

MODEL PAPER – 1
Bachelor of Computer Application (BCA)– Semester 1
Paper : Problem Solving Techniques with C
Time: 3 Hours | Max Marks: 70

♦ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Define algorithm. Explain its characteristics with suitable examples.
 - b) Explain the structure of a C program with syntax.
 - c) Define operators. Explain types of operators in C.
 - d) Explain conditional statements with suitable examples.
 - e) Define one-dimensional array and its applications.
 - f) Explain functions in C and their advantages.
 - g) Define pointer and explain its basic concepts.
 - h) Explain file handling and types of files.
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♦ SECTION – B

Answer ALL questions ($4 \times 10 = 40$ Marks)

2.(a) Explain arithmetic expressions, operator precedence, and associativity with suitable examples.

OR

(b) Explain looping statements (for, while, do-while) with suitable examples.

3.(a) Explain arrays and their types with suitable examples.

OR

(b) Explain functions, function declaration, and passing arguments with examples.

4.(a) Explain pointers and pointer arithmetic with suitable examples.

OR

(b) Explain structures and array of structures with suitable examples.

5.(a) Explain file handling operations with suitable examples.

OR

(b) Explain unions and enumerations with suitable examples.

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

♦ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Explain characteristics of C language.
 - b) Define library functions and explain their usage.
 - c) Explain switch statement with syntax.
 - d) Define looping constructs and their types.
 - e) Explain strings and character arrays.
 - f) Define recursion and its applications.
 - g) Explain dynamic memory allocation.
 - h) Define structures and their importance.
-

♦ SECTION – B

2.(a) Explain conditional branching and nested if statements with examples.

OR

(b) Explain jump statements (break, continue, goto) with examples.

3.(a) Explain string handling functions with examples.

OR

(b) Explain recursion and differentiate it from iteration.

4.(a) Explain pointers as function arguments with examples.

OR

(b) Explain structures and passing structures to functions.

5.(a) Explain file operations (read, write, append) with examples.

OR

(b) Explain enumeration constants and anonymous structures.

MODEL PAPER – 3
Bachelor of Computer Application (BCA)– Semester 1
Paper : Problem Solving Techniques with C
Time: 3 Hours | Max Marks: 70

♦ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Define arithmetic expressions and evaluation.
 - b) Explain precedence and associativity rules.
 - c) Define for loop with example.
 - d) Explain two-dimensional arrays.
 - e) Define local and global variables with examples.
 - f) Explain pointer arithmetic with examples.
 - g) Define array of structures.
 - h) Explain file positioning functions.
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♦ SECTION – B

2.(a) Explain expressions and their evaluation in C with examples.

OR

(b) Explain looping statements with suitable examples.

3.(a) Explain arrays and write a program for matrix multiplication.

OR

(b) Explain functions and recursive functions with suitable examples.

4.(a) Explain pointers and dynamic memory allocation with examples.

OR

(b) Explain structures and pointer to structure with examples.

5.(a) Explain file handling and file status functions with examples.

OR

(b) Explain unions and their applications with examples.

MODEL PAPER – 4
Bachelor of Computer Application (BCA)– Semester 1
Paper : Problem Solving Techniques with C
Time: 3 Hours | Max Marks: 70

◇ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Define basic building blocks of C language.
 - b) Explain arithmetic expressions with examples.
 - c) Define while loop with syntax.
 - d) Explain character arrays and string input/output.
 - e) Define function calling mechanism.
 - f) Explain pointer declaration and initialization.
 - g) Define structure initialization with example.
 - h) Explain types of files in C.
-

◇ SECTION – B

2.(a) Explain operators and expressions with suitable examples.

OR

(b) Explain conditional statements and their types with examples.

3.(a) Explain arrays and string manipulation techniques.

OR

(b) Explain functions and passing arguments with suitable examples.

4.(a) Explain pointer concepts with suitable examples.

OR

(b) Explain structures and functions returning structures.

5.(a) Explain file handling and file operations with suitable examples.

OR

(b) Explain enumerations and unions with suitable examples.

MODEL PAPER – 5
Bachelor of Computer Application (BCA)– Semester 1
Paper : Problem Solving Techniques with C
Time: 3 Hours | Max Marks: 70

♦ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Define problem solving and program development.
 - b) Explain standard library functions in C.
 - c) Define do-while loop with example.
 - d) Explain string handling functions.
 - e) Define recursion with suitable example.
 - f) Explain pointer to pointer.
 - g) Define passing structure to function.
 - h) Explain file read and write operations.
-

♦ SECTION – B

2.(a) Explain program development using algorithms and flowcharts.

