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CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Regular) - December- 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   (10 Marks)

1. a) Write the negation of the statement, "If the processor is fast then the printer is slow." [1M]
   b) Show that for two propositions p and q where (p XOR q) v (p<->q) is a tautology [1M]
   c) Describe Transitive relation. [1M]
   d) How to find the transitive closure of a relation R? [1M]
   e) Define permutations. [1M]
   f) Define algebraic system with example. [1M]
   g) Define combinations. [1M]
   h) Define the well-ordering principle. [1M]
   i) Difference between a directed and undirected graph. [1M]
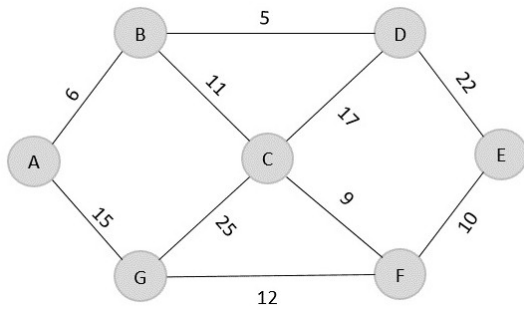   j) Define planar graphs. [1M]

PART-B   (50 Marks)

2. Prove that $((p \rightarrow r) \wedge (q \rightarrow r)) \rightarrow [(p \vee q) \rightarrow r]$ is a Tautology. [10M]

OR

3. For three propositions p, q and r prove that $[(p \vee q) \rightarrow r] \Leftrightarrow [(p \rightarrow r) \wedge (q \rightarrow r)]$. [10M]

4. Let A = {1, 2, 3, 4, 5} and P = {A X A}. R is a relation set such that (x, y) R (x1, y1) [10M]
   $\leftrightarrow xy1 = x1y$. Show that R is an equivalence relation. Compute A/R.

OR

5. With examples differentiate symmetric and anti-symmetric relations. [10M]

6. Prove that a group G is abelian if $(a *b)^{-1} = a^{-1} * b^{-1}$ for all a, b belongs to G. [10M]

OR

7.a) Explain Groups and types of Groups with examples. [5M]
   b) Explain semi groups and monodies. [5M]

8. Solve in a class of 52 students, 30 are studying C++, 28 are studying Pascal and 13 [10M]
   are studying both Languages. How many in this class are studying at least one of these languages?

OR

9. Describe the Binomial theorem with an example. [10M]

10. What is a planar graph? Draw a planar graph of order 5, 8, 6, 12, if possible. [10M]

OR

11. Write algorithm for Kruskal's algorithm. Find minimum spanning tree using [10M] Kruskal's algorithms for following graph?

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