Batch 1 ALL CT QP's AY 2024

Discrete Maths (SRM Institute of Science and Technology)

SRM Institute of Science and Technology
College of Engineering and Technology
DEPARTMENT OF MATHEMATICS
Academic Year: 2024-2025 ODD

SLOT- C1
Set A

Test: FT- II
Course Code & Title: 21MAB302T /Discrete Mathematics
Year & Sem: III/ V

Date: 20 / 08 / 2024
Duration: 60 min
Max. Marks: 30

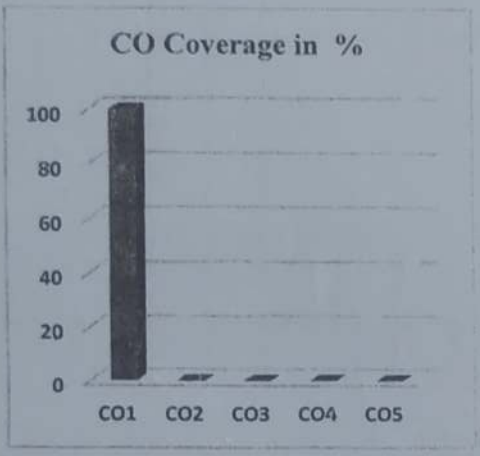
Course Articulation Matrix:

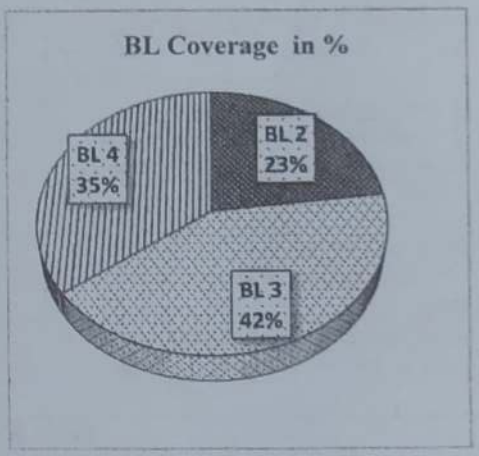
At the end of this course, learners will be able to:		Program Outcomes (PO)											
Course Outcomes (CO)		1	2	3	4	5	6	7	8	9	10	11	12
CO1	Apply the concepts of set theory and its operations in data structures and mathematical modelling languages	3	3										
CO2	Solve problems using counting techniques and understanding the basics of number theory	3	3										
CO3	Comprehend and validate the logical arguments using concepts of inference theory	3	3										
CO4	Inculcate the curiosity for applying the concepts of algebraic structures to coding theory	3	3										
CO5	Apply graph theory techniques to solve wide variety of real world problems	3	3										

Part – A (2 x 8 = 16 Marks)
Answer any TWO questions

Q. No.	Questions	Marks	BL	CO	PO	PI Code
1	i. Simplify using set identities $\bar{A} \cup \bar{B} \cup (A \cap B \cap \bar{C})$. ii. Draw Hasse diagram for the partial ordering R defined as aRb if and only if "a divides b" on the set $A = \{2,4,5,10,12,20,25\}$.	8 (4+4)	2	1	1	1.2.1
2	If R be a relation defined on the natural number set such that aRb if and only if $a^2 + b$ is even. Show that R is an equivalence relation.	8	3	1	2	2.8.1
3	If $f, g, h: \mathbb{R} \to \mathbb{R}$, defined by $f(x) = 3x + 1$, $g(x) = x^2$ and $h(x) = \frac{1}{x}$, then verify that $f \circ (g \circ h) = (f \circ g) \circ h$.	8	3	1	2	2.8.1

Part – B (1 x 14 = 14 Marks) Answer any one question						
4 a)	Find the transitive closure of the relation $R = \{(1,2),(2,1),(2,3),(3,4),(4,5),(5,5)\}$ on the set $A = \{1,2,3,4,5\}$ using Warshall's algorithm.	14	4	1	2	2.8.1
5 a)	i. Prove that the necessary and sufficient condition for a function $f: A \to B$ to be invertible is that f is one-one and onto. ii. Show the function $f: \mathbb{R} \to \mathbb{R}$ defined by $f = \{(x,y) \mid ax + by = c,\ b \neq 0\}$ is invertible and then find the inverse.	14 (7+7)	4	1	2	2.8.1





Evaluation Sheet

Name of the Student:

Register No.

