R20 Regulation *Subject code: 3B3EB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, June 2026

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Common to CSE & IT)

Maximum Marks: 70 Date: 11.06.2026 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	Construct the truth table of (PVQ) $\rightarrow$ P	2M	1	L1
2	If p: A circle is a conic, q: 5 is a real number, r: Exponential series is convergent. Express the compound propositions $p \rightarrow (qV\ r)$, $p \wedge (\sim q)$ in words.	2M	1	L1
3	Write the rule of disjunctive amplification of predicates	2M	2	L1
4	Express the statement in words: "Every student in class has studied Calculus." Using quantifiers.	2M	2	L1
5	Write about Mathematical Induction.	2M	3	L1
6	Explain with an example of pair wise relatively primes.	2M	3	L1
7	Let R= { [1,1] [2,2] [3,3] [4,4] [5,5] [1,2] [2,1] [5,4] [4,5]} be the equivalence relation on A = {1,2,3,4,5} Find equivalence classes and A/R	2M	4	L1
8	Find the inverse of the function $f(x) = e^x$ defined from R to R^+.	2M	4	L1
9	Show that binary operation * defined on (R,*) where $x*y=x^y$ is not associative.	2M	5	L1
10	Define a) Normal subgroup of a group b) Quotient group	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Prove that for any three propositions P,Q,R the compound proposition $((P \rightarrow (Q \rightarrow R)) \rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R))$ is a tautology by i) with truth table ii) with laws of logic	10M	1	L2
	OR			
12	Show that the following set of premises are inconsistent $P \rightarrow Q, P \rightarrow R, Q \rightarrow \sim R, P$	10M	1	L2
13	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	10M	2	L2

	OR			
14	Show that the following set of premises are inconsistent using proof of contradiction. $P \rightarrow Q, P \rightarrow R, Q \rightarrow \sim R, P$	10M	2	L2
15	State and Prove Division algorithm theorem using well ordering principle.	10M	3	L2
	OR			
16	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	3	L2
17	a) Draw the Hasse diagram representing the positive divisors of 36. b) Show that the relation 'R' defined by (a,b) R (c,d) iff a+d=b+c is an equivalence relation.	5M 5M	4	L2
	OR			
18	a) If X={1,2,3,4} and R= {(x,y)/x<y} Draw the graph of 'R' and also give its matrix. b) Write the procedure to find the maximal compatibility blocks to a compatibility relation.	5M 5M	4	L2
19	Construct composition table for the roots of equation $x^4 = 1$ and Show that it is a group with respect to operation multiplication.	10M	5	L2
	OR			
20	a) If 'G' is a group then prove that $(a^{-1})^{-1}=a$ b) Prove that G ={0,1,2,3,4} is an abelian group of order 5 with respect to addition modulo 5.	5M 5M	5	L2