

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

**CLASS: BTECH/IMSC
BRANCH: BT/CE/CHEMICAL/ME/PIE/FT/PHYSICS**

**SEMESTER: 1ST
SESSION : MO/2024**

SUBJECT: EE24101 BASICS OF ELECTRICAL ENGINEERING

TIME: 02 Hours

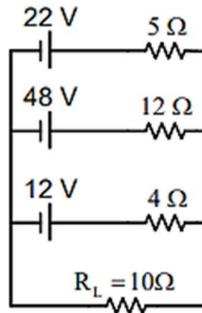
FULL MARKS: 25

INSTRUCTIONS:

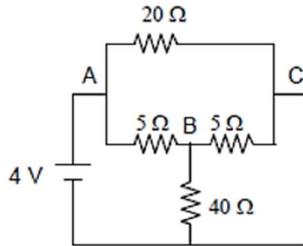
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

- | | | CO | BL |
|---|-----|----|----|
| Q.1(a) Define and classify various types of dependent and independent sources. | [2] | 1 | 1 |
| Q.1(b) Differentiate between passive and active, bilateral and unilateral, linear and non-linear elements in an electrical circuit. | [3] | 1 | 1 |

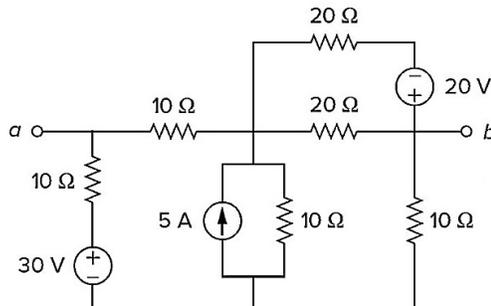
- Q.2(a) Using the procedure of source transformation, find the current through R_L in the circuit shown below. [2] 1,2 3



- Q.2(b) Use the star delta transformation method to calculate the current in the $40\ \Omega$ resistance in the circuit shown below. [3] 1,2 3

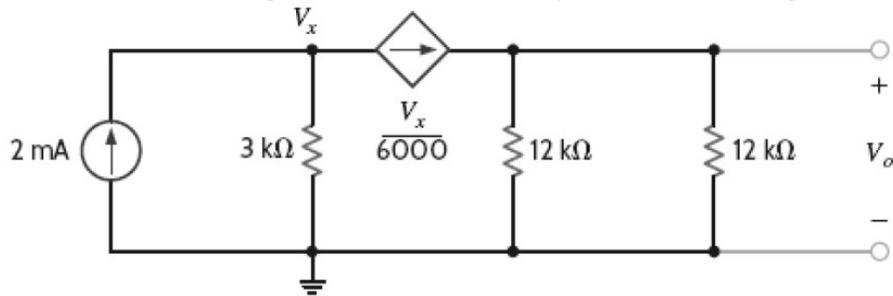


- Q.3(a) Derive the condition to be satisfied for ensuring that the maximum power transfer occurs at load resistance R ? Assuming that the source emf is E and internal resistance is r . [2] 2 2
- Q.3(b) Compute the Thevenin equivalent between the terminals a and b of the circuit shown below. [3] 2 3

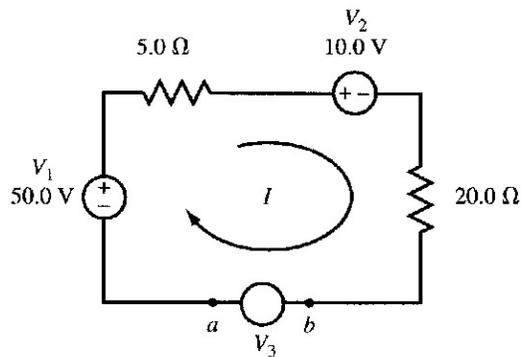


Q.4(a) State the Norton Theorem and draw a Norton equivalent circuit with all variables properly defined. [2] 2 1

Q.4(b) For the circuit shown in figure below use nodal analysis to find the voltage V_o : [3] 2 3



Q.5(a) Find V_3 and its polarity if the current I in the circuit of figure given below is 0.40 A. [2] 1,2 3



Q.5(b) Compute the loop currents i_1, i_2 and i_3 in the circuit shown below using the mesh analysis procedure? [3] 2 3

