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(FOR THE CANDIDATES ADMITTED **25UIT2A1**

DURING THE ACADEMIC YEAR 2025-2026 ONLY) **REG.NO. :**

N.G.M. COLLEGE (AUTONOMOUS): POLLACHI

END-OF-SEMESTER EXAMINATIONS:MAY-2026

B.Sc. - IT **MAXIMUM MARKS: 75**

SEMESTER:II **TIME: 3 HOURS**

PART - III

MATHEMATICS II DISCRETE MATHEMATICS

SECTION – A **(10 X 1 = 10 MARKS)**

ANSWER THE FOLLOWING QUESTIONS. **(K1)**

1.A_____is an ordered collection of objects

a)Relation c)set

b)function d)proposition

2.The duality law in propositions states that

a) Every proposition has an inverse

b) Interchanging AND ↔ OR and 0 ↔ 1 gives dual statement

c) Every tautology is false d) There are no duals in propositional algebra

3.Equivalence classes of a set under an equivalence relation

a) Overlap each other b) Partition the set

c) Contain at least one element of the set d) Are always empty

4.The degree of a vertex in a graph is

a) Number of edges in the graph b) Number of edges incident on the vertex

c) Maximum distance from the vertex d) Number of vertices connected to it

5.The GCD (24,42) is _____.

a)4 b)3 c) 6 d)2

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES **(K2)**

6. Write all the subjects of {2, 5, 9}.

7.Define tautology and contradiction.

8.Define Poset.

9.Define cycle.

10.Write the types of grammar.

SECTION – B **(5 X 5 = 25 MARKS)**

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.(K3)

11. a). Prove Associative laws in set theory.

(OR)

b) Explain Partition of a set with an example.

12. a) Prove that $p \to q \Leftrightarrow \backsim q \to \backsim p$.

(OR)

b) Explain Free and Bound Variables with an example.

13. a)Define Relation. Explain types of Relation with an example.

(OR)

b) Show that the function $f(x) = x^3 and\ g(x) = x^{1\backslash 3}$ for $x \in R$ are inverse of each other.

14. a) Explain briefly different types of Graphs.

(OR)

b) If G is a Euler graph, prove that all vertices of G are of even degree.

15. a)Determine whether **221** is prime or composite.

(OR)

b) Define Language. Explain operation on Languages.

SECTION – C (5 X 8 = 40 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.(K4 (Or) K5)

16. a) In a survey of 100 students, it was found that 40 studied Mathematics, 64 studied Physics, 35 studied Chemistry.1 studied all the three subjects.25 studied Mathematics and Physics,3 studied Mathematics and Chemistry and 20 studied Physics and Chemistry. Find the number of students who studied only Chemistry and the number of students who studied none of these subjects.

(OR)

b) In a city three daily newspapers X, Y, Z are published.65% of the people of the city read X,54% read Y,45% read Z,38% read X and Y,32% read Y and Z,28% read X and Z,12% do not read any of the three papers. If10,00,000 persons live in the city, Find the number of persons who read all the three newspapers.

17. a) Construct the truth table for $\backsim (P \vee (Q \wedge R)) \Leftrightarrow ((P \vee Q) \wedge (P \vee R))$.

(OR)

b) Show that $\backsim (P \wedge Q) \to (\backsim P \vee (\backsim P \vee Q)) \Leftrightarrow (\backsim P \vee Q)$

18. a) Let R denote a relation on the set of all ordered pairs of positive integers by (x, y) R (u, v) iff xv= yu. Show that R is an equivalence relation.

(OR)

b) The necessary and sufficient conditions for the function $f: A \to B$ to be invertible is that f is one-to-one and onto.

19. a) Find the maximum number of edges in a simple connected graph with n vertices and k components.

(OR)

b) Define Binary Tree. Explain types of binary tree with an example.

20. a) Using the Euclidean algorithm find the GCD of 252 and 198**.**

(OR)

b) Explain briefly Regular Expression and Regular Language.

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