PVP 20

Code: 20BS1303

II B.Tech - I Semester – Regular / Supplementary Examinations DECEMBER 2023

DISCRETE MATHEMATICAL STRUCTURES

(Common for CSE, IT)

Duration: 3 hours Max. Marks: 70

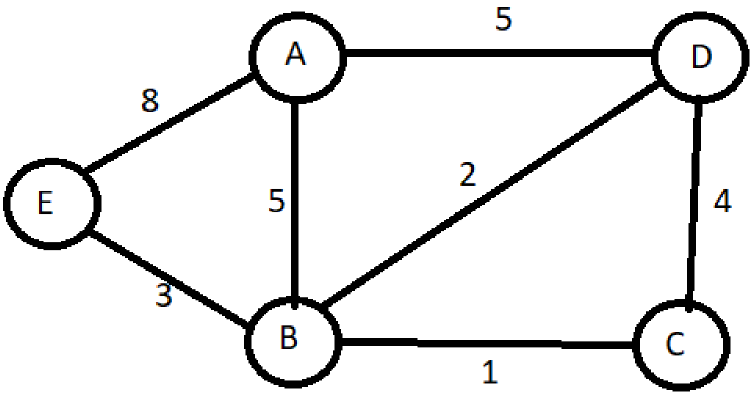
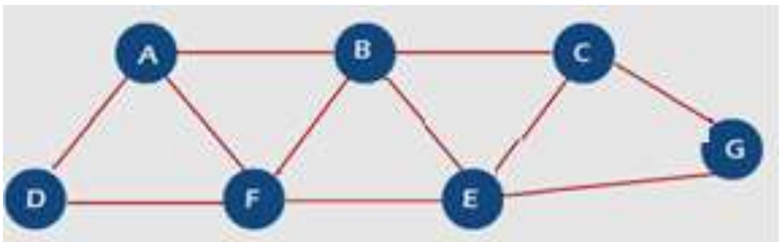
Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
		UNIT-I			
1	a)	Show that $[(A \rightarrow B) \wedge A] \rightarrow B$ is a tautology.	L2	CO1	7 M
	b)	Construct Principal of Conjunctive Normal Forms(PCNF) and Principal of Disjunctive Normal Forms (PDNF) of the formula. $(\neg A \vee \neg B) \rightarrow (A \leftrightarrow \neg B)$	L3	CO2	7 M
		OR			
2	a)	Express the converse, inverse, contra positive of ***'If you work hard then you will be rewarded'.***	L2	CO1	7 M
	b)	What is Principle Conjunctive Normal Form(PCNF)? Construct the PCNF of $(\neg A \rightarrow B) \wedge (C \leftrightarrow A)$	L3	CO2	7 M

UNIT-II					
3	a)	Show that the premises *"One student in this class knows how to write program in JAVA"*, and "*Everyone who knows how to write the programme in JAVA can get a high paying job* imply a conclusion "*someone in this class can get a high paying job*".	L3	CO2	7 M
	b)	Let $Q(x)$ be the sentence that "$x=x+1$", What is the truth value of the quantification $\exists\, x\, Q(x)$ where the universe of discourse is the set of real number ?	L3	CO2	7 M
OR					
4	a)	Let $L(x, y)$ be the predicate *"x likes y"* and let the universe of discourse be the set of all people. Use quantifiers to express each of the following statements. *(i)* *Everyone likes everyone.* *(ii)* *Everyone likes someone.* (iii) *Someone does not like anyone.*	L3	CO2	7 M
	b)	Using rules of inference, show that **'*s*'** is a valid inference from the premises $p\rightarrow \neg q,\ q \vee r,\ \neg s \rightarrow p$ and $\neg r$	L3	CO2	7 M
UNIT-III					
5	a)	Solve the recurrence relation $a_n = a_{n-1}+2\, a_{n-2}$ with $a_0 = 2$ and $a_1=7$.	L3	CO3	7 M
	b)	Solve the recurrence relation $a_n = 2\, a_{n-1}+3 * 2^n$	L3	CO3	7 M

OR					
6	a)	Solve the recurrence relation $a_n = 7a_{n-1} - 10\, a_{n-2}$ with $a_0 = 3$ and $a_1=5$.	L3	CO3	7 M
	b)	Solve the recurrence relation $a_n = a_{n-1}+3^n$	L3	CO3	7 M
UNIT-IV					
7	a)	Suppose that the relation ***R*** on a set is represented by the matrix. $\begin{bmatrix} 1 & 1 & 0 \\ 1 & 1 & 1 \\ 0 & 1 & 1 \end{bmatrix}$ Is ***R*** reflexive, symmetric and/or anti-symmetric? Justify your answer.	L4	CO4	7 M
	b)	Determine whether ***(P(S), ⊆)*** is a lattice where ***S*** is a set {A,B,C} and ***P(S)*** is the power set of ***S.***	L2	CO4	7 M
OR					
8	a)	Determine whether the relation ***R*** on the set of all people is reflexive, symmetric, anti-symmetric and/or transitive where ***(a, b)ϵ R*** if and only if ***a*** is teller than ***b*** .	L2	CO4	7 M
	b)	Examine whether the Posets ***({1, 2, 3,4,5}, |)*** and ***({1, 2, 4, 8, 16}, |)*** are lattices.	L4	CO4	7 M
UNIT-V					
9	a)	Give an example of a graph that has neither an Eulerian circuit nor a Hamiltonian circuit.	L2	CO4	7 M

	b)	Discover a Minimal Spanning Tree for the given weighted graph using Kruskal's Algorithm.  	L4	CO4	7 M
OR					
10	a)	Explain graph coloring and chromatic number with an example.	L2	CO4	7 M
	b)	Consider the following graph  Assume '***A***' is the start node and Compute Depth First Search traversal order of the above graph.	L4	CO4	7 M