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(FOR THE CANDIDATES ADMITTED

21 UIT 2A2

DURING THE ACADEMIC YEAR 2021 ONLY)

REG.NO. :

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

END-OF-SEMESTER EXAMINATIONS: JULY 2022

B.Sc.IT

MAXIMUM MARKS: 70

II SEMESTER

TIME : 3 HOURS

PART - III

MATHEMATICS- II (DISCRETE STRUCTURES)

SECTION - A

(10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

(K1)

1. If $A = \{1,2,3,4,5,6\}$ and $B = \{5,6,7\}$ then $A \cap B =$ ____
a) $\{4,5\}$ b) $\{1,2,3,4,5,6,7\}$ c) $\{5,6\}$ d) $\{1,2,3,4\}$
2. ϕ is ____ if every sentential interpretation of ϕ has the truth value true.
a) Contradiction b) tautology c) false d) None
3. If $f : A \rightarrow B$ is ____ then f is called bijection.
a) One -to- one b) Onto c) Both one-to-one and onto d) Equivalence
4. A graph whose edge set is empty is called a ____.
a) Null graph b) empty graph c) disconnected graph d) edge connected graph
5. The least common multiple of the positive integers a and b is the smallest positive integer that is ____.
a) Multiple by both a and b b) Divisible by both a and b c) $\gcd(a, b)=1$ d) $\gcd(a, b)$.

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES

(K2)

6. Define Set.
7. Define Contradiction
- 8 Define Invertible.
9. Define Tree.
10. Define Regular expressions.

(CONTD...2)

SECTION – B**(5 X 4 = 20 MARKS)****ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)**11. a) Verify $A \cup (B \cap C) = (A \cup B) \cap C$ by using Venn diagram.**(OR)**

b) Verify any one basic law of set algebra.

12. a) Explain basic logical operators.

(OR)

b) Construct 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 Reflexive and Transitive equivalence relation.

(OR)

b) Explain the types of relations

14. a) Prove that every tree has either one or two centers

(OR)

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

15. a) Explain Finite-State machine

(OR)

b) Explain the types of Phrase-Structure Grammars

SECTION - C**(4 X 10 = 40 MARKS)****ANSWER ANY FOUR OUT OF SIX QUESTIONS****(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS****(FROM Qn. No : 17 to 21)****(K4 (Or) K5)**

16. State and prove Euclidean algorithm.

17. For any sets A and B prove the following Demorgan's laws:

(i) $(A \cup B)' = A' \cap B'$

(ii) $(A \cap B)' = A' \cup B'$

18. Show that

(i) $(P \rightarrow (Q \rightarrow R)) \Rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R))$

(ii) $(P \rightarrow Q) \Rightarrow (\neg Q \rightarrow \neg P)$

19. Let $f : A \rightarrow B$ and $g : B \rightarrow C$ be both one-one and onto functions then prove that

$$(g \circ f)^{-1} = f^{-1} \circ g^{-1}$$

20. Make use of the logical arguments, explain the statement

“ a tree with n vertices has (n-1) edges.”

21. Briefly explain regular expressions, grammars and regular languages.

