Course Code: 2040506 Roll No: MLRS-R20

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

II B.Tech II Sem Regular End Examination, July 2022

Discrete Mathematics

(CSE/IT/CSI/CSC/CSD)

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

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART- A

(10*2 Marks = 20 Marks)

1.	a)	Define well-formed formulae and clause form.	2M	CO1	BL1
	b)	Write converse and inverse for the statement "If Sun rises in the east then 3*7=98"	2M	CO1	BL1
	c)	Give suitable examples for a relation which is not equivalence relation	2M	CO2	BL1
	d)	Let X={1,2,3,4,5,6} and R be a relation defined as(x,y) ∈ R if and only if is x -y divisible by 3. Find the elements of relation of R.	2M	CO2	BL3
	e)	From 6 boys and 4 girls, 5 are to be selected for admission for a particular course. In How many ways can this be done if there must be exactly 2 girls?	2M	CO3	BL3
	f)	Calculate the number of binary numbers with 9 one's and 5 zero's	2M	CO3	BL3
	g)	Write the characteristic equation for the following recurrence relation an $a_n - 4a_{n-4} = 0$, n >= 4 and solve it	2M	CO4	BL1
	h)	What is homogeneous recurrence relation?	2M	CO4	BL1
	i)	Define Bipartite graph and Isomorphic graphs.	2M	CO5	BL1
	j)	Define spanning tree. What are its characteristics?	2M	CO5	BL1

PART- B

(10*5 Marks = 50 Marks)

2	a)	Obtain the PCNF and PDNF of $(P \rightarrow (Q \wedge R)) \wedge (\sim P \rightarrow (\sim Q \wedge \sim R))$.	5M	CO1	BL3
	b)	Verify the validity of the following arguments. "Every living thing is a plant or an animal. Logu"s dog is alive and it is not a plant. All animals have heart. Therefore Logu"s dog has a heart."	5M	CO1	BL3
		OR			
3		Without using truth tables prove that $((P \vee Q) \neg (\neg P (\neg Q \vee \neg R))) \vee (\neg P \neg Q) \vee (\neg Q \neg R)$ is a tautology.	10M	CO1	BL3

4	a)	Explain properties of binary relations with examples	5M	CO2	BL4
	b)	Draw the Hasse diagram for the partial ordering {(A, B): $A \leq B$} on the power set e(S) where S={a, b, c} and $\leq$ is subset relation.	5M	CO2	BL1
		OR			
5		In a lattice (L, $\leq$, $\wedge$, $\vee$) state and prove the laws indempotent, commutative, association and absorption.	10M	CO2	BL3
6	a)	Show that given any 52 integers, there exists two of them whose sum or else whose difference is divisible by 100	5M	CO3	BL3
	b)	State and prove multinomial theorem.	5M	CO3	BL3
		OR			
7		State and prove extended pigeon principle. Using it show that 9 colors are used to paint 100 houses at least 12 houses will be of the same color.	10M	CO3	BL3
8	a)	Find the recurrence relation and initial condition for the following sequence: 6, -18, 54, -162 ...	5M	CO4	BL3
	b)	Define generating function. Write the sequence generated by the $2x^2(1-2x)^{-1}$	5M	CO4	BL3
		OR			
9		Find the solution for the Fibonacci series $a_n=a_{n-1}+a_{n-2}$, n>2 and $a_0=1$, $a_1=1$.	10M	CO4	BL3
10	a)	Show that a simple complete digraph with n nodes has the maximum number of edges n(n-1) . Assuming that there are no loops	5M	CO5	BL3
	b)	State and explain graph coloring problem. Give its applications	5M	CO5	BL4
		OR			
11		Explain Kruskal's algorithm with example.	10M	CO5	BL4

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