MODEL PAPER – 1
Bachelor of Computer Application (BCA)– Semester 2
Paper: Computer Networks
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)

1.

a) Define data communication and explain its components.

b) Explain communication model with diagram.

c) Define protocol architecture and its importance.

d) Explain OSI model.

e) Define transmission media and classify them.

f) Explain analog and digital data transmission.

g) Define flow control.

h) Explain Frequency Division Multiplexing (FDM).

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain OSI model in detail.
OR
(b) Compare TCP/IP model with OSI model.

3.(a) Explain guided and unguided transmission media.
OR
(b) Explain signal encoding techniques with examples.

4.(a) Explain asynchronous and synchronous transmission.
OR
(b) Explain error detection techniques with examples.

5.(a) Explain multiplexing techniques including FDM and TDM.
OR
(b) Explain HDLC protocol and its features.

MODEL PAPER – 2
Bachelor of Computer Application (BCA)– Semester 2
Paper: Computer Networks
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)

1.

a) Explain data networking and the Internet.

b) Define TCP/IP protocol architecture.

c) Explain transmission impairments.

d) Define guided transmission media with examples.

e) Explain digital to digital encoding techniques.

f) Define synchronous transmission.

g) Explain types of errors in data communication.

h) Define Time Division Multiplexing (TDM).

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain TCP/IP model and its layers.
OR
(b) Explain need and functions of protocol architecture.

3.(a) Explain analog and digital transmission techniques.
OR
(b) Explain signal encoding techniques in detail.

4.(a) Explain flow control and error control techniques.
OR
(b) Explain HDLC protocol with frame structure.

5.(a) Explain multiplexing techniques including synchronous and statistical TDM.
OR
(b) Explain characteristics of FDM and TDM.

MODEL PAPER – 3
Bachelor of Computer Application (BCA)– Semester 2
Paper: Computer Networks
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)

1.

a) Define data networking and explain its advantages.

b) Explain need for protocol architecture.

c) Define bandwidth and data rate.

d) Explain digital to digital signal encoding.

e) Define analog to digital conversion.

f) Explain types of transmission errors.

g) Define HDLC protocol.

h) Explain synchronous time division multiplexing.

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain TCP/IP protocol architecture with diagram.
OR
(b) Explain OSI model and its significance in networking.

3.(a) Explain transmission media and classify them with examples.
OR
(b) Explain signal encoding techniques in detail.

4.(a) Explain asynchronous transmission and flow control techniques.
OR
(b) Explain error detection methods used in data communication.

5.(a) Explain multiplexing techniques including FDM and TDM with characteristics.
OR
(b) Explain HDLC protocol including its frame structure and features.

MODEL PAPER – 4
Bachelor of Computer Application (BCA)– Semester 2
Paper: Computer Networks
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)

1.

a) Define communication model and explain its elements.

b) Explain comparison between OSI and TCP/IP models.

c) Define signal encoding and its types.

d) Explain analog data to digital signal conversion.

e) Define flow control techniques.

f) Explain error control methods.

g) Define multiplexing and its types.

h) Explain statistical time division multiplexing.

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain data communication system and networking concepts.
OR
(b) Explain protocol architecture and TCP/IP model in detail.

3.(a) Explain data transmission concepts and transmission impairments.
OR
(b) Explain signal encoding techniques with suitable examples.

4.(a) Explain synchronous and asynchronous transmission techniques.
OR
(b) Explain HDLC protocol and its applications.

5.(a) Explain multiplexing techniques and their characteristics.
OR
(b) Explain flow control and error detection techniques.

MODEL PAPER – 5
Bachelor of Computer Application (BCA)– Semester 2
Paper: Computer Networks
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)

1.

a) Define data communication and its components.

b) Explain OSI model layers.

c) Define transmission impairments.

d) Explain guided transmission media.

e) Define synchronous transmission.

f) Explain error detection techniques.

g) Define HDLC protocol.

h) Explain Time Division Multiplexing.

