(FOR THE CANDIDATES ADMITTED   SUB CODE: 22 UIT 2A2

DURING THE ACADEMIC YEAR 2022 ONLY)   REG.NO. :

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

END-OF-SEMESTER EXAMINATIONS : MAY 2023

B.Sc.- INFORMTION TECHNOLOGY   **MAXIMUM MARKS: 50**

SEMESTER: II   **TIME : 3 HOURS**

PART - III

MATHEMATICS –II (DISCRETE MATHEMATICS)

SECTION – A   **(10 X 1 = 10 MARKS)**

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

1. $A \cup A' = $ _____
   (a) A (b) A' (c) ϕ (d) U

2. If a set of formulas $H_1, H_2, \ldots \ldots H_m$ is inconsistent then their conjunction implies _____
   (a) Tautology   (b) predicates (c) contradiction   (d) bound variables

3. If $f : A \to B$ is _____ then f is called bijection
   (a) one-one   (b) onto   (c) a& b   (c) invertible

4. The sum of the degrees of the points of a graph G is_____
   (a) Halves the number of lines   (b) same as the number of lines
   (c) Twice the number of lines   (d) thrice the number of lines

5. The languages accepted by finite automata are easily described by ___ expressions called regular expressions
   (a) Concatenation   (b) closure   (c) Kleene closure   (d) all

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

6. If $A = \{1,2,3,4,5,6\}$ and $`B = \{5,6,7\}$ then find $A \cap B$
7. Define Tautologies.
8. Write the associative law of composition of functions.
9. Write any four types of graphs.
10. Define Relative prime.

SECTION – B   **(5 X 3 = 15 MARKS)**

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

11.   a) Verify $A \cup (B \cup C) = (A \cup B) \cup C$ by using Venn diagram.

(OR)

     b) Write any three basic laws of set algebra.

12. a) Verify whether $(P \to Q) \Rightarrow (\neg Q \to \neg P)$ is a tautology.

(OR)

b) Constructs the truth table for the formula $(P \wedge Q) \vee (\neg P \wedge Q) \vee (P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$

13. a) Explain the types of functions

(OR)

b) Let $f : A \to B$ and $g : B \to C$ be both one-one and onto functions then prove that $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$

14. a) Prove that the number of vertices of odd degree in a graph is always even.

(OR)

b) Prove that a tree with n vertices has (n-1) edges.

15. a) Explain accepted languages with an example .

(OR)

b) Prove that there is an infinite number of primes of the form $4n + 3$.

SECTION – C (5 X 5 = 25 MARKS)
ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.
(K4 (Or) K5)

16. a) For any sets A and B prove that Demorgan's laws:
$(i)\ (A \cup B)' = A' \cap B' \quad (ii)\ (A \cap B)' = A' \cup B'$.

(OR)

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

17. a) Explain any two the Logical operations with truth table.

(OR)

b) Show that $(x)(P(x) \wedge Q(x)) \Rightarrow (\exists x)P(x) \wedge (\exists x)Q(x)$

18. a) Explain equivalence relation with an example.

(OR)

b) Let A={1,2,3,4} Le R={(1,1), (1,2), (2,3),(2,4),(3,4),(4,1),(4,2)} and S={(3,1),(4,4), (2,3),(2,4),(1,1),(1,4)} be two relations on A. compute (i) Is (1,3) ε R∘R? (ii) Is (4,3) εS∘R? (iii) Is (1,1) εR∘S? (iv) S∘R, (v) R∘S

19. a) Prove that a graph G with atleast two points is bipartite ⇔ all its cycles are of even length.

(OR)

b) Prove that a simple graph with n vertices and k components can have at most $\dfrac{(n-k)(n-k+1)}{2}$ edges.

20. a) Explain context sensitive grammar, regular grammar, and languages generated by grammars.

(OR)

b) State and prove euclidean algorithm.

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