Code No.: (R22IT402PC)	R22	H.T.No.			8	R						

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–II–Semester End Examinations (Regular) -July- 2024
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)**

1\. a) Define Tautology with suitable example. [1M]

b) Write the statement in symbolic form then negate statements: [1M]
   i. Some Drivers do not obey the speed limit.
   ii. All dogs have fleas.

c) Draw the Venn diagrams for (A∩B) ∪ (C∩D) of the sets A, B, C, and D. [1M]

d) If A= {α, β}, B={1,2,3}. Find out (A x B) U (B x A). [1M]

e) Give an example of a monoid that is not a group. [1M]

f) Define partially ordered set (poset). [1M]

g) Define conditional probability. [1M]

h) State the principle of Inclusion-Exclusion. [1M]

i) Define complete graph and wheel graph. [1M]

j) List the properties of binary trees. [1M]

PART-B **(50 Marks)**

2\. Construct a truth table for each of these compound propositions. [10M]
   i. $p \rightarrow \neg p$
   ii. $p \leftrightarrow \neg p$
   iii. $p \land q \rightarrow p \lor q$
   iv. $(q \rightarrow \neg p) \leftrightarrow (p \leftrightarrow q)$

OR

3.a) Prove that $(\forall x)(P(x) \lor Q(x)) \Longrightarrow (x)P(x) \lor (\exists x)Q(x)$ [5M]

b) Show that $r \land (p \lor q)$ is a a valid conclusion from the premises $(p \lor q)$, $(q \rightarrow r)$, $(p \rightarrow m)\ and\ (\sim m)$. [5M]

4\. Let $X = \{1, 2, 3, 4, 5, 6, 7\}$ and $R = x, y, \ - y\ is\ divisible\ by\ 3\ in\ X$. Show that R is an equivalence relation [10M]

OR

5\. Consider the sets A = {1,2,3,4}, B={3,4,5,6,7} , C ={6,7,8,9} [10M]
Find AUBUC, (A∩B) – (B∩C), A – (BUC), A X B, B X A, A X B X C.

6\. Define the terms: POSET and Hasse diagram. Determine if the set S={2,4,8,16} with the divisibility relation | is a partially ordered set and draw Hasse Diagram. [10M]

OR

7.a) Define Lattice and explain its properties. [5M]

b) If a, b are any two elements of a group (G, .) which commute, show that a^{-1} and b commute, b^{-1} and a commute, a^{-1} and b^{-1} commute [5M]

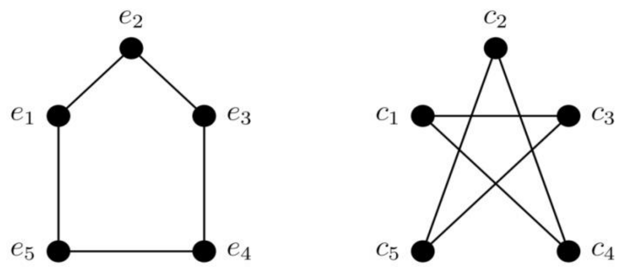
8. State and prove multinomial theorem. [10M]

OR

9.a) Suppose the postal department prints only 5 and 9 cent stamps. Prove that it is possible to make up any postage of n cents using only 5 and 9 cent stamps for $n \geq 35$. [5M]

b) What is the probability that a positive integer selected at random from the set of positive integers not exceeding 100 is divisible by either 2 or 5? [5M]

10. Verify whether the graphs G and G1 are isomorphic or not. Explain the reason. [10M]



OR

11. Show that a graph K_n has a Hamiltonian cycle whenever $n \geq 3$. [10M]

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