BACHELOR OF TECHNOLOGY (CBCS - 2023)
B. Tech. Sem-I Computer Science & Business Systems : WINTER: 2025
SUBJECT: DISCRETE MATHEMATICS

Day : Monday
Date : 08/12/2025

W-27621-2025

Time : 10:00 AM-01:00 PM
Max. Marks : 60

N.B.

1) All questions are **COMPULSORY.**
2) Figures to the **RIGHT** indicate **FULL** marks.
3) Draw neat diagrams **WHEREVER** necessary.
4) Use of non-programmable calculator is allowed

Q.1 Explain Rules of inference for propositional logic: (with the help of suitable examples) **(10)**
a) Modus Ponen b) Modus Tollen c) Hypothetical Syllogism
d) Disjunctive Syllogism e) Resolution

OR

Q.1 Let P & Q be the propositions: **(10)**
P : I bought a lottery ticket this week
Q : I won the million dollar jackpot on Friday
Explain each of these propositions as an English sentence:
a) $\neg P$ b) $P \vee Q$ c) $P \rightarrow Q$ d) $P \wedge Q$
e) $P \leftrightarrow Q$ f) $\neg P \rightarrow \neg Q$ g) $\neg P \wedge \neg Q$ f) $\neg P \vee (P \wedge Q)$

Q.2 What is canonical form? Explain CNF & DNF in detail with suitable examples. **(10)**

OR

Q.2 What is multiset? Explain operations on multisets (union, intersection, difference and sum of multisets) with suitable examples. **(10)**

Q.3 Explain various properties of relations with suitable examples. **(10)**

OR

Q.3 Explain pigeonhole principle with suitable diagrams along with different cases. **(10)**

Q.4 Explain 'semigroup' Algebraic structure, check whether the algebraic system (A, *) whose table is given below, is a semigroup **(10)**

*	a	b	c
a	a	b	c
b	a	c	b
c	a	b	c

OR

Q.4 Explain rings and group codes with suitable examples. Also explain Homomorphism, automorphism & Isomorphism of group. **(10)**

Q.5 Solve the following recurrence relation with iteration method: **(10)**
$T(P) = T(P-1) + 3 \quad P \geq 1$
& $T(0) = 2$ Also calculate the closed form for given equation.

OR

Q.5 Explain permutation & combination function with suitable examples. Also calculate permutation for:- **(10)**
How many necklace of 10 beads each can be made from 13 beads of different color?

Q.6 Explain various types of graph along with suitable diagrams. **(10)**

OR

Q.6 Explain Eulers path & Circuit and Hamitanion path & circuit with suitable examples. **(10)**

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