R20

Code No: R20A0026

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, April 2025

Discrete Mathematics

(CSE, IT, CSE-CS, CSE-AIML, CSE-DS, B.Tech-AIDS & B.Tech-AIML)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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			BCLL	CO(s)	Marks
		SECTION-I			
1	*A*	Construct the truth table for the formula $(P \rightarrow Q) \wedge (Q \rightarrow R)$ and determine if it is a tautology.	L2	CO-I	[7M]
	B	Explain in detail about the Connectives with Examples?	L1	CO-I	[7M]
		OR			
2	*A*	Prove by contradiction: If n^2 is even, then n is even.	L3	CO-I	[7M]
	B	Derive $P \longrightarrow \neg S$ from the premises $P \longrightarrow (Q \vee \boldsymbol{R})$, $Q \rightarrow \neg P$, $S \rightarrow \neg R$ and P.	L2	CO-I	[7M]
		SECTION-II			
3	*A*	Prove that every lattice is a poset, but not every poset is a lattice, using an example.	L2	CO-II	[7M]
	B	Explain the concept of recursive functions with one example. How are they different from ordinary functions?	L2	CO-II	[7M]
		OR			
4	*A*	Determine whether the relation $R=\{(a,b) \mid a$ divides $b\}$ on the set Z^+ is a partial order.	L3	CO-II	[7M]
	B	Let A={1,2,3,4,6,12} on A define the relation R by aRb if and only if a divides b. Construct the Hasse Diagram for this relation.	L2	CO-II	[7M]
		SECTION-III			
5	A	Let G be a set of all non- zero real numbers and $a * b = (ab)/2$ Show that $< G,* >$ is an abelian group.	L1	CO-III	[7M]
	B	Show that $< G,\times_5 >$ is a Group, where G= {1, 2, 3, 4}	L1	CO-III	[7M]
		OR			
6		Discuss the Inclusion-Exclusion Principle. Then, apply it to solve the following problem: How many positive integers ≤ 500 are divisible by any of the numbers 5, 6, or 9?	L3	CO-III	[14 M]
		SECTION-IV			
7	*A*	Solve the recurrence relation $a_n - 3a_{n-1} + 2a_{n-2} = 0$, $n \geq 3$, $a_0 = 1$, $a_1 = 0$	L3	CO-IV	[7M]

B Find the coefficient of x^{27} in the following function $(x^4+x^5+x^6+\ldots\ldots)^5$. **L2** **CO-IV** **[7M]**

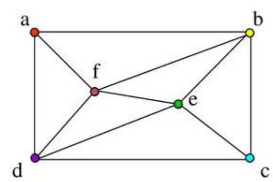
OR

8 Compute the number of ways in which the complete collection of letters that appear in MISSISSIPPI can be arranged in a row so that: (i) S appears at the beginning **L3** **CO-IV** **[14M]**

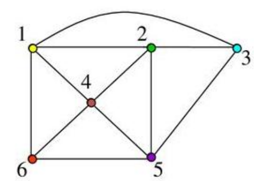
(ii) There are no adjacent I's

SECTION-V

9 Define Isomorphism with an example. Identify whether the given graphs G and G^1 are isomorphic to each other or not. **L3** **CO-V** **[14M]**



G

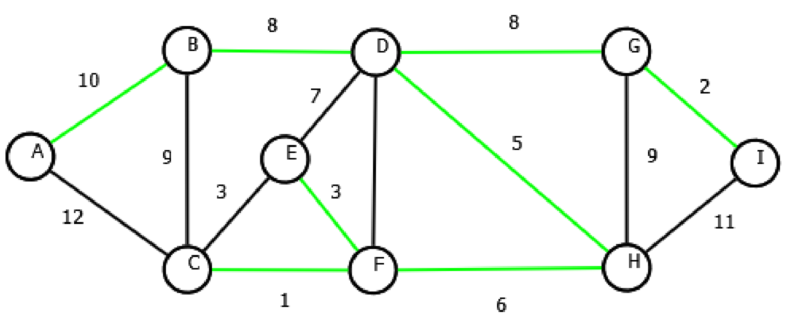


G′

OR

10 Find the MST (Minimal Spanning Tree) of the given graph using **L3** **CO-V** **[14M]**

(a) Kruskal's and
(b) Prim's algorithms.



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