R18 Regulation *Subject code:* **2B4EA**

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, July 2022

DISCRETE MATHEMATICS

(Common to CSE & IT)

Maximum Marks: 70 Date:20.07.2022 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 If R is a relation on the set A={ 1,2,3,4} defined by x R y if x exactly divides y .Prove that (A,R) is a poset.

2 Let f and g be functions from R to R defined by f(x)=ax+b ,g(x)= 1-x+ x^2 . If (gof) =$9x^2$-9x+3,determine a,b

3 Explain about Mathematical Induction

4 Explain with an example of pair wise relatively primes

5 Construct the truth table of $(P \wedge Q) \rightarrow P$

6 Write the rule of modus tollens of predicates

7 If aob=a+b+ab$\forall$ a,b$\in$Z S.T (Z,0) is a semi group.

8 Define cyclic group with an example.

9 Define complete bipartite graph with example

10 Define the following terms with suitable example of i) Complete graph ii)regular graph

Part-B

Answer All the following questions. (10M X 5=50Marks)

11 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. [5+5]

OR

12 a) Let X={1,2,3,4,5,} and relation R={(x,y)/x>y}.Draw the graph of 'R' and also give its matrix.
b) What is Compatibility relation and Write the procedure to find compatibility blocks. [5+5]

13 a) Describe set of rooted trees recursively?

b) Show that if a,b,c are integers such that a/b and a/c then a/mb+nc where m, n are integers. [5+5]

OR

14 State and Prove Division algorithm theorem using well ordering principle. [10]

15 Prove that for any three propositions P,Q,R the compound proposition $((P \to (Q \to R)) \to ((P \to Q) \to (P \to R))$ is a tautology by
i) with truth table ii) with laws of logic [10]

OR

16 a) Show that the following set of premises are inconsistent
$P \to Q, P \to R, Q \to \sim R, P$
b) 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. [5+5]

17 a) Construct composition table for the roots of equation $x^4 = 1$ and Show that it is a group with respect to operation multiplication.
b) Prove that every finite group of order 'n' is isomorphic to permutation group of degree 'n'. [5+5]

OR

18 a) Prove that in a group its identity element, inverse element is unique.
b) State and prove Lagrange's theorem on cosets. [5+5]

19 a) Define graph coloring and chromatic number of a graph and find the chromatic number of
i) $K_{3,3}$ ii) cycle with even number of vertices
b) Define the following terms. Give one suitable example for each. [5+5]

i) Euler circuit ii) Hamiltonian graph

OR

20 a) State and prove Euler's formula in plane graphs.
b) Write the conditions to construct dual of the graph and construct dual of the following graph whose adjacency list given. [5+5]

vertices	Adjacent vertices
a	b,c
b	a,c,e
c	a,d,e,b
d	c
e	b,c