PVP 23

Code: 23BS1305

II B.Tech - I Semester – Regular Examinations - DECEMBER 2024

DISCRETE MATHEMATICS AND GRAPH THEORY

(Common for CSE, IT, AIML, DS)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

BL – Blooms Level CO – Course Outcome

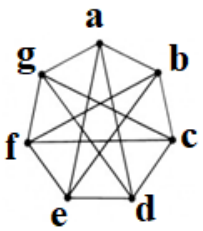
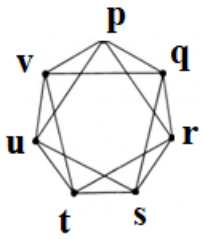
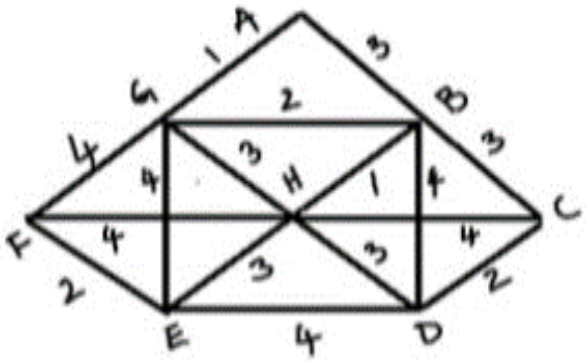
PART – A

		BL	CO
1.a)	Define Proposition.	L1	CO1
1.b)	What is the Difference between CNF and PCNF.	L1	CO1
1.c)	Let Q(x) be the statement "x < 2." What is the truth value of the quantification ∀xQ(x), where the domain consists of all real numbers?	L1	CO2
1.d)	Explain existential quantifier.	L1	CO2
1.e)	Define non-homogeneous recurrence relation of order three.	L2	CO3
1.f)	Solve $a_n + 4a_{n-1} = 2$.	L2	CO3
1.g)	Write Warshall's Algorithm.	L2	CO4
1.h)	Define a Directed Graph.	L1	CO4
1.i)	Define a minimal spanning tree.	L1	CO4
1.j)	Define Hamiltonian Graph.	L1	CO4

PART – B

			BL	CO	Max. Marks
UNIT-I					
2	a)	Show that the proposition $(p \vee \neg q) \wedge (\neg p \vee \neg q) \vee q$ is a tautology.	L2	CO1	5 M
	b)	For any three propositions p, q, r, prove that $[(p \vee q) \rightarrow r] \Leftrightarrow [(p \rightarrow q) \wedge (p \rightarrow r)]$	L3	CO2	5 M
OR					
3	a)	Construct the truth table of the compound proposition $(p \vee \neg q) \rightarrow (p \wedge q)$	L2	CO1	5 M
	b)	Obtain CDNF of the following $P \rightarrow ((P \rightarrow Q) \wedge \neg (\neg Q \vee \neg P))$	L3	CO2	5 M
UNIT-II					
4	a)	Consider these statements "All lions are fierce", "Some lions do not drink coffee", "Some fierce creatures do not drink coffee" Let P(x), Q(x), and R(x) be the statements "x is a lion", "x is fierce" and "x drinks coffee" respectively. Assuming that the domain consists of all creatures express the statement in the argument using quantifiers and P(x), Q(x) and R(x).	L2	CO1	5 M
	b)	Assume that "For all positive integers n, if n is greater than 4, then n^2 is less than 2^n" is true. Use universal modus ponens to show that $100^2 < 2100$.	L3	CO2	5 M
OR					

5	a)	Show that the premises "A student in this class has not read the book," and "Everyone in this class passed the first exam" imply the conclusion "Someone who passed the first exam has not read the book."	L3	CO2	5 M
	b)	Use contraposition show that if x and y are integers and both xy and $x + y$ are even, then both x and y are even.	L2	CO1	5 M
UNIT-III					
6	a)	Solve the recurrence relation $a_n = 7a_{n-1} - 10a_{n-2}$ with $a_0 = 2$ and $a_1 = 3$.	L2	CO1	5 M
	b)	Solve the recurrence relation of Fibonacci sequence of numbers $F_{n+2} = F_{n+1} + F_n$ for $n \geq 0$ given that $F_0=0$, $F_1=1$.	L3	CO3	5 M
OR					
7	a)	Solve the following recurrence relation using characteristic roots. $a_n + 4a_{n-1} + 6a_{n-2} = 0$ and $a_0 = 2$, $a_1 = -7$.	L3	CO3	5 M
	b)	Solve $a_n - 9a_{n-1} + 26a_{n-2} - 24a_{n-3} = 0$, for $n \geq 3$.	L3	CO3	5 M
UNIT-IV					
8	a)	Draw the Hasse diagram representing the positive divisors of 36.	L2	CO1	5 M
	b)	Show that the following graphs are isomorphic.	L4	CO4	5 M

		  G_1 G_2			
OR					
9	a)	Show that congruence modulo m is an equivalence relation on integers.	L2	CO1	5 M
	b)	Draw the Hasse diagram representing the partial ordering {(a, b)/a divides b} on {1, 2, 3, 4, 6, 8, 12}.	L4	CO4	5 M
UNIT-V					
10	a)	Write about Euler's circuit and Hamiltonian cycle with suitable examples.	L2	CO1	5 M
	b)	Explain DFS algorithm to find spanning tree of a graph with suitable example.	L4	CO4	5 M
OR					
11		Show step by step Kruskal's algorithm on the following connected weighted graph and also calculate sum of the weights of the minimal spanning tree? 	L4	CO4	10 M