UG-C-3003-BCA

2026

Full Marks : 70

Time : 3 hours

Answer from **both** the Sections as directed.

The figures in the right-hand margin indicate marks.

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

SECTION–A

Answer any *four* questions : 10 × 4

1. Describe different types of Instruction Formats used in computer systems. Explain their structure with neat diagrams.

2. What do you mean by Addressing Modes in Computer Architecture ? Explain important types of addressing modes clearly.

3. Using the example $Y=(P+Q)/(R+S)$, explain how this expression would be executed using zero-address, one-address, two-addresss and three address instruction formats.

4. Discuss the process of representing a real number in floating point form. Explain normalization, mantissa, exponent, and sign bit with suitable examples.

5. Explain the concept of asynchronous data transfer in computer architecture. Discuss the different methods used for asynchronous transfer between CPU and I/O devices ?

6. Write an assembly program to multiply two single digit numbers by taking user input. Write clearly the steps of executing an assembly programme.

7. Explain the architecture of the Intel 8085 microprocessor with a neat diagram. Describe the functions of its major components.

8. Explain Instruction Pipelining in computer architecture. Describe its stages with a neat diagram and discuss the advantages of pipelining.

SECTION–B

All questions are compulsory : 3×10

9. What is the role of IOP in computer architecture ?

10. Define serial communication.

11. What do you mean by priority Interrupts ?

12. Define macro and write its uses.

13. What is a computer register ?

14. Differentiate between programmed I/O with interrupt initiated I/O ?

15. Explain Instruction Cycle and its different phases.

16. Define data bus, address bus and control bus.

17. Differentiate between RISC and CISC architecture.

18. Define assembler.

UG-C-3002-BCA

2026

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GROUP—A

Answer any *four* questions from the following : 10×4

1. Describe Java as an Object oriented programming language. What are the key features of Java ?

2. Explain JVM, JDK and JRE with suitable diagrams and explain all functionalities.

3. What is constructor in Java ? Explain the different types of constructors. Does Java, provide default constructor ? Explain your answer with suitable example.

4. How is method overloading different from method overriding ? Explain with the help of a suitable code.

5. Define an Interface. How does it differ from an Abstract class ? Write a Java program to create an interface Shape with the getArea() method. Create three classes Rectangle, Circle, and Traingle that implement the Shape interface. Implement the getArea() method for each of the three classes.

6. Differentiate between Thread class and Runnable interface. Write a program that creates two threads; one thread displays odd numbers between 1 and 20, and the other thread displays even numbers between 1 and 20.

(Continued)

7. Define exception. Which keywords are used for exception handling ? Write a program to create custom exception called InvalidAgeException. If a user enters an age less than 18, the program will throw this exception.

8. Differentiate among String, StringBuilder and StringBuffer in Java ? Explain any five string function with an example.

GROUP—B

Answer *all* questions : 3 × 10

9. Discuss all three usages of final keyword.

10. What is the use of this and super keyword ?

11. Describe garbage collection in Java.

12. Why we need both run and start method in multithreading ?

13. What is the role of stack in exception handling ?

14. How can you set a priority of a thread ?

15. What is the purpose of static block, static variable and static method in Java ?

16. What is package ? How are package created and accessed in Java ?

17. Differentiate between array and vector.

18. Why thread synchronization is important in multithreading process ?

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GROUP—A

Answer any *four* questions of the following : 10×4

1. What is Linked List ? How does it differ from array ? Write a program to insert a node at the middle of the list in a doubly linked list.

2. Compare Binary Search Tree (BST) and Binary Tree ? Write an algorithm for inserting a node in BST.

3. Explain HEAP Sort. Show how this input is sorted using heap sort.
12, 45, 21, 76, 83, 97, 82 and 54.

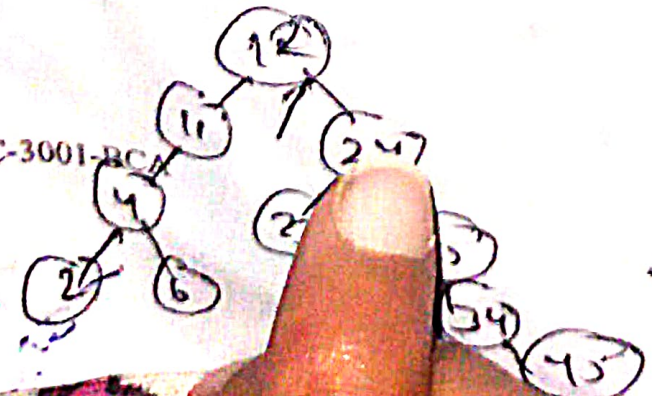
4. Define Stack and explain its characteristics. Write a program in C to implement the concept of Stack.

