Reg. No. : ....

Name : ....

II Semester B.Sc. Degree (CBCSS (OBE) – Regular) Examination, April 2020
(2019 Admission)
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. Define homogeneous function of degree n in x and y.

2. Calculate the value of $\int_0^{\frac{\pi}{2}} \sin^7 x \, dx$.

3. Evaluate $\int \frac{1}{x} dx$.

4. Find the Cartesian equation of the polar equation $r \cos \theta = -4$.

5. What is the product of eigen values of a matrix A ?

$(4\times1=4)$

PART – B

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

6. State Euler's theorem on homogeneous function.

7. Find the first order partial derivatives of $z = x^3 + y^3 - 3axy$.

8. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\cos x}{1 + \sin^2 x} dx$.

9. What is the reduction formula for $\int \tan^n x \, dx$?

10. Evaluate $\int x e^x \, dx$.

11. Evaluate $\int_1^2 \int_0^4 2xy \, dy \, dx$.

12. Find a polar equation for the circle $x^2 + (y - 3)^2 = 9$.

P.T.O.

13. Define eigen vectors.

14. Find the matrix corresponding to the quadratic form $x_1^2 + 2x_1x_2 + 2x_1x_3 - 2x_2x_3$.

15. What is meant by similarity of matrices ?   (7×2=14)

PART – C

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

16. Given $u = \sin\left(\dfrac{x}{y}\right)$, $x = e^t$ and $y = t^2$, find $\dfrac{du}{dt}$ as a function of t.

17. Find the value of $\displaystyle\int_0^1 x^2(1-x^2)^{\frac{3}{2}}dx$.

18. Evaluate $\displaystyle\int \dfrac{dx}{x^2 + 2x + 2}$.

19. Calculate $\displaystyle\int_0^1\int_0^1\int_0^1 (x^2 + y^2 + z^2)dz\,dy\,dx$.

20. Sketch the region of integration $-1 \le x \le 2$, $x - 1 \le y \le x^2$.

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 $X^T AX$.   (4×3=12)

PART – D

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

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

24. Evaluate $\displaystyle\int \dfrac{1}{x^3(x-1)^2(x+1)} dx$.

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

26. Using Cayley Hamilton theorem, show that $A^3 - 6A^2 + 11A - 61 = 0$, where

$$A = \begin{bmatrix} 1 & 1 & 2 \\ 0 & 2 & 2 \\ -1 & 1 & 3 \end{bmatrix} \text{ and hence find } A^{-1}.$$ (2×5=10)