

Enroll No.....

Roll No.....

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School of Engineering Sciences & Technology
Even Semester Examination-2023(SUPPLEMENTARY)

Paper Name: DISCRETE MATHEMATICS

Paper Code: BTCSE 401

Time: 3 Hours

Maximum Marks: 75

Note: Mobile Phones or programmable calculator or any equipment with memory are not allowed inside the examination hall. Follow proper numbering for answering the questions.

Attempt all questions from section A ($7 \times 5 = 35$), Any four questions from section B ($4 \times 10 = 40$).

Section-A (Attempt all questions $7 \times 5 = 35$)

Q.N.	Questions	Marks	CO	BL
1	Prove that $G = \{1, 2, 3, 4, 5, 6\}$ with binary operation X_7 is cyclic.	5	CO4	L5
2	Find the number of permutations formed by taking all the letters of the following words 1. CALCULUS 2. MATHEMATICS	5	CO2	L2
3	If $f: \mathbb{Z} \rightarrow \mathbb{Z}$, $g: \mathbb{Z} \rightarrow \mathbb{Z}$ and $h: \mathbb{Z} \rightarrow \mathbb{Z}$ defined by $f(n) = n^2$, $g(n) = n + 1$ and $h(n) = n - 1$. Find $g \circ f \circ h$ and $h \circ f \circ g$.	5	CO1	L5
4	Distinguish between circuit and walk.	5	CO5	L1
5	Let $A = R - \{3\}$ and $B = R - \{1\}$. If $f: A \rightarrow B: f(x) = (x - 2)/(x - 3)$, show that f is bijective.	5	CO1	L5
6	Prove that every subgroup of an abelian group is always normal subgroup.	5	CO4	L1
7	Use truth tables to verify the commutative laws a) $p \vee q \Leftrightarrow q \vee p$ b) $p \wedge q \Leftrightarrow q \wedge p$	5	CO3	L3

Section- B (Attempt any four questions $4 \times 10 = 40$ Marks)

Q.N.	Questions	Marks	CO	BL
1	Let $(A, *)$ be a semigroup. Show that for any $a, b, c \in A$, if $a * c = c * a$ and $b * c = c * a$, then $(a * b) * c = c * (a * b)$.	10	CO4	L4
2	Define a tree. Explain the difference between rooted tree and binary tree.	10	CO5	L1
3	Use truth tables to verify the distributive laws $p \wedge (q \vee r) = (p \wedge q) \vee (p \wedge r)$	10	CO3	L6

4	Show that the relation R on the set of all triangles in the plane defined by $\mathbf{R} = \{ (a,b) : \text{triangle } a \text{ is similar to triangle } b \}$ is an equivalence relation.	10	CO1	L3
5	Write a note on various operations of graphs.	10	CO5	L1
6	Three men have 4 coats, 5 waistcoats and 6 caps. In how many ways can they wear them?	10	CO2	L5

BL-Bloom's Taxonomy Levels

(1. Remembering, 2. Understanding, 3. Applying, 4. Analysing, 5. Evaluating, 6. Creating.)