

BACHELOR OF TECHNOLOGY (CBCS - 2023)
B. Tech. Sem-II COMPUTER SCIENCE & ENGINEERING : SUMMER : 2024
SUBJECT: DISCRETE MATHEMATICAL STRUCTURES

Day : Thursday
Date : 30/05/2024

S-27696-2024

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) Assume suitable data **WHEREVER** necessary.
- 4) Draw neat diagrams **WHEREVER** necessary.

- Q.1** Construct truth table for following compound propositions: (10)
- i) $(p \rightarrow q) \leftrightarrow (\sim q \rightarrow p)$ ii) $(p \oplus q) \rightarrow (p \oplus \sim q)$
iii) $(p \leftrightarrow q) \vee (\sim p \leftrightarrow q)$ iv) $(\sim p \leftrightarrow \sim q) \leftrightarrow (p \leftrightarrow q)$
v) $(p \vee q) \rightarrow (p \wedge q)$

OR

- Q.1** Show that following propositions are logically equivalent. (10)
- i) $p \leftrightarrow q$ and $(p \wedge q) \vee (\sim p \wedge \sim q)$ are equivalent.
ii) $(p \rightarrow r) \wedge (q \rightarrow r)$ and $(p \vee q) \rightarrow r$ are equivalent.
iii) $\sim p \rightarrow (q \rightarrow r)$ and $q \rightarrow (p \vee r)$ are equivalent.

- Q.2** What is multiset? Explain operations on multiset with suitable examples. (10)

OR

- Q.2** Let A, B, C be the sets. show that: (10)
- a) $(A \cup B) \subseteq (A \cup B \cup C)$ b) $(A - B) - C \subseteq (A - C)$
c) $(A - C) \cap (C - B) = \phi$ d) $(B - A) \cup (C - A) = (B \cup C) - A$

- Q.3** What are different types of functions? Explain composition of functions with suitable diagram and examples. (10)

OR

- Q.3** What are the different properties of relations? Explain with suitable examples. (10)

- Q.4** Calculate minimum Hamming distance for following codes and rewrite the code using Evens parity check-bit. (10)
 $C = \{ 1001, 1101, 0010, 1110 \}$. Also explain Group codes with examples.

OR

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

P. T. O.

Q.5 What is Permutation? Explain with example. Also state the equation for permutation with repetition along with example. (10)

OR

Q.5 Solve the following Recurrence relation with Iteration method: (10)

$$T(p) = T(p-1) + 3 \quad P \geq 1$$

$$T(0) = 2.$$

Q.6 What is Binary tree? Explain. Also explain various properties of Binary trees. (10)

OR

Q.6 Explain shortest path Algorithm by nearest neighbor method using suitable example of graph. (10)

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