◇ SECTION – B

2.(a) Explain OSI model with functions of each layer.
OR
(b) Explain TCP/IP model and compare with OSI model.

3.(a) Explain analog and digital transmission with examples.
OR
(b) Explain signal encoding techniques.

4.(a) Explain flow control and error control techniques.
OR
(b) Explain HDLC protocol in detail.

5.(a) Explain multiplexing techniques (FDM, TDM).
OR
(b) Explain transmission media and their characteristics.

MODEL PAPER – 6
Bachelor of Computer Application (BCA)– Semester 2
Paper: Computer Networks
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)

1.

a) Define data communication system and explain its characteristics.

b) Explain layers of TCP/IP model.

c) Define analog and digital signals with examples.

d) Explain unguided transmission media.

e) Define digital to analog conversion techniques.

f) Explain asynchronous transmission.

g) Define error detection and correction.

h) Explain statistical time division multiplexing.

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain communication model and components of data communication system.
OR
(b) Explain OSI reference model with functions of each layer.

3.(a) Explain transmission impairments and their effects on signal quality.
OR
(b) Explain encoding techniques: digital to digital and analog to digital.

4.(a) Explain synchronous transmission and types of transmission errors.
OR
(b) Explain flow control and error control techniques in data link layer.

5.(a) Explain multiplexing techniques and their characteristics.

OR

(b) Explain HDLC protocol and its working mechanism.

UNIT WISE IMPORTANT QUESTIONS

UNIT – I (Basics & Protocol Architecture)

- Data communication and its components ⭐⭐⭐⭐⭐
- Communication model ⭐⭐⭐⭐⭐
- Computer networks and Internet ⭐⭐⭐⭐⭐
- Protocol architecture ⭐⭐⭐⭐⭐
- Need for protocol architecture ⭐⭐⭐⭐
- OSI model ⭐⭐⭐⭐⭐
- TCP/IP model ⭐⭐⭐⭐⭐
- Comparison of OSI and TCP/IP ⭐⭐⭐⭐⭐

UNIT – II (Data Transmission & Media)

- Data transmission concepts ⭐⭐⭐⭐⭐
- Analog vs Digital transmission ⭐⭐⭐⭐⭐
- Transmission impairments ⭐⭐⭐⭐⭐
- Guided transmission media ⭐⭐⭐⭐⭐
- Unguided transmission media ⭐⭐⭐⭐⭐
- Signal encoding techniques ⭐⭐⭐⭐⭐
- Digital to digital encoding ⭐⭐⭐⭐⭐
- Analog to digital conversion ⭐⭐⭐⭐⭐

UNIT – III (Error Control & Data Link Layer)

- Asynchronous and synchronous transmission ⭐⭐⭐⭐⭐
- Types of errors ⭐⭐⭐⭐⭐
- Error detection techniques ⭐⭐⭐⭐⭐
- Flow control ⭐⭐⭐⭐⭐
- Error control ⭐⭐⭐⭐⭐
- HDLC protocol ⭐⭐⭐⭐⭐

UNIT – IV (Multiplexing)

- Frequency Division Multiplexing (FDM) ⭐⭐⭐⭐⭐
- Time Division Multiplexing (TDM) ⭐⭐⭐⭐⭐

- Synchronous TDM
- Statistical TDM
- Characteristics of multiplexing

MODEL PAPER – 1
Bachelor of Computer Application (BCA)– Semester 2
Paper: Data Structures with C
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)

1.

a) Define data structure and explain its classification.

b) Explain time and space complexity.

c) Describe linear array and its representation in memory.

d) Explain linear search algorithm.

e) Define linked list and explain its types.

f) What is stack? Explain its operations.

g) Define queue and explain its types.

h) What is tree? Define basic terminology.

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain operations on arrays including insertion, deletion, and searching.
OR
(b) Explain binary search algorithm and compare it with linear search.

