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 $y=\left(1+x^2\right)\cos x$.

16. Find $\frac{dy}{dx}$, if $y=\left(x^2+x\right)\operatorname{cosec} x$.

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

$$x+y+z=3$$
$$x+2y+3z=4$$
$$x+4y+9x=6.$$

(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)