Oct 2020

B.Tech.(CSE)- IV SEMESTER

Discrete Mathematics (PCC-CS-401)

Time: 3 Hours **Max. Marks:75**

Instructions :
1. *It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.*
2. *Answer any four questions from Part -B in detail out of 7 questions.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART -A

Q1 (a) Prove that Intersection of sets is distributive with respect to union of sets. (1.5)

(b) Prove that $p \wedge (\sim p)$ is a contradiction. (1.5)

(c) Define multisets and various operations on them. (1.5)

(d) Define Cut point and Bridge in Graphs. (1.5)

(e) Explain Partition with proper example. (1.5)

(f) State and proveequivalence relation with example. (1.5)

(g) Explain Euler formula with example. (1.5)

(h) Let f be a function from A to B, where A=B=Set of real numbers R and $f(a)= (4a-2)/3$. Find f^{-1} . (1.5)

(i) How many permutations of the letters of the word 'APPLE' are there. (1.5)

(j) What are bijective functions? Explain with Example. (1.5)

PART -B

Q2 (a) In a canteen, out of 123 students, 42 students buy ice-cream, 36 buy bums and 10 buys cakes, 15 students buy ice-cream and buns, 10 buys ice-cream and cakes, 4 buys cakes and buns but not ice-cream and 11 buys ice-cream and buns but not cakes. Draw venn diagram to illustrate the above information and find: (6)

a. How many students buy nothing at all?

b. How many students buy at least two items?

c. How many students buy all the three items?

(b) Use mathematical induction to show that (5)
$1^2 + 2^2 + \ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$, $n>=1$

(c) Define Cantor's Diagonal Argument.(5)

Q3 (a) Find whether the following implication is tautology, contradiction or contingency : (10)

a. (p=>q)v r=>[(pvr)=>(qvr)]

b. (pΛq=>r)v(p=>r)v(q=>r)

(b) Find the validity of the following Argument : (5)

Robbery was the motive for the crime only if the victim had money in his pockets. But robbery or vengeance was the motive for the crime.Therefore, vengeance must have been the motive for the crime.

Q4 Explain the following(with proper Example): (15)
i) Perfect Graph
ii) Articulation point
iii) Partial Order Relation

Q5 (a) Construct the binary tree for following traversals of a tree: (5)
Preorder : a b d h e i c f g
Inorder : h d b i e a f c g

(b) Explain and prove Schroeder Bernstein theorem. (10)

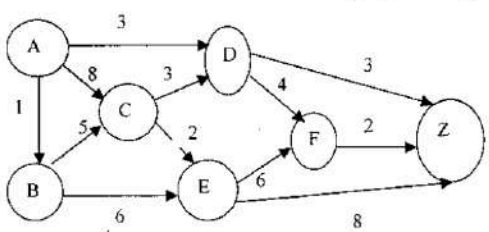
Q6 (a) Consider an algebraic system (G, *), where G is the set of all non-zero real numbers and * is a binary operation defined by (10)

a*b=a+b-ab

Show that (G, *) is a group.

(b) What is Integral Domain in algebraic systems? Explain with example (5)

Q7 (a) Find the shortest distance between A and Z using Dijkstra algorithm stepwise: (10)



b) Draw the Minimum Spanning tree for following graph: (5)