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 2024

DISCRETE MATHEMATICS

(Common to CSE & IT)

Maximum Marks: 70 Date:18.07.2024 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.

	Part-A		
All the following questions carry equal marks (10X2M=20 Marks)		CO	Bloom Tx
1	Let R= { [1,1] [2,2] [3,3] [4,4] [5,5] [1,2] [2,1] [5,4] [4,5]} be the equivalence relation on A = {1,2,3,4,5} Find equivalence classes and A/R	1	L1
2	Find the inverse of the function f(x) = e^x defined from R to R^+.	1	L1
3	Explain about Mathematical Induction	2	L1
4	Explain with an example of pair wise relatively primes	2	L1
5	Construct the truth table of (PVQ) $\rightarrow$ P	3	L1
6	Write the rule of disjunctive amplification of predicates	3	L1
7	If aob=a+b+ab$\forall$ a,b$\in$Z S.T (Z,0) is a semi group.	4	L1
8	Define cyclic group with an example.	4	L1
9	Define complete bipartite graph with example	5	L1
10	Define the following terms with suitable example of i) Complete graph ii)regular graph	5	L1
	Part-B		
Answer All the following questions. (5X10M=50Marks)			
11	Let A be any finite set and P(A) be the power set of A.$\subseteq$ be the inclusion relation on the elements of P(A). Draw the Hasse diagrams of (P(A),$\subseteq$) for i) A = {a} ii) A = {a,b} iii) A = {a,b,c} IV) A = {a,b,c,d} [10]	1	L2
	OR		
12	Let A = B = {x/ -1$\leq x \leq$ 1} for each of the following functions state whether it is injective, surjective or bijective a) f(x) = IxI b) g(x) = sinπx c) h(x) = $\frac{2x+3}{5}$ [10]	1	L2
13	a) Use Mathematical Induction to prove the following generalization of one of Demorgan's laws $(\cap_{j=1}^{n} A_j)' = \cup_{j=1}^{n} A_j'$ where $A_1, A_2, A_3, \ldots\ldots A_n$ are subsets of universal set U. [5]	2	L2

	b) Prove that if a/bc and (a,b)=1 then a/c. [5]		
	OR		
14	State and Prove Division algorithm theorem using well ordering principle.[10]	2	L2
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]	3	L2
	OR		
16	a) Show that the following set of premises are inconsistent [5] $P \to Q, P \to R, Q \to \sim R, P$ 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]	3	L2
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. [5] b) Prove that every finite group of order 'n' is isomorphic to permutation group of degree 'n'. [5]	4	L2
	OR		
18	a) Prove that G ={0,1,2,3,4,5,6} is an abelian group of order 7 with respect to addition modulo 7. [5] b) Define subgroup, normal subgroup, Quotient group, left and right cosets with an example for each. [5]	4	L2
19	a) State and prove Euler's theorem on plane graphs. [5] b) Define isomorphism of graphs. What are the steps followed in discovering the isomorphism. [5]	5	L2
	OR		
20	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 [5] b) Define the following terms. Give one suitable example for each [5] i) Euler circuit ii) Hamiltonian graph	5	L2