S.NO: 22N1-UM

Course Code: MUAP1 / KUMA1

A.D.M.COLLEGE FOR WOMEN, NAGAPATTINAM

(AUTONOMOUS)

B. Sc (COMPUTER SCIENCE) / BCA Degree Examination

I Semester – November – 2022

AC I - MATHEMATICS I - ALGEBRA AND CALCULUS

Time: 3 hours

Maximum Marks: 75

Section -A

10X2=20

Answer **ALL** the Questions:

- 1. Change the equation $2x^4 3x^3 + 3x^2 x + 2 = 0$ into another the coefficient of whose highest term will be unity.
- 2. Find the quotient and remainder when $3x^3 + 8x^2 + 8x + 12$ is divided by x - 4
- 3. Define singular matrix and give an example.
- 4. Define orthogonal matrix and give an example.
- 5. Find the maximum value of $\frac{\log x}{x}$ for positive values of *x*.
- 6. For what values of x is the curve $y = 3x^2 2x^3$ concave upwards and when is it convex upwards?
- 7. Evaluate $\int x e^x dx$
- 8. Write the formula for half range cosine series and sine series.
- 9. Solve $ydx xdy + 3x^2y^2e^{x^3} = 0$
- 10. Solve $(D^2 5D + 4)y = 0$

(1)

Section -B

Answer ALL the Questions:

11. a) Diminish the roots of
$$x^4 - 5x^3 + 7x^2 - 4x + 5 = 0$$
 by 2.

(or)

b) Determine completely the nature of the roots of the equation $x^5 - 6x^2 - 4x + 5 = 0$

12. a) Show that the matrix $A = \begin{bmatrix} 1 & 2 & -1 \\ 3 & 8 & 2 \\ -5 & 2 & -4 \end{bmatrix}$ satisfies the

equation A(A-I)(A+2I) = 0

(or)

b) Find the inverse of the matrix $\begin{pmatrix} 1 & 2 & -1 \\ 3 & 8 & 2 \\ 4 & 9 & -1 \end{pmatrix}$

13. a) Find the points of inflection on the cubic $y = \frac{a^2 x}{x^2 + a^2}$ and

show that they lie on a straight line.

(or)

b) Find $\frac{du}{dt}$, where $u = x^2 + y^2 + z^2$, $x = e^t$, $y = e^t \sin t$ and $z = e^t \cos t$.

(2)

14. a) Solve
$$\int \frac{6x+5}{\sqrt{6+x-2x^2}} dx$$

(or)

b) Obtain the Fourier series of period 2π , for the function $f(x) = x^2$

in $(-\pi,\pi)$

15. a) Solve $(1-x^2)\frac{dy}{dx} + 2xy = x\sqrt{1-x^2}$ given that y = 0 when x = 0(or) b) Solve $(D^2 - 8D + 9)y = 8\sin 5x$

Section – C 3 X 10 = 30 Answer any THREE Questions:

- 16. Show that the roots of the equation $x^3 + px^2 + qx + r = 0$ are in arithmetic progression if $2p^3 - 9pq + 27r = 0$. Show that the above condition is satisfied by the equation $x^3 - 6x^2 + 13x - 10 = 0$. Hence or otherwise, solve the equation.
- 17. Find the characteristic equation of the matrix $A = \begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{pmatrix}$ and

hence determine its inverse.

18. If
$$u = \tan^{-1} \frac{x^3 + y^3}{x - y}$$
, prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$.

(3)

19. Evaluate $I = \int_{0}^{\pi/2} \log \sin x$

20. Solve $(D^2 + 16)y = e^{-3x} + \cos 4x$.
