

D 73138

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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 $A^2 - 5A - 14 = 0$.
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)