K22U 1065

Reg. No. : .....

Name : .....

II Semester B.Sc. Degree (C.B.C.S.S. – Supplementary) Examination, April 2022
(2016 – 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**.

1. The area of the ellipse $x = a\cos t$, $y = b\sin t$ is

2. Define null space of a matrix.

3. The eigen values of the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 2 & 4 & 0 \\ 6 & 4 & 2 \end{bmatrix}$ are

4. What is meant by isomorphism of two graphs ?

SECTION – B

Answer **any 7** questions from among the questions **5** to **13**. These questions carry **2** marks **each**.

5. Find the area of the cardioid $r = a(1 + \cos\theta)$.

6. Find the length of the arc of the curve $y = \log \sec x$ from $x = 0$ to $x = \frac{\pi}{3}$.

7. Evaluate the integral $\int_0^{\infty}\int_x^{\infty} \frac{e^{-y}}{y}\, dx\, dy$ by changing the order of integration.

8. Solve by Crammer's rule
   $2x - 5y = 23$
   $4x + 6y = -2$.

9. Find the inverse of $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 4 & 9 \end{bmatrix}$.

P.T.O.

10. Determine whether the vectors (1, 1, 0), (1, 0, 0) and (1, 1, 1) are linearly independent or not.

11. Find the rank of $\begin{bmatrix} 2 & 1 & 0 \\ 13 & -13 & 12 \\ -3 & 5 & -4 \end{bmatrix}$ using determinants.

12. Find the eigen values of the matrix $\begin{bmatrix} 3 & 0 & 12 \\ -6 & 3 & 0 \\ 9 & 6 & 3 \end{bmatrix}$.

13. Prove that the no. of points of odd degree in a graph is even.

SECTION – C

Answer **any 4** questions from among the questions **14** to **19**. These questions carry **3** marks **each**.

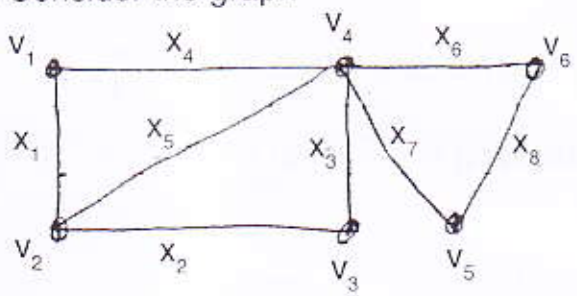
14. Find the area common to the circles $r = a\sqrt{2}$ and $r = 2a\cos\theta$.

15. Evaluate $\int_0^a \int_0^x \int_0^{x+y} e^{x+y+z}\, dx\, dy\, dz$.

16. Find the inverse of $\begin{bmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{bmatrix}$.

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

18. Consider the graph



Give a walk, trail, path, closed walk, cycle and a triangle.

19. Show that in a group of two or more people there are always two with exactly the same number of friends inside the group.

SECTION – D

Answer **any 2** questions from among the questions **20** to **23**. These questions carry **5** marks **each**.

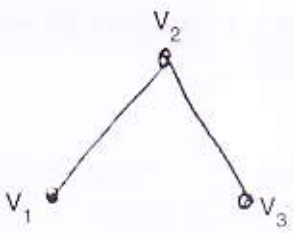
20. Find the area between the curve $x(x^2 + y^2) = a(x^2 - y^2)$ and its asymptote. Also find the area of its loop.

21. Solve the system of equations

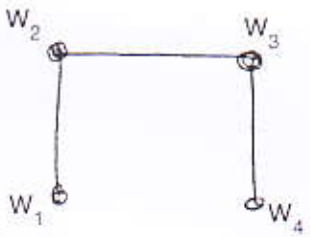
$$2x_1 + x_2 + 2x_3 + x_4 = 6$$
$$6x_1 - 6x_2 + 6x_3 + 12x_4 = 36$$
$$4x_1 + 3x_2 + 3x_3 - 3x_4 = -1$$
$$2x_1 + 2x_2 - x_3 + x_4 = 10.$$

22. Verify Cayley Hamilton theorem for the matrix $\begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$.

23. Consider the graphs G_1 and G_2 given below. Construct graphs $G_1 \cup G_2$, $G_1 + G_2$ and $G_1 \times G_2$.



G_1



G_2