D 52771 (Pages : 4) Name.....

Reg. No.....

FIRST SEMESTER B.C.A. DEGREE EXAMINATION, NOVEMBER 2018

(CUCBCSS–UG)

Complementary Course

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 a null matrix. Give an example.
2. Find A – B if $A = \begin{bmatrix} 1 & 2 & -3 \\ 4 & -5 & 6 \end{bmatrix}, B = \begin{bmatrix} 7 & -8 & 9 \\ 2 & 8 & -4 \end{bmatrix}$.
3. State Cayley-Hamilton theorem.
4. Define Singular matrix.
5. Define limit of a function.
6. Find $\frac{dy}{dx}$ if $y = \sin x + \cos x$.
7. If $f(x)$ is an even function then what is the value of $\int_{-a}^{a} f(x)\,dx$?
8. Find $\int x^2 + e^{3x} + \sin 2x\,dx$.
9. Evaluate $\int_{0}^{5} \left(x^2 + 1\right) dx$.
10. Find the derivative of $x \cos x$.

(10 × 1 = 10 marks)

Turn over

Section B

Answer **all** *questions.*
Each question carries 2 *marks.*

11. Find AB if $A = \begin{bmatrix} 9 & 3 \\ -2 & 0 \end{bmatrix}, B = \begin{bmatrix} 1 & -4 \\ 2 & 5 \end{bmatrix}$.

12. Find the determinant of the matrix $\begin{bmatrix} 1 & 3 & 0 \\ 2 & 6 & 4 \\ -1 & 0 & 2 \end{bmatrix}$.

13. Find the eigen value of the matrix $\begin{bmatrix} 3 & 4 \\ 5 & 2 \end{bmatrix}$.

14. Find the rank of the matrix $\begin{bmatrix} 1 & 2 \\ 4 & 9 \end{bmatrix}$.

15. Find $\frac{dy}{dx}$ if $y = (x^2 + 1)^2$.

16. Find $\frac{dy}{dx}$ if $y = x^2 + x \cos x$.

17. Evaluate $\int x \log x \, dx$.

18. Evaluate $\int_0^{\pi/2} \sin 2x \, dx$.

(8 × 2 = 16 marks)

Section C

Answer any **six** *questions.*
Each question carries 4 *marks.*

19. Find the derivative of $\sin x$ using first principle.

20. Find the inverse of the matrix $\begin{bmatrix} 2 & -3 & 3 \\ 2 & 2 & 3 \\ 3 & -2 & 2 \end{bmatrix}$.

21. Solve the system of linear equation using Gauss-Siedel method :

$$4y + 3z = 8$$
$$2x - z = 2$$
$$3x + 2y = 5.$$

22. Find the rank of the matrix $\begin{bmatrix} 1 & 0 & 2 & 3 \\ 2 & 1 & 0 & 1 \\ 4 & 1 & 4 & 7 \end{bmatrix}$.

23. Evaluate $\int \frac{1}{x^2+x+1}\,dx$.

24. Find $\frac{dy}{dx}$ if $y = x^{\sin^{-1}x}$.

25. Evaluate $\int x^3 e^x\,dx$.

26. Find $\frac{dy}{dx}$ if $y = 3^x \sin 3x$.

27. Evaluate $\int_1^2 \frac{3x^2+3}{x^3+3x+5}\,dx$.

(6 × 4 = 24 marks)

Section D

Answer any **three** *questions.*
Each question carries 10 *marks.*

28. (a) Find the eigen value of the matrix $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$.

(b) Find the rank of the matrix $\begin{bmatrix} 1 & -1 & 3 & 6 \\ 1 & 3 & -3 & -4 \\ 5 & 3 & 3 & 11 \end{bmatrix}$.

29. (a) Find the inverse of the matrix $\begin{bmatrix} 2 & 1 & 2 \\ 2 & 2 & 1 \\ 1 & 2 & 2 \end{bmatrix}$.

(b) Solve the system of equation using Gauss Jordan method
$2x - y + 2z = 8$
$3x + 2y - 2z = -1$
$5x + 3y - 3z = 3$.

30. (a) Find $\frac{dy}{dx}$ if $y = \log\left[x + \sqrt{x^2 + 1}\right]$.

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

31. (a) Evaluate $\int x^3 \sqrt{3 + 5x^4}\, dx$.

(b) Evaluate $\int \sin^4 x \cos^2 x\, dx$.

32. (a) Evaluate $\int_0^2 \frac{dx}{x + 4 - x^2}$.

(b) Evaluate $\int_0^{\pi/4} \log(1 + \tan x)\, dx$.

(3 × 10 = 30 marks)