Name :

II Semester B.Sc. Degree (C.B.C.S.S. – Supplementary) Examination, April 2022 (2016-2018 Admissions)

COMPLEMENTARY COURSE IN MATHEMATICS 2C02 MAT-PH: Mathematics for Physics and Electronics - II

Time: 3 Hours

Max. Marks: 40

SECTION - A

All the first 4 questions are compulsory. They carry 1 mark each.

2. Write the formula for the area of the surface of the solid obtained on revolving

Give the reduction formula for cosⁿ x dx.

- about x axis, the arc of the curve y = f(x) intercepted between the points whose abscissae are a. b. Two matrices A and B are equal if and only if _____
- 4. When is it possible to multiply two matrices of order $m \times n$ and $p \times q$?
- SECTION B

Answer any 7 questions from among the questions 5 to 13. These questions carry

5. What is the area of the loop of the curve $r^2 = a^2 \cos 2\theta$?

- 6. Calculate the area bounded by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{h^2} = 1$.
- 7. Find the whole length of the astroid $x^{3} + y^{3} = a^{3}$.
- 8. Find the volume of the solid obtained by revolving the circle $x^2 + y^2 = a^2$ about
- the x axis.
- 9. Evaluate $\int_0^1 \int_0^1 \frac{dx \, dy}{\sqrt{1 x^2} \sqrt{1 y^2}}$.

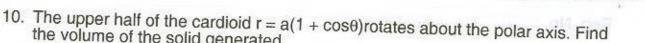
P.T.O.

the volume of the solid generated.

3 marks each.

4x + 5y + z = 3

K22U 1060



01

- 11. If A is a 2×2 matrix, show that $A A^{T}$ is skew symmetric. 12. Prove that for a 2×2 matrix, the eigenvalues of a diagonal matrix are real.
- 13. If a square matrix A has its characteristic equation $x^2 1 = 0$, prove that its determinant is ±1.
- SECTION C

Answer any 4 questions from among the questions 14 to 19. These questions carry

14. Find the area of one loop of the curve $r = \sqrt{3} \cos 3\theta + \sin 3\theta$.

- 15. Transform to polar co-ordinates and integrate $\iint \sqrt{\frac{1-x^2-y^2}{1+x^2+y^2}} dx dy$ the integral being extended over all positive values of x and y subject to $x^2 + y^2 \le 1$.
- 16. Solve the system of linear equations X + Y + Z = 12x + 3z = 2

by Gaussian Elimination. 17. Verify Cayley-Hamilton theorem for the matrix $A = \begin{pmatrix} 2 & 3 \\ -1 & 5 \end{pmatrix}$

- 18. Prove that the eigenvalues of a 3×3 lower triangular matrix are the same as its diagonal entries. 19. Verify that $(A^{-1})^{-1} = A$ for the matrix A =
- Answer any 2 questions from among the questions 20 to 23. These questions carry 5 marks each. 20. Find the intrinsic equation of the astroid $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$ when s is measured from i) the vertex ii) the cusp on the x - axis.

21. Show that if the area lying within the cardioid $r = 2a (1 + \cos\theta)$ and without the parabola $r(1 + \cos\theta) = 2a$ revolves about the initial line, the volume generated

i) For which values of a and b the system has a unique solution? Why?

ii) For which values of a and b the system is inconsistent? Why?

SECTION - D

x + y = 3x + 2y + z = 5

x + y + az = b

is $18\pi a^3$.

22. Find the eigenvalues and eigenvectors for $A = \begin{pmatrix} 10 & 2 \\ 3 & 5 \end{pmatrix}$.

23. Consider the system of linear equations

K22U 1060