

ST MARY'S COLLEGE (AUTONOMOUS), THRISSUR-20**I SEMESTER BCA (FYUGP) DEGREE EXAMINATION, November 2024****BCA1CJ102 : Mathematical Foundation for Computer Applications****2024 Admission Onwards****(Credits: 4)**

Time : 2 Hours

Maximum Marks : 70

Section A*[Answer all. Each question carries 3 Marks] (Ceiling: 24 Marks)*

1. State principal diagonal of a matrix? [BTL1]
2. Solve the given matrix $\begin{bmatrix} x & y \\ z & 2w \end{bmatrix} + \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ -3 & 2 \end{bmatrix}$ [BTL3]
3. Evaluate the determinant $\begin{bmatrix} \sec \theta & \tan \theta \\ \tan \theta & \sec \theta \end{bmatrix}$ [BTL5]
4. Define Linear Independence of a vector. [BTL1]
5. Define augmented matrix. Write down the augmented matrix of the give system of equations [BTL4]

$$x + 4y - z = -5$$

$$x + y - 6z = -12$$

$$3x - y - z = 4$$
6. Suppose $a = -2i + 3j + 5k$ and $b = i + 2j + 3k$ are two vectors, then find the value of the dot product of these two vectors. [BTL2]
7. Compute $\frac{dy}{dx}$ when $y = (\sin x)^x$ [BTL2]
8. Find the integral of $2x - 3x^3 + \frac{1}{x^2}$ [BTL1]
9. Evaluate $\int_1^2 \frac{3x^2+3}{x^3+3x+5} dx$ [BTL3]
10. Apply integration on $\frac{x^2-x+1}{x}$ [BTL3]

Section B*[Answer all. Each question carries 6 Marks] (Ceiling: 36 Marks)*

11. Prove that the given matrix $A = \begin{bmatrix} 2 & 3 & 4 \\ 1 & 2 & 3 \\ 5 & 7 & 9 \end{bmatrix}$ is singular. [BTL3]

Turn Over

12. Evaluate X and Y if $2X + 3Y = \begin{bmatrix} 2 & 3 \\ 4 & 0 \end{bmatrix}$ and $3X + 2Y = \begin{bmatrix} 2 & -2 \\ -1 & 5 \end{bmatrix}$ [BTL4]
13. Determine the characteristics equation and eigen value of the matrix [BTL2]
- $$B = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 1 & 0 \\ 1 & 3 & 1 \end{bmatrix}$$
14. If $a = [1, -2, 1]$, $b = [2, -1, 1]$ and $c = [1, 1, -2]$ then prove that [BTL3]
- $$a \times (b \times c) = (a \times b) \times c.$$
15. What you mean by 2D vector. Explain different operations in 2D vector. [BTL1]
16. Evaluate $\frac{dy}{dx}$ where $y = \frac{\cos x}{\log x}$ [BTL4]
17. Find the differential of $y = e^{2x^3}$ [BTL5]
18. Integrate $\sqrt{\sin 2x} \cos 2x dx$ using substitution method? [BTL5]

Section C

[Answer **any one**. Each question carries 10 Marks] (1x10=10 Marks)

19. (i) Find the derivative of $\sin x$ using first principle [BTL3]
(ii) State derivative at a point
20. Evaluate the following $\int_0^{\pi/4} \log(1 + \tan x) dx$ [BTL3]
