R22 Regulation *Subject code: 4E4FA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, December 2024

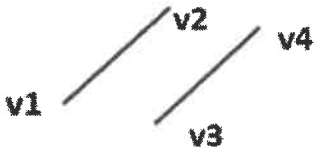
DISCRETE MATHEMATICS

(INFORMATION TECHNOLOGY)

Maximum Marks: 60 Date:03.12.2024 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

	Part-A	CO	Bloom Tx
All the following questions carry equal marks	(10X1M=10 Marks)		
1.a)	The inverse of $p \rightarrow q$ is the proposition of _____	CO1	K1
b)	Convert the given statement into symbolic form, "If Raju wakes up early then he will reach college early."	CO1	K2
c)	The value of 'r' if $20C_r = 20C_{r+2}$_____.	CO2	K2
d)	The recurrence relation for the sequence $a_n = 2n + 9, n \geq 1$_____.	CO2	K2
e)	In a finite graph the number of vertices of odd degree is always _____	CO3	K1
f)	The degree of a graph with 12 vertices is _____	CO3	K1
g)	A function is defined by f(x)=2x and f(x + y) = f(x) + f(y) is called _____	CO4	K2
h)	a * H is a set of _____ coset.	CO4	K1
i)	Define equivalence relation.	CO5	K1
j)	Find the inverse of the function $f(x) = \frac{10x+13}{4x+12}$.	CO5	K2
	Part-B		
Answer All the following questions.	(5X10M=50Marks)	CO	Bloom Tx level
2	Find PCNF $P \rightarrow ((Q \wedge P) \wedge (\sim P \rightarrow (\sim Q \wedge \sim R)))$ (without using truth table). [10M]	CO1	K3
	OR		
3	Show that $R \vee S$ follows logically from the premises: $(C \vee D), (C \vee D) \rightarrow \sim H, \sim H \rightarrow (A \wedge \sim B)$ and $(A \wedge \sim B) \rightarrow R \vee S$. [10M]	CO1	K3
4	Solve the recurrence relations $a_n + 3a_{n-1} - 4a_{n-2} = 0, n \geq 2$ with the initial condition $a_0 = 3, a_1 = -2$. [10M]	CO2	K3
	OR		

5	Find the number of integers between 1 and 250 that are not divisible by any of the integers 2, 3, 5 and7. [10M]	CO2	K3
6	Find the adjacency matrix of the following graph G. Find A^2, A^3 and $Y = A + A^2 + A^3 + A^4$.What is your Observation of entries in A^2 and A^3.  [10M]	CO3	K3
	OR		
7	Prove that a simple graph with n vertices with k components can have at most $\frac{(n-k)(n-k+1)}{2}$ edges. [10M]	CO3	K3
8	Examine whether $G = \left\{\begin{pmatrix} a & a \\ a & a \end{pmatrix} : a \neq 0 \in R\right\}$ is a commutative group under matrix multiplication, where R is the set of all real numbers. [10M]	CO4	K3
	OR		
9	Prove that the non-zero elements of Z_7 is a group under multiplication modulo 7. [10M]	CO4	K3
10	Show that the relation R is an equivalence relation in the set $A = \{1, 2, 3, 4, 5\}$ given by the relation $R = \{(a, b): \lvert a - b \rvert \text{ is even}\}$. [10M]	CO5	K3
	OR		
11	If f, g, h *are* functions from R→ R defined by $f(x) = x + 2$, $g(x) = x^2 + 3$, $h(x) = 4x$, then determine the functions i) $g \circ f$ ii) $(f \circ g) \circ h$ iii) f^2 . [10M]	CO5	K3