PVP 20

Code: 20BS1303

II B.Tech - I Semester – Regular / Supplementary Examinations
DECEMBER - 2022

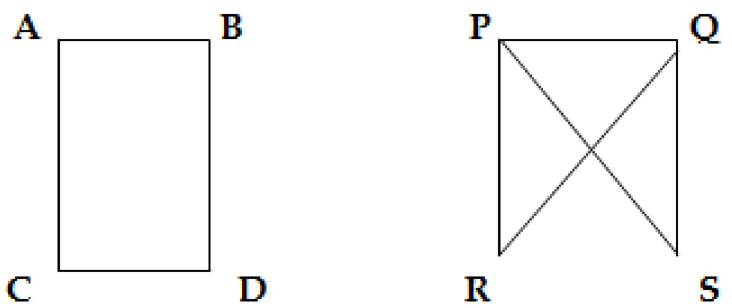
DISCRETE MATHEMATICAL STRUCTURES
(Common for CSE, IT)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

			BL	CO	Max. Marks
UNIT-I					
1	a)	Verify whether: $[(p\to r)\Lambda(q\to r)] \to[(p \Lambda q) \to r]$ is a tautology or not ?	L2	CO1	7 M
	b)	Obtain the Disjunctive normal form(DNF) and conjunctive normal form (CNF) of the following expression: $P \to (P \wedge (Q \to P))$.	L3	CO2	7 M
OR					
2	a)	Construct the truth table for the logical relation $\{[p \to (q \vee r)] \wedge (\sim q)\} \to (p \to r)$.	L2	CO1	7 M
	b)	Obtain the principal disjunctive normal form of $(\neg P \to R) \wedge (Q \Leftrightarrow P)$.	L3	CO2	7 M
UNIT-II					
3	a)	Show that $R \wedge (P \vee Q)$ is a valid conclusion from the premises $P \vee Q, Q \to R, P \to M$, and $\neg$M.	L3	CO2	7 M

	b)	Verify whether the following argument is valid? If Joe is a Mathematician, then he is ambitious. If Joe is an early riser, then he does not like oatmeal. If Joe is ambitious, then he is an early riser. Hence, If Joe is a Mathematician, then he does not like oatmeal.	L3	CO2	7 M
OR					
4	a)	Show that $P \vee Q$ follows from P.	L3	CO2	7 M
	b)	Prove or disprove the validity of the following argument. Lions are dangerous animals. There are lions. Therefore, there are dangerous animals.	L3	CO2	7 M
UNIT-III					
5	a)	Solve the recurrence relation using the method of Characteristic Roots: $a_n - 3a_{n-1} + 2a_{n-2} = 0 \text{ for } n \geq 2$	L3	CO3	7 M
	b)	Solve the recurrence relation $a_n - 6a_{n-1} + 8a_{n-2} = 3^n \text{ for } n \geq 2 \text{ and } a_0 = 3, a_1 = 7$	L3	CO3	7 M
OR					
6	a)	Using the method of Characteristic Roots, solve the recurrence relation $a_n - 5a_{n-1} + 6a_{n-2} = 0$, for $n \geq 2$ and $a_0 = 1$, $a_1 = -2$.	L3	CO3	7 M
	b)	Solve the recurrence relation $a_n - 6a_{n-1} + 8a_{n-2} = n\, 4^n$ for $n \geq 2$.	L3	CO3	7 M

		UNIT-IV			
7	a)	Show that $R = \{(a, b) \mid a + b \text{ is EVEN } ; a, b \in \text{Natural numbers}\}$ is an Equivalence relation.	L4	CO4	7 M
	b)	Let U be a nonempty set and P (U) be the set of all subsets of U. Prove that [P(U);⊆] is a poset and draw the poset diagram if U={a, b, c}.	L4	CO4	7 M
		OR			
8	a)	Using Warshall's algorithm find the adjacency matrix of the transitive closure of $\{(a, b), (b, d), (b, b), (c, c)\}$ on $\{a, b, c, d\}$.	L4	CO4	7 M
	b)	In a digraph $G = (V, E)$, show that an edge $(x, y) \in E^n \Leftrightarrow \exists$ a directed path of length n from x to y in G.	L4	CO4	7 M
		UNIT-V			
9	a)	Check whether the following graphs are isomorphic or not. 	L4	CO4	7 M
	b)	Prove that a tree with 'n' vertices has exactly 'n-1' edges.	L4	CO4	7 M
		OR			

10	a)	State and prove Euler formula for connected planar graphs.	L4	CO4	7 M
	b)	Prove that every simple planar graph is 5-colorable.	L4	CO4	7 M