Tribhuvan University

Faculty of Humanities & Social Sciences

OFFICE OF THE DEAN

2025

Bachelor in Computer Applications
Course Title: Data Structures and Algorithms
Code No: CACS 201
Semester: III

Full Marks: 60
Pass Marks: 24
Time: 3 hours

Candidates are required to answer the questions in their own words as far as possible.

Group B

Attempt any SIX questions. **[6×5 = 30]**

2. Explain stack as ADT. Describe push and pop operation in stack. [1+4]
3. Define linear and circular queue. Write are the limitation of linear queue? How circular queue can used to overcome the limitation of linear queue. [1+2+2]
4. What is hashing? Explain different types of collision resolution techniques with suitable example. [1+4]
5. What is recursion? Write an algorithm to solve Tower of Hanoi problem. [1+4]
6. Differentiate between internal sorting and external sorting algorithm. Explain insertion sorting algorithm with example. [1+4]
7. How graph can be represented using adjacency matrix? Explain Depth first traversal in a graph with suitable example. [2+3]
8. A binary tree T has 9 nodes. The inorder and preorder traversals of T yield the following sequence of nodes:
   In-order: R Z J T K H N M P
   Pre-order: K Z R T J N H P M
   Draw the tree T. [5]
9. Write short notes on: [2.5+2.5]
   a) Deterministic and non-deterministic algorithm
   b) Divide and conquer algorithm

Group C

Attempt any TWO questions. **[2×10 = 20]**

10. Describe types of linked list. Write an algorithm to perform following operation in circular linked list.
    - Insert node at the beginning of circular linked list.
    - Insert node at the end of circular linked list.
    - Delete node from the beginning of circular linked list.
    - Delete node from the end of circular linked list [2+ 8]
11. Differentiate between strict binary tree and skewed tree. Explain binary search tree and insertion and deletion operation in BST in detail. Consider following data and construct BST. 14,11,12,19,15,22,13,8,33,7,9,20. [2+5+3]
12. What is priority queue? Explain sequential searching algorithm and binary searching algorithm with suitable illustration. [1+ 4 +5]

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2025

Bachelor in Computer Applications
Course Title: Web Technology
Code No: CACS 205
Semester: III

Full Marks: 60
Pass Marks: 24
Time: 3 hours

Candidates are required to answer the questions in their own words as far as possible.

Group B

Attempt any SIX questions. **[6×5 = 30]**

2. What is client-side and server-side image maps? Explain with example.
3. Differentiate between inline, internal, and external CSS with examples.
4. Explain 2-tier and 3-tier architecture with proper diagrams.
5. What is a Formal Public Identifier (FPI)? Describe its purpose and explain the syntax used to define an FPI with appropriate examples. [1+4]
6. Define DTD. Why XSLT is it important in real-time XML data processing? [1+4]
7. What is a web server? Describe the various functions and responsibilities performed by a web server. [1+4]
8. Explain how sessions are used in server-side scripting to manage user data. Describe how session data differs from cookies and write server-side script to demonstrate session creation, removal and retrieval. [1+1+3]

Group C

Attempt any TWO questions. **[2×10 = 20]**

9. Write HTML code to create a form for registration of customer data for ecommerce website with field (name, email, phone, address, date of birth, gender) and write server-side code to validate form for required validation for all field, type validation for phone and store that information inside "customers" table within "ecommerce" database. [4+6]
10. Design and create a responsive webpage using HTML and CSS that includes the following features: (Make necessary assumptions for style information): [2+3+3+2]

    - Header section must contain website logo on the left and include a horizontal navigation menu on the right with at least 4 links.
    - Content section with two columns layouts first part with 80% width which must have A heading(h1) and a paragraph describing the website or product and image with an alt attribute, second part with 20% width contains list of services company provides.
    - Footer section must contain contact information (address, phone and email) with location map(google) for your company using iframe.
    - Use semantic tags to define different block of page and navigation must be vertical for width below 756px.

