| Code No.: R22IT402PC | R22 | H.T.No. | | | 8 | R | | | | | | |
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**CMR ENGINEERING COLLEGE: : HYDERABAD**
**UGC AUTONOMOUS**
**II–B.TECH–II–Semester End Examinations (Regular) -June- 2025**
**DISCRETE MATHEMATICS**
**(Common for IT, CSD, CSC)**

**[Time: 3 Hours]** **[Max. Marks: 60]**

**Note:** This question paper contains two parts A and B.
Part A is compulsory which carries 10 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART-A** **(10 Marks)**

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| 1. | a) | Differentiate between free and bound variables. | [1M] |
| | b) | What is a well-formed formula? | [1M] |
| | c) | Give an example of a one-to-one function. | [1M] |
| | d) | Write the roster form of the set of even natural numbers less than 10. | [1M] |
| | e) | What is a distributive lattice? | [1M] |
| | f) | What is the complement of an element in Boolean algebra? | [1M] |
| | g) | What is $^5C_2$? | [1M] |
| | h) | Find the number of permutations of the word "LEVEL." | [1M] |
| | i) | A planar graph has 6 vertices and 9 edges. How many faces does it have by using Euler's formula? | [1M] |
| | j) | In a cycle graph with 6 vertices, is there a Euler circuit? | [1M] |

**PART-B** **(50 Marks)**

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|---|---|---|
| 2. | Discuss the basic logical connectives and their corresponding truth tables with examples. | [10M] |
| | **OR** | |
| 3. | Find the PCNF of the formula $(P \rightarrow \neg R) \wedge (Q \rightarrow P)$. | [10M] |
| 4. | What is the power set? Explain with an example. How many elements are in the power set of a set with *n* elements? | [10M] |
| | **OR** | |
| 5. | Let A= {1, 2}and B= {a, b}.<br>i) Define a relation R from A to B such that each element in A is related to elements of B.<br>ii) Represent the relation as a set of ordered pairs. | [10M] |
| 6. | Draw the Hasse diagram for the set {1,2,3,6} with divisibility relation. Is it a lattice? | [10M] |
| | **OR** | |
| 7. | What is a semigroup? State and prove any two properties of semigroups. Give examples. | [10M] |
| 8. | Expand $(x+2y+3z)^4$ using the multinomial theorem and find the term containing $x^2y^1z^1$. | [10M] |
| | **OR** | |
| 9. | From a group of 10 men and 6 women, in how many ways can a committee of 4 men and 2 women be selected? | [10M] |
| 10. | Graph G has 21 edges, 3 vertices of degree 4 and the other vertices are of degree 3. Find the number of vertices in G? | [10M] |
| | **OR** | |
| 11. | Find the chromatic polynomial & chromatic number for $K_{3,3}$. | [10M] |

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