BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BTECH — **SEMESTER:** 3rd
BRANCH: ECE — **SESSION:** MO/2022

SUBJECT: EC209 NETWORK THEORY

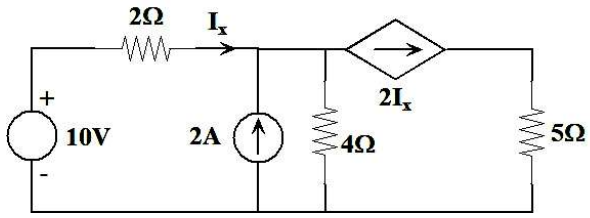
TIME: 2 HOURS — **FULL MARKS:** 25

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data handbook/Graph paper etc. to be supplied to the candidates in the examination hall.

				CO	BL
Q1	(a)	From the cut set matrix given below, draw the oriented graph. The branches of the graph are 2, 4 and 6.	[2]	CO1 CO2	BL2

$$\begin{matrix} 1 & 2 & 3 & 4 & 5 & 6 \end{matrix}$$
$$\begin{bmatrix} 1 & 0 & 0 & -1 & 0 & 1 \\ 0 & -1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & -1 & 1 & 1 \end{bmatrix}$$

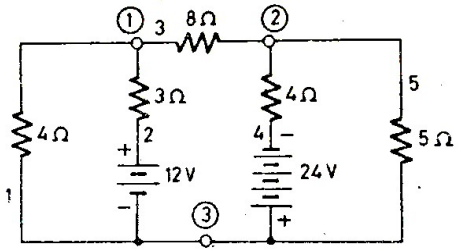
Q1 (b) Using Thevenin's theorem, calculate the current through the 2Ω resistor. [3] CO1 CO2 CO3 CO4 BL2

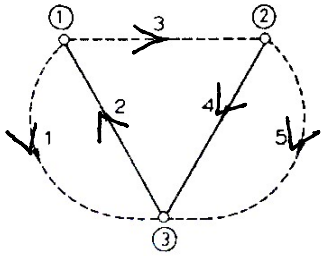


Q2 (a) Define reciprocity theorem. [2] CO1 BL1

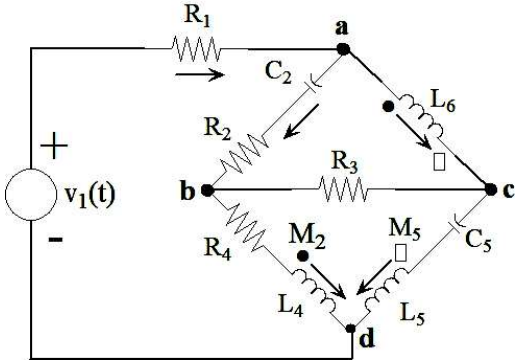
Q2 (b) Derive the condition for maximum power transfer to the load $Z_L = R_L + jX_L$ connected to a network whose impedance is given by $Z_S = R_S + jX_S$. [3] CO2 BL2

Q3 (a) Find the edge currents of the following network using f-circuit equations. [5] CO1 CO2 CO4 BL1





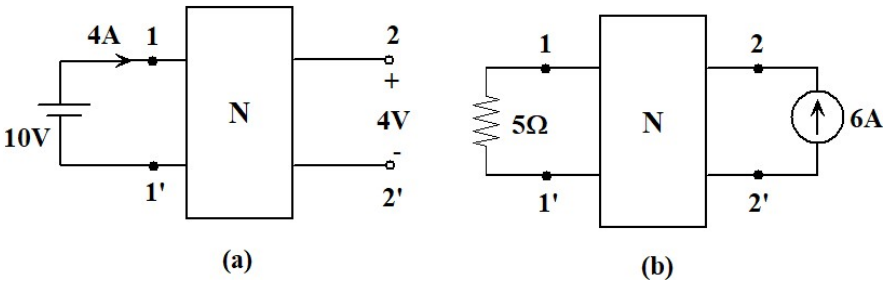
Q4 (a) Sketch the transform network of the circuit shown and write the mesh equations. Assume initial current $i_{L4}(0)$ through L_4 and initial voltage $v_{C5}(0)$ across capacitor C_5. Nodes are marked as a, b, c, and d. [5] CO1 CO2 CO4 BL3



PTO

Q5 (a) Transfer function of a network is given by $H(s) = \frac{2}{s^2 + 8s + 15}$. Calculate the unit step response of the network in time domain. [2] CO2 BL3

Q5 (b) A set of measurements is made on a linear time invariant passive network N as shown in the Fig. (a). The network is then reconnected as Fig. (b). Solve the problem to find the current through the 5Ω resistor. [3] CO1 CO2 CO4 BL3



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