

**BACHELOR OF TECHNOLOGY (CBCS - 2023)**  
**B. Tech. Sem-II Computer Science & Engineering : SUMMER : 2025**  
**SUBJECT: DISCRETE MATHEMATICAL STRUCTURES**

Day : Friday  
Date : 30/05/2025

S-27696-2025

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 Resolution principle with example in detail (10)  
OR
- Q.1** Construction a table for following compound propositions: (10)
- a)  $(p \rightarrow q) \leftrightarrow (\neg q \rightarrow \neg p)$
  - b)  $(p \leftrightarrow q) \oplus (p \leftrightarrow \neg q)$
  - c)  $(p \oplus q) \rightarrow (p \oplus \neg q)$
  - d)  $(p \leftrightarrow q) \vee (\neg p \leftrightarrow q)$
  - e)  $(\neg p \leftrightarrow \neg q) \leftrightarrow (p \leftrightarrow q)$
- Q.2** Explain what is prime number. Also explain properties of prime numbers in detail along 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)  $(B - A) \cup (C - A) = (B \cup C) - A$
- Use suitable assumptions / Venn diagram to prove
- Q.3** What are different types of functions? Explain composition of functions with suitable diagrams & examples. (10)  
OR
- Q.3** Explain Pigeonhole principle with suitable diagrams along with different cases. (10)
- Q.4** Explain various Binary operations with respect to algebraic structures. (10)  
OR
- Q.4** Write a note on error recovery with respect to group codes in Algebraic structures. (10)
- Q.5** What is Permutation? Explain with suitable example. Also explain sum-rule & product - rule. (10)  
OR
- Q.5** Explain Iteration method for linear recurrence relation with the help of suitable example. (10)
- Q.6** What is a tree? Explain following Terminologies with respect of Tree with suitable diagrams: (10)
- |                           |                   |                     |
|---------------------------|-------------------|---------------------|
| a) Root node              | b) Degree of node | c) Parent node      |
| d) Child nodes            | e) Siblings       | f) Leaf node        |
| g) Internal node          | h) Level of tree  | i) Path of the tree |
| j) Depth / height of tree |                   |                     |
- OR
- Q.6** Explain shortest path Algorithm by nearest neighbor method using suitable example of graph. (10)

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