

**CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS**

**II-B.TECH-I-Semester End Examinations (Regular) - December- 2024
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**(10 Marks)**

1. a) What is the difference between formal logic and informal logic? [1M]
- b) What is a proposition? [1M]
- c) What is the cardinality of a set? [1M]
- d) What is an injective function? [1M]
- e) What is an identity element in an algebraic system? [1M]
- f) What is a Boolean algebra? [1M]
- g) How many ways can n distinct objects be arranged? [1M]
- h) What is the formula for the number of combinations with repetitions? [1M]
- i) What is an Euler circuit? [1M]
- j) Why is the Four-Color Theorem significant in graph theory? [1M]

PART-B**(50 Marks)**

2. Prove or disprove the validity of the following arguments using the rules of inference. [10M]
(i) All men are giants (ii) All kings are men (iii) Therefore, all kings are giants.

OR

- 3.a) Test the Validity of the Following argument. If you work hard, you will pass the exam. You did not pass. Therefore you did not work hard. [5M]
- b) With constructing the Truth Table prove that $(p \rightarrow q) \rightarrow q \Leftrightarrow p \vee q$? [5M]
4. Which elements of the poset $(\{2,4,5,10,12,20,25\}, /)$ are maximal and which are minimal? [10M]

OR

5. Let $F(x)$ be the set of all one-to-one onto mappings from X onto X , where $X = \{1,2,3\}$. Find all the elements of $F(x)$ and find the inverse of each element. [10M]
6. Let G be a group of positive real numbers under multiplication and G' be a group of all real numbers under addition. The mapping $f : G \rightarrow G'$ given by $f(x) = \log_{10} x$. Show that f is an isomorphism. [10M]

OR

- 7.a) The operation \circ is defined by $a \circ b = a$ for all $a, b \in S$. Show that (S, \circ) is a semi group. [5M]
- b) If a, b are any two elements of a group (G, \cdot) , which commute. Show that [5M]
 - i. a^{-1} and b commute.
 - ii. b^{-1} and a commute.
 - iii. a^{-1} and b^{-1} commute.

8. State and prove The Principle of Inclusion-Exclusion. [10M]

OR

9. Find the number of integer solutions of the equation $x_1 + x_2 + x_3 + x_4 + x_5 = 30$ under the constraints $x_i \geq 0$ for $i=1,2,3,4,5$ and further x_2 is even and x_3 is odd. [10M]

- 10.a) Show that if the number of vertices of a connected graph is n and the number of edges m and the region r , then $r+n-m=2$? [5M]
- b) Show that the number of odd degree Vertices in a graph is always even? [5M]

OR

11. Explain about the following with examples. [10M]
- Eulerian Graph.
 - Chromatic number.
