



R22 Regulation *Subject code:4E3EC*
TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech III Semester Regular/Supplementary Examinations, December 2025

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to CSE & CSE(AI&ML))

Maximum Marks: 60

Date:22.12.2025

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)	Marks	CO	BTL
1.a)	Define Well Formed Formula		1M	1	L1
b)	What is the purpose of a truth table?		1M	1	L1
c)	Define a bound variable.		1M	2	L1
d)	What does it mean for a set of statements to be logically consistent?		1M	2	L1
e)	Define Recursion with an example		1M	3	L1
f)	Define prime and coprime numbers.		1M	3	L1
g)	Define partial order relation.		1M	4	L1
h)	Define equivalence relation with example?		1M	4	L1
i)	What is an Abelian group?		1M	5	L1
j)	What is a homomorphism?		1M	5	L1

Part-B

Answer All the following questions.		(5X10M=50Marks)	Marks	CO	BTL
2	a) Explain well formed formulas with suitable example. b) Show that $S \vee R$ is tautologically implied by $(P \vee R) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$.		5M	1	L2
	OR				
3	a) Without constructing the Truth Table, prove that $(p \rightarrow q) \rightarrow q = p \vee q$. b) Determine equivalent PDNF for the propositional function $\sim(P \vee Q) \leftrightarrow (P \wedge Q)$.		5M	1	L5
			5M	1	L5
4	a) Prove that the following argument is valid: No engineers are fools. No one who is not a fool is an administrator. Kumar is an engineer. Therefore, Kumar is not an administrator. b) Write a short note on Predicates & Predicate Logic with examples.		5M	2	L5
			5M	2	L1
	OR				
5	a) Prove or disprove the validity of the following arguments using the rules of inference. i) All men are fallible ii) All kings are men iii) Therefore, all kings are fallible b) Explain the method of proof by contradiction with an example.		5M	2	L5
			5M	2	L2

6	a) Using Euclidean Algorithm, find GCD(1819,3587).	5M	3	L1
	b) Explain in brief about Division theorem.	5M	3	L2
OR				
7	a) Explain in brief about Euclidean algorithm.	5M	3	L2
	b) Explain in brief about testing the prime numbers.	5M	3	L2
8	a) Develop the Hasse diagram for the divisibility on the set $\{1,2,3, 4,8,16,28, 32,64\}$	5M	4	L3
	b) Identify the following relation R on $X = \{1, 2, 3, 4\}$ is an equivalence relation or not? Given $R = \{(1, 1), (1, 4), (4, 1), (2, 2), (2, 3), (3, 4), (3, 3), (3, 2), (4, 3), (4, 4)\}$.	5M	4	L3
OR				
9	a) Develop the Hasse diagram of $(P(S), \leq)$, where P(S) is power set of the set $S = \{a,b,c\}$	5M	4	L3
	b) Let $X = \{1, 2, 3, 4, 5, 6, 7\}$ and $R = \{(x,y)/ x-y \text{ is divisible by } 3\}$ in X. show that R is an Equivalence Relation.	5M	4	L2
10	a) Briefly explain about Semi groups and Monoids.	5M	5	L2
	b) Let $(\{a,b\}, *)$ be a semi group ,where $a*a=b$. show that i) $a*b=b*a$ ii) $b*b=a$.	5M	5	L2
OR				
11	a) State and prove Lagranges theorem on cosets.	5M	5	L3
	b) Show that every cyclic group is abelian group, but the converse is not true.	5M	5	L2