This question paper contains 3 printed pages.

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B.C.A. (Sem. - III)

Roll No. .....

UG0801

BCA-63T-201

B.C.A. Three/Four Year (Semester - III)

EXAMINATION - Dec. 2025 (Held in Feb. 2026)

(Faculty of Science)

Subject - BCA

Data Structures and Algorithms

Time Allowed: Three Hours

Maximum Marks: 80

No supplementary answer book will be given to any candidate. Hence the candidates should write the answers precisely in the main answer book only.

किसी भी परीक्षार्थी को पूरक उत्तर–पुस्तिका नहीं दी जाएगी। परीक्षार्थियों को समस्त प्रश्नों के उत्तर मुख्य उत्तर पुस्तिका में ही लिखने चाहिए।

Answers to short answer-type questions must be given in sequential order. Similarly, all the parts of one question of descriptive part should be answered in one place in the answer-book.

लघुत्तरात्मक प्रश्नों के उत्तर प्रश्नों के क्रमानुसार ही देवें। इसी प्रकार किसी भी एक वर्णनात्मक प्रश्न के अन्तर्गत पूछे गए विभिन्न प्रश्नों के उत्तर, उत्तर–पुस्तिका में एक ही स्थान पर क्रमानुसार हल करने चाहिए।

Write your roll number on the question paper before start writing the answers to questions.

प्रश्नों के उत्तर लिखने से पूर्व प्रश्न–पत्र पर रोल नम्बर अवश्य लिखिए।

Question paper consists of two parts A and B.

प्रश्न पत्र में दो भाग अ और ब होंगे।

PART A : 20 marks भाग – अ : 20 अंक

Part A is compulsory having 10 very short answer-type questions (with a limit of 20 words) of two marks each. The first question is based on knowledge, understanding and applications of the topics/text covered in the syllabus.

भाग अ में दो अंक के 10 अति लघु उत्तरीय प्रश्न (20 शब्दों की सीमा के साथ) अनिवार्य हैं। पहला प्रश्न पाठ्यक्रम में शामिल विषयों / पाठ के ज्ञान, समझ और अनुप्रयोगों पर आधारित है।

PART - B : 60 marks भाग – ब : 60 अंक

Part B of the question paper is divided into four units comprising question numbers 2-5. There is one descriptive question from each unit with internal choice. Each question will carry 15 marks.

प्रश्न पत्र का भाग ब प्रश्न संख्या 2–5 सहित चार इकाइयों में विभाजित है। प्रत्येक इकाई से आंतरिक विकल्प के साथ एक वर्णनात्मक प्रश्न है। प्रत्येक प्रश्न 15 अंक का है।

PART - A

1. (a) What is the significance of Big-O notation in algorithm analysis? 2X10=20

   (b) What is the role of an algorithm in problem solving?

   (c) What is difference between static and dynamic list.

   (d) Give the properties of binary tree.

   (e) Define the following term in tree:

   (a) Degree of a Node

   (b) Labelled Trees

   (f) What is Acyclic graph?

   (g) Define the term Pendant Node applicable to a graph.

   (h) When is binary search preferred over linear search?

   (i) How does quicksort achieve O (n log n) average-case time complexity?

   (j) List out the types of Sorting.

PART - B

UNIT - I

2. Describe the importance of Big, - O, Big-Theta, and Big-Omega notations in algorithm design. How do they help in comparing algorithms, and what are their limitations? 15

OR

Write an algorithm to insert a node between two nodes in a doubly linked list. 15

UNIT - II

3. Write an algorithm to insert a node between two nodes in a singly linked list. 15

OR

Write an algorithm to delete a node which has two children from a binary, search tree. 15

UNIT - III

4. Write short note on: 15

   (a) Distinguish between directed and undirected graph

   (b) Complete Graph

   (c) Traversing of a Graph

OR

(a) Define a simple graph and distinguish it from a multigraph.

(b) Explain the difference between a path and a circuit (cycle) in a graph. 2X7.5=15

UNIT - IV

5. What is Hashing Method? Explain the type of hashing methods commonly used with a suitable example. 15

OR

Describe the merge sort algorithm, focusing on its divide-and-conquer approach. Explain why it is stable, its time and space complexity, and its advantages over other sorting algorithms. 15