3.(a) Explain singly linked list and its operations with suitable example.
OR
(b) Explain hashing and collision resolution techniques.

4.(a) Explain stack using arrays and linked lists with applications.
OR
(b) Explain recursion and its applications with suitable examples.

5.
(a) Explain binary trees and tree traversal methods.
OR
(b) Explain graph representation and graph traversal techniques.

MODEL PAPER – 2
Bachelor of Computer Application (BCA)– Semester 2
Paper: Data Structures with C
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)

1.

a) Define algorithm and explain time-space tradeoff.

b) Explain binary search with suitable example.

c) Define two-dimensional array and its representation.

d) Explain bubble sort technique.

e) Define doubly linked list.

f) Explain circular linked list.

g) What is recursion? Explain with example.

h) Define priority queue.

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain searching techniques and compare linear search and binary search.
OR
(b) Explain sorting techniques: bubble sort, selection sort, and insertion sort.

3.(a) Explain doubly linked list and its operations with example.
OR
(b) Explain hash tables and different hash functions.

4.(a) Explain stack operations and applications such as infix to postfix conversion.
OR
(b) Explain queue operations and circular queue with examples.

5.(a) Explain Binary Search Tree (BST) and its operations.
OR
(b) Explain graph traversal methods (DFS and BFS).

MODEL PAPER – 3
Bachelor of Computer Application (BCA)– Semester 2
Paper: Data Structures with C
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)

1.

a) Define operations on arrays.

b) Explain insertion and deletion in arrays.

c) Define selection sort.

d) Explain sparse matrices.

e) Define circular queue.

f) Explain evaluation of postfix expression.

g) Define binary tree.

h) Explain AVL tree.

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain array operations and searching techniques with suitable examples.
OR
(b) Explain sorting techniques with suitable examples.

3.(a) Explain circular linked list and its operations with example.
OR
(b) Explain collision resolution techniques using open addressing and chaining.

4.(a) Explain stack applications including postfix evaluation and recursion.
OR
(b) Explain types of queues and their applications.

5.(a) Explain binary trees and traversal techniques.
OR
(b) Explain AVL trees and their operations.

MODEL PAPER – 4
Bachelor of Computer Application (BCA)– Semester 2
Paper: Data Structures with C
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)

1.

a) Define data structure operations.

b) Explain insertion sort.

c) Define multidimensional array.

d) Explain polynomial addition using linked list.

e) Define deque (double-ended queue).

f) Explain Towers of Hanoi problem.

g) Define graph and its terminology.

h) Explain tree traversal methods.

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain array representation and operations with suitable examples.
OR
(b) Explain searching techniques and compare their efficiency.

3.(a) Explain singly linked list operations with suitable example.
OR
(b) Explain hashing and collision resolution techniques.

4.(a) Explain stack and recursion with applications.
OR
(b) Explain queue and circular queue operations with examples.

5.(a) Explain binary search tree operations (insertion, deletion, searching).
OR
(b) Explain graph representation and traversal methods.

MODEL PAPER – 5
Bachelor of Computer Application (BCA)– Semester 2
Paper: Data Structures with C
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)

1.

a) Define data structures and explain types with examples.

b) Explain time complexity with suitable example.

c) Define binary search and explain its advantages.

d) Explain insertion sort technique.

e) Define singly linked list and its representation.

f) Explain stack and its applications.

g) Define circular queue and its advantages.

h) Explain Binary Tree and its types.

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain array operations including insertion, deletion, and searching with suitable examples.
OR
(b) Explain sorting techniques: bubble sort, selection sort, and insertion sort with examples.

3.(a) Explain linked list operations including insertion and deletion with suitable examples.
OR
(b) Explain hashing techniques and collision resolution methods with examples.

4.(a) Explain stack operations and applications such as infix to postfix conversion and evaluation.
OR
(b) Explain queue types and operations including circular queue with suitable examples.

