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Total No. of Pages : 02

Total No. of Questions : 09

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

MATHEMATICS-III

Subject Code : BTAM304-18

M.Code : 76438

Date of Examination: 23-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

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

SECTION-A

1. Solve the following:

a) Examine for maxima and minima $f(x, y) = x^2 + y^2 - 2(x + y)$.

b) Change order of integration for $\int_{y=0}^1 \int_{x=y}^{\sqrt{2-y^2}} (x, y) dx dy$.

c) State Cauchy convergence criterion.

d) Using Cauchy's root test, discuss convergence of $\sum \left(1 + \frac{1}{n}\right)^{-n^2}$.

e) State Leibnitz test for alternating series.

f) Define integrating factor. Is it unique for a given differential equation? Justify.

g) Solve $y = px + \cot^{-1} p$.

h) Solve $y \sin 2x dx - (1 + y^2 + \cos^2 x) dy = 0$.

i) Solve $(D^4 - 25)y = 0$.

j) Solve $(x+1)^2 y'' - (x+1)y' + y = 0$.

SECTION B

2. If $\Theta = t^n e^{-r^2/4t}$, what value of n will make $\frac{1}{r^2} \frac{\partial}{\partial r} \left(r^2 \frac{\partial \Theta}{\partial r} \right) = \frac{\partial \Theta}{\partial t}$.
3. Test for convergence the series $\sum \frac{(n!)^2}{(2n)!} x^{2n}$.
4. Discuss uniform convergence of $\sum \frac{\cos nx}{n^p}$, ($p > 0$).
5. Solve $xy(1+xy^2) \frac{dy}{dx} = 1$.
6. Using the method of variation of parameters, solve $\frac{d^2 y}{dx^2} + 4y = \tan 2x$.

SECTION-C

7. Find the volume of the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$.
8. Solve : $y = 2px + y^2 p^3$.
9. Solve : $x \frac{d^2 y}{dx^2} - 2 \frac{y}{x} = x + \frac{1}{x^2}$.

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.