OR

(b) Explain control structures in C with suitable examples.

3.(a) Explain arrays and write a program for searching an element.

OR

(b) Explain recursion and write a program to find factorial.

4.(a) Explain pointers and pointers to functions with examples.

OR

(b) Explain structures and array of structures with examples.

5.(a) Explain file handling and its applications.

OR

(b) Explain unions, enumerations, and their differences.

UNIT WISE IMPORTANT QUESTIONS

UNIT – I (Basics, Operators, Control Statements)

- Algorithm and flowchart ★★★★★
- Structure of C program ★★★★★
- Characteristics of C language ★★★★★
- Operators in C (all types) ★★★★★
- Operator precedence and associativity ★★★★★
- Arithmetic expressions ★★★★★
- Library functions ★★★★★
- Conditional statements (if, if-else, nested if) ★★★★★
- Switch statement ★★★★★
- Looping statements (for, while, do-while) ★★★★★
- Jump statements (break, continue, goto) ★★★★★

UNIT – II (Arrays, Functions, Recursion)

- One-dimensional arrays ★★★★★
- Two-dimensional arrays ★★★★★
- Strings and character arrays ★★★★★
- Functions (types, advantages) ★★★★★
- Function declaration and calling ★★★★★
- Local vs global variables ★★★★★
- Passing arguments to functions ★★★★★
- Recursion ★★★★★
- Recursion vs iteration ★★★★★

UNIT – III (Pointers & Structures):

- Basics of pointers ★★★★★
- Pointer declaration and initialization ★★★★★
- Address operator (&) ★★★★★
- Pointer arithmetic ★★★★★
- Pointers as function arguments ★★★★★
- Dynamic memory allocation ★★★★★
- Structures (definition, initialization) ★★★★★
- Array of structures ★★★★★
- Pointer to structure ★★★★★
- Passing structure to function ★★★★★

UNIT – IV (Unions, Files)

- Union and structure difference ★★★★★
- Enumeration constants ★★★★★
- Anonymous structures ★★★★★

- File handling ★★★★★
- Types of files ★★★★★
- File operations (open, close, read, write) ★★★★★
- File positioning functions ★★★★★
- File status functions ★★★★★



Smart Study
— PLUS —

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

♦ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Define digital signals and distinguish between digital and analog systems.
 - b) State and explain Boolean laws and theorems.
 - c) Explain number system conversions with suitable examples.
 - d) Define half adder and full adder with logic expressions.
 - e) What is flip-flop? Explain its types.
 - f) Define instruction cycle and its phases.
 - g) Explain addressing modes with examples.
 - h) What is cache memory? Explain its advantages.
-

♦ SECTION – B

Answer ALL questions ($4 \times 10 = 40$ Marks)

2.(a) Explain K-Map simplification for 2 and 3 variables with suitable examples.

OR

(b) Explain binary arithmetic operations and binary codes with examples

3.(a) Explain combinational circuits such as adders, decoders, and multiplexers.

OR

(b) Explain flip-flops and their types with diagrams.

4.(a) Explain basic computer organization and instruction formats.

OR

(b) Explain CPU organization and different addressing modes.

5.(a) Explain memory hierarchy and cache memory organization.

OR

(b) Explain pipelining and parallel processing with suitable examples.

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

♦ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Explain Von Neumann architecture with neat diagram.
 - b) Define SOP and POS forms with examples.
 - c) Explain Gray code and Excess-3 code.
 - d) What is decoder? Explain its working.
 - e) Define register and explain types of registers.
 - f) Explain computer instructions and their types.
 - g) What is RISC architecture? State its advantages.
 - h) Define Direct Memory Access (DMA).
-

♦ SECTION – B

Answer ALL questions ($4 \times 10 = 40$ Marks)

2.(a) Explain K-Map simplification for 4 variables with suitable examples.

OR

(b) Explain error detecting and correcting codes with examples.

3.(a) Explain encoders, multiplexers, and demultiplexers with examples.

OR

(b) Explain shift registers and binary counters with diagrams.

4.(a) Explain instruction codes and computer registers in detail.

OR

(b) Explain stack organization and program control.

5.(a) Explain input-output organization and modes of data transfer.

