R22 Regulation *Subject code: 4E3EC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, July 2024

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Common to CSE & CSE(AI&ML))

Maximum Marks: 60 Date:25.07.2024 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)	Write the sentence "It is not true that all roads lead to Rome" in the symbolic form	CO1	L2
b)	Define converse, inverse, contrapositive.	CO1	L1
c)	If P is true, Q is false and R is true, then find the truth value of ((P ^ Q) → R) V (P V R) without constructing the truth table.	CO2	L2
d)	Find the truth value of (x) (P(x)v Q(x)) where P(x): x=1: Q(x): x=2 and the universe is 1,2.	CO2	L1
e)	State and explain recursion.	CO3	L2
f)	Write the division algorithm with an example.	CO3	L1
g)	Let A = {1, 2, 3, 4} show that the relation "divides" is a partial ordering on A. Draw the Hasse diagram.	CO4	L1
h)	Let I= {0,1,2} and define functions f and g from I to I as follows for all x in I, f(x)= (x^2+x+1) mod 3 and g(x)= $(x+2)^2$ mod 3, state whether f=g.	CO4	L2
i)	What is monoid?	CO5	L1
j)	Define Homomorphism, Epimorphism, Monomorphism and Isomorphism.	CO5	L1

	Part-B		
Answer All the following questions.	(5X10M=50Marks)		Bloom Tx level
2	a. Obtain the product of sum canonical form of the following formula : (P^Q^R)v(ꞁP^Q^R)v(¬ P^¬ Q^¬ R). [5M] b. Describe the basic connectives along with their truth tables. [5M]	CO1	L6
	OR		
3	a. Obtain PCNF and PDNF by using truth table for the formula (P → Q) V (Q ↔ R). [5M] b. Prove that [(P→R) ^ (Q→R)] →[(PVQ)→R] is Tautology. [5M]	CO1	L6
4	a. Show that S V R is tautologically implied by (P V Q) ^ (P → R) ^ (Q → S). [5M]	CO2	L4

	b. What is the difference between statement calculus and predicate calculus? Explain the necessity of predicate calculus. [5M]		
	OR		
5	Prove or disprove the following statements: [10M] • All men are mortal • All kings are men • Therefore, All kings are mortal	CO2	L5
6	Illustrate the Euclidean Algorithm for finding GCD of two numbers. [10M]	CO3	L2
	OR		
7	Demonstrate the recursion theorem for factorial and Fibonacci sequence? [10M]	CO3	L3
8	a. Show that R is Equivalence relation, where [5M] R= (a,a),(a,b),(b,a),(b,b),(c,d),c,c),(d,c),(d,d)} b.Compute the transitive closure of the relation R={(1,1),(1,2),(1,3),(2,3),(3,1)} defined over a set S={1,2,3}. [5M]	CO4	L4
	OR		
9	a. Define a poset. Give any two partial ordering relations. [5M] b. Draw the Hasse diagram for the relation R={(x,y) | x divides y} on ={2,3,6,12,24,36}. [5M]	CO4	L3
10	a. Prove that if a^2=a, then a=e where a belongs to a group. [5M] b. Let group G={0,2,4,6,8) and a subset of G, S={0,2,4}. Prove that S is a subgroup of G under multiplication modulo 4. [5M]	CO5	L5
	OR		
11	a. Verify whether the following algebraic system is a group or not [5M] G={1,2,3,4,5} and the operation $+_6$. Where $+_6$ represents additive module. b. In a group G for a,b € G, O(a)=5, $aba^{-1}=b^2$ and b is not the identity element. Show that O(b)=31. [5M]	CO5	L4