UG — BCA (C – 3001)

2025

Time : 3 hours

Full Marks : 70

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

The figures in the margin indicate full marks.

Answer from both the Groups as directed.

Group – A

Answer any **four** questions of the following :

10×4 = 40

1. Define a single-dimensional array and explain how data is stored and accessed in this structure ?

2. Define sparse arrays and explain their significance in terms of memory efficiency. Write a program to convert a two-dimensional matrix into its sparse representation.

VJ – 105/2

3. Define linked lists and explain their advantages over arrays. Write a program to create a singly linked list and display all the nodes of a linked list.

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

5. Define infix, prefix and postfix expressions. Write an algorithm to evaluate a valid postfix expression. Use the algorithm to evaluate the following postfix expression :

$$6, 5, \wedge, 3, 2, *, +, 8, 7, 4, -, +, +$$

6. Define a Binary Search Tree. Discuss the advantages of BST in searching and sorting. Provide an example to illustrate insertion and deletion in a BST.

7. Explain the divide-and-conquer approach used in merge sort. Provide an example demonstrating how merge sort organizes an unsorted array.

8. Construct binary tree from the following traversal sequence :

   Postorder : D F E B G L J K H C A

   Inorder : D B F E A G C L J H K

Group – B

9. Answer all questions of the following :

$$3 \times 10 = 30$$

(a) Give the node strcture of a doubly linked list.

(b) Define space and time complexity of an algorithm.

(c) Mention the different ways of traversal in binary tree.

(d) Explain Double-Ended queue.

(e) Write an algorithm to convert infix to profix experssion.

(f) Differentiate between Sorting and Searching.

(g) Define Height balanced tree.

(h) What is Non-linear data strcuture ?

(i) Differentiate between Graph and Tree.

(j) Discuss real-world applications where stacks are commonly used.

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UG—BCA (C – 3002)

2025

Time : 3 hours

Full Marks : 70

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

The figures in the margin indicate full marks.

Answer from both the Groups as directed.

Group – A

Answer any **four** questions of the following :

$$10 \times 4 = 40$$

1. Discuss how Java differs from C and C++ in terms of memory management and platform independence. Discuss the role of Data Types in defining variables and thier impact on program efficiency.

2. Explain the basic features of object oriented programming language. Explain the functionality of Java Virtual machine.

VJ – 106/2 (Turn over)

use abstract keyword
no variable ≥constant

3. Discuss different types of loops and their applications. Provide an example to show how loops can simplify repetitive tasks in a program.

4. What is an abstract class ? Explain the use of abstract class with an example.

5. What are interfaces ? Illustrate how interfaces can be used for implementing multiple inheritance.

6. Explain the life cycle of a thread. Write a program that creates two threads one thread displays numbers from 10 to 1 and the other thread displays numbers from 10 to 1.

7. Define exception. Which keywords are used for exception handling ? Write a program that catches negative exception (user defined exception). This is caused when a negative number is entered by a user.

8. What is string class ? How is it different from StringBuffer class ? Write a program to count number of vowels in a string.

Group – B

9. Answer all questions of the following :

$$3 \times 10 = 30$$

(a) Java is platform independent language ? justify.

(b) What is the use of super keyword ?

(c) What is finalization in Java ?

(d) What is package ? How are package created and accessed in java ?

(e) What is demon thread ?

(f) What is the major difference between array and vector ?

(g) Why thread synchronization important for multithreading process ?

(h) Differentiate between equals () method and == operator.

(i) Explain any three string functions used in JAVA.

(j) Explain each component of the statement "public static void main (String args[])".

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UG — BCA (C – 3003)

2025

Time : 3 hours

Full Marks : 70

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

The figures in the margin indicate full marks.

Answer from both the Sections as directed.

Section – A

Answer any **four** questions of the following :

10×4 = 40

1. Explain the importance of Assembly Language in computer programming. How does it differ from high-level languages ? Write an assembly program to multiply two single digit numbers by taking user input.

2. What is the Intel 8085 microprocessor ? Describe the architecture of the Intel 8085 microprocessor.
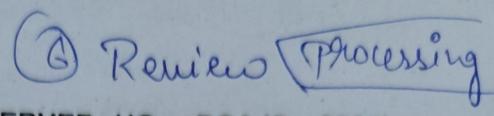
3. Explain the different modes of data transfer (Programmed I/O, Interrupt-driven I/O and Direct Memory Access).

