

SRINIVASA RAMANUJAN INSTITUTE OF TECHNOLOGY**(AUTONOMOUS)**

II B. Tech I Sem – Semester End Examinations – Supplementary – Dec 2022

DISCRETE MATHEMATICS**[194GA05301]**

(Computer Science & Engineering)

Time: 3 hours**Max. Marks: 70****PART-A**

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- a) Is $\neg (P \wedge (P \vee Q)) \rightarrow Q$ a tautology or not?
 - b) Write the converse and inverse for $P \rightarrow Q$.
 - c) Identify the Properties in the given Relation $A = \{1, 2, 3, 4\}$ and $R = \{(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (4, 4), (3, 1), (1, 3)\}$.
 - d) Define Lattice.
 - e) What is Group Homomorphism?
 - f) Find the GCD of 60 and 42?
 - g) Define generating function.
 - h) Write the major applications of Circular Permutations.
 - i) Define Hamiltonian Graph.
 - j) Differentiate Path and Circuit.

PART-B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT-1

- 2 a) Show that $R \rightarrow S$ can be derived from the Premises $P \rightarrow (Q \rightarrow S)$, $\neg R \vee P$ and Q ? **[5M]**
- b) Obtain principal disjunctive normal form of $(\neg P \vee Q)$? **[5M]**

OR

- 3 a) Prove the Validity of the following Statements using Predicate Calculus? **[5M]**
All men are Clever
Sachin is Man

Therefore sachin is clever
- b) Explain the inference theory for predicate calculus. **[5M]**

UNIT-2

- 4 a) Illustrate various properties of Binary Relations with clear examples. **[5M]**
- b) Let $A = \{1, 2, 3, 4, 6, 8, 12\}$, define the partial ordering relation R by aRb if and only if a divides b . Draw the Hasse diagram for R . **[5M]**

OR

- 5 a) Given the functions defined by f and g find $(f \circ g)(x)$ and $(g \circ f)(x)$. **[5M]**
i) $f(x) = 4x - 1$, $g(x) = 3x$ ii) $f(x) = 5x + 1$, $g(x) = 2x - 3$
- b) Check whether the Poset $(S, /)$ is a distributive Lattice or not where $S = \{1, 2, 3, 6\}$? **[5M]**

UNIT-3

- 6 a) Let $W = \{1, -1, i, -i\}$ and $*$ is a multiplication operation. Find whether $\langle W, * \rangle$ is a group or not. **[5M]**
- b) Prove that $\langle \mathbb{Z}_5, +_5 \rangle$ is an abelian group of order 5. **[5M]**

OR

- 7 Explain the Euclidean algorithm with example. [10M]

UNIT-4

- 8 a) Write about Sum rule and Product rule with an example. [5M]
b) Determine the Coefficient of X^9Y^3 in the expansion of $(x+2y)^{12}$? [5M]

OR

- 9 a) How many six character passwords in computer possible, if first 2 characters are Letters and others are digits? [5M]
b) Define Multinomial Theorem. Find number of integers less than 250 and divisible by 3 or 5 or 11? [5M]

UNIT-5

- 10 a) Prove that complete graph of 5 vertices is non-planar. [5M]
b) Define the following with examples: [5M]
(i) Directed Graph (ii) Non-directed Graph (iii) Simple Graph.

OR

- 11 a) How many vertices will the graph contain 6 edges and all vertices of degree 3. [5M]
b) Distinguish Depth First Search and Breadth First Search algorithms. [5M]
