

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

CLASS: IMSC
BRANCH: PHYSICS

SEMESTER : III
SESSION : MO/2025

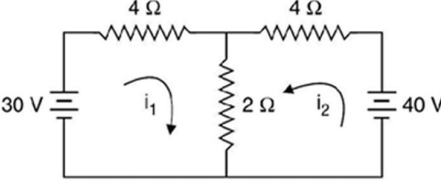
SUBJECT: SEC24203 - ELECTRICAL CIRCUITS AND NETWORK SKILLS

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

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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|----|
| Q.1(a) Sketch the Wheatstone bridge circuit and obtain the condition for bridge to be balanced. | [2] | 01 | 03 |
| Q.1(b) Determine the current in all branches of the network given in adjacent diagram using loop analysis | [3] | 01 | 03 |
|  | | | |
| Q.2(a) Show that, in an ac circuit, the current across a capacitor leads the voltage by 90°. | [2] | 01 | 02 |
| Q.2(b) Explain with the help of a suitable example the phasor diagram method for determining the current in an ac circuit containing capacitive and inductive elements. | [3] | 01 | 03 |
| Q.3(a) Define and explain the <i>power factor</i> of an ac circuit. | [2] | 01 | 02 |
| Q.3(b) An inductor $L = 50$ H, a capacitor $C = 0.22 \mu\text{F}$ and a resistor $R = 200 \Omega$ are connected in series. Calculate the power factor and the power dissipated in the circuit if the circuit is driven by a 220 V, 50 Hz ac supply. | [3] | 01 | 03 |
| Q.4(a) Draw the symbols of SPST and SPDT switches. Describe an application of SPDT switch. | [2] | 02 | 02 |
| Q.4(b) Explain the working of an SPDT relay. | [3] | 02 | 02 |
| Q.5(a) Differentiate between control and power circuits. | [2] | 02 | 02 |
| Q.5(b) Explain the working of an ON/OFF type control system. Give an example in which this type of control is used. | [3] | 02 | 02 |

:::23/09/2025:::E