D1BCA2202   (PAGES 2)   Reg.No.............................

Name: ....

FIRST SEMESTER UG DEGREE EXAMINATION, NOVEMBER 2022

(Regular/Improvement/Supplementary)

BCA

GBCA1C01: MATHEMATICAL FOUNDATION OF COMPUTER APPLICATIONS

Time: 2 Hours   Maximum Marks: 60

SECTION A: Answer the following questions. Each carries 2 marks.
(Ceiling 20 Marks)

1. If $A = \begin{bmatrix} 1 & -2 \\ 3 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 1 \\ 4 & 2 \end{bmatrix}$, find AB .

2. Find a if $\begin{vmatrix} a & 2 \\ 4 & a \end{vmatrix} = 8$

3. Define a non - singular matrix. Give an example.

4. Find $|A|$ if $A = \begin{bmatrix} 5 & -1 & 8 \\ -1 & 5 & 2 \\ 1 & 1 & -2 \end{bmatrix}$

5. Find $\dfrac{d}{dx}(x+2)(x+3)$

6. Construct a 2×2 matrix $A = [a_{ij}]$, whose elements are given by $a_{ij} = \dfrac{i + 2j}{3i}$

7. Find $\displaystyle\int \left(x - \dfrac{1}{x} \right)^3 dx$

8. Define an idempotent matrix. Give an example

9. Find $\displaystyle\int \dfrac{\sin 2x}{\sin x} dx$

10. Define a skew – symmetric matrix. Give an example.

11. Find $\displaystyle\int \dfrac{\sec x + \tan x}{\sec x - \tan x} dx$

12. Find $\displaystyle\int_0^{2\pi} \cos(4x - 2)\, dx$

(PTO)

SECTION B: Answer the following questions. Each carries 5 marks.
(Ceiling 30 Marks)

13. Find $\displaystyle\int \frac{1 - \cos 2x}{1 + \cos 2x}\, dx$

14. Find the matrices A and B if $A + B = \begin{bmatrix} 5 & 2 \\ 6 & -3 \end{bmatrix}$ and $A - B = \begin{bmatrix} 9 & 4 \\ 8 & -7 \end{bmatrix}$

15. Solve the following system of equations using Gauss elimination method

$$x - 2y + z = 1$$
$$-2x + y + z = 1$$
$$x + y - 2z = -2$$

16. Find $\displaystyle\int \frac{1}{\sqrt{x^2 - 4x + 5}}\, dx$

17. If $\vec{a} = \vec{i} + 2\vec{j} - 3\vec{k}$ and $\vec{b} = 3\vec{i} - \vec{j} + 2\vec{k}$. Show that $\vec{a} + \vec{b}$ is perpendicular to $\vec{a} - \vec{b}$

18. Find $\dfrac{d}{dx} \sin^{-1} x$ using first principles.

19. Find $\displaystyle\int \frac{1}{\sqrt{2x+3} + \sqrt{2x-3}}\, dx$

SECTION C: Answer any 1 question. Each carries 10 marks.

20. a) Find $\dfrac{d}{dx} \sin^{-1} 2x$

    b) Find $\dfrac{d}{dx} \cos^{-1} \sqrt{\dfrac{1 + \cos x}{2}}$

    c) Find $\dfrac{d}{dx} \left(x^2 + 11x + 7\right)(x + 5)$

21. a) Find $\displaystyle\int x \sin^2\left(\frac{x}{2}\right) dx$

    b) Find $\displaystyle\int x^2 \left(\log x\right)^2 dx$

(1 x 10 = 10 Marks)