

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS

II-B.TECH-I-Semester End Examinations (Supply) - June- 2025

DISCRETE MATHEMATICS

(Common for CSE, CSM)

[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

(20 Marks)

1. a) Write the negation of the statement, "If the processor is fast then the printer is slow." [1M]
- b) Construct truth table for $(\neg p \vee \neg q)$. [1M]
- c) List the types of relations? [1M]
- d) Write short notes on a partial order relation? [1M]
- e) When a lattice is said to be bounded? [1M]
- f) Translate the logical equivalence $(T \wedge T) \vee \neg F \equiv T$ into an identity in Boolean algebra. [1M]
- g) In how many of the distinct permutations of the letters in MISSISSIPPI. [1M]
- h) If n is the positive integer, then $2^{3n} - 7n - 1$ is divisible by. [1M]
- i) How many edges are there in a graph with 10 vertices each of degree six? [1M]
- j) Define Binary tree. Give an example. [1M]

PART-B

(50 Marks)

2. Obtain the PDNF and PCNF of the following formula: $(\neg P \vee \neg Q) \rightarrow (P \leftrightarrow \neg Q)$. [10M]

OR

- 3.a) Construct the truth table for the statement formula $(P \vee \neg Q)$. [5M]
- b) Construct the truth table for $(P \vee Q) \vee \neg P$. [5M]
4. Let A be a given finite set and $p(A)$ its power set. Let \subseteq be the inclusion relation on the elements $p(A)$ Construct the Hasse diagrams of $(p(A), \subseteq)$ [10M]
 - i) $A = \{a\}$
 - ii) $A = \{a, b\}$
 - iii) $A = \{a, b, c\}$
 - iv) $A = \{a, b, c, d\}$

OR

5. What is a partial order relation? Let $S = \{x, y, z\}$ and consider the power set $P(S)$ with relation R given by set inclusion. Is R a partial order? [10M]
6. Show that the set N of natural numbers is a semi group under the operation $x * y = \max \{x, y\}$. Is it a monoid? [10M]

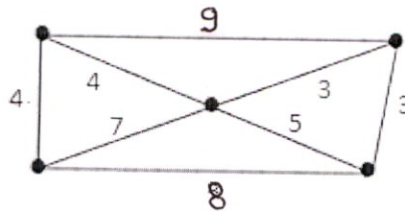
OR

7. The direct product of any two distributive lattices is a distributive lattice. [10M]
8. Determine the number of 5 card combinations out of a deck of 52 cards, if there is exactly one ace in each combination. [10M]

OR

9. State and prove that the binomial and multinomial theorem. [10M]

10. Apply Kruskal's algorithm to find a minimal spanning tree of the following weighted graph. [10M]



OR

11. Define Eulerian graph. Show that a non-empty connected graph is Eulerian if and only if all its vertices are of even degree. [10M]