4. What are peripheral devices in a computer system ? Classify them based on their functions and provide examples for each category.

5. Describe the IEEE 754 standard for floating point representation. Explain its components (sign, exponent and mantissa).

6. Describe the various types of instruction formats used in CPUs (e.g., zero, one, two, and three-address formats). Take appropriate example to illustrate each type.

7. Define addressing modes in CPU instructions. Describe different types of addressing modes with examples.

8. Define the concept of pipelining in CPU architecture. Explain how pipelining enhances instruction execution speed.

Section – B

9. Answer **all** questions of the following :

$$3 \times 10 = 30$$

(a) Compare and contrast serial communication with parrallel communication.

(b) What is an input / output interface ?

(c) Compare RISC architectures with Complex Instruction Set Computer (CISC) architectures.

(d) Define array processing in computer architecture.

(e) Define instrusction cycle and its phases.

(f) What are different types of registers in computer organization ?

(g) What is bus in computer architecture ?

(h) What are shift micro operations ?

(i) How is ALU important to computer architecture ?

(j) What is the importance of priority interrupt in multitasking ?

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2025

Time : 3 hours

Full Marks : 70

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

The figures in the margin indicate full marks.

Answer from both the Sections as directed.

Section – A

Answer any **four** questions of the following :

10×4 = 40

1. Define a "system" and explain its key chracteristics in detail. Distinguish between physical and abstract systems with examples.

2. What are the phases of the System Development Life Cycle (SDLC) in detail ? Compare any two SDLC models highlighting their applications and limitations.

(Planning, Analyze, Design, Development, Testing)

VJ – 108/2   (Turn over)

3. Explain Software Maintenance. Describe its classfication.

4. How are technical, operational and economic feasibilities interrelated ? Discuss how a failure in one aspect could affect the others.

5. Design a level-o DFD for "Online food delivery application. Take necessary considerations for entities, data and processes.

6. Explain various fact-finding techniques used in System Analysis and Design. Which technique do you think is more suitable for the requirements of a rapidly evolving e-commerce platform ?

7. What is Sotware Testing ? Decribe any three types of software testing techniques.

8. Discuss the importance of User Manual, Programming manual, Operator manual in Software development.

Section – B

(Compulsory)

9. Answer the following questions : $3 \times 10 = 30$

  (a) What is decision tree ?

  (b) What are the important roles and skills of system analyst ?

  (c) What is data dictionary ?

  (d) What do you understand by software threats ?

  (e) What is Gantt Chart ?

  (f) What is cost benefit analysis ?

  (g) What do you mean by system planning ?

  (h) Differentiate between open and closed system.

  (i) What is the difference between logical and physical design in system development ?

  (j) Differentiate between Structured English and Pseudocode. In what scenarios would you choose one over the other ?

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UG — BCA (C – 3005)

2025

Time : 3 hours

Full Marks : 70

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

The figures in the margin indicate full marks.

Answer from both the Sections as directed.

Section – A

Answer any **four** questions of the following :

$$10 \times 4 = 40$$

1. State and prove Bay's theorem.

2. Define events and explain the different types of events.

3. Three persons A, B, and C throw a die in succession till one gets a six and wins the game. Find their respective probabilities of winning.

VJ – 109/2 (Turn over)

4. Find Mean, Median and Mode from the following data :

Marks obtained	No. of students
Less then 10	15
Less then 20	35
Less then 30	60
Less then 40	84
Less than 50	90
Less than 60	117
Less than 70	198
Less than 80	250

5. Obtain the equation of the line of regression for the following data :

X	Y
65	67
66	68
67	65
67	68
68	72
69	72
70	69
72	71

6. Find range, standard deviation and variance for the data :

87, 99, 75, 87, 94, 75, 35, 88, 87.

7. Calculate the coefficient of correlation between the value of X and Y given below :

X	Y
78	125
89	137
97	156
69	112
59	107
79	136
68	123
61	108

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

VJ – 109/2   (3)

Section – B

9. Answer all questions of the following :

$$3 \times 10 = 30$$

(a) Define Sample space and random variable.

(b) What is moments ?

(c) Write difference between M. D and S. D.

(d) Define Poisson distribution.

(e) Write Merit and Demerit of Mode.

(f) Define Chi-square distribution.

(g) Define Standard Deviation.

(h) Write about T-distribution.

(i) Define Skewness and Kurtosis.

(j) Write Hypothesis testing procedure.

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