

BACHELOR OF TECHNOLOGY (CBCS - 2023)  
B. Tech. Sem-I CS&BS : WINTER : 2023  
SUBJECT : DISCRETE MATHEMATICS

Day : Thursday  
Date : 30-11-2023

W-27621-2023

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) Use of non-programmable **CALCULATOR** is allowed.

Q.1 Explain resolution principle with example in detail (10)

OR

Construct a table for following compound proposition:

- i)  $(p \rightarrow q) \leftrightarrow (\neg q \rightarrow \neg p)$
- ii)  $(p \leftrightarrow q) \oplus (p \rightarrow \neg q)$
- iii)  $(p \oplus q) \rightarrow (p \oplus \neg q)$
- iv)  $(p \leftrightarrow q) \vee (\neg p \leftrightarrow q)$
- v)  $(\neg p \leftrightarrow \neg q) \leftrightarrow (p \leftrightarrow q)$

Q.2 Explain basic set operation with examples and draw following venn diagram (10)  
of given operation:

- i)  $A \cap (B - C)$  ii)  $(A \cap B) \cup (A \cap C)$  iii)  $(A \cap \bar{B}) \cup (A \cap \bar{C})$
- iv)  $\bar{A} \cap \bar{B} \cap \bar{C}$

OR

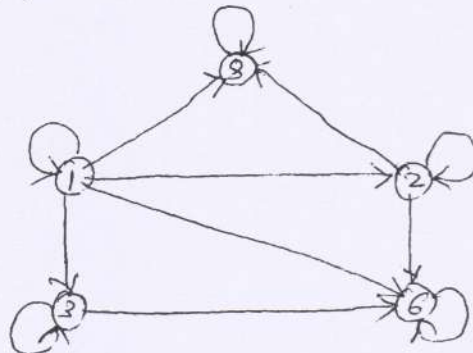
What is multisets? Explain operations on multisets (union, intersection, difference, sum of multisets) with suitable examples.

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

OR

What is Hasse diagram? Explain how to draw a Hasse diagram from given graph with each steps.

$A = \{1, 2, 3, 6, 8\}$



P.T.O.

- Q.4 Explain following Algebraic structures in detail: (10)  
i) Rings ii) Group codes

OR

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

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

- Q.5 Solve the following recurrence relation with characteristic root method (10)  
i)  $a_n - 6a_{n-1} - 8a_{n-2} = 0$   
(Homogeneous Equation)

OR

Explain combinatorics and basic counting principle. Also explain sum rule and product rule with suitable examples.

- Q.6 Explain isomorphism of a graph with suitable example. Also explain Bipartite graphs. (10)

OR

Explain Eulers path and circuit and Hamiltonian path and circuit with suitable examples.

\* \* \* \*