



K24U 1624

Reg. No.: .....

Name : .....

Second Semester B.Sc. Degree (CBCSS – OBE-Regular/Supplementary/  
Improvement) Examination, April 2024

(2019 Admission Onwards)

COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS

2C02 MAT-CS : Mathematics for Computer Science – II

Time : 3 Hours

Max. Marks : 40



UNIT – I

Short answer type. Answer **any 4** questions. **Each** question carries **1** mark. **(4×1=4)**

1. Find the value of  $f(x, y, z) = \sqrt{x^2 - y^3 + 3z}$  at the point  $(4, 0, -4)$ .

2. Find  $\lim_{(x, y) \rightarrow (3, 4)} \sqrt{x^2 + y^2 - 1}$ .

3. Evaluate  $\int \sin^3 x \, dx$ .

4. Define a line in polar co-ordinates.

5. When can you say that a matrix is diagonalizable ?

UNIT – II

Short essay type. Answer **any 7** questions. **Each** question carries **2** marks. **(7×2=14)**

6. Find the domain and range of the function  $f(x, y, z) = xy \ln z$ .

7. If  $f(x, y) = x + y$ , find  $\frac{\partial f}{\partial x}$  and  $\frac{\partial f}{\partial y}$ .

8. Find  $\frac{dw}{dt}$  if  $w = xy + z$ ,  $x = \cos t$ ,  $y = \sin t$ ,  $z = t$ . What is the derivative's value at  $t = \frac{\pi}{2}$ .

9. Evaluate  $\int_0^{\pi/4} \sin^4 2x \, dx$ .

P.T.O.



10. Evaluate  $\int_0^{\frac{\pi}{2}} \cos^5 x \, dx$ .
11. Evaluate  $\int_{-2}^2 (x^4 - 4x^2 + 6) \, dx$ .
12. Find the average value of  $z = f(x, y) = x \cos xy$  over the rectangle  $R : 0 \leq x \leq \pi, 0 \leq y \leq 1$ .
13. When can you say that a quadratic form is negative definite ?
14. Let  $A = \begin{bmatrix} 3 & 4 \\ 6 & 2 \end{bmatrix}$  is the coefficient matrix. Find the symmetric coefficient matrix C.
15. Show that the matrices  $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ , and  $B = \begin{bmatrix} 6 & 0 \\ 0 & 1 \end{bmatrix}$  are similar.

UNIT – III

Essay type. Answer **any 4** questions. **Each** question carries **3** marks. **(4×3=12)**

16. Describe the level surfaces of  $f(x, y, z) = z^2 - x^2 - y^2$ .
17. Evaluate  $\int_0^{\infty} \frac{dx}{(1+x^2)^4}$ .
18. Evaluate  $\int_0^{\pi/6} \cos^6 3\theta \sin^2 6\theta \, d\theta$ .
19. Find the volume of the solid generated by revolving the region bounded by  $y = \sqrt{x}$  and the lines  $y = 1, x = 4$  about the line  $y = 1$ .
20. Find the polar equivalent of the curve whose Cartesian equation is  $x^2 - y^2 = 1$ .
21. Find a linearly independent eigenvectors of the matrix  $\begin{bmatrix} 0 & 16 \\ 4 & 0 \end{bmatrix}$  and diagonalize it.
22. Prove that 0 is a characteristic root of a matrix if and only if the matrix is singular.



UNIT – IV

Long essay type. Answer **any 2** questions. **Each** question carries **5** marks. **(2×5=10)**

23. If  $u = \sin^{-1} \frac{x+2y+3z}{x^8+y^8+z^8}$ , find the value of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z}$ .

24. Evaluate  $\int \tan^6 x \, dx$ .

25. Evaluate  $\int_1^3 \int_{\frac{1}{x}}^1 \int_0^{\sqrt{xy}} xyz \, dz \, dy \, dx$ .

26. Find the characteristic roots of the matrix  $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$  and then verify Cayley Hamilton theorem. Also express  $A^5 - 4A^4 - 7A^3 + 11A^2 - A - 10I$  as a linear polynomial in A.

