Reg. No. : ....

Name : ....

II Semester B.Sc. Degree (CBCSS-Supplementary) Examination, April 2023
(2017-2018 Admissions)
COMPLEMENTARY COURSE IN MATHEMATICS
2C02MAT-BCA : Mathematics for BCA – II

Time : 3 Hours

Max. Marks : 40

SECTION – A

All the first **4** questions are **compulsory**. They carry **1** mark **each**.   (4×1=4)

1. Write the formula for arc length of a curve in parametric form.

2. Write the rank of the matrix $\begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix}$.

3. State the Cayley Hamilton Theorem.

4. Draw the graph having adjacency matrix $\begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 0 \\ 1 & 0 & 0 \end{bmatrix}$.

SECTION – B

Answer **any 7** questions from among the questions **5** to **13**. The questions carry **2** marks **each**.   (7×2=14)

5. Find the area enclosed between $y = |x| - 1$ and $y = 1 - |x|$.

6. Find the area of the surface generated by the straight line segment $x + y + 1$ in the first quadrant by revolving about the x-axis.

7. Evaluate $\int_{0}^{1}\int_{0}^{1}\int_{0}^{1} xyz\,dz\,dy\,dx$.

8. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$, find $(A + B)^{T}$.

P.T.O.

9. If $A = \begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$, write A^3 in terms of A and $I_2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$.

10. Find the eigen values of $A = \begin{bmatrix} 1 & 2 \\ -1 & 4 \end{bmatrix}$.

11. Draw the graph of $K_{2,3}$.

12. Verify whether 1, 2, 3, 4, 5 is the degree sequence of a graph or not.

13. Give example of a graph on 4 vertices and its incidence matrix.

SECTION – C

Answer **any 4** questions from among the questions **14** to **19**. These questions carry **3** marks **each**.   (4×3=12)

14. Find the length of the curve $x = t - \sin t$, $y = 1 - \cos t$ for $0 \le t \le 2\pi$.

15. Solve the system of equations :

    $x - 2y + z = 3$

    $2x + y - 3z = 1$ using Cramer's rule.

    $2x + 5y - 4z = 3$

16. If 0 is an eigen value of matrix A, then prove that A is singular.

17. Using Cayley Hamilton theorem, find A^{-1} where $A = \begin{bmatrix} 5 & 9 \\ 2 & 4 \end{bmatrix}$.

18. Prove that a matrix is not invertible if and only if 0 is an eigen value of the matrix.

19. Find eigen values and eigen vectors of $\begin{bmatrix} 1 & 1 \\ 0 & 2 \end{bmatrix}$.

SECTION – D

Answer **any 2** questions from among the questions **20** to **23**. These questions carry **5** marks **each**. (2×5=10)

20. Prove that the length of the curve given by the parametric equation
$x = \cos^3\theta, y = \sin^3\theta; 0 \le \theta \le 2\pi$ is 6.

21. Evaluate $\displaystyle\int_{y=0}^{1}\int_{x^0}^{1-x^2} y\sin\{\pi(1-x^2)\}\,dxdy$ by writing the integral in the reverse order.

22. Solve using Cramer's rule the system $3x + y - 2z = 3$, $x + 2y + z = 6$, $2x - y + 4z = 4$.

23. Verify Cayley Hamilton theorem for the matrix $A = \begin{bmatrix} 3 & 5 & 1 \\ 1 & 0 & 4 \\ 2 & 4 & 2 \end{bmatrix}$. Also find inverse of the matrix A.