K22U 1299

Reg. No. : .....

Name : .....

II Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/ Improvement) Examination, April 2022
(2019 Admission Onwards)
COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS
2C02 MAT – BCA : Mathematics for BCA II

Time : 3 Hours Max. Marks : 40

PART – A

Answer **any four** questions. **Each** question carries **1** mark.

1. If z is a homogeneous function of degree n in x and y, then find $x^2\frac{\partial^2 z}{\partial x^2} + 2xy\frac{\partial^2 z}{\partial x \partial y} + y^2\frac{\partial^2 z}{\partial y^2}$.

2. Find the value of $\int_0^{\frac{\pi}{2}} \sin x\, dx$.

3. Evaluate $\int \frac{dx}{2x-5}$.

4. Find the Cartesian equation of the polar equation r = 2.

5. Calculate the eigenvalues of a diagonal matrix. **(4×1=4)**

PART – B

Answer **any seven** questions. **Each** question carries **2** marks.

6. State Euler's theorem on homogeneous function.

7. Find the value of $\lim_{\substack{x\to 1\\ y\to 2}} \frac{3x^3y}{x^2+2y^2+4}$.

P.T.O.

8. Evaluate $\int_0^1 \frac{2x}{1+x^2}\,dx$.
9. What is the reduction formula for $\int \tan^n x\,dx$?
10. Evaluate $\int x \cos x\,dx$.
11. Find the value of $\int_1^2 \int_0^4 xy\,dy\,dx$.
12. Sketch the region of integration $0 \le x \le 3$, $0 \le y \le 2x$.
13. Define eigenvectors.
14. What is meant by similarity of matrices ?
15. Find the matrix corresponding to the quadratic form $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$. **(7×2=14)**

PART – C

Answer **any four** questions. **Each** question carries **3** marks.

16. Find the value of $\frac{du}{dt}$, given $u = y^2 - 4ax$, $x = at^2$ and $y = 2at$.
17. Evaluate $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ if $z = x^2y - x \sin xy$.
18. Find the value of $\int_0^1 \frac{x^5}{\sqrt{1-x^2}}\,dx$.
19. Evaluate $\int_{-1}^{1} \int_0^1 \int_0^2 (x + y + z)\,dx\,dy\,dz$.
20. Find a polar equation for the circle $(x - 3)^2 + (y + 1)^2 = 4$.
21. Calculate the eigenvalues and eigenvectors of the matrix $\begin{bmatrix} 10 & 3 \\ 4 & 6 \end{bmatrix}$.
22. Classify the nature of a quadratic form X^TAX. **(4×3=12)**

PART – D

Answer **any two** questions. **Each** question carries **5** marks.

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

24. Integrate $\frac{x+1}{(x-1)^2(x+2)^2}$ with respect to x.

25. Calculate $\int\int f(x, y)\, dA$ over $R : 0 \le x \le 2, -1 \le y \le 1$, where $f(x, y) = 100 - 6x^2y$.

26. Using Cayley Hamilton theorem find the inverse of the matrix $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$. Also express $A^5 - 4A^4 - 7A^3 + 11A^2 - A - 10I$ as a linear polynomials in A.

(2×5=10)