



UG – 414

II Semester B.C.A. Examination, Sept./Oct. 2022
(CBCS) (Repeaters) (2014-15 and Onwards)
COMPUTER SCIENCE
BCA – 203 : Data Structures

Time : 3 Hours

Max. Marks : 70

Instruction : Answer **all** Sections.

SECTION – A

Answer **any ten** questions, **each** question carries **2** marks.

(10×2=20)

1. Define Linear and Non-Linear data structure.
2. Define searching and sorting.
3. What is Stack ? Give example.
4. What is Circular Linked List ?
5. What is Recursion ?
6. What is Input Restricted Queue ?
7. Define graph and sub graph.
8. Define path matrix.
9. Define traversal of a tree. Mention its types.
10. Give the structure of NODE in Double Linked List.
11. Define Infix, Prefix and Postfix Expression.
12. What is the drawback of Binary Search ?

P.T.O.



SECTION – B

Answer **any five** questions, **each** question carries **10** marks.

(5×10=50)

13. a) Write an algorithm to insert an element into the array at a particular position.
b) Write a 'C' program to perform binary search operation on array. (5+5)
14. a) Write a function to insert a node at the beginning of the singly linked list.
b) Write a program to sort the elements of the array using Bubble Sort. (5+5)
15. a) Explain the operations performed on data structures.
b) Explain the insertion and deletion operations on queues. (5+5)
16. a) Convert $a + b / c * d / e \wedge f$ to postfix expression.
b) Write an algorithm to perform push and pop operations on stacks. (5+5)
17. a) What are dequeues ? Write a program to perform insertion and deletion operations on dequeues.
b) Define Linked List. Explain different types of linked list, mention its advantages. (6+4)
18. a) Explain the operations performed on strings with example.
b) Write a function to find the length of the string without using built-in function. (5+5)
19. a) Write a program to construct Binary Search Tree.
b) Write an algorithm to perform post-order traversal of binary tree. (5+5)
20. a) Explain Breadth First Search algorithm with an example.
b) Write a short note on :
a) Recursion
b) Priority Queues. (6+4)



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II Semester B.C.A. Examination, September/October 2022
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COMPUTER APPLICATIONS

Paper – BCA 205 : Numerical and Statistical Methods

Time : 3 Hours

Max. Marks : 100

Instruction : Answer **all** the Sections.

SECTION – A

I. Answer **any ten** of the following. (10×2=20)

- 1) Define relative error.
- 2) Write the formula for secant method.
- 3) Write the inverse Lagrange interpolation formula.
- 4) Write the formula for Newton's backward difference interpolation.
- 5) Find the divided differences of $f(x) = x^3 + x + 2$ for the arguments 1, 3, 6, 11.
- 6) Write the Simpson's $\frac{1}{3}$ rd formula.
- 7) Explain LU decomposition method.
- 8) Find the harmonic mean of the series 5, 10, 15, 20, 25.
- 9) Define correlation.
- 10) Explain measures of skewness.
- 11) Prove that $P(\bar{A}) = 1 - P(A)$.
- 12) Define a sample space and conditional probability.

SECTION – B

II. Answer **any six** of the following. (6×5=30)

- 13) Use Bisection method in five stages to find a real root of the equation $x^3 - 2x - 5 = 0$ correct upto three decimal places.
- 14) Estimate $f(7.5)$ from the table.

x	1	2	3	4	5	6	7	8
f(x)	1	8	27	64	125	216	343	512

P.T.O.



15) Using Lagrange formula find $f(6)$ from the following data.

x	3	7	9	10
f(x)	168	120	72	63

16) Evaluate $\int_0^1 \frac{dx}{1+x}$ using Trapezoidal rule by dividing the interval into 6 parts.

17) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Simpson's $\left(\frac{3}{8}\right)^{\text{th}}$ rule.

18) Solve by Gauss-Jacobi method

$$10x + y + z = 12; x + 10y + z = 12; x + y + 10z = 12.$$

19) Solve the system of equations by Cholesky method.

$$x_1 + 2x_2 + 3x_3 = 5; 2x_1 + 8x_2 + 22x_3 = 6; 3x_1 + 22x_2 + 82x_3 = -10.$$

20) Determine the single-precision and double precision of the decimal number 52.234375.

SECTION – C

III. Answer **any six** of the following.

(6×5=30)

21) Solve the system of equations by Gauss-Elimination method

$$x + 2y + z = 3; 2x + 3y + 3z = 10; 3x - y + 2z = 13.$$

22) Solve by Gauss-Seidel method

$$10x + 2y + z = 9; x + 10y - z = -22; -2x + 3y + 10z = 22.$$

23) Find the largest eigen value of the matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$.

24) Solve $\frac{dy}{dx} = x^2 + y^2$, $y(0) = 1$ by Picard's method.

25) Solve $\frac{dy}{dx} = x - y^2$, $y(0) = 1$ by Taylor's series method upto fourth degree and hence find the value of y at $x = 0.1$.

26) Solve $\frac{dy}{dx} = 3x + \frac{y}{2}$, $y(0) = 1$ by Runge-Kutta method and hence find $y(0.2)$

by taking $h = 0.2$.



27) Find the Geometric mean for the following data.

Class Interval	4 – 8	8 – 12	12 – 16	16 – 20	20 – 24	24 – 28	28 – 32	32 – 36	36 – 40
Frequency	6	10	18	30	15	12	10	6	2

28) If A and B are events with $P(A) = \frac{5}{8}$, $P(B) = \frac{3}{8}$ and $P(A \cup B) = \frac{3}{4}$, find $P(A|B)$ and $P(B|A)$.

SECTION – D

IV. Answer **any four** of the following.

(4×5=20)

29) Compute the standard deviation of the following data.

Class x	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Frequency f	8	12	17	14	9	7	4

30) Find the co-efficient of correlation for the following data :

x	10	14	18	22	26	30
f	18	12	24	6	30	36

31) Calculate Karl Pearson's co-efficient of skewness for the following data :

25, 15, 23, 40, 27, 25, 23, 25, 20.

32) Two cards are drawn from a well-shuffled ordinary deck of 52 cards. Find the probability that they are both aces if the first card is

i) replaced ii) not replaced.

33) State and prove Bayes theorem.

34) Ten coins are tossed simultaneously. Find the probability of getting

i) atleast seven heads ii) atmost 4 heads.



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