R	A													

Q. No	CO	Marks Scored	Total
1	1		
2	1		
3	1		
4	1		
5	1		

Consolidated Marks:

CO	Marks Scored
CO 1	
Total	

Signature of the course faculty

SRM Institute of Science and Technology
College of Engineering and Technology
DEPARTMENT OF MATHEMATICS
Academic Year: 2024-2025 ODD

SLOT- C1
Set B

Test: FT -II
Course Code & Title: 21MAB302T / Discrete Mathematics
Year & Sem: III/ V

Date: 20 / 08 / 2024
Duration: 60 min
Max. Marks: 30

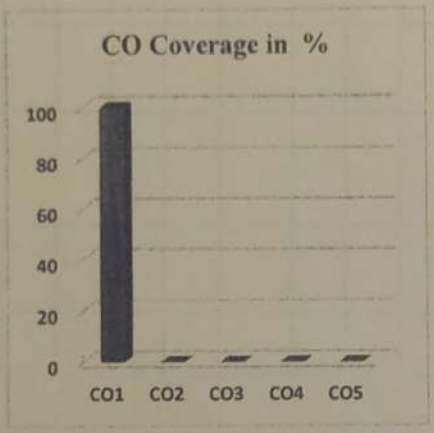
Course Articulation Matrix:

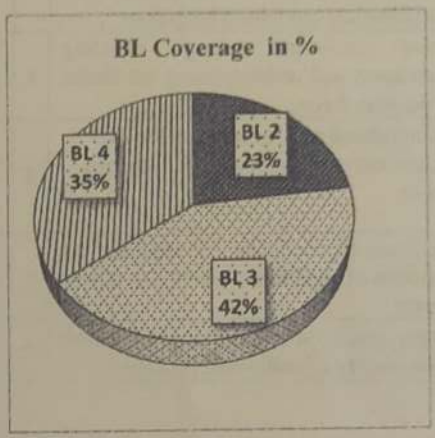
At the end of this course, learners will be able to:		Program Outcomes (PO)											
Course Outcomes (CO)		1	2	3	4	5	6	7	8	9	10	11	12
CO1	Apply the concepts of set theory and its operations in data structures and mathematical modelling languages	3	3										
CO2	Solve problems using counting techniques and understanding the basics of number theory	3	3										
CO3	Comprehend and validate the logical arguments using concepts of inference theory	3	3										
CO4	Inculcate the curiosity for applying the concepts of algebraic structures to coding theory	3	3										
CO5	Apply graph theory techniques to solve wide variety of real world problems	3	3										

Part – A (2 x 8 = 16 Marks)
Answer any TWO questions

Q. No.	Questions	Marks	BL	CO	PO	PI Code
1	i. Simplify the following expression $\overline{(A \cup B)} \cap \overline{(\bar{A} \cup \bar{C})} \cap \overline{(\bar{B} \cup C)}$ using set identities. ii. Draw the Hasse diagram for $(D_{12}, \mid)$ where D_{12} is the set of positive divisors of 12.	8 (4+4)	2	1	1	1.2.1
2	If R be a relation defined on the set of integers such that aRb if and only if $3a + 4b = 7n$ for some integer n, then prove that R is an equivalence relation.	8	3	1	2	2.8.1
3	If $f, g, h: \mathbb{R} \to \mathbb{R}$, defined by $f(x) = x + 2$, $g(x) = \frac{1}{x^2+1}$ and $h(x) = 5$, find $(f \circ (g \circ h))(x)$ and $((f \circ g) \circ h)(x)$ and then verify that $f \circ (g \circ h) = (f \circ g) \circ h$.	8	3	1	2	2.8.1

Part – B (1 x 14 = 14 Marks) Answer any one question						
4	Find the transitive closure of the relation $R = \{(a,e),(b,d),(c,c),(d,b),(e,a)\}$ on the set $A = \{a,b,c,d,e\}$ using Warshall's algorithm.	14	4	1	2	2.8.1
5	i. If $f: A \to B$ and $g: B \to C$ are invertible functions, then prove that $g \circ f: A \to C$ is also invertible and $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$. ii. Show that the function $f: \mathbb{R} \to \mathbb{R}$ defined by $f(x) = 2x + 3$ is invertible and then find the inverse.	14 (7+7)	4	1	2	2.8.1





Evaluation Sheet

Name of the Student:

Register No.

