R18 Regulation *Subject code: 2H3S2*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech III Semester Regular Examinations, February 2021

MATHEMATICAL FOUNDATIONS

(CE,EEE & ECE)

Maximum Marks: 70 Date: 17.03.2021 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 (10x2Mark=20 Marks)

1 Construct the implication truth table for two statements P,Q.
2 Construct the disjunctive truth table for two statements P,Q.
3 Write the rule of modus Tollens of predicates.
4 Write the rule of disjunctive syllogism of predicates.
5 How many different arrangement of letters MISSISSIPPI are possible?
6 In how many ways can the digits 0,1,2,3,4,5,6,7,8,9 be arranged so that 0 and 1 are adjacent and are in the order 0,1.
7 Define bijective function.
8 Define compatibility relation.
9 Define semi group.
10 Define homomorphism of groups

Part-B

Answer all the following five questions (5x10Marks=50 Marks)

11 Find PDNF & PCNF of$\{(P \rightarrow (Q \wedge R)) \wedge (\sim (Q \vee R))\}$ (10M)

OR

12 Find CNF & DNF of $(P \rightarrow (Q \wedge R)) \rightarrow (\sim P \rightarrow (\sim Q \wedge \sim R))$ (10M)

13 Prove or disprove the following argument using truth table (10M)

$P \rightarrow \sim Q$

$R \rightarrow P$

Q

$\therefore \sim R$

OR

14 Define consistent and inconsistent of arguments and test whether the following argument is consistent or inconsistent (10M)

$$P \to Q, P \to R, Q \to \sim R, P$$

15 State and prove Multinomial theorem. (10M)

OR

16 a)Find the coefficient of $X^3Y^3Z^2$ in $(2X - 3Y + 5Z)^8$ (5M)
b)Prove the identity $c(n,r)c(r,k)=c(n,k)c(n-k,r-k)$ (5M)

17 Define partial ordering relation and draw a poset diagram for the poset $(D_{30}, /)$ (10M)

OR

18 Define an equivalence relation also. Let P(A) be the power set of any non empty set A, then prove that the relation $\subseteq$ of inclusion is not an equivalence relation. (10M)

19 Define an abelian group .Prove that the set G= {0,1,2,3,4} is an abelian group of order 5 with respect to addition modulo 5. (10M)

OR

20 Define groupoid, semigroup, monoid with examples and show that the set Q under the binary operation '0' defined by a0b= (a + b)/2 is not a semigroup. (10M)