11. **Write XML code and create XML Schema Definition (XSD)** to validate the structure and data types of the customer XML data. Your schema should enforce the following rules: [4+6]
    - CustomerID should be a required integer element.
    - Name should be a required string with a maximum length of 100 characters.
    - Phone should be a required string consisting of exactly 10 digits.
    - Address should be an optional string.
    - DateOfBirth should be a required date element with a format YYYY-MM-DD.

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2025

Bachelor in Computer Applications
Course Title: Probability and Statistics
Code No: CAST 202
Semester: III

Full Marks: 60
Pass Marks: 24
Time: 3 hours

Candidates are required to answer the questions in their own words as far as possible.

Group B

Attempt any SIX questions. **[6×5 = 30]**

2. Discus the application of statistics in computer application.
3. The 100 salesmen employed by a company have booked the following number of orders for a newly introduced FAX machine during the last six months:

Number of orders Booked	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
No. of salesman	4	12	25	30	15	8	6

Calculate mean, median and mode of the above data.

4. Define correlation. A school teacher believes that there is a linear relationship between the verbal test score (y) for eighth graders and the number of library books checked out (x). Following are the data collected on 8 students.

X	12	15	3	7	10	5	22	9
Y	77	85	48	59	75	41	94	65

(i) Compute the correlation coefficients r between X and Y and Interpret it.
(i) Find coefficient of determination and interpret it.

5. Define regression. The technician now varies the temperature (^{0}C) while keeping other conditions as constant as possible and obtain the following results:

Yield (Y)	127	128	130	131	133
Temperature (X)	70	75	80	85	90

(i) Construct the regression line of yield on temperature
(ii) Predict the yield when temperature is 95.
(iii) Interpret the regression coefficients.

6. Define probability. The odds against of A solving a problem as 8 to 6 and the odds in favor of B solving the same problem are 14 to 10. What is the probability that (i) Both A and B will solve it and (ii) A solves it but B fails to solve it?
7. Write difference between parameter and statistic.
8. What is sampling distribution? Construct frequency distribution table of sample mean in population 2, 4, 6, 8. (i) W ite down all possible sample size of two without replacement. (ii) Show that sample mean is an unbiased estimate of population mean.

Group C

Attempt any TWO questions. **[2×10 = 20]**

9. What are different methods of measuring dispersion? Following are the marks of Basic Statistics obtained by two students A and B in 9 tests of 100 marks each.

Test	1	2	3	4	5	6	7	8	9
Mark of A	50	82	73	45	25	80	72	56	62
Mark of B	45	65	55	50	68	62	72	52	56

(i) Who is better? (ii) If the consistency of performance is the criteria for awarding a prize, who should get the prize?

10. The mean weight of products is 68.22 grams with variance of 10.8 grams. How many products in a batch of 1000 would you expect (a) to be over 72 grams, (b) between 70 and 72 grams, and (c) below 65 grams?
11. A part of the investigation of the collapse of the roof of a building, a testing laboratory is given all the available bolts that connected the steel structure at 3 different positions on the roof. The forces required to see each of these bolts are as follows:

Position 1	90	82	79	98	83	91	
Position 2	95	83	75	102	95	90	92
Position 3	83	89	80	94			

Perform an analysis of variance to test at the 0.05 level of significance whether the differences among the sample means at the three positions are significant.

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2025

Bachelor in Computer Applications
Course Title: OOP in Java
Code No: CACS 204
Semester: III

Full Marks: 60
Pass Marks: 24
Time: 3 hours

Candidates are required to answer the questions in their own words as far as possible.

