R18 Regulation *Subject code:* 2B4EA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Regular/Supplementary Examinations, July 2021

DISCRETE MATHEMATICS

(Common to CSE & IT)

Maximum Marks: 70 Date:13.07.2021 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 which carries 10M.
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 roster notation for "RAINBOW".
2 Define equivalence relation.
3 State well ordering principle.
4 Find the gcd of 120 and 500.
5 Write the truth table for conjunction of two propositions.
6 Define converse, contra positive, inverse.
7 State any two properties of a group.
8 Define Homomorphism of groups.
9 Define complete graph.
10 Define Euler circuit.

Part-B

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

11 If $f(x) = x^2 - 6$ *and* $g(x) = 2x + 1$, then find the following:
i) $(f\ o\ g)(x)$ (5 marks)
ii) $(g\ o\ f)(x)$ (5 marks)

OR

12 (a)Which elements of the poset ({2,4,5,10,12,20,25},/) are maximal and which are minimal? (5 marks)
(b) Draw the Hasse diagram for $D24 = \{1, 2, 3, 4, 6, 8, 12, 24\}, D30 = \{1, 2, 3, 5, 6, 10, 15, 30\}$, $D36 = \{1, 2, 3, 4, 6, 9, 12, 18, 36\}$considering the partial order divisibility. (5 marks)

13 State and prove the fundamental theorem of arithmetic. (10 marks)

OR

14 Prove that by using mathematical induction, that for all $n \geq 1$, $n^3 + 2n$ is a multiple of 3. (10 marks)

15 Show that $R \vee S$ follows logically from the premises
$(C \vee D), (C \vee D) \rightarrow \neg H, \neg H \rightarrow (A \wedge \neg B) and (A \wedge \neg B) \rightarrow R \vee S$. (10 marks)

OR

16 Show that the hypothesis, "It is not sunny this afternoon and it is colder than yesterday", "we will go swimming only if it is not sunny", "If we go for swimming, then we will take a canoe trip" and "If we take a Canoe trip then we will be home by sunset" lead to the conclusion "we will be home by sunset". (10 marks)

17 Show that the set of all non-zero real numbers is a group under the operation $*$ defined by $a * b = ab/2$. (10 marks)

OR

18 Prove that every subgroup of a cyclic group is cyclic. (10 marks)

19 A connected graph is Euler graph if and only if each pair of its vertices is of even degree. (10 marks)

OR

20 Give an example of a graph which is
(i) Eulerian but not Hamiltonian. (2 marks)
(ii) Hamiltonian but not Eulerian. (2 marks)
(iii) both Eulerian and Hamiltonian. (3 marks)
(iv) not an Eulerian and not a Hamiltonian. (3 marks)