5.(a) Explain Binary Search Tree operations including insertion, deletion, and searching.
OR
(b) Explain graph traversal techniques (DFS and BFS) with suitable examples.

UNIT-WISE IMPORTANT QUESTIONS

UNIT – I (Arrays, Searching & Sorting)

- Definition and classification of data structures
- Time and space complexity
- Linear arrays and memory representation
- Operations on arrays (insert, delete, search)
- Linear search
- Binary search
- Comparison of searching methods
- Bubble sort
- Selection sort
- Insertion sort
- Two-dimensional arrays
- Sparse matrices

UNIT – II (Linked Lists & Hashing)

- Linked list vs arrays
- Singly linked list
- Doubly linked list
- Circular linked list
- Operations on linked list
- Polynomial addition using linked list
- Hashing and hash tables
- Collision resolution techniques

UNIT – III (Stacks, Queues & Recursion)

- Stack operations (array & linked list)
- Applications of stack
- Infix to postfix conversion
- Evaluation of postfix expression
- Recursion
- Tower of Hanoi
- Queue operations
- Circular queue
- Priority queue
- Deque

UNIT – IV (Trees & Graphs)

- Tree terminology ★★★★★
- Binary tree ★★★★★
- Tree traversals (inorder, preorder, postorder) ★★★★★
- Binary Search Tree (BST) ★★★★★
- Insertion and deletion in BST ★★★★★
- AVL trees ★★★★★
- Graph representation ★★★★★
- Graph traversal (DFS, BFS) ★★★★★

MODEL PAPER – 1
Bachelor of Computer Application (BCA)– Semester 2
Paper: Mathematical Foundations to Computer Science – II
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)

1.

a) Define proposition and explain basic logical connectives with examples.

b) Construct truth table for a given compound statement.

c) Define tautology, contradiction, and contingency.

d) Explain Conjunctive Normal Form (CNF) and Disjunctive Normal Form (DNF).

e) Define semigroup and monoid with examples.

f) Explain group and its properties.

g) What is Bisection method? Explain the procedure.

h) Define Linear Programming Problem (LPP) and give an example.

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain logical equivalence and rules of inference with suitable examples.
OR
(b) Prove mathematical statements using the principle of mathematical induction.

3.(a) Explain algebraic structures including group, subgroup, and cyclic group.
OR
(b) Solve algebraic equations using Newton-Raphson method with suitable example.

4.(a) Explain interpolation using Newton's forward and backward formulas with suitable examples.
OR
(b) Explain numerical integration using trapezoidal rule and Simpson's 1/3 rule with examples.

5.(a) Solve Linear Programming Problem using graphical method with suitable example.
OR
(b) Explain transportation problem and obtain initial feasible solution using North-West corner method.

MODEL PAPER – 2
Bachelor of Computer Application (BCA)– Semester 2
Paper: Mathematical Foundations to Computer Science – II
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)

1.

a) Define quantifiers and explain universal and existential quantifiers with examples.

b) Explain conditional and biconditional statements.

c) Define logical equivalence with example.

d) Explain subgroup with suitable example.

e) Define cyclic group and give example.

f) Explain Newton-Raphson method with steps.

g) Define Lagrange interpolation formula.

h) What is simplex method? Explain its significance.

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Construct truth tables and identify tautologies and contradictions.
OR
(b) Explain proof by contradiction with suitable example.

3.(a) Explain algebraic structures and properties of groups with examples.
OR
(b) Solve equations using Bisection method with suitable example.

4.(a) Explain interpolation using Lagrange's method with example.
OR
(b) Explain numerical integration using trapezoidal rule with example.

5.(a) Solve Linear Programming Problem using graphical method.
OR
(b) Explain transportation problem and solve using least cost method.

