



TKRCET
Indian to Chennai International in Excellence

R20 Regulation

Subject code: 3B3EB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, December 2025

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE (Common to CSE & IT)

Maximum Marks: 70

Date: 30.12.2025

Duration: 3 hours

- Note: 1. This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 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 (10X2M=20 Marks)		Marks	CO	BTL
1	If p: A circle is a conic q: 5 is a real number. r : Exponential series is convergent. Express the compound propositions $p \rightarrow (q \vee r)$, $p \wedge (\sim q)$ in words.	2M	1	L1
2	Write on CNF.	2M	1	L1
3	Write the rule of Modus Ponens of predicates.	2M	2	L1
4	Express the statement in words: "Every student in class has studied Calculus." Using quantifiers.	2M	2	L1
5	Define Mersenne prime numbers.	2M	3	L1
6	State fundamental theorem of arithmetic hence find the prime factorization of 810.	2M	3	L1
7	Let $D_{24} = \{1, 2, 3, 4, 6, 8, 12, 24\}$ and the relation "I" exactly divides be a partial ordering relation on D_{24} . Then draw the Hasse Diagram of (D_{24}, I)	2M	4	L1
8	Consider the function $f: \mathbb{R}$ to \mathbb{R} defined by $f(x) = 2x + 5$, another function $g(x) = (x - 5)/2$. Prove that g is inverse of f .	2M	4	L1
9	Show that the cube roots of unity forms a group with respect to multiplication.	2M	5	L1
10	Define a) Left coset of subgroup H in G. b) Right coset of subgroup H in G.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Construct PCNF of $(P \leftrightarrow Q) \rightarrow R$. a) Using truth table b) with out truth table	10M	1	L2
OR				
12	a) Find PDF of $(Q \vee P) \wedge (Q \vee R) \wedge (\sim (P \vee R) \vee \sim Q)$. b) Obtain DNF of $(Q \rightarrow P) \wedge (\sim P \wedge Q)$	5M 5M	1	L2

13	Test for validity of the following argument " No Engineering student is bad in studies " "Anil is not bad in studies" Therefore " Anil is an engineering student"	10M	2	L2
OR				
14	a) Check the validity of the following argument All integers are rational numbers. Some integers are powers of 5. Therefore, some rational numbers are powers of 5. b) Show that the following set of premises are inconsistent $P \rightarrow Q, P \rightarrow R, Q \rightarrow \sim R, P$	5M 5M	2	L2
15	State and Prove Division algorithm theorem using well ordering principle.	10M	3	L2
OR				
16	State and prove Euclidean algorithm to find GCD with example.	10M	3	L2
17	a) Prove that the relation R defined by "a is congruent to b modulo m" on the set of integers is an equivalence relation. b) Draw the Hassediagram representing the positive divisors of 45.	5M 5M	4	L2
OR				
18	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 A/R also find partitions of A.	10M	4	L2
19	Define subgroup, normal subgroup, Quotient group, left and right cosets with an example for each.	10M	5	L2
OR				
20	a) Prove that set of non-singular matrices of order 2×2 is a group but not an abelian group under multiplication. b) If 'G' is a group then prove that $(a^{-1})^{-1} = a$	5M 5M	5	L2