

Roll No.

Total No. of Pages : 02

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B.Tech.(CE / AI & ML / AI & Data Science) / AI / CSE / (Cyber Security) / Data Science/ (IoT) / (Internet of Things and Cyber Security including Block Chain Technology) / Computer Engg. /) (Sem.-3)

MATHEMATICS-III

Subject Code : BTAM304-18

M.Code : 76438

Date of Examination : 19-01-23

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Solve the following :

- State Geometrical Interpretation of Partial Derivative.
 - Whether the function $f(x, y, z) = 3x^2yz + 5xy^2z + 4z^4$ is homogenous if yes state its degree.
 - Evaluate $\int_1^{2.3} \int_1^1 dx dy$.
 - What do you mean by divergent infinite series?
 - Discuss the behavior of the series $\sum \frac{n(n+1)}{(n+2)^2}$.
 - Find the integration factor of the differential equation : $xdy + ydx = 0$.
 - Define Bernoulli's equation with example.
 - Find the particular integral of the equation : $4 \frac{d^2y}{dx^2} - 4 \frac{dy}{dx} + y = e^{\frac{x}{2}}$.

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- Define Cauchy's Linear Differential equation.

- Write down the solution of $\frac{dx}{dy} + Px = Q$, where P and Q are functions of y alone.

SECTION-B

- If $u = (1 - 2xy + y^2)^{-\frac{1}{2}}$, prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = y^2 u^3$.
- Evaluate $\iint e^{x+3y} dx dy$ over the triangle bounded by the lines $x = 0$, $y = 0$, and $x + y = 1$.
- Test for convergence or divergence the series $\sum_{n=1}^{\infty} \frac{1}{n} \sin \frac{1}{n}$.
- Solve the differential equation : $x^2 \left(\frac{dy}{dx} \right)^2 - 2xy \frac{dy}{dx} + 2y = x^2$.
- Solve $(2x^2y^2 + y) dx - (x^3y - 3x) dy = 0$.

SECTION-C

- Prove that $\iiint \sqrt{1 - \frac{x^2}{a^2} - \frac{y^2}{b^2} - \frac{z^2}{c^2}} dx dy dz = \frac{\pi^2 abc}{4}$.
- Apply the method of variation of parameter to solve the equation $\frac{d^2y}{dx^2} + 16y = 32 \sec 2x$.
- Solve the differential equation : $(3x + 2)^2 \frac{d^2y}{dx^2} + 5(3x + 2) \frac{dy}{dx} - 3y = x^2 + x + 1$.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

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