R22 Regulation *Subject code:E251PC1*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

M.TECH I Semester Regular/Supplementary Examinations, March 2025

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(CSE)

Maximum Marks: 60 Date:10.03.2025 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

All the following questions carry equal marks	(10X1M=10 Marks)	CO No.	BTL
1.a)	Write the Statement in symbolic form: " The crop will be destroyed if there is a flood"	CO1	L1
b)	What is the rule of modus pones of predicates	CO1	L1
c)	Verify the relation " exactly divides" be a partial ordering relation on D_{18}.	CO2	L2
d)	Determine whether f(x) = $\frac{x^2+1}{x^2+2}$ is bijective or not.	CO2	L2
e)	Define Fibonacci numbers recursively.	CO3	L1
f)	Write about about Structural Induction.	CO3	L1
g)	Give an example of Linear Recurrence Relation.	CO4	L1
h)	What is Inclusion – Exclusion Principle.	CO4	L1
i)	Define the term 'Tree ' with suitable example.	CO5	L1
j)	Draw the graph of $k_{3,3}$	CO5	L2

Part-B

Answer All the following questions.	(5X10M=50Marks)	CO No.	BTL
2	Show that the following Premises are inconsistent: If Jack misses many classes through illness, then he fails high school. If Jack fails high school, then he is uneducated. If Jack reads a lot of books, then he is not uneducated. Jack misses many classes through illness and reads a lot of books. (10M)	CO1	L1
	OR		
3(a)	Show that R∧(P∨Q) is a valid conclusion from the premises P∨Q , Q→ R, P→ M and $\sim M$.. (5M)	CO1	L1
3(b)	Show that $\sim(P\vee(\sim P\wedge Q))$ and $(\sim P \wedge \sim Q)$ are logically equivalent. (5M)	CO1	L1
4(a)	If f:R→ R, $g: R \rightarrow R$, where R is the set of real numbers .f(x) = $x^2 - 2$, g(x) = x+4 find f og and gof. State whether these functions are bijective or not. (5M)	CO2	L1
4(b)	Let X = {1,2,3,4} and relation R = {(x,y) / $x > y$}. Draw the graph of R and also give its matrix. (5M)	CO2	L2

	OR		
5	Show that the relation R={ (a,a),(a,b),(b,a),(b,b)(c,c)} on A={a,b,c} is an equivalence relation and find its equivalence classes (10M)	CO2	L1
6(a)	Define an algorithm. Describe an algorithm for finding the maximum value in a finite sequence of integers. (5M)	CO3	L2
6(b)	Define Big-0- notation and show that f(x)= $x^2 + 2x + 1$ is $0(x^2)$ (5M)	CO3	L1
	OR		
7	Use Mathematical Induction to show that (10M) $1+2+2^2 + 2^3 + \cdots \dots\dots\dots + 2^n = 2^{n+1} - 1$	CO3	L2
8	Define Conditional Probability. State and Prove Baye's theorem. (10M)	CO4	L1
	OR		
9	Solve the Recurrence relation $a_n + 5a_{n-1} + 6a_{n-2} = 3n^2 - 2n + 1$ (10M)	CO4	L2
10	Define the following terms with suitable example of i) Complete Bipatite graph ii)Regular graph iii) Spanning graph iv) Simple graph v) Hamiltonian graph (10M)	CO5	L1
	OR		
11a	Prove that the number of vertices of odd degree in a graph is always even.(5M)	CO5	L1
11b	Distinguish between Euler circuits and Hamiltonian circuits. (5M)	CO5	L2