OR

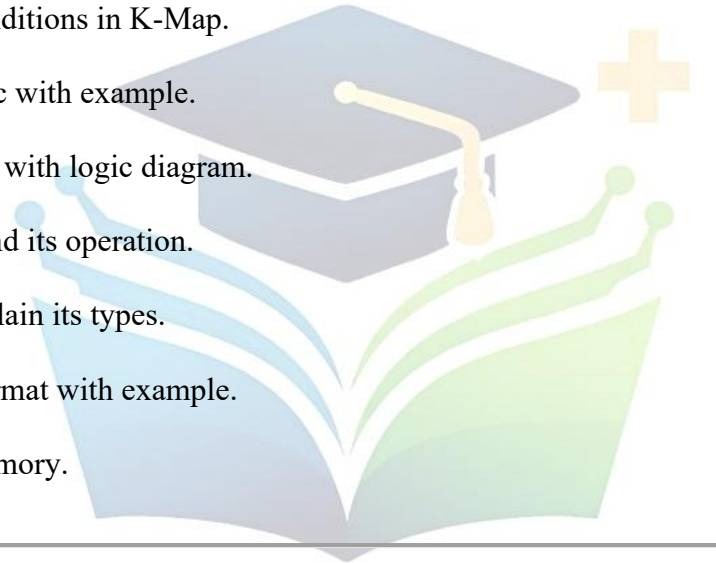
(b) Explain virtual memory and memory management hardware.

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

♦ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Define digital logic and Boolean expressions with example.
 - b) Explain don't care conditions in K-Map.
 - c) Define BCD arithmetic with example.
 - d) Explain demultiplexer with logic diagram.
 - e) Define J-K flip-flop and its operation.
 - f) What is interrupt? Explain its types.
 - g) Explain instruction format with example.
 - h) Define associative memory.
- 

♦ SECTION – B

Answer ALL questions ($4 \times 10 = 40$ Marks)

2.(a) Explain K-Map simplification and Boolean expression minimization techniques.

OR

(b) Explain number systems and perform arithmetic operations in different number systems.

3.(a) Explain combinational circuits with suitable examples.

OR

(b) Explain sequential circuits and flip-flops with diagrams.

4.(a) Explain computer organization and instruction cycle in detail.

OR

(b) Compare RISC and CISC architectures.

5.(a) Explain pipeline processing and instruction pipeline.

OR

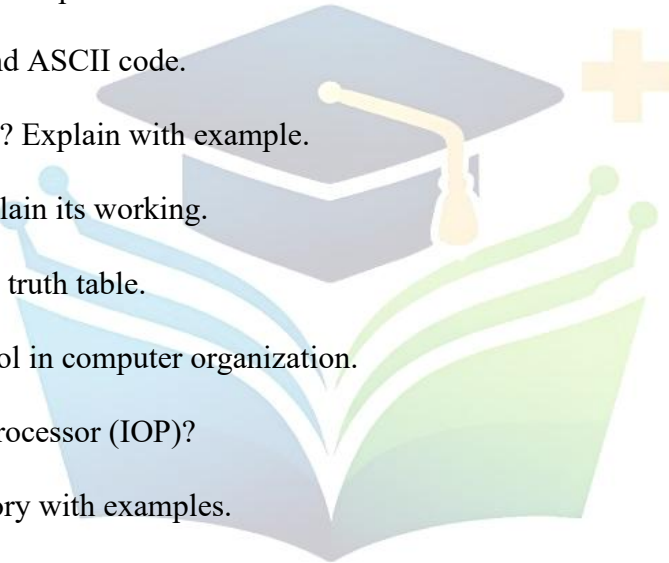
(b) Explain memory organization including cache and virtual memory.

MODEL PAPER – 4
Bachelor of Computer Application (BCA)– Semester 1
Paper: Computer Architecture
Time: 3 Hours | Max Marks: 70

♦ **SECTION – A**

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Define digital system and explain its characteristics.
 - b) Explain binary codes and ASCII code.
 - c) What is octal arithmetic? Explain with example.
 - d) Define encoder and explain its working.
 - e) Explain T flip-flop with truth table.
 - f) Define timing and control in computer organization.
 - g) What is Input-Output Processor (IOP)?
 - h) Explain auxiliary memory with examples.
- 

♦ **SECTION – B**

Answer ALL questions ($4 \times 10 = 40$ Marks)

2.(a) Explain Boolean algebra and K-Map simplification with suitable examples.

OR

(b) Explain number system conversions and different coding schemes.

3.(a) Explain adders, subtractors, and decoders with suitable diagrams.

OR

(b) Explain registers and shift registers with examples.

4.(a) Explain CPU organization and data transfer operations.

OR

(b) Explain instruction formats and addressing modes.

5.(a) Explain input-output interface and interrupt system.

OR

(b) Explain memory hierarchy and virtual memory organization.

