

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**U.G. DEGREE EXAMINATION – ALLIED****FOURTH SEMESTER – APRIL 2022****UMT 4405 – MATHEMATICS FOR COMPUTER APPLICATIONS**

Date: 27-06-2022

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

PART – A**Answer ALL questions****(10x2= 20)**

1. Express $\cos \theta$ in terms of ascending powers of θ .
2. Write down the expansion of $\tan 7\theta$.
3. State Remainder theorem.
4. Find the equation with rational coefficients whose roots are $2 + i$.
5. Define a scalar matrix with an example.
6. What are the eigen values of the matrix $= \begin{bmatrix} 1 & 0 & 0 \\ 0 & 15 & 0 \\ 0 & 0 & 3 \end{bmatrix}$.
7. State Euler's theorem.
8. Evaluate the first order partial differential coefficients of $u = x^3 + y^3$.
9. Define transcendental equation with example.
10. What do you mean by interpolation?

PART – B**Answer any FIVE questions****(5 x 8 = 40)**

11. If $\cos a \cosh b = \cos c$ and $\sin a \sinh b = \sin c$, then prove that
 $\sin c = \pm \sin^2 a = \pm \sinh^2 b$.
12. Expand $\sin^3 \theta \cos^5 \theta$ in a series of sines of multiples of θ .
13. Find the condition that the roots of the equation $ax^3 + 3bx^2 + 3cx + d = 0$ may be in geometric progression.
14. Prove that $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$ when $u = \log \frac{x^2 + y^2}{xy}$.
15. Find the characteristic equation of the matrix $A = \begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{bmatrix}$ and hence determine its inverse.
16. If $u = \tan^{-1} \frac{x^3 + y^3}{x - y}$, then prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$.
17. Find the second and third order derivatives of $f(x)$ at $x = 1.5$ if

x	1.5	2.0	2.5	3.0	3.5	4.0
f(x)	3.375	7.000	13.625	24.000	38.875	59.000

18. Find an iterative formula to find \sqrt{N} and hence find $\sqrt{12}$ using Newton Raphson method.

PART – C

Answer any TWO question

(2 x 20 = 40)

19. Solve the equation $6x^6 - 35x^5 + 56x^4 - 56x^2 + 35x - 6 = 0$.

21. Diagonalize the matrix $A = \begin{bmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$.

22. Evaluate $\int_0^{10} \frac{dx}{1+x^2}$ using (a) Trapezoidal rule (b) Simpson's one-third rule (c) Simpson's three-eighth rule.

23.(a) Verify Euler's theorem for (i) $u = x^3 - 3x^2y + 3xy^2 + y^3$

(ii) $u = x^3 + y^3 + z^3 + 3xyz$.

(b) Expand $\cos 8\theta$ in terms of $\sin \theta$.

(10 +10)

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