C 33336 (Pages : 4) Name.....

Reg. No.....

FIRST SEMESTER B.C.A. DEGREE EXAMINATION, NOVEMBER 2017

(CUCBCSS—UG)

BCA 1C 01—MATHEMATICAL FOUNDATIONS FOR COMPUTER APPLICATIONS

(2017 Admissions)

Time : Three Hours Maximum : 80 Marks

Section A

Answer **all** *the questions.*
Each question carries 1 *mark.*

1. Define rank of a matrix.

2. Find A + B, where $A = \begin{bmatrix} 6 & 5 \\ 8 & 2 \end{bmatrix}, B = \begin{bmatrix} 3 & 7 \\ 9 & 4 \end{bmatrix}$.

3. Find the transpose of a matrix $\begin{bmatrix} -2 & 6 & 9 \\ 1 & 8 & 5 \\ 4 & 3 & 7 \end{bmatrix}$.

4. Find $\lim_{x \to 3} \frac{x^2 - 9}{x - 3}$.

5. State fundamental theorem of calculus.

6. Find $\frac{dy}{dx}$ if $y = a^x$.

7. Find the characteristic equation of the matrix $\begin{bmatrix} 1 & -2 \\ 3 & 0 \end{bmatrix}$.

8. Find $\int (\sin 2x + \cos 2x)\, dx$.

9. If $f(x)$ is an odd function then what is the value of $\int_{-a}^{a} f(x)\, dx$.

10. Find the derivative of $Y = x \log x$.

(10 × 1 = 10 marks)

Turn over

Section B

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

11. Find the determinant of the matrix $A = \begin{bmatrix} 9 & 1 & 8 \\ 4 & 6 & 5 \\ 3 & 7 & 2 \end{bmatrix}$.

12. Find AB if $A = \begin{bmatrix} 3 & 5 \\ 9 & 2 \end{bmatrix}, B = \begin{bmatrix} 5 & 8 \\ 3 & 4 \end{bmatrix}$.

13. Find $\int_2^3 (9x + 5)\, dx$.

14. Find the Eigen values of the matrix $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$.

15. Find $\frac{dy}{dx}$, if $y = x^2 \sin x$.

16. Find $\int x\, e^x\, dx$.

17. Find the rank of a matrix $\begin{bmatrix} 2 & 3 \\ -4 & -6 \end{bmatrix}$.

18. Find $\lim_{x \to \frac{\pi}{2}} \frac{\tan \theta}{\sec \theta}$.

(8 × 2 = 16 marks)

Section C

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

19. Find the derivative of x^n using first principle.

20. Find the inverse of the matrix $A = \begin{bmatrix} 3 & 7 & -4 \\ 2 & -8 & 5 \\ 9 & 6 & -2 \end{bmatrix}$.

21. Solve the system of equations by Guass elimination method :

$$4x_1 + 2x_2 + 5x_3 = 21$$
$$3x_1 + 6x_2 + x_3 = 31$$
$$x_1 + 8x_2 + 3x_3 = 37.$$

22. Find $\int_0^{\frac{\pi}{2}} x^2 \cos x \, dx$.

23. Find $\int_0^1 \frac{2x+3}{x^2+3x+5} dx$.

24. Find the rank of a matrix $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 7 \\ 3 & 6 & 10 \end{bmatrix}$.

25. Find $\frac{dy}{dx}$ given $y + \sqrt{y} = x^2$.

26. Find $\frac{dy}{dx}$, if $y = \left(5t^2 - 3\right)^{\frac{1}{4}}$.

27. Find A(B+C) where $A = \begin{bmatrix} 1 & 2 \\ 3 & -4 \end{bmatrix}$, $B = \begin{bmatrix} -5 & 3 \\ 2 & 8 \end{bmatrix}$ and $C = \begin{bmatrix} 4 & 6 \\ 1 & -3 \end{bmatrix}$.

(6 × 4 = 24 marks)

Section D

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

28. (a) Find the eigen values of a matrix $\begin{bmatrix} -2 & 0 & -2 \\ 0 & 4 & 0 \\ -2 & 0 & 5 \end{bmatrix}$.

(b) Find the solution of the linear equation by Gauss Jordan method :

$$4x_1 + 2x_2 + 7x_3 = 35$$
$$3x_1 + x_2 + 8x_3 = 25$$
$$5x_1 + 3x_2 + x_3 = 40.$$

Turn over

29. (a) Find the rank of the matrix $A = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 3 & -2 & 1 \\ 2 & 0 & -3 & 2 \end{bmatrix}$.

(b) Find the solution of the linear equation by Gauss Siedel method.

$$x_1 + x_2 + 2x_3 = 4$$
$$2x_1 - x_2 + 3x_3 = 9$$
$$3x_1 - x_2 - x_3 = 2.$$

30. (a) Find the derivative of $y = \frac{\sqrt{\sin(4x+1) + \cos(4x-1)}}{3x}$.

(b) State and prove Increment theorem.

31. (a) Find $\int \frac{7x^2 + 13x}{(x-1)(x^2+4)}\, dx$.

(b) Find $\int \tan^3 x \sec^5 x\, dx$.

32. (a) Evaluate $\int_0^1 \frac{16}{x^2\sqrt{4-9x^2}}\, dx$.

(b) Evaluate $\int_0^{\frac{\pi}{2}} \left(e^{3x}\cos 2x + e^{-3x}\sin 2x\right) dx$.

(3 × 10 = 30 marks)