R	A												

Q. No	CO	Marks Scored	Total
1	1		
2	1		
3	1		
4	1		
5	1		

Consolidated Marks:

CO	Marks Scored
CO 1	
Total	

Signature of the course faculty

SRM

C1 SLOT-Set A

SRM Institute of Science and Technology
College of Engineering and Technology
Department of Mathematics
SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu
Academic Year: 2024-25 (ODD)

Test: FT-III
Course Code &Title: 21MAB302T-Discrete Mathematics
Year & Sem: III & V

Date: 26/09/2024
Duration: 2 Periods (100 minutes)
Max. Marks: 50 marks

21MAB302T – Discrete Mathematics		Program Outcomes (POs)													
		Graduate Attributes												PSO	
S. No.	Course Outcomes (COs)	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Apply the concepts of set theory and its operations in data structure and mathematical modeling languages	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Solve problems using counting techniques and understand the basics of number theory	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Comprehend and validate the logical arguments using concepts of inference theory	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Inculcate the curiosity for applying the concepts of algebraic structures to coding theory	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Apply graph theory techniques to solve wide variety of real-world problems	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-

Part – A (1x 4 = 4 Marks)
Answer ALL questions

Q. No	Questions	Marks	BL	CO	PO
1	The number of permutations of a set of k elements is (a) k! (b) (k-1)! (c) (k+1)! (d) (k+2)!	1	1	2	2
2	If a|b and a|c , then (a) b|a (b) c|a (c) a|b+c (d) b|c	1	2	2	2
3	The dual of the statement $P \wedge (Q \vee (R \wedge T))$ is (a) $P \vee (Q \wedge (R \wedge F))$ (b) $P \vee (Q \vee (R \vee T))$ (c) $P \vee (Q \wedge (R \vee T))$ (d) $P \vee (Q \wedge (R \vee F))$	1	2	3	2
4	The contra positive statement of $\neg R \rightarrow S$ is (a) $S \rightarrow R$ (b) $R \rightarrow S$ (c) $\neg S \rightarrow R$ (d) $S \rightarrow \neg R$	1	1	3	2

Part – B (2x 8 = 16 Marks)
Answer any TWO questions

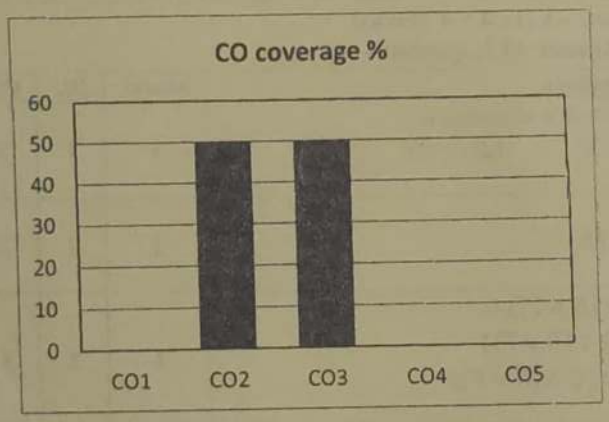
Q.No	Questions	Marks	BL	CO	PO
5	(a If there are 5 points inside a square of side of length 2, prove that two of the points are within a distance of $\sqrt{2}$ of each other.	4	3	2	2
	(b) Find the gcd (512, 320) and lcm (512, 320) by prime factorization technique.	4	2	2	2
6	(a) Find the number of possible ways in which the letters of the word COTTON can be arranged so that the two T's does not appear together.	4	3	2	2
	(b) Construct the truth table for the following compound proposition $(p \leftrightarrow q) \leftrightarrow ((p \wedge q) \vee (\neg p \wedge \neg q))$	4	2	3	2
7	Using Mathematical Induction, show that $a^n - b^n$ is divisible by $(a - b)$ for all $n \in N$.	8	3	3	2

