Question Paper Code: R22A22CS02

R22

ANURAG Engineering College

(An Autonomous Institution)

II B.Tech II Semester Regular Examinations, June/July – 2024

DISCRETE MATHEMATICS

(COMPUTER SCIENCE AND ENGINEERING, INFORMATION TECHNOLOGY & ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

Time: 3 Hours **Max. Marks: 60**

Section – A (Short Answer type questions) (10 Marks)

Answer All Questions

		Course Outcome	B.T Level	Marks
1.	Write the rule of disjunctive normal form.	CO1	L1	1M
2.	Write the truth table for "conjunction"	CO1	L1	1M
3.	Define a function? Mention any two types of functions	CO2	L1	1M
4.	Define an Equivalence Relation	CO2	L2	1M
5.	Define a semigroup with one suitable example	CO3	L1	1M
6.	What is a Lattice?	CO3	L1	1M
7.	Write the coefficient of x^5y^3 in the expansion of $(x+y)^8$	CO4	L1	1M
8.	How many different arrangements of letters MISSISSIPPI are possible	CO4	L2	1M
9.	Define complete bipartite graph with example	CO5	L1	1M
10.	Define Chromatic number of a graph	CO5	L1	1M

Section B (Essay Questions)

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

11. A)	Define quantifiers let p(x):x^2-8x+15=0 q(x):x is odd, r(x): x>0 with the set of all integers as the universe. Determine truth or falsity of each of the following statements. If a statement is false give counter example i) $\forall x, [p(x) \rightarrow q(x)]$ ii) $\forall x\ [\sim q(x) \rightarrow \sim p(x)]$ iii) $\exists x, [p(x) \rightarrow q(x)]$ iv)$\forall x[p(x) V q(x)] \rightarrow r(x)$	CO1	L1	10M
	OR				
B)	By constructing truth table find PDNF of (P $\rightarrow$(Q $\wedge$ R)) $\wedge$ ($\sim$ Q$\wedge\sim$ R)	CO1	L2	10M
12. A)	i) If X={1,2,3,4} and R= {(x, y)/x < y} Draw the graph of 'R' and also give its Relation matrix.	CO2	L3	5M
	ii) Prove that the relation R defined by "a is congruent to b modulo m" on the set of integers is an equivalence relation.			5M
	OR				
B)	Let f(x) = x^2+ 6, g(x)= x-4 and h(x) = 5x for x $\in$ R, where R is set of real numbers. Find i) gof(x) ii) fog(x) iii) fogoh(x) iv) hogof(x) v) foh(x)	CO2	L1	10M
13. A)	Show that set Q_+ of all positive rational numbers form an abelian group under the composition defined by '0' such that a0b= $\frac{ab}{3}$ for a,b$\in$ Q_+	CO3	L1	10M
	OR				
B)	Prove that set of non singular matrices of order 2 x 2 is a group but not an abelian group under multiplication.	CO3	L2	10M

14. A)	i) Prove the identity c(n, r) c(r, k) = c(n, k) c(n-k, r-k)	CO4	L2	5M
	ii) Find the coefficient of $x^3y^3z^2$ *in* $(2x - 3y + 5z)^8$		L1	5M
	OR			
B)	Find the number of integral solutions to $x_1 + x_2 + x_3 + x_4 = 50$ where $x_1 \geq -4, x_2 \geq 7, x_3 \geq -14, x_4 \geq 10$	CO4	L1	10M
15. A)	Define the following terms with example i) Eulerian graph ii) Hamiltonian graph iii) Graph coloring iv) Multi graph v) Regular graph	CO5	L1	10M
	OR			
B)	Define Planar Graph? State and Prove Euler's formula	CO5	L1	10M