

D 73138

(Pages : 3)

Name.....

Reg. No.....

**FIRST SEMESTER B.A./B.Sc. DEGREE EXAMINATION, NOVEMBER 2019**

(CUCBCSS-UG)

B.C.A.

BCA 1C 01—MATHEMATICAL FOUNDATION OF COMPUTER APPLICATIONS

(2017 Admissions)

Time : Three Hours

Maximum : 80 Marks

**Section A**

*Answer all questions.*

*Each question carries 1 mark.*

1. Define diagonal matrix.
2. Give an example of an upper triangular matrix.
3. Define a system of linear equations.
4. Define eigen value of a square matrix.
5. Define limit of a function
6. Find  $\frac{dy}{dx}$ , if  $y = \sqrt{\tan x}$ .
7. Find the derivative of  $\cot(2x+1)$
8. Evaluate  $\int \log x dx$ .
9. What is the value of  $\int_{-a}^a f(x) dx$  if  $f(x)$  is an odd function ?
10.  $\int \frac{1}{1+x^2} dx =$

(10 × 1 = 10 marks)

**Section B**

*Answer all questions.*

*Each question carries 2 marks.*

11. Find the adjoint of the matrix  $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ .
12. Show that the matrix  $\begin{bmatrix} 2 & -1 \\ 1 & 3 \end{bmatrix}$  is non-singular.

Turn over

13. Find the rank of the matrix  $\begin{bmatrix} 2 & 4 \\ 1 & 2 \end{bmatrix}$ .
14. Find  $x, y, z, w$  if  $2 \begin{bmatrix} x & y \\ z & w \end{bmatrix} + \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ -3 & 2 \end{bmatrix}$ .
15. Find  $\frac{dy}{dx}$ , if  $y = (1 + x^2) \cos x$ .
16. Find  $\frac{dy}{dx}$ , if  $y = (x^2 + x) \operatorname{cosec} x$ .
17. Evaluate  $\int \sqrt{x} \, dx$ .
18. Evaluate  $\int_0^{\pi/4} \tan x \, dx$ .

(8 × 2 = 16 marks)

## Section C

Answer any six questions.  
Each question carries 4 marks.

19. If  $A = \begin{bmatrix} 3 & -5 \\ -4 & 2 \end{bmatrix}$  then prove that  $A^2 - 5A - 14I = 0$ .
20. Express the matrix  $\begin{bmatrix} 1 & 4 & 5 \\ 2 & 2 & 3 \\ 3 & 1 & 0 \end{bmatrix}$  as the sum of a symmetric and skew symmetric matrices.
21. Find the angle between the vectors  $[2, -1, 1]$  and  $[-1, 3, 5]$ .
22. If  $A = \begin{bmatrix} 2 & 0 \\ 3 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 0 & 1 \\ 2 & 4 \end{bmatrix}$ . Verify  $(AB)^{-1} = B^{-1} A^{-1}$ .
23. Differentiate  $\sqrt{x}$  using first principle.
24. Find  $\frac{dy}{dx}$ , if  $y = \frac{x \sin^{-1} x}{\sqrt{1-x^2}}$ .
25. Evaluate  $\int \frac{\cos^2 x}{\cos^2 x \sin^2 x} \, dx$ .

26. Evaluate  $\int \frac{1}{1 + \sin x} dx$ .

27. Evaluate the definite integral  $\int_0^{\pi} x \sin^3 x dx$ .

(6 × 4 = 24 marks)

## Section D

Answer any three questions.  
Each question carries 10 marks.

28. (a) If  $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 1 & 3 \\ 4 & 1 & 8 \end{bmatrix}$  and  $B = \begin{bmatrix} 4 & 1 & 0 \\ 2 & -3 & 1 \\ 1 & 1 & -1 \end{bmatrix}$  then verify that  $(AB)' = B'A'$ .

(b) Compute the inverse of A. Where  $A = \begin{bmatrix} 1 & 0 & 2 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$ .

29. (a) Solve the system of linear equations using Gauss Jordan method

$$x + y + z = 3$$

$$x + 2y + 3z = 4$$

$$x + 4y + 9z = 6.$$

(b) Find the eigen value of the matrix  $\begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$ .

30. (a) Find  $\frac{dy}{dx}$ , if  $y = x^x$ .

(b) Find  $\frac{dy}{dx}$ , if  $y = (x \sin x)^3$ .

31. (a) Integrate  $\frac{4x}{(x-2)(x-1)}$ .

(b) Find  $\int e^x \cos x dx$ .

32. (a) Evaluate the definite integral  $\int_1^e \frac{\log x}{x} dx$ .

(b) Evaluate the definite integral  $\int_0^1 \frac{2x+3}{5x^2+1} dx$ .

(3 × 10 = 30 marks)