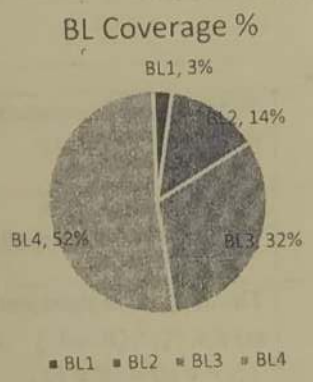
PART – C (2 x 15 = 30 Marks)
Answer any TWO questions

8	Use Euclidean algorithm to find gcd (28844, 15712). Hence determine m and n such that gcd (28844, 15712) = 28844m + 15712n.	15	4	2	2

9	(a) A total of 1232 students have taken a course in Tamil, 879 have taken a course in English and 114 have taken a course in Hindi. Further, 103 have taken courses in both Tamil and English, 23 have taken courses in both Tamil and Hindi and 14 have taken courses in both English and Hindi. If 2092 students have taken at least one of Tamil, English and Hindi, how many students have taken a course in all the three languages?	8	4	2	2
	(b) Without using truth table prove the following $[(p \vee q) \wedge (p \rightarrow r) \wedge (q \rightarrow r)] \Rightarrow r$.	7	3	3	2
10	(a) If it rains heavily, then travelling will be difficult. If students arrive on time then travelling was not difficult. They arrived on time. Therefore, it did not rain heavily (Use Direct Method).	8	4	3	2
	(b) Prove the following using the CP-rule $P \rightarrow (Q \rightarrow S), \neg R \vee P, Q \Rightarrow R \rightarrow S$.	7	4	3	2

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





Name of the Student: R A

Part- A (4*1= 4 Marks)				
Q. No	CO	Max. Marks	Marks Obtained	Total
1	2	1		
2	2	1		
3	3	1		
4	3	1		

Part- B (2 *8 = 16 Marks)				
5(a)	2	4		
5(b)	2	4		
6(a)	2	4		
6(b)	3	4		
7	3	8		
Part- C (2 * 15 = 30 Marks)				
8	2	15		
9(a)	2	8		
9(b)	3	7		
10(a)	3	8		
10(b)	3	7		
Total Marks Obtained				

CO Attainment

CO	Marks Scored
CO2	
CO3	
Total	

Signature of the Course Teacher

SRM

C1 SLOT-Set B

SRM Institute of Science and Technology
College of Engineering and Technology
Department of Mathematics
SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu
Academic Year: 2024-25 (ODD)

Test: FT-III
Course Code &Title: 21MAB302T-Discrete Mathematics
Year & Sem: III & V

Date: 26/09/2024
Duration: 2 Periods (100 minutes)
Max. Marks: 50 marks

21MAB302T – Discrete Mathematics for Engineers		Program Outcomes (POs)													
		Graduate Attributes											PSO		
S. No.	Course Outcomes (COs)	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Apply the concepts of set theory and its operations in data structure and mathematical modeling languages	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Solve problems using counting techniques and understand the basics of number theory	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Comprehend and validate the logical arguments using concepts of inference theory	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Inculcate the curiosity for applying the concepts of algebraic structures to coding theory	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Apply graph theory techniques to solve wide variety of real-world problems	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-

