Question Paper Code: R18A21CS01

R18

ANURAG Engineering College

(An Autonomous Institution)

II B.Tech I Semester Supplementary Examinations, Jan/Feb-2024

DISCRETE MATHEMATICAL STRUCTURES

(COMPUTER SCIENCE AND ENGINEERING)

Time: 3 Hours **Max. Marks: 75**

Section – A (Short Answer type questions) (25 Marks)

Answer All Questions

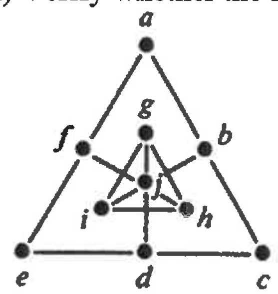
	Question	Course Outcome	B.T Level	Marks
1.	Write the symbolic form of the proposition "If tigers have wings then the earth revolves around the Sun". Also find its truth value	CO1	2	2M
2.	State DeMorgan , idempotent and identity laws	CO1	1	3M
3.	How many distinct 4-digit ATM PINs containing all different digits can be formed?	CO2	2	2M
4.	Find the total number of diagonals in a decagon	CO2	1	3M
5.	Find the generating function for $\{2024^n\}_{n=1}^{\infty}$	CO3	1	2M
6.	Compute the characteristic equation and its roots for the recurrence relation $a_n = 5a_{n-1} - 6a_{n-2}$ for $n \geq 2, a_0 = 1, a_1 = 0$	CO3	1	3M
7.	Is Z the set of integers a monoid under usual multiplication? Justify your answer	CO4	1	2M
8.	If $S = \{2024, 2025, 2026\}$ then show that $(P(S), \subseteq)$ is a lattice	CO4	2	3M
9.	In a round-robin tournament the A team beats the B,Cand D teams,B beats C and D,C beats D.Model this outcome with a directed graph	CO5	2	2M
10.	Construct a 4-regular graph with 6 vertices	CO5	1	3M

Section B (Essay Questions)

Answer all questions, each question carries equal marks. **(5 X 10M = 50M)**

		Question	Course Outcome	B.T Level	Marks
11.	A)	Show that $(p \wedge (p \rightarrow q)) \rightarrow q$ and $p \wedge (q \wedge \neg p)$ are tautology and contradiction respectively	CO1	2	10M
		OR			
	B)	i) Define Existential Quantifiers and Universal Quantifiers with examples.	CO1	2	5M
		ii) Show that $\{[p \rightarrow (q \vee r)] \wedge \neg q\} \rightarrow (p \rightarrow r)$ is a Tautology.			5M
12.	A)	If all the positive numbers are formed by taking all the digits in 8-digit number 20242024 and are arranged in ascending order then what will be the rank of that 8-digit number?	CO2	3	10M
		OR			
	B)	There are 10 points on a plane and four of them are collinear. Find the total number of distinct straight lines,triangles,quadrilaterals and hexagons formed by joining these points with straight edge	CO2	3	10M
13.	A)	Solve $a_{n+2} - 2a_{n+1} + a_n = 2^n, a_0 = 2, a_1 = 1$ by applying generating functions	CO3	2	10M
		OR			
	B)	Find solution to the recurrence relation $a_n = 2a_{n-1} + 5a_{n-2} - 6a_{n-3}$ with initial conditions $a_0 = 7, a_1 = -4, a_2 = 8$	CO3	2	10M

14. A)	Let A be a given finite set,P(A) be its power set and $\subseteq$be the inclusion relation on P(A).Draw Hassee diagram for (P(A),$\subseteq$) if A={0},{0,2}.{0,2,4}	CO4	2	10M
	OR			
B)	Let R be a binary relation on the set of positive integers such that R= {(a , b):$a = b^2$}.Is R Reflexive? Symmetric? Antisymmetric? Transitive? An equivance relation? A partial order relation?	CO4	3	10M
15. A)	Show that the maximum number of edges in a simple disconnected graph G with n vertices and k components is $\frac{(n-k)(n-k+1)}{2}$	CO5	2	10M
	OR			
B)	i) Verify whether the following graph is planar or not.	CO5	3	5M



ii) State and prove Euler formula. 5M