Group B

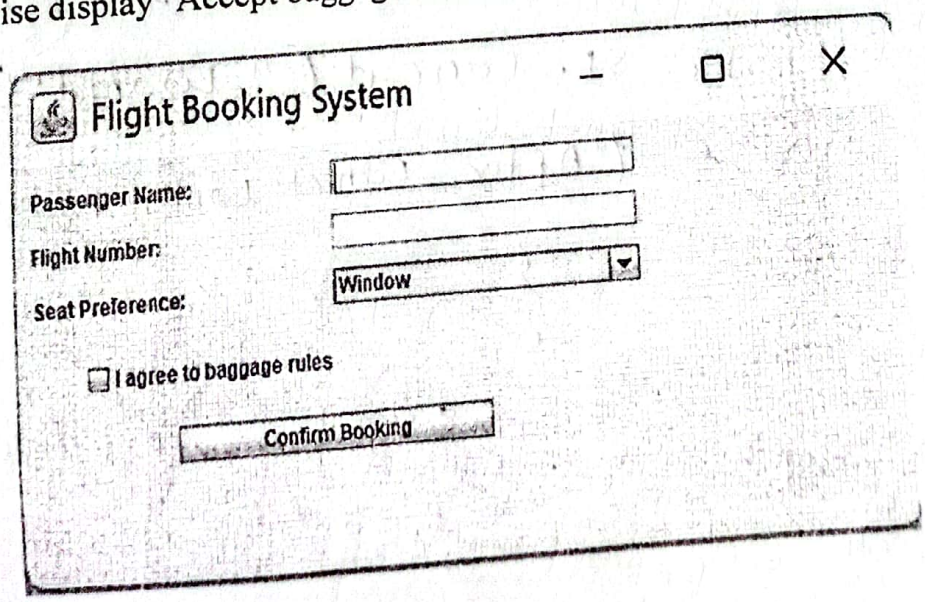
Attempt any SIX questions. **[6×5 = 30]**

2. What is command-line arguments? Write a program to accept two numbers and display their sum using command-line arguments. [5]
3. Write a program to demonstrate exception handling of ArrayIndexOutOfBoundsException. [5]
4. What is string immutability? Explain with an example. [1+4]
5. Write a program to create multiple threads and execute them concurrently. [5]
6. Explain the **Serializable** interface in java with an example. [5]
7. What is multiple inhertitance? Explain how multiple inheritance is implemented in Java? [1+4]
8. What is JDBC? Explain its architecture. [1+4]

Group C

Attempt any TWO questions. **[2×10 = 20]**

9. Explain nested and inner classes in java with examples. Discuss the scenarios where inner classes are useful. [10]
10. Create a class Person with attributes name and age, and a method display(). Derive a class Employee from Person with additional attributes employeeId and salary. Use constructors and override the display() method to include all details. [4+6]
11. Build a form with Passenger Name, Flight Number, Seat Preference (Window, Aisle, Middle), and a checkbox for "I agree to baggage rules." Clicking Confirm Booking should save data to "flight.txt" if rules are accepted otherwise display "Accept baggage rules first." [6+4]



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2025

Bachelor in Computer Applications
Course Title: System Analysis and Design
Code No: CACS 203
Semester: III

Full Marks: 60
Pass Marks: 24
Time: 3 hours

Candidates are required to answer the questions in their own words as far as possible.

Group B

Attempt any SIX questions. **[6×5 = 30]**

2. Define information system. What are its characteristics? [1+4]
3. What are different types of maintenance and when should they be implemented. [5]
4. Define interface. What are different methods of interaction? Explain them briefly. [1+4]
5. Prototyping is one of the effective methods to determine the requirement. Do you agree with the statement? Justify. [5]
6. What is cost benefit analysis? Explain different areas that come under intangible benefits. [1+4]
7. What is outsourcing? What are the advantages and disadvantages of outsourcing? [1+4]
8. What are the different considerations that must be kept in mind to better design forms and reports? [5]

Group C

Attempt any TWO questions. **[2×10 = 20]**

9. List and define DFD symbols. Draw a DFD up to level-2 for any food ordering system (assume requirements as required). [3 + 7]
10. What is data modeling, Explain conceptual, logical and physical data modeling? Explain normalization up to 3NF. [1+3+6]
11. What are different types of information system? Explain them briefly. [10]