Part – A (1x 4 = 4 Marks)
Answer ALL questions

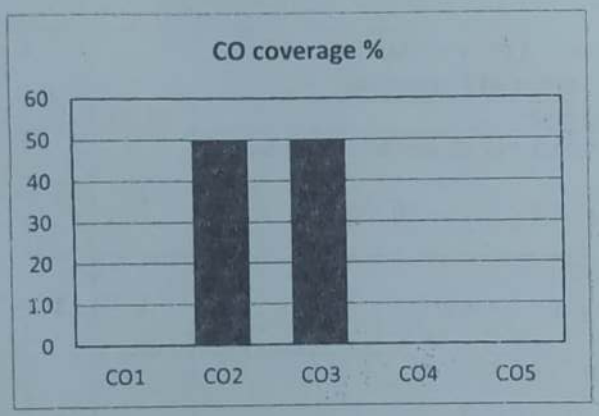
Q. No	Questions	Marks	BL	CO	PO
1	In how many different ways 7 different beads can arrange to form a necklace? (a) 250 (b) 300 (c) 360 (d) 350	1	1	2	2
2	If gcd (a, b) = 1 then the gcd (Ka, Kb) = ? (a) 1 (b) K (c) 2K (d) does not exists	1	2	2	2
3	The dual of the statement $(P \wedge Q) \vee (R \wedge S)$ is (a) $(P \wedge Q) \wedge (R \wedge S)$ (b) $(P \vee Q) \wedge (R \vee S)$ (c) $(P \wedge Q) \vee (R \vee S)$ (d) $(P \vee Q) \vee (R \vee S)$	1	2	3	2
4	The inverse statement of $\neg R \rightarrow S$ is (a) $S \rightarrow R$ (b) $R \rightarrow \neg S$ (c) $\neg S \rightarrow R$ (d) $S \rightarrow \neg R$	1	1	3	2

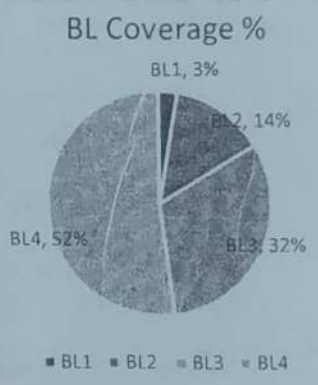
Part – B (2x 8 = 16 Marks)
Answer any TWO questions

Q.No	Questions	Marks	BL	CO	PO
5	**(a)** A man walked for 10 hrs and covered a total distance of 45 km. It is known that he walks 6 km in the first hour and 3 km in the last hour. Show that he must have walked at least 9km within a certain period of 2 consecutive hours.	4	3	2	2
	(b) Find the gcd (231,1575) and lcm (231, 1575) by prime factorization technique.	4	2	2	2
6	**(a)** In how many ways 5 boys and 4 girls can be seated at a round table if (i) all the four girls sit together (ii) all the four girls do not sit together	4	3	2	2
	(b) Using truth table, show that $[p \wedge (\neg q \wedge (p \rightarrow q))]$ is a contradiction.	4	2	3	2
7	Using mathematical induction prove the following statement "$n^3 + 2n$ is divisible by 3, for every integer n"	8	3	3	2

PART – C (2 x 15 = 30 Marks) Answer any TWO questions					
8	Use Euclidean algorithm to find gcd (12344, 15712). Hence determine m and n such that gcd (12344, 15712) = $12344m + 15712n$.	15	4	2	2
9	(a) Find the number of positive integers between 1 and 250 which are not divisible by any of 2, 3, and 5.	8	4	2	2
	(b) Without using truth tables, prove that $p \rightarrow (q \rightarrow p) \equiv \neg p \rightarrow (p \rightarrow q)$	7	3	3	2
10	(a) Show that the following set of premises is inconsistent: If Rama gets his degree, he will go for a job. If he goes for a job, he will get married soon. If Rama gets for higher study, he will not get married. Rama gets his degree and goes for higher study.	8	4	3	2
	(b) Use indirect method to show that, $\neg P$ can be derived from $R \rightarrow \neg Q, R \vee S$, $S \rightarrow \neg Q$, and $P \rightarrow Q$.	7	4	3	2

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





Name of the Student: R A

Part- A (4*1= 4 Marks)				
Q. No	CO	Max. Marks	Marks Obtained	Total
1	2	1		
2	2	1		
3	3	1		
4	3	1		

Part- B (2 *8 = 16 Marks)			
5(a)	2	4	
5(b)	2	4	
6(a)	2	4	
6(b)	3	4	
7	3	8	

Part- C (2 * 15 = 30 Marks)			
8	2	15	
9(a)	2	8	
9(b)	3	7	
10(a)	3	8	
10(b)	3	7	
Total Marks Obtained			

