Total number of printed pages: 4

UG/3rd Semester/UIE301

2024

NETWORK THEORY

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

Answer any five questions.

1. a) Define the following:

c)

- (i) Passive element (ii) Linear element (iii) Lumped network okrajhar : : Bodoland
- (iv) Node (V) Bilateral element
- Power dissipated by 5 Ω resistor is 20 W. Find the value of source voltage 5 b) Vs





Calculate the current drawn from the source d)



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2. a) Find the current through 15Ω resistor using Superposition principle in the 10 circuit shown below.



b) Find current flowing through 20 ohm resistor by first finding Norton's 10 equivalent circuit to the left of terminals A and B.



3. a) Determine the maximum power that can be delivered to the variable 10 resistor R. All resistance are in ohms.



- c) State and explain
 (i)Reciprocity Theorem.
 (ii)Millman's Theorem
- 4. a) Define following terms:

(i) Resonance (ii) Bandwidth (iii) Half power frequency (iv) Quality factor

- b) Show that resonant frequency of series resonance circuit is equal to the 8 geometric mean of two half power frequencies.
- c) Draw the resonance curve of the series RLC circuit.

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2

5+5=10

4

Page | 2

d) Determine the resonant frequency Ω_0 of the circuit shown below



- 5. a) Define the following terms:
 - (i) Oriented graph (ii) Non-planner graph (iii) Twig
 - b) For the graph shown below write tie set matrix with twigs (4, 5, 6).
 - c) For the given oriented graph write complete incidence matrix. Also write reduced incidence matrix. Determine number of possible trees for given oriented graph.



d) Construct dual network of the circuit shown below.



6 a) The switch is closed at t=0, find values of I,di/dt and d^2i/dt^2 at t=0+. 7 Assume all initial current of inductor to be zero for current.

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Initially circuit is open for long time. At t=0, it is closed. Find i(t) for t>0. b) 10 Also find V_L (t).



Fill in the blanks: c)

> (i)The value of the time constant in the R-L circuit is ntral Institute Of Technol (ii) If the roots of an equation are real and unequal, then the response will be _____

> (iii) In an RC circuit where the capacitor has an initial voltage of V_0 , when the switch is closed the response _

Determine the Z parameters for the circuit. Also show symmetry and 7 a) 7 reciprocity of the network.



Determine Y parameters of the two port network shown below b)



c) Establish a relationship between line and phase voltages and currents in a 6 star connection.

7