*R18 Regulation* *Subject code:2H3S2 RA*

**TKR COLLEGE OF ENGINEERING AND TECHNOLOGY**

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

**B.Tech III Semester Supplementary Examinations, February 2024**

**MATHEMATICAL FOUNDATIONS**

**(EEE)**

***Maximum Marks: 70*** Date:16.02.2024 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.

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| | 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 disjunctive amplification of predicates. | |
| 4 | Write the rule of modus Pones of predicates. | |
| 5 | Find the number of permutations of the letters of the word 'SUCCESS'. | |
| 6 | In how many ways can we distribute 10 identical marbles among 6 distinct containers? | |
| 7 | Define onto 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 $\{(P \rightarrow (Q \wedge R)) \wedge (\sim (Q \vee R))\}$ [10] | |
| | OR | |
| 12 | Find CNF & DNF of $(P \rightarrow (Q \wedge R)) \rightarrow (\sim P \rightarrow (\sim Q \wedge \sim R))$ [10] | |
| 13 | Prove or disprove the following argument using truth table. [10]<br>$P \rightarrow \sim Q$<br>$R \rightarrow P$<br>$Q$<br>$\therefore \sim R$ | |
| | OR | |

| | |
|---|---|
| 14 | Define consistent and inconsistent of arguments and test whether the following argument is consistent or inconsistent. [10]<br>$P \rightarrow Q, P \rightarrow R, Q \rightarrow \sim R, P$ |
| 15 | a) Find the coefficient of $a^2b^3c^2d^5$in the expansion of $(a + 2b - 3c + 2d + 5)^{16}$ [5]<br>b) How many positive integers 'n' can be formed using the digits 3,4,4,5,5,6,7,if we want 'n' to exceed 5,000,000. [5] |
| | OR |
| 16 | State and prove multinomial theorem. [10] |
| 17 | Define the types of relations and draw the Hasse diagram representing the positive divisors of 36. [10] |
| | OR |
| 18 | Define equivalence relation . If R denotes a relation on the set of all ordered pairs of positive integers by (a,b)R(c,d) iff ad=bc show that 'R' is an equivalence relation. [10] |
| 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. [10] |
| | 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. [10] |