ . To attain a steady state it requires certain time. He is interested in knowing the circuit behavior in transient state. Help him out by deriving an equation for transient behavior of this RC network.
- b. Figure shows a RC circuit excited by a DC source of 100v.

1. Write the initial and final condition of 'C' in the circuit.
2. For the given circuit switch K is closed at  $t = 0$ , find the value of  $i$ ,  $di/dt$ ,  $d^2i/dt^2$  at  $t=0^+$ .



(CO2,CO3,CO4,CO1) [Application]

19. a. Y parameter of two port network is a  $2 \times 2$  admittance matrix. Since [admittance](#) is the ratio of circuit current and voltage, therefore this admittance matrix gives the relationship between the input and output current and voltage of the network. It is also known as the short circuit admittance parameter. Derive the Y parameters of a two-port network.
- b. Determine the Y parameters for the below-given network



(CO4) [Application]