MODEL PAPER – 3
Bachelor of Computer Application (BCA)– Semester 2
Paper: Mathematical Foundations to Computer Science – II
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)
1.

a) Define compound statements with suitable examples.

b) Explain rules of inference in propositional logic.

c) Define contingency with example.

d) Explain monoid with suitable example.

e) Define error in numerical methods and its types.

f) Explain Newton's forward interpolation formula.

g) Define duality in Linear Programming.

h) What is Vogel's approximation method?

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain propositional logic and construct truth tables for compound statements.
OR
(b) Prove results using mathematical induction with suitable example.

3.(a) Explain algebraic structures including semigroup and cyclic group with examples.
OR
(b) Solve algebraic equation using Newton-Raphson method.

4.(a) Explain interpolation using Newton's forward formula with suitable example.
OR
(b) Explain numerical integration using Simpson's 1/3 rule with suitable example.

5.(a) Solve Linear Programming Problem using simplex method.
OR
(b) Solve transportation problem using Vogel's approximation method.

MODEL PAPER – 4
Bachelor of Computer Application (BCA)– Semester 2
Paper: Mathematical Foundations to Computer Science – II
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)
1.

a) Define logical operations and explain basic connectives.

b) Explain quantifiers and their scope with examples.

c) Define Conjunctive Normal Form (CNF) with example.

d) Explain subgroup test with suitable example.

e) Define Newton's backward interpolation formula.

f) Explain Simpson's 1/3 rule.

g) Define feasible solution in Linear Programming Problem.

h) Explain MODI method in transportation problem.

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain logical connectives and logical equivalence with examples.
OR
(b) Explain proof techniques including contradiction and induction.

3.(a) Explain semigroup and cyclic group with suitable examples.
OR
(b) Solve equations using Bisection method with suitable example.

4.(a) Explain interpolation using Newton's backward formula with example.
OR
(b) Solve numerical integration using trapezoidal rule with example.

5.(a) Explain simplex method and duality in Linear Programming.
OR
(b) Solve transportation problem using MODI method.

PAPER – 5
Bachelor of Computer Application (BCA)– Semester 2
Paper: Mathematical Foundations to Computer Science – II
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)
1.

a) Define logical equivalence and give suitable example.

b) Explain modus ponens and modus tollens with examples.

c) Define Disjunctive Normal Form (DNF) with example.

d) Explain group and its properties.

e) Define Newton-Raphson method with steps.

f) Explain Lagrange interpolation formula.

g) Define simplex method.

h) Explain North-West corner method.

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain propositional logic and construct truth tables for given statements.
OR
(b) Prove results using principle of mathematical induction.

3.(a) Explain algebraic structures and subgroup properties with examples.
OR
(b) Solve equations using numerical methods (Bisection/Newton-Raphson).

4.(a) Explain interpolation using Lagrange's formula with suitable example.
OR
(b) Explain Simpson's 1/3 rule with suitable example.

5.(a) Solve Linear Programming Problem using graphical method and simplex method.
OR
(b) Solve transportation problem using North-West corner method.

UNIT WISE IMPORTANT QUESTIONS

UNIT – I (Logic & Proofs)

- Propositions and logical connectives ⭐⭐⭐⭐⭐
- Truth tables ⭐⭐⭐⭐⭐
- Compound statements ⭐⭐⭐⭐
- Tautology, contradiction, contingency ⭐⭐⭐⭐⭐
- Logical equivalence ⭐⭐⭐⭐⭐
- CNF and DNF ⭐⭐⭐⭐⭐
- Quantifiers ⭐⭐⭐⭐⭐
- Conditional statements ⭐⭐⭐⭐
- Rules of inference ⭐⭐⭐⭐⭐
- Modus ponens and modus tollens ⭐⭐⭐⭐⭐
- Proof by contradiction ⭐⭐⭐⭐⭐
- Mathematical induction ⭐⭐⭐⭐⭐

UNIT – II (Algebraic Structures)

