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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 $\dfrac{dy}{dx}$ if $y = \sin x + \cos x$.

7. If $f(x)$ is an even function then what is the value of $\int_{-a} f(x)\,dx$?

8. Find $\int x^2 + e^{3x} + \sin 2x\,dx$.

9. Evaluate $\int_{0} \left(x^2 + 1 \right) dx$.

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 $\int \sin 2x \, dx$.

$(8 \times 2 = 16 \text{ marks})$

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 $\int \dfrac{1}{x^2 + x + 1}\, dx$

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

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

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

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

$(6 \times 4 = 24 \text{ marks})$

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 $2x - y + 2z = 8$
    $$3x + 2y - 2z = -1$$
    $$5x + 3y - 3z = 3.$$

Turn over

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

   (b) Find $\dfrac{dy}{dx}$ 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 $\displaystyle\int_{0}^{2} \dfrac{dx}{x + 4 - x^2}$.

   (b) Evaluate $\displaystyle\int_{0}^{\pi/4} \log(1 + \tan x)\, dx$.

$(3 \times 10 = 30 \text{ marks})$