CO Attainment

CO	Marks Scored
CO2	
CO3	
Total	

Signature of the Course Teacher

C1 SLOT SET A

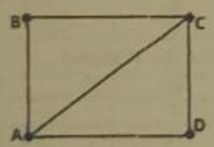
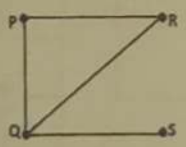
SRM Institute of Science and Technology
College of Engineering and Technology
Department of Mathematics
SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu
Academic Year: 2024-25 (ODD)

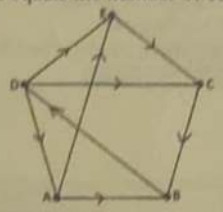
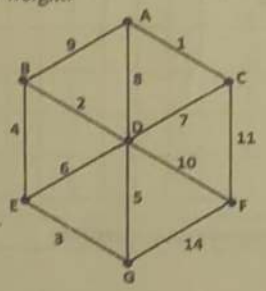
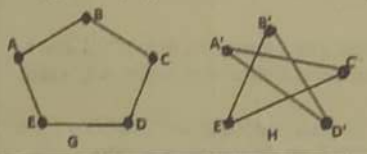
Test: FT-IV
Course Code &Title: 21MAB302T-Discrete Mathematics
Year & Sem: III & V

Date: 29/10/2024
Duration: 2 Periods (100 minutes)
Max. Marks: 50 marks

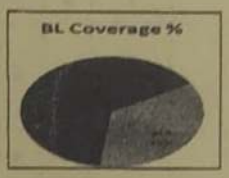
21MAB302T – Discrete Mathematics		Program Outcomes (POs)													
		Graduate Attributes											PSO		
S. No.	Course Outcomes (COs)	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Apply the concepts of set theory and its operations in data structure and mathematical modeling languages	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Solve problems using counting techniques and understand the basics of number theory	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Comprehend and validate the logical arguments using concepts of information theory	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Inculcate the curiosity for applying the concepts of algebraic structures to coding theory	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Apply graph theory techniques to solve wide variety of real-world problems	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-

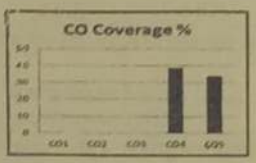
Part – A (1x 4 = 4 Marks) Answer ALL questions

Q. No	Questions	Marks	BL	CO	PO
1	Consider the two statements: (i) A cyclic group is abelian. (ii) If $\{G, \bullet\}$ is a finite cyclic group of order n with a as a generator, then a^m is also a generator of $\{G, \bullet\}$, if and only if the greatest common divisor of m and n is 1, where $m < n$. (A) Both the statement is true. (B) Statement (i) is true and (ii) is false. (C) Statement (i) is false and (ii) is true. (D) Both the statement is false.	1	1	4	2
2	The identity element of the group $\{Z_5, \times_5\}$ with multiplication modulo 5 is (A) 0 (B) -1 (C) 5 (D) 1	1	2	4	2
3	A simple graph, in which there is exactly one edge between each pair of distinct vertices, is called (A) Bipartite graph (B) Regular graph (C) Complete graph (D) Isomorphic graph	1	2	5	2
4	If $G = (V, E)$ is an undirected graph with e edges, then $\sum_i \deg(v_i)$ is equal to (A) $2e$ (B) $4e$ (C) e (D) None of these	1	1	5	2
	Part – B (2x 8 = 16 Marks)Answer any TWO questions				
5	If α and β are the elements of the symmetric group S_4, given by $\alpha = \begin{pmatrix}1&2&3&4\\3&4&2&1\end{pmatrix}$ and $\beta = \begin{pmatrix}1&2&3&4\\2&4&3&1\end{pmatrix}$, then find $\alpha\beta$, $\beta\alpha$, α^2 and α^{-1}.	8	3	4	2
6	(a) Prove that the inverse of each element of the group $\{G, \bullet\}$ is unique. (b) Find the Hamiltonian path and Hamiltonian circuit if it exist in the following graphs G and H  G  H	4 4	3 2	4 5	2 2
7	(a) Find the adjacency matrix and incidence matrix for the graph G with vertices $V = \{1, 2, 3, 4, 5\}$ and edges $\{e_1, e_2, e_3, e_4, e_5, e_6\}$ and defined by $e_1 = (1, 2)$, $e_2 = (1, 3)$, $e_3 = (2, 4)$, $e_4 = (3, 5)$, $e_5 = (4, 5)$, $e_6 = (1, 4)$. (b) Suppose there are 6 people at a party, and they all shake hands with each other. Each person shakes hands with every other person exactly once. Using handshaking theorem, determine how many handshakes will happen?	4 4	3 3	5 5	2 2
	PART – C (2 x 15 = 30 Marks) Answer any TWO questions				
8	(a) Show that the set Z_5 of equivalence classes modulo 5 is an abelian group under the operation $+_5$ of addition modulo 5. (b) Let $\{G, \bullet\}$ be a cyclic group generated by a, then prove that a^{-1} is also a generator.	10 5	4 4	4 4	2 2

