K21U 3474

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-BCA : Mathematics for BCA II

Time : 3 Hours Max. Marks : 40

PART – A

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

1. Calculate $\lim_{\substack{x \to 1 \\ y \to 2}} \left(\frac{2x^2y}{x^2 + y^2 + 1} \right)$.
2. Show that $\int_0^{\frac{\pi}{2}} \cos^7 x \, dx = {}^{16}/_{35}$.
3. Evaluate $\int \frac{dx}{3x - 4}$.
4. Find the Cartesian equation of the polar equation $r \sin \theta = 3$.
5. If $\lambda_1, \lambda_2, \ldots, \lambda_n$ are the eigen values of a matrix A, then find the eigen values of A^m, where m is a positive integer. **(4×1=4)**

PART – B

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

6. State Euler's theorem on homogeneous function.
7. Determine whether the function $z = ax^2 + 2hxy + by^2$ is homogeneous or not. If homogeneous write the degree.
8. Evaluate $\int xe^x \, dx$.
9. Find the reduction formula for $\int \tan^n x \, dx$.
10. Calculate $\int_0^{\frac{\pi}{2}} \frac{\cos x}{1 + \sin^2 x} \, dx$.

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11. Find the value of $\int_0^2 \int_{-1}^{1} (x - y)\, dy\, dx$.
12. Find a polar equation for the circle $x^2 + (y - 2)^2 = 4$.
13. Define eigen vectors.
14. Find the matrix corresponding to the quadratic form $2x_1x_2 + 2x_1x_3 - 2x_2x_3$.
15. What is meant by similarity of matrices ? **(7×2=14)**

PART – C

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

16. If $u = x \log(xy)$ where $x^3 + y^3 + 3xy = 1$, find $\frac{du}{dx}$.
17. Verify $\frac{\partial^2 z}{\partial y \partial x} = \frac{\partial^2 z}{\partial x \partial y}$ when $z = x^3 + y^3 - 3axy$.
18. Evaluate $\int_0^a \frac{x^4}{\sqrt{a^2 - x^2}}\, dx$.
19. Find the value of $\int_0^2 \int_0^2 \int_0^2 xyz\, dx\, dy\, dz$.
20. Sketch the region of integration $y^2 \le x \le 4$, $-2 \le y \le 2$.
21. Prove that eigen values of a diagonal matrix are just the diagonal elements of the matrix.
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. Show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 2u \log u$ where $\log u = \frac{x^3 + y^3}{3x + 4y}$.
24. Integrate $\frac{x^2 + x + 1}{(x + 1)^2 (x + 2)}$ with respect to x.
25. Calculate $\iint f(x, y)\, dA$ over $R : 0 \le x \le 1, 0 \le y \le 2$, where $f(x, y) = 6y^2 - 2x$.
26. Verify Cayley Hamilton theorem for the matrix $A = \begin{bmatrix} 2 & 2 & 0 \\ 2 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$. **(2×5=10)**