D 12608 (Pages : 3) Name...................................

Reg. No...................................

FIRST SEMESTER (CBCSS–UG) DEGREE EXAMINATION NOVEMBER 2021

B.C.A.

BCA 1C 01—MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS

(2021 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A

*Answer atleast **eight** questions.*
Each question carries 3 marks.
All questions can be attended.
Overall ceiling 24.

1. Define singular and non-singular matrix

2. Define principal diagonal of matrix.

3. If $A = \begin{bmatrix} x - y & 2x + z \\ 2x - y & 3z + w \end{bmatrix} = \begin{bmatrix} -2 & 5 \\ 0 & 8 \end{bmatrix}$. Then find x, y, z and w.

4. State the definition of Eigen value.

5. Evaluate the determinant $\begin{vmatrix} \cos n\theta & \sin n\theta \\ -\sin n\theta & \cos n\theta \end{vmatrix}$.

6. Define derivative of a function at a point.

7. State function of function rule.

8. Find $\dfrac{dy}{dx}$ if $y = \sqrt{\sin x}$.

9. Find the derivative of $(x - 1)(x - 2)$.

10. Evaluate $\int_1^2 x^2 dx$.

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11. Define an even function. What is the value of $\int_{-a}^{a} \cos x \, dx$?

12. Write any two properties of definite integral.

(8 × 3 = 24 marks)

Section B

Answer atleast **five** *questions.*

Each question carries 5 marks.

All questions can be attended.

Overall ceiling 25.

13. If $A = \begin{bmatrix} a & b & c \\ c & a & b \\ b & c & a \end{bmatrix}$, then prove that $|A| = a^3 + b^3 + c^3 - 3abc$.

14. If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ where $ad - bc \neq 0$ then find the inverse of A.

15. Find the vector perpendicular to the vectors $2i - j + k$ and $3i + 4j - k$.

16. Find the derivative of $\cos x$ using the first principal.

17. Differentiate $e^x \log(\sin 2x)$.

18. Evaluate $\int \frac{3x + 2}{x^2 + 3x + 2}$.

19. Integrate $\frac{\cos^3 x + 1}{\cos^2 x}$.

(5 × 5 = 25 marks)

Section C

Answer any **one** *question.*
The question carries 11 *marks.*

20. (a) Solve the system of linear equations :

$$x_1 - x_2 + x_3 = 4$$
$$2x_1 + x_2 - 3x_3 = 0$$
$$x_1 + x_2 + x_3 = 2.$$

(b) Find the eigen values the matrix :

$$\begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{bmatrix}.$$

21. (a) Find if $\dfrac{dy}{dx}$, if $y = e^x \log\left(1 + x^2\right)$.

(b) Integrate $\dfrac{1}{x^2 + 2x + 7}$.

(1 × 11 = 11 marks)