SE Choice Based CR-19 e-scheme) - Summer 2025

CMPN
4-6-25

Paper / Subject Code: 50922 / Discrete Structures & Graph Theory

Time: **Marks: 80**

N.B. : (1) Question Number 1 is compulsory2)Solve any three questions from the remaining questions
3) Make suitable assumptions if needed
4) Assume appropriate data whenever required. State all assumptions clearly.

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1.	a.	Explain the following terms partition set with suitable example. 1. Partition set 2. Disjoint sets	5
	b.	Construct the Truth Table and check if the following statement is tautology. $(P \rightarrow Q) \leftrightarrow (\neg Q \rightarrow \neg P)$	5
	c.	Let f : A→B be a Function from A to B . Prove that f^{-1} exists if and only if f is a Bijective Function.	5
	d.	Prove by mathematical induction that **$x^n - y^n$ is divisible by x-y**	5
2	a	Define Equivalence Relation. A relation R is called circular if aRb and bRc imply cRa. Show that R is circular if and only if it is an Equivalence Relation	8
	b.	Let A = {1,2,3,4} and R= {(1,1), (1,2), (1,4), (2,4), (3,1), (3,2), (4,2), (4,3), (4,4)}. Find Transitive Closure of R using Warshall's algorithm.	8
	c	Let f: R → R be a function defined by f(x)=2x-3. Prove that it is Bijective & find inverse.	4
3	a	Let f,g,h be functions on real numbers R defined as follows: f(x) = 2x+5, g(x) = 5x + 3, h(x) = 3x Find: 1) fog 2) g o f 3) g o h 4) f o g o h 5) g o f o h	8
	b	Give the generating function for the following sequences 1) {0,1,2,3,4…} 2){1,2,3,4,5 …} 3) {2,2,2,2,2...} 4) { 0,0,0,1,1,1,1,…}	8