- Semigroup ⭐⭐⭐⭐⭐
- Monoid ⭐⭐⭐⭐⭐
- Group ⭐⭐⭐⭐⭐
- Subgroup ⭐⭐⭐⭐⭐
- Cyclic group ⭐⭐⭐⭐⭐
- Properties of algebraic structures ⭐⭐⭐⭐

UNIT – III (Numerical Methods)

- Errors in numerical methods
- Bisection method
- Newton-Raphson method
- Newton's Forward interpolation
- Newton's Backward interpolation
- Lagrange interpolation
- Trapezoidal rule
- Simpson's 1/3 rule

UNIT – IV (Optimization Techniques)

- Linear programming formulation
- Graphical method
- Simplex method
- Duality
- Transportation problem
- North-West corner method
- Least cost method
- Vogel's approximation method
- MODI method

MODEL PAPER – 1
Bachelor of Computer Application (BCA)– Semester 2
Paper: Mathematical Foundations to Computer Science – II
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)

1.

a) Define proposition and explain basic logical connectives with examples.

b) Construct truth table for a given compound statement.

c) Define tautology, contradiction, and contingency.

d) Explain Conjunctive Normal Form (CNF) and Disjunctive Normal Form (DNF).

e) Define semigroup and monoid with examples.

f) Explain group and its properties.

g) What is Bisection method? Explain the procedure.

h) Define Linear Programming Problem (LPP) and give an example.

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain logical equivalence and rules of inference with suitable examples.
OR
(b) Prove mathematical statements using the principle of mathematical induction.

3.(a) Explain algebraic structures including group, subgroup, and cyclic group.
OR
(b) Solve algebraic equations using Newton-Raphson method with suitable example.

4.(a) Explain interpolation using Newton's forward and backward formulas with suitable examples.
OR
(b) Explain numerical integration using trapezoidal rule and Simpson's 1/3 rule with examples.

5.(a) Solve Linear Programming Problem using graphical method with suitable example.
OR
(b) Explain transportation problem and obtain initial feasible solution using North-West corner method.

MODEL PAPER – 2
Bachelor of Computer Application (BCA)– Semester 2
Paper: Mathematical Foundations to Computer Science – II
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)

1.

a) Define quantifiers and explain universal and existential quantifiers with examples.

b) Explain conditional and biconditional statements.

c) Define logical equivalence with example.

d) Explain subgroup with suitable example.

e) Define cyclic group and give example.

f) Explain Newton-Raphson method with steps.

g) Define Lagrange interpolation formula.

h) What is simplex method? Explain its significance.

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Construct truth tables and identify tautologies and contradictions.
OR
(b) Explain proof by contradiction with suitable example.

3.(a) Explain algebraic structures and properties of groups with examples.
OR
(b) Solve equations using Bisection method with suitable example.

4.(a) Explain interpolation using Lagrange's method with example.
OR
(b) Explain numerical integration using trapezoidal rule with example.

5.(a) Solve Linear Programming Problem using graphical method.
OR
(b) Explain transportation problem and solve using least cost method.

MODEL PAPER – 3
Bachelor of Computer Application (BCA)– Semester 2
Paper: Mathematical Foundations to Computer Science – II
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)
1.

a) Define compound statements with suitable examples.

b) Explain rules of inference in propositional logic.

c) Define contingency with example.

d) Explain monoid with suitable example.

e) Define error in numerical methods and its types.

f) Explain Newton's forward interpolation formula.

g) Define duality in Linear Programming.

h) What is Vogel's approximation method?

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain propositional logic and construct truth tables for compound statements.
OR
(b) Prove results using mathematical induction with suitable example.

3.(a) Explain algebraic structures including semigroup and cyclic group with examples.
OR
(b) Solve algebraic equation using Newton-Raphson method.

4.(a) Explain interpolation using Newton's forward formula with suitable example.
OR
(b) Explain numerical integration using Simpson's 1/3 rule with suitable example.

5.(a) Solve Linear Programming Problem using simplex method.
OR
(b) Solve transportation problem using Vogel's approximation method.

