



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – COMPUTER SCIENCE

FOURTH SEMESTER – APRIL 2022

UMT 4406 – MATHEMATICS FOR COMPUTER SCIENCE

Date: 27-06-2022

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

PART – A

(10x 2 = 20 Marks)

Q. No

Answer ALL questions

- 1 Find the determinant of the matrix $A = \begin{vmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{vmatrix}$.
- 2 If $y = e^{ax}$ then find y_2 .
- 3 Prove that $\nabla \cdot \vec{r} = 3$ and $\nabla \times \vec{r} = 0$ where $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$.
- 4 Find $\frac{dy}{dx}$ when $y = \log(\tan e^x)$.
- 5 Find $\lim_{x \rightarrow \infty} \frac{x^3 - 8}{x - 2}$.
- 6 Solve: $q = 2yp^2$.
- 7 Define continuous function.
- 8 Solve $(D^2 + 5D + 6)y = 0$.
- 9 State Stokes theorem.
- 10 Find the solution of $\frac{\partial^2 z}{\partial y^2} = \sin y$.

PART – B

(5 x 8 = 40 Marks)

Answer any FIVE questions

- 11 If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, then show that A satisfies the equation $A^2 - 5A - 2I = 0$.
- 12 Evaluate maxima and minima of $x^3 - 18x^2 + 96x + 4$.
- 13 Evaluate: $\int x^3 \cos 2x dx$.
- 14 If $x = a(\theta - \sin\theta)$ and $y = a(1 - \cos\theta)$, then find $\frac{dy}{dx}$.
- 15 Find ϕ if $\nabla\phi = (6xy + z^3)\vec{i} + (3x^2 - z)\vec{j} + (3xz^2 - y)\vec{k}$.
- 16 Find the divergence and curl of the following: $x^2\hat{i} + y^2\hat{j} + z^2\hat{k}$
- 17 Solve $(D^2 + 4D + 5)y = e^x + x^3$.

18 Evaluate $\int_0^a \int_0^b (x^2 + y^2) dx dy$

PART – C

(2 x 20 = 40 Marks)

Answer any TWO questions

19 (a) Using matrices, solve $3x + 4y + 5z = 18$, $2x - y + 8z = 13$,
 $3x - 2y + 7z = 20$. (10)

(b) Evaluate $\iint x y dx dy$ taken over the quadrant of the circle $x^2 + y^2 = a^2$. (10)

20 Verify Stokes theorem for $\vec{A} = (2x - y)\vec{i} - yz^2\vec{j} - y^2z\vec{k}$ taken over the (20)
upper half surface of the sphere $x^2 + y^2 + z^2 = 1, z \geq 0$ and the boundary
curve C, the circle $x^2 + y^2 = 1, z = 0$.

21 (a) Solve: $(D^2 - 5D + 6)y = x^2 - x + 2$. (10)

(b) Solve $3x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = x$. (10)

22 (a) Find the general solution of $(y + z)p + (z + x)q = x + y$ (10)

(b) Solve $p(1 + q^2) = q(z - 1)$ (10)

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