5. Convert the following infix expressions to equivalent prefix expression and then evaluate the prefix expression using stack.
(8 + 2) / 2 * 3 – 2 / 1 + 3

6. Construct an AVL tree by inserting the following values sequentially :
23, 34, 12, 11, 6, 2, 45, 4, 25 and 24.

7. Define an array and discuss its drawbacks. Write a program to insert an element at the k^{th} position.

8. Construct Binary Tree from the following tree traversal sequence :
Inorder- 11, 12, 23, 24, 25, 32, 43, 46, 54, 65
Pre-Order- 32, 23, 11, 12, 24, 25, 43, 54, 46, 65



GROUP—B

Answer *all* questions : 3 × 10

9. Differentiate between Linear and Non-Linear Data Structure.

10. Write the structure of circular linked list.

11. What is the height of the tree ? List all its components.

12. Write any three real time application of Queue.

13. Define Big-Oh Notation.

14. Define Sparse Array.

15. What is the time Complexity of a Bubble Sort and Selection Sort ?

16. What do you mean by sorting and searching ?

17. Differenciate between B Tree and B+ Tree.

18. What is the advantage of using a linked list over an array for stack implementation ?

UG-C-3005-BCA

2026

Full Marks : 70

Time : 3 hours

Answer from **both** the Groups as directed.

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GROUP—A

Answer any *four* questions of the following: 10×4

1. State and prove Bay's Theorem with applications.

2. Two cards are drawn at random from a standard deck of 52 cards. Find the probability that :

(*a*) Both are aces

(*b*) One is an ace and the other is a king

(*c*) At least one is a face card

Also verify the addition law of probability.

3. Define random variable and probability distribution. Explain types of random variables.

4. Calculate the Arithmetic Mean, Median, and Mode for the following data :

Class Interval	Frequency
0-10	5
10-20	9
20-30	14
30-40	8
40-50	4

mode = 24.54

median = 24.28

mean = 24.25

(*Continued*)

5. Explain Coefficient of variation and its uses.

6. Find Karl Pearson's coefficient of correlation between X and Y :

X	Y
2	5
4	7
6	9
8	8
10	11

7. From the following data, find the regression equation of Y on X :

X	Y
1	2
2	3
3	5
4	4
5	6

Also estimate Y when X = 6

8. Calculate the Chi-square(X^2) test from the following data :

	Hb%		
	Above Normal	Below Normal	Total
Above Normal	20	30	50
Below Normal	40	10	50
Total	60	40	100

GROUP—B
(Compulsory)

Answer *all* the questions : 3 × 10

9. Define probability.

10. Define Event and Sample Space.

11. What is Chi-square test?

12. Define regression.

13. What are types of correlation?

14. Define Standard Deviation.

15. Define Poisson distribution.

16. Define Test of goodness of fit.

17. Define Skewness.

18. Write merit and demerit of mode.

UG-C-3004-BCA

2026

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Time : 3 hours

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SECTION–A

Answer any *four* questions of the following : 10×4

1. Define a system. Explain its characteristics and elements in detail. Differentiate between physical and abstract system.

2. Explain the importance of documentation in system success. Discuss the purpose and importance of any three types of documentation.

3. Describe the role of system analyst in SDLC. Discuss the skills and qualities required for system analyst.

4. What is a feasibility study ? Explain any three types during software development.

5. Explain the phases of the System Development Life Cycle (SDLC). Discuss the any two SDLC models with their advantages and disadvantages.

6. Design a level-0 of a 'Library Management System'. Take necessary considerations for entities, data and processes.

7. What is Quality Control (QC). How would you differentiate between Quality Assurance (QA) and Quality Control (QC).

8. Describe Decision Trees and Decision Tables with examples. Differentiate between them.

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SECTION–B

Answer all questions : 3 × 10

9. Define Data Dictionary.

10. Differentiate between open and closed systems.

11. What is a Gantt chart ?

12. Define software risk management.

13. Define user requirements.

14. List important fact-finding techniques in initial investigation.

15. Define s/w threat and risk analysis.

16. What is system planning ?

17. List the advantages of pseudocode.

18. What is software maintenance ?