Got it 👍 Here is the **final one**

MODEL PAPER – 5
Bachelor of Computer Application (BCA)– Semester 1
Paper: Computer Architecture
Time: 3 Hours | Max Marks: 70

♦ **SECTION – A**

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Explain digital computers and logic design concepts.
- b) Define truth table and Boolean function with example.
- c) Explain hexadecimal arithmetic with example.
- d) Define multiplexer and explain its working.
- e) What is D flip-flop? Explain its operation.
- f) Explain general register organization.
- g) Define pipelining and its advantages.
- h) Explain cache memory mapping techniques.

♦ **SECTION – B**

Answer ALL questions ($4 \times 10 = 40$ Marks)

2.(a) Explain Boolean laws and simplify expressions using K-Map.

OR

(b) Explain binary codes and error detection techniques.

3.(a) Explain combinational circuits with suitable examples.

OR

(b) Explain sequential circuits and binary counters with diagrams.

4.(a) Explain instruction cycle and basic computer organization.

OR

(b) Explain RISC architecture and its features.

5.(a) Explain pipelining and parallel processing techniques.

OR

(b) Explain memory organization including cache and virtual memory.

UNIT-WISE IMPORTANT QUESTIONS

UNIT – I (Digital Logic & Number Systems)

- Boolean laws and theorems ★★★★★
- K-Map simplification (2, 3, 4 variables) ★★★★★
- SOP and POS forms ★★★★★
- Don't care conditions ★★★★★
- Number system conversions ★★★★★
- Binary arithmetic ★★★★★
- BCD arithmetic ★★★★★
- Binary codes (ASCII, EBCDIC, Gray, Excess-3) ★★★★★
- Error detecting and correcting codes ★★★★★

UNIT – II (Combinational & Sequential Circuits)

- Half adder and full adder ★★★★★
- Subtractor ★★★★★
- Multiplexer and demultiplexer ★★★★★
- Encoder and decoder ★★★★★
- Flip-flops (SR, JK, D, T) ★★★★★
- Shift registers ★★★★★
- Binary counters (synchronous & asynchronous) ★★★★★

UNIT – III (CPU & Computer Organization)

- Instruction cycle ★★★★★
- Instruction formats ★★★★★
- Addressing modes ★★★★★
- Computer registers ★★★★★
- Stack organization ★★★★★
- Data transfer and manipulation ★★★★★
- RISC vs CISC ★★★★★
- Input-output interrupts ★★★★★

UNIT – IV (Memory & I/O Organization)

- Memory hierarchy ★★★★★
- Cache memory ★★★★★
- Virtual memory ★★★★★
- Associative memory ★★★★★

- Input-output organization ★★★★★
- DMA (Direct Memory Access) ★★★★★
- Interrupt system ★★★★★
- Pipelining ★★★★★
- Parallel processing ★★★★★



Smart Study
— PLUS —

MODEL PAPER – 1
Bachelor of Computer Application (BCA)– Semester 1
BCA – Fundamentals of Information Technology
Time: 3 Hours | Max Marks: 70

♦ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Describe the evolution of computers with suitable examples.
 - b) Explain the functional units of a computer system.
 - c) What is instruction cycle? Explain its phases.
 - d) Discuss different types of memory with examples.
 - e) Explain various input devices used in computers.
 - f) Convert a decimal number into binary and hexadecimal.
 - g) Describe the functions of an operating system.
 - h) Explain the concept of information system.
-

♦ SECTION – B

Answer ALL questions ($4 \times 10 = 40$ Marks)

2.(a) Explain the classification of computers and their applications in different fields.

OR

(b) Describe memory hierarchy and different storage devices in detail.

3.(a) Explain number systems and perform conversions with suitable examples.

OR

(b) Discuss binary arithmetic operations and logic gates with truth tables.

4.(a) Explain the types and functions of operating systems in detail.

OR

(b) Describe the program development life cycle with suitable examples.

5.(a) Explain categories of information systems with examples.

OR

(b) Discuss security threats and various security mechanisms used in computers.

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

◇ SECTION – A ◇ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Distinguish between digital and analog computers.
 - b) Explain the role of CPU registers.
 - c) Describe cache memory and its advantages.
 - d) Explain different types of output devices.
 - e) Perform binary to octal and hexadecimal conversion.
 - f) Define algorithm and explain its characteristics.
 - g) Explain internet architecture briefly.
 - h) Describe cryptography and its importance.
-

◇ SECTION – B

Answer ALL questions ($4 \times 10 = 40$ Marks)

2.(a) Explain the structure of a computer system and interconnection of its components.

OR

(b) Discuss different types of secondary storage devices and their working.

3.(a) Explain number system conversions and binary representation techniques.

OR

(b) Discuss binary coding schemes and logic gates with examples.

4.(a) Explain process management and memory management in operating systems.

OR

(b) Describe internet services and methods of connecting to the internet.

