Course Name: Discrete Mathematical Structures

Course Outcomes (CO):

1. Apply logic and rules of inference to draw a conclusion from a set of premises in a finite sequence of steps.
2. Apply principles of sets operations and functions.
3. Apply various operations on sets and represent them using Venn diagram.
4. Use the fundamental counting principles to determine the number of outcomes for a specified problem.
5. Develop the recurrence relation for the given problems
6. Discuss and differentiate the types of functions, relations and groups.

Model Question Paper
Total Duration (H: M): 3:00
Course: Discrete Mathematical Structures
Maximum Marks: 100

Note: Answer Any two questions from UNIT I, UNIT II and one question from UNIT III

Q.No	**Questions**	**Marks**	**CO**	**BL**	**PI**
	UNIT I				
1a	Use the set bilder method, identify the following set **(i)** **A={1,3,5,7,9………….}** **(ii)** **D={1/2,2/3,3/4,4/5……….}**	4	CO2	L3	1.1.1
1b	Use the Raster Method to identify each of the sets (i) The set of even positive integers that are divisible by 10 (ii) The set of vowels in English alphabets which predecessor r √	4	CO 1	L3	1.1.1
1c	For any set A and B show that **(i)** **P(AUB)= P(A)∩P(B)** **(ii)** **P(A)UP(B)CP(AUB)**	4	CO1	L2	1.1.1

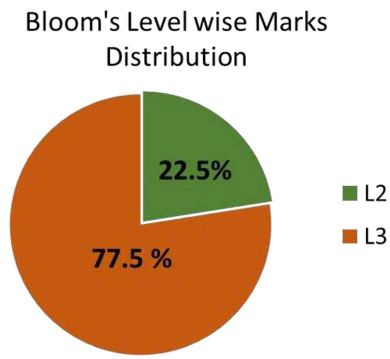
Q.No	**Questions**	**Marks**	**CO**	**BL**	**PI**
2a	Let **A = {-2,-1, 0, 1, 2},** the function f:A→**R** be defined by the formula $f(x) = x^2 + 1$, find the range of **f.**	4	CO 2	L2	1.1.1
2b	Let **S-{1, 2, 3, 4, 5}** and A=SXS. Define the relation R **on A :(a,b)R(c,d)** if and only if **ad = bc**, show that R is an equivalence relation.	4	CO 1	L3	1.1.1
2c	If **A ={1,2,3,4}** and **B ={p,q},** then find AXB and BXA and represent by the tree diagram.	4	CO1	L3	1.1.1

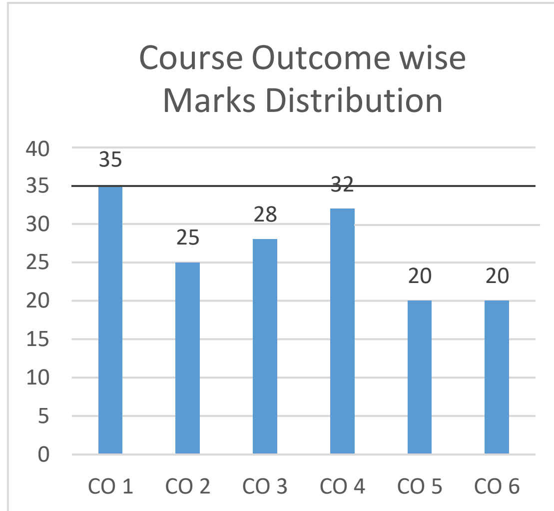
3a	Define Graph; Properties of Graph, and Bipartite Graph, K- regular Graph, Sub-Graph, Vertex disjoint Sub-Graph, and Edge disjoint Sub-Graph with example.	4	CO 2	L2	1.1.1
3b	Prove that the sum of the degree of all vertices of a Graph is twice the number of edges in graph $$\sum_{i}^{n} \mathbf{deg(v_i) = 2q}$$ And also prove that the number of vertices of add degree in a graph G is always even	4	CO 1	L3	1.1.1
UNIT II					
4a	Determine whether the following statement are Tautologies, r : ~(p ^{v} ~q)v(q ^~p) and also define Logical equivalence and Logical implication with example.	4	CO4	L3	1.1.1

Q.No	**Questions**	**Marks**	**CO**	**BL**	**PI**
b	Obtain Disjunction Normal form (DNF) of ~ (p v q)↔(p ^ q)	4	CO4	L3	1.1.1
c	Let S={a,b,c} and A=P(S), is a poset with the partial order (set inclusion) and A=[{ø} ,{a},{b},{c},{a,b}.{a,c},{b,c},{a,b,c}]. Draw Hasse digram of A	4	CO3	L2	1.1.1
5a	prove that the set of all nth roots of unity forms a finite abelian group of order n with respect to multiplication .	4	CO3	L3	1.1.1
b	Show that the set G={a+b√2 :a,b € Q} is a group with respect to addition Note:- €:- means belongs to	4	CO4	L2	1.1.1
c	Let H be a sub group of a group G and define T ={x€G: xH =Hx} Prove that T is a subgroup of G	4	CO4	L3	1.1.1

6a	**If X and y are the two finite sets, such that n(X U Y) = 36, n(X) = 20, n(Y) = 28, then find n(X ∩ Y).**	4	CO4	L3	1.1.1

Q.No	Questions	Marks	CO	BL	PI
b	**In a group of 100 students, 72 students can speak English and 43 students can speak Hindi. Based on these data, answer the following questions:** a. **Find the number of students who can speak English only.** b. **Find the number of students who can speak Hindi only.** c. **Find the number of students who can speak both English and Hindi.**	5	CO3	L3	1.1.1
c	**Simplify the expression (x + y)(x + z) using the laws of boolean algebra.**	5	CO3	L2	1.1.1
	UNIT III				
7a	Find the particular solution of the difference equations. $a_{r+2}-2a_{r+1}+a_r=3r+5.$	5	CO5	L3	1.1.2
b	Define Ring and Field .If R is a ring then for all a,b,c € Rthen prove that (i) a0=0a=0 (ii) a(-b)= -(ab) = (-a)(b).	5	CO5	L2	1.1.2
c	To verify that the existentially quantified statement for some real number x,$(1/1+x^2)$ is false	5	CO5	L3	1.1.2
8a	Find the Conjunctive normal form(CNF) of the function f= [x ^ (y` v z)] v z`and then find its Disjunctive normal form(DNF) from it	5	CO6	L3	1.1.1
b	To prove that $(ab)^{-1} = b^{-1}a^{-1}$ a,b G ie. the inverse of the product of two elements of a group G is product of the inverse taken in the reverse order	5	CO6	L2	1.1.1
c	Let R+ be the multiplication group of all possible real numbers and R be the additive group of all real numbers . Show that the mapping g: R+ → R defined by g(x) = logx V,x€ R+ is an isomorphism. Note:- V means for all	5	CO6	L2	1.1.1





BL – Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3 – Applying, 4 – Analysing, 5 – Evaluating, 6 - Creating)CO – Course Outcomes
PO – Program Outcomes; PI Code – Performance Indicator Code