

(FOR THE CANDIDATES ADMITTED

SUBJECT CODE **24 UCT 1A1**

DURING THE ACADEMIC YEAR 2024-25 ONLY)

REG.NO.

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

END-OF-SEMESTER EXAMINATIONS : NOVEMBER – 2024

B.Sc. – COMPUTER TECHNOLOGY

MAXIMUM MARKS: 75

I SEMESTER

TIME : 3 HOURS

PART – III

ALLIED I : MATHEMATICS I – DISCRETE MATHEMATICS

SECTION – A

(10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

(K1)

MULTIPLE CHOICE QUESTIONS.

1. If Φ is an empty set, then $n(P(P(\Phi))) =$
(a) Φ (b) 0 (c) 1 (d) 2
2. Let $p : I$ am in Bangalore; $q : I$ love cricket; then $q \Rightarrow p$ (q implies p) is??
(a) If I love cricket then I am in Bangalore (c) I am not in Bangalore
(b) If I am in Bangalore then I love cricket (d) I love cricket
3. Let N be the set of natural numbers. Define R on N as, $R = \{(x,y) : x + y \text{ is even, } x, y \in N\}$. Then R is a _____ relation.
(a) reflexive (b) symmetric (c) transitive (d) equivalence
4. The sum of the degrees of the points of a graph G is _____ the number of lines
(a) equal (b) twice (c) thrice (d) four times
5. A Hamilton cycle of a graph G is a cycle that contains _____ vertex of G .
(a) every (b) odd (c) even (d) any one

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES (Qn. No. 6 - 10) (K2)

6. If A and B are any two sets then prove that $A \cap B \subseteq A$.
7. State the law of contradiction.
8. Define union and intersection of relations.
9. Distinguish between weighted and unweighted graph.
10. What is disconnected graph?

(CONTD 2)

/2/ (24 UCT 1A1)
SECTION – B (5 X 5 = 25 MARKS)

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

11. a) Prove $(A \cap B)^c = A^c \cup B^c$

(OR)

b) Prove that $A \cap (B - C) \subset A - (B \cap C)$.

12. a) Show that $(p \Rightarrow q) \Leftrightarrow (\neg q \Rightarrow \neg p)$ is a tautology.

(OR)

b) If x is an even integer, then prove that x^2 is an even integer.

13. a) Let R be the relation represented by $M_R = \begin{pmatrix} 0 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \end{pmatrix}$. Find the relation matrices

representing (i) R^{-1} (ii) R^c (iii) R^2

(OR)

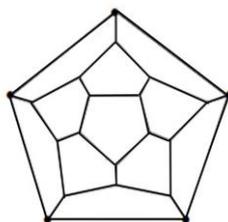
b) If $f(x) = x^2$ and $g(x) = 2x + 1$, verify whether $(f \circ g)(x)$ and $(g \circ f)(x)$ are equal or not?

14. a) Prove that there is no 3-connected graph with 7 edges.

(OR)

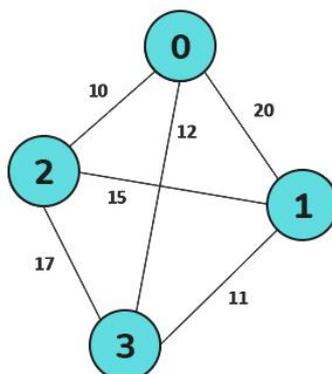
b) Prove that the number of vertices of odd degree in a graph is always even.

15. a) Does the following graph have a Hamiltonian Circuit?



(OR)

b) Given a set of cities and the distance between every pair of cities as an adjacency matrix. Find the shortest possible route that visits every city exactly once and returns to the starting point.



(CONTD 3)

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 school, all pupils play either Hockey or Football or both. 400 play Football, 150 play Hockey, and 130 plays both the games. Find

- (i) The number of pupils who play Football only,
- (ii) The number of pupils who play Hockey only,
- (iii) The total number of pupils in the school.

(OR)

b) Prove Distributive Laws using Venn Diagram.

17. a) Show that $(p \rightarrow (q \rightarrow r)) \Rightarrow (p \rightarrow q) \rightarrow (p \rightarrow r)$ is an implication.

(OR)

b) Suppose that the integers 1, 2, 3, ..., 10 are randomly positioned around a circular wheel. Show that (by proof of contradiction method) the sum of some set of 3 consecutively positioned numbers is at least 15.

18. a) If N is a set of Natural numbers, show that the relation R defined by $(a,b) R (c,d) \iff a + d = b + c ; (a,b), (c,d) \in N \times N$, is an equivalence relation.

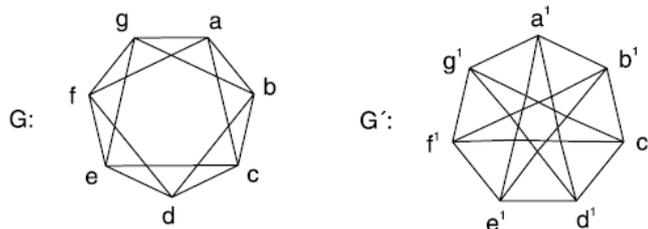
(OR)

b) Prove that the inverse of an invertible function is unique.

19. a) Prove that every $(u - v)$ walk in a graph contains a $(u - v)$ path.

(OR)

b) Show that the following graphs G and G' are isomorphic.



20. a) Prove that a given connected graph G is a Euler graph if and only if all vertices of G are of even degree.

(OR)

b) Explain Konisberg bridge problem. Represent the problem by means of graph. Does the problem have a solution?