5.(a) Explain different types of information systems and their applications.

OR

(b) Discuss computer security including hacking, malware, and firewalls.

MODEL PAPER – 3
Bachelor of Computer Application (BCA)– Semester 1
BCA – Fundamentals of Information Technology
Time: 3 Hours | Max Marks: 70

♦ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Explain the characteristics of computers.
 - b) Describe different generations of computers with features.
 - c) What is instruction format? Explain its components.
 - d) Discuss different types of secondary memory devices.
 - e) Explain human data entry devices with examples.
 - f) Perform conversion of binary number into decimal and octal.
 - g) Define flowchart and explain its symbols.
 - h) Explain the concept of cloud computing.
-

♦ SECTION – B

Answer ALL questions ($4 \times 10 = 40$ Marks)

2.(a) Describe the internal structure of CPU and explain its working.

OR

(b) Explain memory hierarchy and various types of memory in detail.

3.(a) Explain number system conversions and binary arithmetic operations with examples.

OR

(b) Describe logic gates and binary coding schemes with suitable illustrations.

4.(a) Explain functions of operating system including file and device management.

OR

(b) Describe algorithm, pseudo code, and control structures with examples.

5.(a) Explain information systems and their classification with examples.

OR

(b) Discuss computer security, security attacks, and protection mechanisms.

MODEL PAPER – 4
Bachelor of Computer Application (BCA)– Semester 1
BCA – Fundamentals of Information Technology
Time: 3 Hours | Max Marks: 70

♦ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Define computer. Explain its applications in various fields.
 - b) Describe the components inside a computer cabinet.
 - c) Explain different access methods of storage devices.
 - d) What is I/O port? Explain its types.
 - e) Convert hexadecimal number into binary and decimal.
 - f) Explain signed and unsigned numbers.
 - g) Describe types of software with examples.
 - h) Explain wireless networking and Bluetooth technology.
-

♦ SECTION – B

Answer ALL questions ($4 \times 10 = 40$ Marks)

2.(a) Explain interconnection of computer units and overall working of a computer system.

OR

(b) Describe magnetic disk, optical disk, and magneto-optical disk with their features.

3.(a) Explain binary number system, conversions, and representation techniques.

OR

(b) Discuss logic gates with truth tables and their applications.

4.(a) Explain operating system functions including protection and security features.

OR

(b) Describe internet protocols, addressing, and types of internet connections.

5.(a) Explain management support systems and operational support systems.

OR

(b) Discuss security mechanisms including authentication, digital signatures, and firewall.

MODEL PAPER – 5
Bachelor of Computer Application (BCA)– Semester 1
BCA – Fundamentals of Information Technology
Time: 3 Hours | Max Marks: 70

♦ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Explain analog and digital signals with examples.
 - b) Describe the role of ALU in a computer system.
 - c) What is cache memory? Explain its importance.
 - d) Explain source data entry devices.
 - e) Convert octal number into binary and decimal.
 - f) Define binary coding schemes with examples.
 - g) Explain types of internet services.
 - h) Describe artificial intelligence and its applications.
-

♦ SECTION – B

Answer ALL questions ($4 \times 10 = 40$ Marks)

2.(a) Explain history of computers and classification with suitable examples.

OR

(b) Describe memory hierarchy and explain primary and secondary memory in detail.

3.(a) Explain number system conversions and binary arithmetic operations.

OR

(b) Discuss logic gates and binary data representation techniques.

4.(a) Explain operating system concepts including user interface and device management.

OR

(b) Describe internet architecture, addressing, and services.

5.(a) Explain computer-based information systems and their categories.

OR

(b) Discuss computer security including threats, cryptography, and security policies.

UNIT WISE IMPORTANT QUESTIONS

■ UNIT – I (Computer Basics & Hardware)

- Characteristics of computer ★★★★★
- Generations of computers ★★★★★
- Classification of computers ★★★★★
- Components of computer system ★★★★★★
- CPU (ALU, CU, Registers) ★★★★★
- Memory hierarchy ★★★★★
- Primary vs Secondary memory ★★★★★
- Cache memory ★★★★★
- Instruction cycle ★★★★★
- Microprocessor ★★★★★
- Storage devices (Magnetic, Optical) ★★★★★★

■ UNIT – II (I/O Devices & Data Representation)

- Input devices ★★★★★
- Output devices ★★★★★
- Working of I/O system ★★★★★
- Number system (Binary, Octal, Hexadecimal) ★★★★★★
- Number conversions ★★★★★★
- Binary arithmetic ★★★★★
- Logic gates ★★★★★
- Binary coding schemes ★★★★★
- Types of software ★★★★★
- System software vs Application software ★★★★★

