R22 Regulation *Subject code: 4E4FA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech IV Semester Regular Examinations, July 2024

DISCRETE MATHEMATICS

(INFORMATION TECHNOLOGY)

Maximum Marks: 60 Date:18.07.2024 Duration: 3 hours

	Part-A	CO	Bloom Tx
All the following questions carry equal marks (10X1M=10 Marks)			
1.a)	Find the contrapositive of $p \rightarrow q$.	CO1	L2
b)	Convert the argument "All dogs are faithful animals" into symbolic form.	CO1	L2
c)	Find the value of 'r' if $5P_r = 60$.	CO2	L2
d)	Suppose we select any group of 1000 students in a college then how many of them have same birthday?	CO2	L2
e)	Define complete graph.	CO3	L2
f)	Define Spanning tree.	CO3	L2
g)	Define cyclic group.	CO4	L2
h)	Define a group homomorphism.	CO4	L1
i)	Define composite function.	CO5	L1
j)	Find the inverse of the functions $f(x) = 2x + 3$.	CO5	L2

	Part-B	CO	Bloom Tx level
Answer All the following questions. (5X10M=50Marks)			
2	Obtain PCNF and PDNF of $(P \wedge Q) \vee (\sim P \wedge R) \vee (Q \wedge R)$. [10]	CO1	L3
	OR		
3	Check the following set of premises are inconsistent or not. [10] i) If Raja gets his degree, he will go for a job. ii) If he goes for a job, he will get married soon. iii) If he goes for higher study, he will not get married. iv) Raja gets his degree and goes for higher study.	CO1	L 3
4	Using mathematical induction method prove one of Demorgan's Law of union of sets. [10]	CO2	L 3
	OR		
5	Find the solution to the recurrence relation $a_n = 6a_{n-1} - 11a_{n-2} + 6a_{n-3}$ with $a_0 = 2, a_1 = 5$ & $a_2 = 15$. [10]	CO2	L3
6	What are Eulerian and Hamiltonian graphs? Draw graphs satisfying the following conditions (i) Eulerian but not Hamiltonian (ii) Hamiltonian but not Eulerian (iii) both Eulerian and Hamiltonian (iv) not an Eulerian and not a Hamiltonian. [10]	CO3	L3
	OR		

7	Show that a simple graph G with n vertices is connected if it has more than $\frac{(n-1)(n-2)}{2}$ edges. [10]	CO3	L3
8	State and prove Lagrange's theorem. [10]	CO4	L3
	OR		
9	Show that $(R-\{-1\}, *)$ is an abelian group under the binary operation $*$ defined by $a*b = a+b+ab, \forall a,b \in R-\{-1\}$. [10]	CO4	L3
10	Three friends A, B, and C live near each other at a distance of 5 km from one another. We define a relation R between the distances of their houses. (i) Is R an equivalence relation? (ii) Also state the conditions for an equivalence relation. [10]	CO5	L3
	OR		
11	If A = {1,2,3,4,5,6} and the functions f and g are defined as [10] $f = \{(1,3),(2,6),(3,4),(4,2),(5,1),(6,5)\}$ and $g = \{(1,6),(2,4),(3,1),(4,5),(5,3),(6,2)\}$. Prove that $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$.	CO5	L3