9	(a) Find the code words generated by the parity check matrix $H = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ where the encoding function is $e: B^3 \to B^6$.	10	4	4	2
	(b) Find the in-degree and out-degree of each vertex of the following graph. Also verify the sum of the out-degree equals the number of edges. 	5	3	5	2
10	(a) Find the minimal spanning tree of the following graph using Kruskal's algorithm. Also find the minimum total weight. 	10	4	5	2
	(b) Show that the following pair of graphs G and H are isomor phic. 	5	4	5	2

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





R	A															

Name of the Student:

CO Attainment

Part- A (4*1= 4 Marks)				
Q. No	CO	Max. Marks	Marks Obtained	Total
1	4	1		
2	4	1		
3	5	1		
4	5	1		

CO	Marks Scored
CO4	
CO5	
Total	

Part- B (2 *8 = 16 Marks)				
5	4	8		
6(a)	4	4		
6(b)	5	4		
7(a)	5	4		
7(b)	5	4		
Part- C (2 * 15 = 30 Marks)				
8(a)	4	10		
8(b)	4	5		
9(a)	4	10		
9(b)	5	5		
10(a)	5	10		
10(b)	5	5		
Total Marks Obtained				

Signature of the Course Teacher

SRM

C1 SLOT SET B

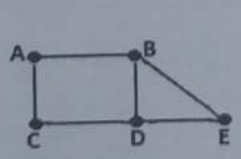
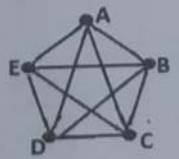
SRM Institute of Science and Technology
College of Engineering and Technology
Department of Mathematics
SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu
Academic Year: 2024-25 (ODD)

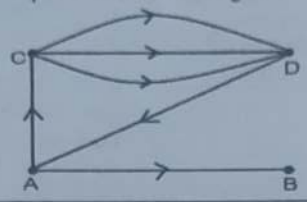
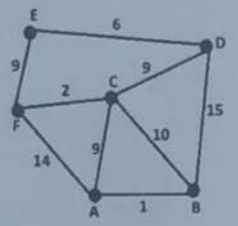
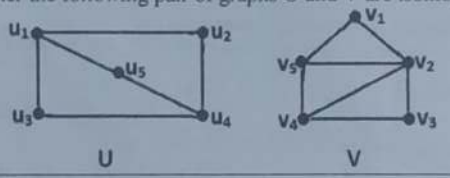
Test: FT-IV
Course Code &Title: 21MAB302T-Discrete Mathematics
Year & Sem: III & V

Date: 29/10/2024
Duration: 2 Periods (100 minutes)
Max. Marks: 50 marks

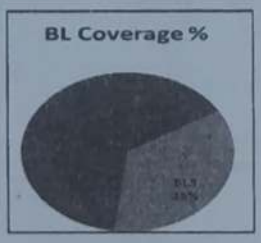
21MAB302T – Discrete Mathematics		Program Outcomes (POs)												PSO		
		Graduate Attributes														
S. No.	Course Outcomes (COs)	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Apply the concepts of set theory and its operations in data structure and mathematical modeling languages	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Solve problems using counting techniques and understand the basics of number theory	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Comprehend and validate the logical arguments using concepts of inference theory	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Inculcate the curiosity for applying the concepts of algebraic structures to coding theory	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Apply graph theory techniques to solve wide variety of real-world problems	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-

