Roll No. | | | | | | | | | | | | | **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 $\int_{y=0}^{1}\int_{x=y}^{\sqrt{2-y^2}} (x, y)\, dxdy$.

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

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 $\frac{d^2y}{dx^2} + 4y = \tan 2x$.

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 : $y = 2px + y^2p^3$.

9. Solve : $x\frac{d^2y}{dx^2} - 2\frac{y}{x} = x + \frac{1}{x^2}$.

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.