**LNCT UNIVERSITY, BHOPAL**

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Enro.....

Class Roll No.....

**Second Mid Semester Examination, Dec- 2024**

**Subject Name: Discrete Structure, Code: CS/AL-305**

**Branch : CSE/AIML Semester: III**

**Time: 1:30 Hrs** **Max. Marks: 20**

**Note: All questions are compulsory**

Q.1 Show that the set of all positive rational numbers $Q_+$ forms an abelian group under the composition defined by $a * b = \frac{ab}{2}, \forall a, b \in Q_+$ (CO 3) 6 marks

**OR**

Q.1 Show that intersection of two subgroups of a group $(G,.)$ is a subgroup of $(G,.)$ (CO3) 6 marks

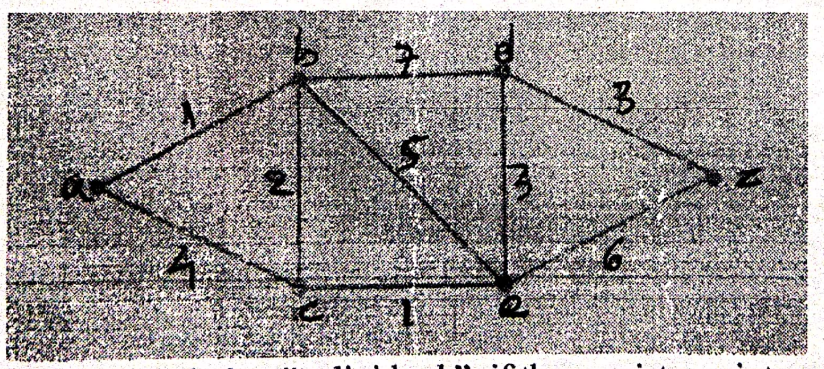
Q.2 (a) Draw the Graph whose incidence matrix is given below: (CO4) 5 marks

| V↓ / E→ | $e_1$ | $e_2$ | $e_3$ | $e_4$ | $e_5$ | $e_6$ |
|---|---|---|---|---|---|---|
| $v_1$ | 1 | 0 | 0 | 0 | 0 | 0 |
| $v_2$ | 1 | 1 | 1 | 0 | 0 | 0 |
| $v_3$ | 0 | 1 | 0 | 1 | 1 | 1 |
| $v_4$ | 0 | 0 | 0 | 0 | 1 | 1 |
| $v_5$ | 0 | 0 | 1 | 1 | 0 | 0 |

**(b)** Define with example: (i) Isomorphic graph (ii) Bipartite graph (CO4) 2 marks

**OR**

Q.2 Find the shortest path from a to z by using Dijshtra's method (CO4) 7 marks




**Q.3** Prove that the relation "a divides b", if there exists an integer c such that ac = b and it is denoted by "a | b" on the set of all positive integers N is a partial ordered relation. (CO5) 7marks

**OR**

**Q.3** Solve: $a_r - 4a_{r-1} + 4a_{r-2} = (r+1)^2, r \geq 2$ (CO5) 7 m