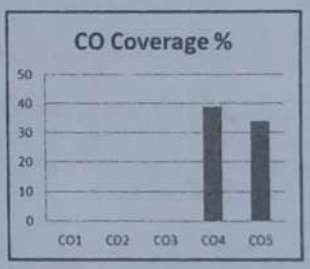
Part – A (1x 4 = 4 Marks) Answer ALL questions

Q. No	Questions	Marks	BL	CO	PO
1	The necessary and sufficient condition of the subset H to be a subgroup of a group $\{G, *\}$ is (A) for every $a, b \in H, a * b \in G$. (B) for every $a, b \in H, a * b \in H$. (C) for every $a, b \in H, a * b^{-1} \in G$. (D) for every $a, b \in H, a * b^{-1} \in H$.	1	1	4	2
2	The identity element of the group $\{Z_5, +_5\}$ with addition modulo 5 is (A) 0 (B) -1 (C) 5 (D) 1	1	2	4	2
3	A connected graph contains an Euler path, if and only if it has exactly two vertices of (A) even degree (B) zero degree (C) odd degree (D) does not depend upon degree of vertices	1	2	5	2
4	What is the minimum number of colors required for a complete graph with 4 vertices? (A) 1 (B) 4 (C) 2 (D) 3	1	1	5	2
	Part – B (2x 8 = 16 Marks) Answer any TWO questions				
5	If α and β are the elements of the symmetric group S_4, given by $\alpha = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 2 & 1 & 3 \end{pmatrix}$ and $\beta = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 1 & 2 & 4 \end{pmatrix}$, then find $\alpha\beta$, $\beta\alpha$, α^2 and α^{-1}.	8	3	4	2
6	**(a)** Prove that the intersection of any two subgroups of a group G is also a subgroup of G. **(b)** Find the Eulerian path and Eulerian circuit if it exist in the following graphs G and H.  G  H	4 4	3 2	4 5	2 2
7	Prove that the number of edges in a bipartite graph with n vertices is at most $\frac{n^2}{4}$.	8	3	5	2
	PART – C (2 x 15 = 30 Marks) Answer any TWO questions				
8	**(a)** Prove that the set $\mathbb{R} - \{1\}$ forms an abelian group with respect to $*$ defined by $a * b = (a + b - ab)$, for all $a, b \in \mathbb{R} - \{1\}$. **(b)** If $f: G \to G'$ is a group homomorphism from $\{G, *\}$ to $\{G', \cdot\}$. Prove that (i) $f(e) = e'$ where e and e' are the identity element of G and G' respectively (ii) for any $a \in G, f(a^{-1}) = [f(a)]^{-1}$.	10 5	4 4	4 4	2 2

9	**(a)** Given the generator matrix $G=\begin{pmatrix}1&0&0&1&1&0\\0&1&0&0&1&1\\0&0&1&1&0&1\end{pmatrix}$ corresponding to the encoding function is $e: B^3 \rightarrow B^6$. Find the corresponding Parity check matrix and use it to decode the following received words and hence to find the original message. (i) 110101 (ii) 110001	10	4	4	2
	(b) Find the in-degree and out-degree of each vertex of the following graph. Also verify the sum of the in-degree equals the number of edges. 	5	3	5	2
10	**(a)** Find the minimal spanning tree of the following graph using Kruskal's algorithm and also find the minimum total weight. 	10	4	5	2
	(b) Determine whether the following pair of graphs U and V are isomorphic. 	5	4	5	2

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





R	A														

Name of the Student:

CO Attainment

Part- A (4*1= 4 Marks)				
Q. No	CO	Max. Marks	Marks Obtained	Total
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CO	Marks Scored
CO4	
CO5	
Total	

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Signature of the Course Teacher