■ UNIT – III (Operating System & Internet)

- Operating system and its functions ★★★★★
- Types of operating systems ★★★★★
- Process management ★★★★★
- Memory management ★★★★★
- File management ★★★★★
- Algorithm and flowchart ★★★★★
- Program development life cycle ★★★★★
- Internet basics ★★★★★
- Internet services ★★★★★

- Internet architecture ★★★★★

■ UNIT – IV (Information Systems & Security)

- Data vs Information vs Knowledge ★★★★★
- Information system and CBIS ★★★★★
- Types of information systems ★★★★★
- Security threats and attacks ★★★★★
- Malware and hacking ★★★★★
- Cryptography ★★★★★
- Digital signature ★★★★★
- Firewall ★★★★★
- Authentication methods ★★★★★



Smart Study
— PLUS —

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

◇ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Define set. Explain set operations with properties.
 - b) Define relation. Explain types of relations.
 - c) State and explain Pigeonhole principle.
 - d) Define permutation and combination with examples.
 - e) Define graph. Explain basic terminology of graphs.
 - f) Define tree. State properties of trees.
 - g) Define matrix. Explain types of matrices.
 - h) Define determinant of a matrix and its properties.
-

◇ SECTION – B

Answer ALL questions ($4 \times 10 = 40$ Marks)

2.(a) Explain relations on a set, properties of relations, and equivalence relations with examples.

OR

(b) Explain functions, types of functions (injective, surjective, bijective), and inverse of functions.

3.(a) Explain basics of counting, permutation, and combination with examples.

OR

(b) Explain recurrence relations and solve using characteristic equation method.

4.(a) Explain graphs, types of graphs, and Euler and Hamiltonian graphs.

OR

(b) Explain trees, spanning trees, and their properties with examples.

5.(a) Explain matrix operations and inverse of a matrix with examples.

OR

(b) Explain Eigen values, Eigen vectors, and Cayley-Hamilton theorem.

MODEL PAPER – 1

MODEL PAPER – 2

Bachelor of Computer Application (BCA)– Semester 1 Paper: Mathematical Foundations to Computer Science – I

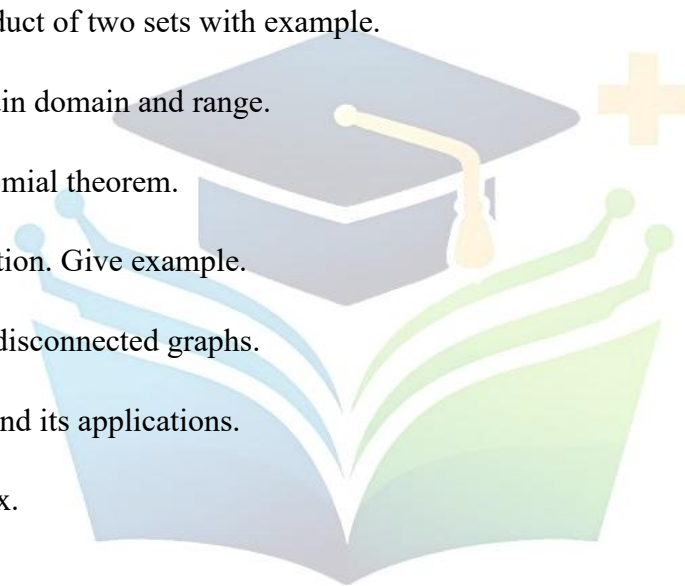
Time: 3 Hours | Max Marks: 70

♦ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Define subset. Explain properties of subsets with examples.
- b) Explain Cartesian product of two sets with example.
- c) Define function. Explain domain and range.
- d) State and explain Binomial theorem.
- e) Define recurrence relation. Give example.
- f) Define connected and disconnected graphs.
- g) Define spanning tree and its applications.
- h) Define rank of a matrix.



♦ SECTION – B

Answer ALL questions ($4 \times 10 = 40$ Marks)

- 2.(a) Explain equivalence relations and partitions on a set with examples.

OR

- (b) Explain types of functions and composition of functions with examples.

- 3.(a) Explain permutation and combination with suitable examples.

OR

- (b) Solve recurrence relation using characteristic equation method.

- 4.(a) Explain basic terminology of graphs, paths, cycles, and complete graphs.

OR

- (b) Explain trees, properties of trees, and concept of spanning tree.

5.(a) Explain matrix multiplication and inverse of a matrix with examples.

OR

(b) Explain Eigen values and Eigen vectors with suitable example.

