



K21U 3473

Reg. No. : .....

Name : .....

II Semester B.Sc. Degree (CBCSS-OBE-Reg./Sup./Imp.)  
Examination, April 2021  
(2019 Admission Onwards)  
COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS  
2C02 MAT-CS : Mathematics for Computer Science – II

Time : 3 Hours

Max. Marks : 40

PART – A

Answer **any 4** questions :

(1×4=4)

1. Evaluate  $\int_0^{\frac{\pi}{2}} \sin^2 x \, dx$ .
2. Graph the set of points whose polar co-ordinates satisfy  $-2 \leq r \leq 2$  and  $\theta = \frac{\pi}{6}$ .
3. Evaluate the integral  $\int_0^1 \int_0^2 \int_0^3 dx dy dz$ .
4. Define a positive definite quadratic form.
5. Prove that the matrices A and  $A^T$  have the same eigen values.

PART – B

Answer **any 7** questions :

(2×7=14)

6. Find the limit of  $\frac{x(y-1)}{y(x-1)}$  when  $(x, y) \rightarrow (1, 1)$ , if the limit exists.
7. If  $f(x, y) = x^8 \sin\left(\frac{y}{x}\right)$ , find the value of  $x \frac{\partial f}{\partial x} + y \frac{\partial f}{\partial y}$ .
8. Find  $\frac{dz}{dx}$  using chain rule, given that  $z = x^2 + \sqrt{y}$  and  $y = \sin x$ .

P.T.O.



9. Show that  $\int_0^{\pi} \sin^7(x/2) dx = \frac{32}{35}$ .
10. Evaluate  $\int_0^{\pi} \sin^3 \theta \cdot \cos^6 \theta d\theta$ .
11. Find the value of  $\int \cos^4 x dx$ .
12. Show that  $\int_0^{\pi/2} \sin^6 \theta \cdot \cos^5 \theta d\theta = \frac{8}{693}$ .
13. Write all polar co-ordinates of the point  $P(1, \pi/4)$ .
14. Find the perimeter of the circle  $x^2 + y^2 = 4$ .
15. Write the matrix of the quadratic form  $x_1^2 + 2x_2^2 - 7x_3^2 - 4x_1x_2 + 8x_1x_3 + 5x_2x_3$ .

## PART - C

Answer **any 4** questions :

(3×4=12)

16. If  $u = (y - z)(z - x)(x - y)$ , show that  $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$ .
17. If  $u = \log_e \left( \frac{x^2 - y^2}{x^2 + y^2} \right)$ , prove that  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 1$ .
18. Using reduction formula, evaluate  $\int \tan^4 x dx$ .
19. Evaluate  $\int_0^1 x^4 (1-x^2)^{3/2} dx$ .
20. Show that  $\int_0^3 \int_0^2 \int_0^1 (x+y+z) dz dx dy = 18$ .
21. Find the value of the integral  $\int_2^a \int_2^b \frac{dx \cdot dy}{xy}$ .
22. Find the nature of the quadratic form  $8x^2 + 7y^2 + 3z^2 - 12xy - 8yz + 4zx$ .



PART - D

Answer **any 2** questions :

(5×2=10)

23. If  $u = \tan^{-1}\left(\frac{x^3 + y^3}{x + y}\right)$ , prove that  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$ .

24. Show that  $\int_0^1 x^{3/2} (1-x)^{3/2} dx = \frac{3\pi}{128}$ .

25. Change the order of integration  $\int_0^1 \int_{x^2}^x (2x^2 + y) dy dx$  and hence or otherwise evaluate the same.

26. Find the eigen values and eigen vectors of the matrix  $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ .

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