R20 Regulation *Subject code:* 3B3EB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Regular Examinations, February 2022

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Common to CSE & IT)

Maximum Marks: 70 Date:22.02.2022 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)

1 Write the symbolic form of " Good food is not cheap".
2 Show that $(p \wedge q) \rightarrow p$ is a tautology.
3 Define inconsistent premises.
4 Define the converse, contra positive and inverses of $p \rightarrow q$.
5 Determine whether 1601 is a prime.
6 Find the gcd of 414 and 662.
7 State partial order set.
8 Define an equivalence relation.
9 If (G,*) is an abelian group then prove that $(a * b)^2 = a^2 * b^2, \forall\, a, b \in G$.
10 Define homomorphism.

Part-B

Answer All the following questions. (5X10M=50Marks)

11 (a) Without using truth table prove that $p \rightarrow (q \rightarrow p) \equiv To$. 5M
(b) Find the PCNF of $P \vee (\neg P \rightarrow (Q \vee (\neg Q \rightarrow R))$. 5M

OR

12 (a) Prove that $\{(P \rightarrow Q) \wedge (Q \rightarrow R)\} \rightarrow (P \rightarrow R)$ is tautology. 5M
(b) Prove that $(\exists x)\, M(x)$ follows logically from the premises $(\forall x)\, (H(x) \rightarrow M(x))$ and $(\exists x) H(x)$. 5M

13 Check whether the premises $a \rightarrow (b \rightarrow c), d \rightarrow (b \wedge \neg c)$ and $(a \wedge d)$ are inconsistent or not. 10M

OR

14 Using indirect method, show that Q can be derived from the premises $P \rightarrow Q, R \rightarrow Q, S \rightarrow (P \vee R), S$. 10M

15 State and prove the fundamental theorem of arithmetic. 10M

OR

16 Using the Euclidean algorithm, express (1976, 1776) as a linear combination of them. 10M

17 (a) Find the inverse of $f(x) = \frac{2x-3}{5x-7}$. 5M

(b) If $f(x) = -4x + 9$ and $g(x) = 2x - 7$, find $(f \circ g)(3)$. 5M

OR

18 (a) Draw the Hasse diagram for X = {2,3,6,12,24, 36} $\leq$ is a relation such that $x \leq y$ if x divides y. 5M

(b) Check whether $(N, \leq)$ is poset or not where N is set of all positive integers and $\leq$ is defined by $m \leq n$ if n-m is a non - negative integer. 5M

19 State and prove Lagrange's theorem on cosets. 10M

OR

20 Show that the set of all non-zero real numbers is an abelian group under the operation * defined by $a * b = \frac{ab}{2}$. 10M