**Dr. B.R. Ambedkar University, AGRA**
**I$^{th}$ Sem. Examination, Dec. 2017**
**BCA - 105 : Mathematics–I**

**Note :** Attempt any five questions. All questions carry equal marks.

1. (i) Find the Rank of the Matrix.

$$\begin{bmatrix} 2 & 3 & -2 & 4 \\ 3 & -2 & 1 & 2 \\ 3 & 2 & 3 & 4 \\ -2 & 4 & 0 & 5 \end{bmatrix}$$

(ii) Find the adjoint of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 5 & 0 \\ 2 & 4 & 3 \end{bmatrix}$ and verify the result

$A(\text{adj}A) = (\text{adj } A) = |A| I_3$

2. (i) Solve the following system of Equation using Cramer's Rule.

$x + 2y + 3z = 6$
$2x + 4y + z = 7$
$3x + 2y + 4z = 14$

(ii) If $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & -1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$

then find $A^2$ and show $A^2 = A^{-1}$

3. (i) Evaluate $\lim_{x \to 0} \dfrac{\sqrt{(1+x)} - \sqrt{(1-x)}}{x}$

(ii) Let f be a function defined by

$$f(x) = \begin{cases} \dfrac{x}{|x| + x^2}, & x \neq 0 \\ 0, & x = 0 \end{cases}$$

Does $\lim_{x \to 0} f(x)$ exists?

4. (i) Show that the function f(x) defined by
$f(x) = |x| + |x-1|$, $x \in R$ is continuous at $x = 0$ & $x = 1$.

(ii) A function, $f(x) = \begin{cases} \dfrac{9x}{x+2}, & x > 1 \\ 3, & x = 1 \\ \dfrac{x+3}{x}, & x < 1 \end{cases}$

Examine the continuity of f(x) in thc internat (–3, 3)

5. (i) State and prove Mean value theorem.
   (ii) Find $n^{th}$ derivative of $\sin^2 x$ in $2x$.
6. (i) Show that $x^5 - 5x^4 + 5x^3 - 1$ has a maximum when $x = 1$ and minimum when $x = 3$.
   (ii) Differentiate the function : $\log\left(\sqrt{x}\, e^x\right)$
7. (i) Evaluate $\int \sec^3 x\, dx$
   (ii) Evaluate $\int_0^a \frac{x^4}{\sqrt{a^2 - x^2}} dx$
8. (i) Evaluate when $n \to \infty$ of the series

$$\frac{1}{\sqrt{x}}\left[1 + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \ldots\ldots + \frac{1}{\sqrt{x}}\right]$$

   (ii) Evaluate the Integral

$$\int_0^2 \frac{1}{(1-x)^2} dx$$

9. (i) Show that the sum of three vectors determine by the medians of a triangle directed from the vertices is zero.
   (ii) Show that the vector $2\hat{i} - \hat{j} + \hat{k}$ and $\hat{i} - 3\hat{j} - 5\hat{k}$ are perpendicular.
10. (i) Find the area of parallel from whose adjacent sides are given by vectors $\vec{a} = 3\hat{i} + \hat{j} + 4\hat{k}$ and $\vec{b} = \hat{i} = 2\hat{j} + \hat{k}$
    (ii) Find the angle between the vectors
    $\vec{r}_1 = 3\hat{i} - 2\hat{j} + \hat{k}$ and $\vec{r}_2 - 4\hat{i} + 5\hat{j} + 7\hat{k}$

# D.B.R.A. University, Agra

## B.C.A. Second Semester Examination, May—2022

## Object Oriented Programming Using C++ (C-201)

**Time : 3 Hours]** **[Maximum Marks : 50**

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**Note :** Attempt any **five** questions. **All** questions carry equal marks.

1. Discuss various concepts of object oriented programming with suitable example.
2. Define constructor. What are the characteristics of a constructor function? Explain the concept of copy constructor with the help of an example.
3. (a) Write a program to illustrate the concept of multi-dimensional arrays using C++.
   (b) What do you mean by the term overloading? What is meant by overloading of a function? When do we use this concept? Explain.
4. What do you understand by the term inheritance? Discuss and compare multilevel and multiple inheritance.
5. Write a program to demonstrate the concept of array of pointers in C++. Differentiate between ordinary variable and pointer variable.
6. Why do we need to use exception handling mechanism? Write a program to explain the concept of exception handling. When should a function throw an exception?
7. Discuss and compare various looping constructs used in C++. Why do we use looping constructs?
8. Write short notes on :
   (i) Enumerated data type
   (ii) Abstract classes
   (iii) Inline function
   (iv) Type def statement.