MODEL PAPER – 3

Bachelor of Computer Application (BCA)– Semester 1 **Paper: Mathematical Foundations to Computer Science – I**

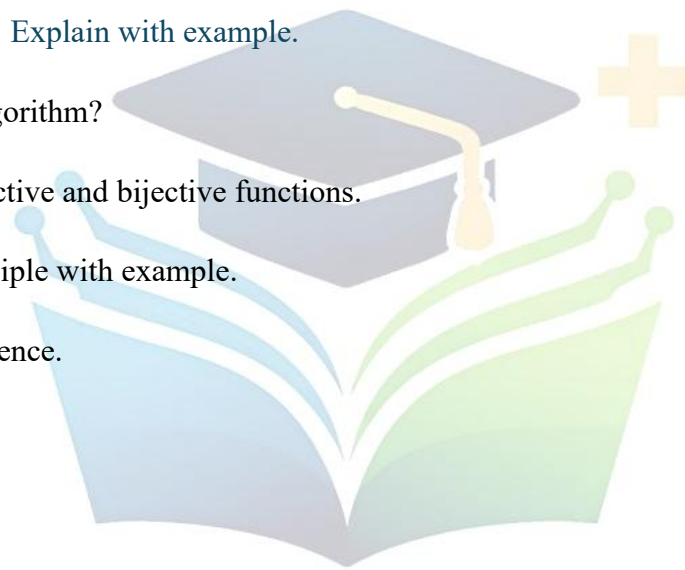
Time: 3 Hours | Max Marks: 70

♦ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Define Venn diagrams. Explain with example.
- b) What is Warshall's algorithm?
- c) Define injective, surjective and bijective functions.
- d) State Pigeonhole principle with example.
- e) Define Fibonacci sequence.
- f) What is Euler graph?
- g) Define planar graph.
- h) Define orthogonal matrix.



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♦ SECTION – B

Answer ALL questions ($4 \times 10 = 40$ Marks)

2.(a) Explain closures of relations and Warshall's algorithm with example.

OR

(b) Explain inverse of a function and ceiling and floor functions with examples.

3.(a) Explain Pigeonhole principle and solve suitable problems.

OR

(b) Explain recurrence relations with Fibonacci and Tower of Hanoi examples.

4.(a) Explain Euler and Hamiltonian graphs with suitable examples.

OR

(b) Explain subgraphs, paths, cycles, and weighted graphs.

5.(a) Explain determinant of a matrix and solve system of linear equations.

OR

(b) State and prove Cayley-Hamilton theorem.

MODEL PAPER – 4

Bachelor of Computer Application (BCA)– Semester 1
Paper: Mathematical Foundations to Computer Science – I

Time: 3 Hours | Max Marks: 70

♦ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Define Venn diagram and illustrate with example.
- b) Explain Warshall's algorithm.
- c) Define injective, surjective, and bijective functions with examples.
- d) State and explain Pigeonhole principle.
- e) Write the recurrence relation for Fibonacci sequence.
- f) Define Euler graph and give example.
- g) What is a planar graph?
- h) Define orthogonal matrix with example.

♦ SECTION – B

Answer ALL questions ($4 \times 10 = 40$ Marks)

2.(a) Explain closures of relations and illustrate Warshall's algorithm with suitable example.

OR

(b) Explain inverse of a function and discuss ceiling and floor functions with examples.

3.(a) Explain Pigeonhole principle and solve related problems.

OR

(b) Explain recurrence relations with examples such as Fibonacci sequence and Tower of Hanoi.

4.(a) Explain Euler and Hamiltonian graphs with suitable examples.

OR

(b) Explain subgraphs, paths, cycles, and weighted graphs.

5.(a) Explain determinant of a matrix and solve a system of linear equations.

OR

(b) State and prove Cayley-Hamilton theorem with example.

MODEL PAPER – 5

Bachelor of Computer Application (BCA)– Semester 1

Paper: Mathematical Foundations to Computer Science – I

Time: 3 Hours | Max Marks: 70

♦ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

a) Define properties of set operations with examples.

b) Explain representation of relations using matrices.

c) Define logarithmic and exponential functions.

d) State and prove Binomial coefficient formula.

e) Define Tower of Hanoi problem.

f) Explain complete graph with example.

g) Define skew-symmetric matrix.

h) Explain inverse of a matrix.

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♦ SECTION – B

Answer ALL questions ($4 \times 10 = 40$ Marks)

2.(a) Explain properties of relations and types of relations with examples.

OR

(b) Explain composition of functions and its properties with examples.

3.(a) Explain Binomial theorem and its applications.

OR

(b) Solve linear recurrence relations using characteristic roots method.

