2023
(Session : 2022-25)
(Paper ID : 11201)

Time : 3 hours

Full Marks : 80

Candidates are required to give their answers in their own words as far as practicable.

The questions are of equal value.

*Answer any **five** questions.*

1. Define the following with an example :
   (a) Singleton Set
   (b) Proper Subset
   (c) Complement of Set
   (d) Venn-Diagam

2. Given universal set U = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}, A = {2, 4, 6}, B = {1, 3, 5, 7}, C = {6, 7}, then find :
   (a) $A^c \cap B$

(b) $(A \cup B) - C$

(c) $(A \cup C)^C$

(d) $(A \cup U) \cap (B \cup C)$

3. What is function ? Define it. Explain various types of functions with suitable example.

4. If $f(x) = ax^2 + bx + 2$, $f(1) = 3$ and $f(4) = 42$, find b.

5. If $A = \{1, 3, 5\}$, let R be a relation such that XRY : if $y = x + 2$ and S be the relation such that XSY : if $x < y$ then find following :

(a) RoS

(b) SoR

(c) RoR

(d) SoS

With the help of diagram.

6. What is Graph ? Explain sequential representation of graph (directed, undirected, weighted) using adjacency matrix with suitable example.

7. What is Algebraic structure if Discrete Mathematics ? Explain properties of algebraic structure with suitable example.

8. What is Hash Diagram ? Show that set of all divisors of 12 forms a lattice.

9. Let the function of $f : R \rightarrow R$ be given by $f(x) = x^2 + 1$. Find $f^1(-5)$, $f^1(26)$ and $f^1(10, 37)$.

10. Define following :

    (a) Partition of a Set

    (b) Semi Group

    (c) Binary Operation

    (d) POSET

2023
(Session : 2022-25)
(Paper ID : 11202)

Time : 3 hours

Full Marks : 80

Candidates are required to give their answers in their own words as far as practicable.

The questions are of equal value.

*Answer any **five** questions.*

1. Draw the Block Diagram of CPU. Explain the structure and functioning of Arithmetic Logic Unit (ALU).

2. What is Demorgan's Theorem ? Explain it with diagram and truth table.

3. What do you mean by addressing mode ? Discuss any four Addressing Modes.

4. What is Memory ? Explain different types of memory.

5. What do you mean by Digital counter ? Design a 3-bit binary counter using Flip-Flop.

6. What is Binary Arithmetic ? Explain Binary Addition and Subtraction with example.

7. What is Multiplexer and De-multiplexer ? Explain it.

8. What is Logic Gates ? Explain it with diagram and truth table.

9. What is complement ? To find the 1's and 2's complements of following :

   (a) $(10101011)_2$

   (b) $(11100011)_2$

   (c) $(11010010)_2$

   (d) $(10101010)_2$

10. Write short notes on any two of the following :

    (a) Sequential Circuit

    (b) Universal gates

    (c) ROM

    (d) Register

BCA(II) — Data. Str.
thr. C (BC – 203)

2023
(Session : 2022-25)
(Paper ID : 11203)

Time : 3 hours

Full Marks : 80

Candidates are required to give their answers in their own words as far as practicable.

The questions are of equal value.

*Answer any **five** questions.*

1. What is array ? Explain different types of array with diagram. Also write a program to use them.

2. What do you mean by recursion ? Explain different types of recursion. Differentiate looping and recursion.

3. Write a program to multiply two matrices.

4. What is linked list ? Explain different types of linked list with neat diagrams. How linked list is advantageous over the array ?

5. What is binary tree ? Define and prove the different properties of binary tree.

6. What is Queue ? Explain different type of operations performed on a queue.

7. What is doubly linked list ? Write functions to create, add, delete, display and count the elements of doubly linked list.

8. Write a program to create a binary search tree. Write the recursive functions for display it in pre-order, in-order and post order.

9. Construct a binary tree whose pre-order and in-order traversal are as follows :

   (a) Post-order : G D B H I E F C A

   (d) In-order : D G B A H E I C F

10. Differentiate any **two** of following with help of diagram :

    (a) Singly Linked List and Doubly Linked List

    (b) Stack and Queue

    (c) Linear and non-linear data structure

BCA(II) — Sys. Anal. & Dgn. (BC – 204)

2023
Session : 2022-25)
(Paper ID : 11204)

Time : 3 hours

Full Marks : 80

Candidates are required to give their answers in their own words as far as practicable.

The questions are of equal value.

*Answer any **five** questions.*

1. What is system ? Define the characteristics and components of system.
2. What are the various types of information system ?
3. What are principles that guide system design ?
4. Discuss various roles and responsibilities of a system analyst.
5. What is OAS ? What are the roles of computer to implement OAS ?

6. (a) A data dictionary is a structured repository of data. Discuss.

   (b) Why do we test systems ? How important is testing ? Elaborate.

7. Write short notes on the following :

   (a) MIS

   (b) System Documentation

   (c) Audit Trail

   (d) Preliminary Investigation

8. What is the role of software maintenance in system development ? Explain various types of software maintenance and their use.

9. (a) Differentiate between validation and verification.

   (b) What is decision table ? Explain with suitable example.

10. What are the various parameters which define the quality of software ? How it be measured ?