MODEL PAPER – 4
Bachelor of Computer Application (BCA)– Semester 2
Paper: Mathematical Foundations to Computer Science – II
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)
1.

a) Define logical operations and explain basic connectives.

b) Explain quantifiers and their scope with examples.

c) Define Conjunctive Normal Form (CNF) with example.

d) Explain subgroup test with suitable example.

e) Define Newton's backward interpolation formula.

f) Explain Simpson's 1/3 rule.

g) Define feasible solution in Linear Programming Problem.

h) Explain MODI method in transportation problem.

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain logical connectives and logical equivalence with examples.
OR
(b) Explain proof techniques including contradiction and induction.

3.(a) Explain semigroup and cyclic group with suitable examples.
OR
(b) Solve equations using Bisection method with suitable example.

4.(a) Explain interpolation using Newton's backward formula with example.
OR
(b) Solve numerical integration using trapezoidal rule with example.

5.(a) Explain simplex method and duality in Linear Programming.
OR
(b) Solve transportation problem using MODI method.

PAPER – 5
Bachelor of Computer Application (BCA)– Semester 2
Paper: Mathematical Foundations to Computer Science – II
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions (6 × 5 = 30 Marks)
1.

a) Define logical equivalence and give suitable example.

b) Explain modus ponens and modus tollens with examples.

c) Define Disjunctive Normal Form (DNF) with example.

d) Explain group and its properties.

e) Define Newton-Raphson method with steps.

f) Explain Lagrange interpolation formula.

g) Define simplex method.

h) Explain North-West corner method.

◇ SECTION – B

Answer ALL questions (4 × 10 = 40 Marks)

2.(a) Explain propositional logic and construct truth tables for given statements.
OR
(b) Prove results using principle of mathematical induction.

3.(a) Explain algebraic structures and subgroup properties with examples.
OR
(b) Solve equations using numerical methods (Bisection/Newton-Raphson).

4.(a) Explain interpolation using Lagrange's formula with suitable example.
OR
(b) Explain Simpson's 1/3 rule with suitable example.

5.(a) Solve Linear Programming Problem using graphical method and simplex method.
OR
(b) Solve transportation problem using North-West corner method.

UNIT WISE IMPORTANT QUESTIONS

UNIT – I (Logic & Proofs)

- Propositions and logical connectives ⭐⭐⭐⭐⭐
- Truth tables ⭐⭐⭐⭐⭐
- Compound statements ⭐⭐⭐⭐
- Tautology, contradiction, contingency ⭐⭐⭐⭐⭐
- Logical equivalence ⭐⭐⭐⭐⭐
- CNF and DNF ⭐⭐⭐⭐⭐
- Quantifiers ⭐⭐⭐⭐⭐
- Conditional statements ⭐⭐⭐⭐
- Rules of inference ⭐⭐⭐⭐⭐
- Modus ponens and modus tollens ⭐⭐⭐⭐⭐
- Proof by contradiction ⭐⭐⭐⭐⭐
- Mathematical induction ⭐⭐⭐⭐⭐

UNIT – II (Algebraic Structures)

- Semigroup ⭐⭐⭐⭐⭐
- Monoid ⭐⭐⭐⭐⭐
- Group ⭐⭐⭐⭐⭐
- Subgroup ⭐⭐⭐⭐⭐
- Cyclic group ⭐⭐⭐⭐⭐
- Properties of algebraic structures ⭐⭐⭐⭐

UNIT – III (Numerical Methods)

- Errors in numerical methods
- Bisection method
- Newton-Raphson method
- Newton's Forward interpolation
- Newton's Backward interpolation
- Lagrange interpolation
- Trapezoidal rule
- Simpson's 1/3 rule

UNIT – IV (Optimization Techniques)

- Linear programming formulation
- Graphical method
- Simplex method
- Duality
- Transportation problem
- North-West corner method
- Least cost method
- Vogel's approximation method
- MODI method