4.(a) Explain connected graphs and spanning trees with suitable examples.

OR

(b) Explain trees and prove basic properties of trees.

5.(a) Explain rank of a matrix and its applications.

OR

(b) Explain system of linear equations using matrices with suitable example.

MODEL PAPER – 6

Bachelor of Computer Application (BCA)– Semester 1
Paper: Mathematical Foundations to Computer Science – I

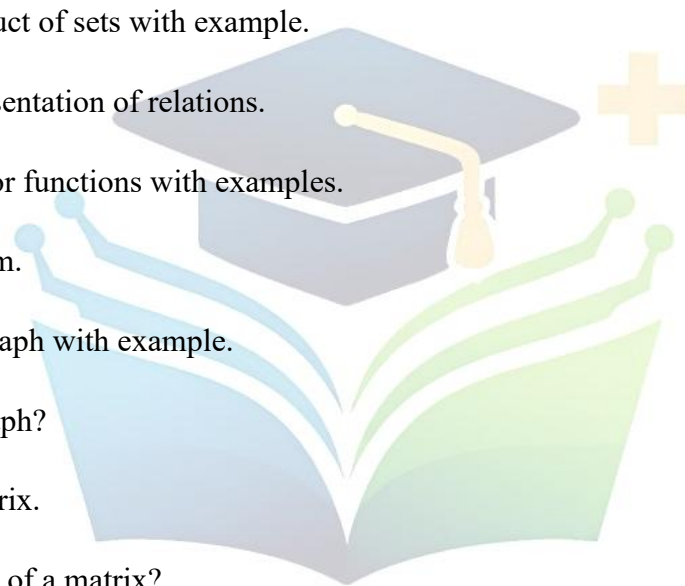
Time: 3 Hours | Max Marks: 70

♦ SECTION – A

Answer any SIX questions ($6 \times 5 = 30$ Marks)

1.

- a) Define Cartesian product of sets with example.
- b) Explain digraph representation of relations.
- c) Define ceiling and floor functions with examples.
- d) State Binomial theorem.
- e) Define Hamiltonian graph with example.
- f) What is a weighted graph?
- g) Define symmetric matrix.
- h) What are Eigen values of a matrix?



♦ SECTION – B

Answer ALL questions ($4 \times 10 = 40$ Marks)

2.(a) Explain equivalence relation and partition of a set with suitable examples.

OR

(b) Explain surjective, injective, and bijective functions with examples.

3.(a) Explain permutation and combination with suitable examples.

OR

(b) Explain recurrence relations and solve using characteristic equation method.

4.(a) Explain graphs, subgraphs, and complete graphs with examples.

OR

(b) Explain trees, spanning trees, and their applications.

5.(a) Explain determinant and inverse of a matrix with examples.

OR

(b) Explain Eigen values and Eigen vectors with suitable examples.

UNIT-WISE IMPORTANT QUESTIONS

UNIT – I (Sets, Relations, Functions)

- Set operations and their properties ★★★★★
- Subsets and Venn diagrams ★★★★★
- Cartesian product ★★★★★
- Types of relations ★★★★★
- Properties of relations ★★★★★
- Equivalence relation and partition ★★★★★
- Closures of relations ★★★★★
- Warshall's algorithm ★★★★★
- Types of functions (injective, surjective, bijective) ★★★★★
- Composition and inverse of functions ★★★★★
- Ceiling and floor functions ★★★★★

UNIT – II (Counting & Recurrence)

- Basics of counting ★★★★★
- Pigeonhole principle ★★★★★
- Permutations and combinations ★★★★★
- Binomial coefficients ★★★★★
- Binomial theorem ★★★★★
- Recurrence relations ★★★★★
- Fibonacci sequence ★★★★★
- Tower of Hanoi ★★★★★
- Solving recurrence (characteristic roots) ★★★★★

UNIT – III (Graph Theory)

- Basic terminology of graphs ★★★★★
- Types of graphs ★★★★★
- Connected and disconnected graphs ★★★★★
- Paths and cycles ★★★★★
- Complete graphs ★★★★★
- Euler graphs ★★★★★

- Hamiltonian graphs ★★★★★
- Trees and properties ★★★★★
- Spanning trees ★★★★★
- Planar graphs ★★★★★

■ UNIT – IV (Matrix Algebra)

- Types of matrices ★★★★★
- Matrix operations ★★★★★
- Determinant of a matrix ★★★★★★
- Rank of a matrix ★★★★★
- Inverse of a matrix ★★★★★
- Solving linear equations ★★★★★
- Eigen values and Eigen vectors ★★★★★★
- Cayley-Hamilton theorem ★★★★★



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