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# D.B.R.A. University, Agra
## B.C.A. Second Semester Examination, May—2022
## Digital Electronics (C-202)

**Time : 3 Hours]** **[Maximum Marks : 50**

**Note :** Attempt any **five** questions. **All** questions carry equal marks.

1. (a) Express the Boolean function F(A, B, C) = A + B'C in sum of minterms form.
   (b) Simplify the Boolean functions $xy + x'z + yz$ to a minimum number of literals.
2. (a) Describe ASCII codes and its use in data transfer.
   (b) Which are universal logic gates, describe?
3. Simplify the Boolean function F in sum of products using the don's—care condition *d* :
   (a) F (A, B, C, D) = B'C'D' + BCD' + ABCD'
   *d* (A, B, C, D) = B'CD' + A'BC'D
4. (a) Discuss a full-adder circuit with truth table and logic diagram.
   (b) Implement NOT, AND, OR by NAND gates.
5. What is flip-flop circuit? Describe JK Flip-Flop with characteristic table and logic diagram.
6. (a) What are sequential circuits? How they are differ from combinational circuits?
   (b) What are shift registers? Discuss it's uses.
7. (a) Implement the logic diagram the following flip-flop input functions :
   JA = BC'*x* + B' C*x*
   KA = B + *y*
   (b) Explain 4 bit ripple counter with diagram.
8. (a) What are registers in sequential circuit? Discuss types of register.
   (b) Discuss serial transfer in two shift register with example.
9. Differentiate between ring counter and Johnson counters with diagrams.
10. Write short notes on any **two** of the following :
    (a) Binary Codes
    (b) Parity Checker method
    (c) Magnitude comparator

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# D.B.R.A. University, Agra
## B.C.A. Second Semester Examination, May—2022
## Data Structure Using C/C++ (C-203)

**Time : 3 Hours]** **[Maximum Marks : 50**

**Note :** Attempt any **five** questions. **All** questions carry equal marks.

1. (a) Define the term data structure and state the two factors on which the choice of a particular data structure depends on.
   (b) Distinguish between random according and sequential accessing with example and what makes the array a suitable data structure for random accessing of an element in a list.
2. Write down the algorithm to insert and delete an element from the array.
3. Write an algorithm to implement selection sort and sort the following list in descending order by using the selection sort algorithm.
   15, 12, 4, 16, 9, 10, 94
4. What are the various methods to store arrays in the memory. Explain their expressions using suitable examples.
5. Write short notes on the followings with examples and suitable diagrams :
   (a) Singly linked list
   (b) Doubly linked list
6. Illustrate the algorithm to insert an element into singly linked list after a given location.
7. Convert the following infix expression into postrix and prefix expression.
   $X = [(a + b) + (c / a)] - 2$
8. What do you mean by Traversal of a tree. Explain the difference between preorder and postorder traversal with the help of example.
9. Illustrate the linear queue and circular queue with example. Compare the array and linked list representation of a queue and explain your answer.
10. Explain the followings :
    (a) Linear search & Binary search
    (b) Tree and Binary search tree.

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# D.B.R.A. University, Agra
## B.C.A. Second Semester Examination, May—2022
## Principal of Management (C-204)

**Time : 3 Hours]** **[Maximum Marks : 50**

**Note :** Attempt any **five** questions. **All** questions carry equal marks.

1. Define Management. Discuss the importance and functions of Management.
2. Discuss Management as Art, Science and Profession.
3. Differentiate between Planning and forecasting. Discuss in detail the techniques of forecasting.
4. Define Planning. Explain the need and various types of planning.
5. Write short notes on :
   (a) Delegation of authority
   (b) Types of Organization structure
6. Write short notes on :
   (a) Styles of leadership
   (b) Maslow need hierarchy theory of Motivation
7. Define Controlling. Discuss its importance and process.
8. Define Strategic Management. Discuss the relevance and benefits of strategic management.
9. Discuss the Social Responsibility of Management.
10. Write short notes on :
    (a) Management of Change
    (b) Stress Management

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