Pune Vidyarthi Griha's
College of Science and Technology
F.Y.B.Sc (Information Technology)
SEMESTER-I SECOND HALF OF NOVEMBER-2023
SUB:Computational Logic and Discrete Structures

Q.P. CODE:USIT104 (TIME :2 ½ Hrs.) Total Marks: 75M

N.B:-

1. All questions are compulsory.
2. Answers to the same question must be written together.
3. Numbers to the right indicate full marks.
4. Draw neat labeled diagrams wherever necessary.
5. Use of Non-programmable calculators is allowed.

Q1 Answer the following questions. (Any Three) (15M)

1. In a class of 25 students ,12 have taken economics ,8 have taken economics but not political science.

   (i) Find the number of students who have taken economics and political science.

   (ii) Find the number of students those who have taken politics but not economics.

2. Prove that $(ab)^n=a^nb^n$ is true for every natural number n.
3. let R be the relation on the set of real numbers such that aRb if and only if (a-b) is an integer. Is R an equivalence Relation ?
4. Define Mathematical Induction and Method of Solving Problems.
5. Let A={1,2,3,4,5,6} and R={(a,b)|a divides b}
6. Define Venn Diagram.

Q2 Answer the following questions. (Any Three) (15M)

1. If the function f:R→ R defined as f(x)=6x+2 for every x∈R then show that f is one-to-one,onto. hence find f^{-1}.
2. Define composite Functions and If f(x) = 7x and g(x) =$2x^2$ then find fog and gof (2).
3. What is the chance that a leap year selected at random will contain 53 Sundays?
4. There are two bags .The first contains 5 red and 7 White balls and the second contains 3 red and 12 white balls .One ball is taken out at random from the first bag and is put in the second bag. Now a ball is drawn from the second bag.What is the probability that this last ball is red?
5. Define Random Variable,Independent Events, Equally likely Events.
6. Define Cardinality,Algorithms and functions.

Q3 Answer the following questions. (Any Three) (15M)

1. Define Pigeonhole Principle and show that 7 colours are used to paint 50 bicycles,then at least 8 bicycles of the same colour.
2. Define Permutations and Combinations with one example
3. Find the number of arrangements that can be made out of the letter : DADDY.
4. Using an Iterative method to predict a solution for following recurrence relation : $a_n=a_{n-1}+n$, for $n\geq 1$ and $a_0=1$.
5. Define Recurrence Relation,Inclusion- Exclusion Principle and Degree of Recurrence Relation.
6. A bagel shop sells M=5 kind of bangles.Find Number m of ways a customer can buy:(a) 8 bagels (b) a dozen bagels

Q4 Answer the following questions. (Any Three) (15M)

1. Explain Graphs,Directed graph and Undirected graph.
2. Define Graph coloring ,Regular Graphs,Connected and Disconnected Graph.
3. Define adjacent edges,Simple graph,Multigraph and Loop.
4. Define the terms Vertices, Edges and Complete graphs.
5. Define Adjacency Matrix with one example.
6. Write a short note on Path and Cycle.

Q5 Answer the following questions. (Any Three) (15M)

1.Define Trees and Properties of Trees.

2.Define Traversing Binary Tree. Give one example of it.
3.Draw all trees with five Vertices.
4.Explain the term Lattice.
5.Let A = {1,2,3,4,6,9,12} be aRb if a divides b. show that R is POSET ,draw Hasse diagram .
6.Define LUB and GLB.