



R18 Regulation

Subject code: 2B4EA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, February 2024

DISCRETE MATHEMATICS

(Common to CSE & IT)

Maximum Marks: 70

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	L3
2	Find the inverse of the function $f(x) = e^x$ defined from R to R^+ .	1	L3
3	Explain about Mathematical Induction	2	L2
4	Explain with an example of pair wise relatively primes	2	L2
5	Construct the truth table of $(PVQ) \rightarrow P$	3	L3
6	Write the rule of disjunctive amplification of predicates	3	L2
7	Show that binary operation $*$ defined on $(R, *)$ where $x*y = x^y$ is not associative.	4	L2
8	Explain about Normal subgroup of a group.	4	L2
9	Explain about complete bipartite graph with example	5	L2
10	Explain about Complete graph.	5	L2

Part-B

Answer All the following questions. (5X10M=50Marks)			
11	a) Draw the Hasse diagram representing the positive divisors of 36. [5] b) Show that the relation 'R' defined by $(a,b) R (c,d)$ iff $a+d=b+c$ is an equivalence relation. [5]	1	L3
OR			
12	a) If $X = \{1,2,3,4\}$ and $R = \{(x,y)/x < y\}$ Draw the graph of 'R' and also give its matrix. [5] b) Write the procedure to find the maximal compatibility blocks to a compatibility relation. [5]	1	L3
13	a) Use Mathematical Induction to prove the following generalization of one of Demorgan's laws. [5] $(\cap_{j=1}^n A_j)' = \cup_{j=1}^n A_j'$ where $A_1, A_2, A_3, \dots, A_n$ are subsets of universal set U b) Prove that if a/bc and $(a,b)=1$ then a/c . [5]	2 2	L5

	OR																										
14	State and Prove Division algorithm theorem using well ordering principle. [10]	2	L5																								
15	Prove that for any three propositions P,Q,R the compound proposition $((P \rightarrow (Q \rightarrow R)) \rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R)))$ is a tautology by i) with truth table ii) with laws of logic [5+5]	3	L5																								
	OR																										
16	a) Show that the following set of premises are inconsistent. [5] $P \rightarrow Q, P \rightarrow R, Q \rightarrow \sim R, P$ 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	L3																								
	OR																										
18	a) If 'G' is a group then prove that $(a^{-1})^{-1}=a$. [5] b) Prove that $G =\{0,1,2,3,4\}$ is an abelian group of order 5 with respect to addition modulo 5. [5]	4	L3																								
19	Two graphs with the following adjacency list are given, show that they are isomorphic to each other. [10] Graph G <table><tr><td>vertices</td><td>Adjacent vertices</td></tr><tr><td>a</td><td>b,c</td></tr><tr><td>b</td><td>a</td></tr><tr><td>c</td><td>a,d,e</td></tr><tr><td>d</td><td>c</td></tr><tr><td>e</td><td>c</td></tr></table> Graph H <table><tr><td>vertices</td><td>Adjacent vertices</td></tr><tr><td>k</td><td>l</td></tr><tr><td>l</td><td>k,m,n</td></tr><tr><td>m</td><td>l</td></tr><tr><td>n</td><td>l,o</td></tr><tr><td>o</td><td>n</td></tr></table>	vertices	Adjacent vertices	a	b,c	b	a	c	a,d,e	d	c	e	c	vertices	Adjacent vertices	k	l	l	k,m,n	m	l	n	l,o	o	n	5	L5
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20	Write the conditions to construct dual of the graph and construct dual of the following graph whose adjacency list given. [10] <table><tr><td>vertices</td><td>Adjacent vertices</td></tr><tr><td>a</td><td>b,c</td></tr><tr><td>b</td><td>a,c,e</td></tr><tr><td>c</td><td>a,d,e,b</td></tr><tr><td>d</td><td>c</td></tr><tr><td>e</td><td>b,c</td></tr></table>	vertices	Adjacent vertices	a	b,c	b	a,c,e	c	a,d,e,b	d	c	e	b,c	5	L5												
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