Maulana Azad National Institute of Technology, Bhopal

Mid Term Examination (February, 2022) [Online Assessment]

Course: B. Tech.	**Semester-I**	**Branch: All**
Subject: Mathematics-I		**Sub. Code: MTH-111**
Time: 90 Minutes	**Date: 04-02-2022**	**Max. Marks: 20**

Instructions: There are five questions. Attempt all questions. Your writing should be readable. Assume missing data if any. Please capture the images of the handwritten solutions and make a single PDF, where the **filename** should be **your scholar number** and upload the file in response to your solution. Please write **your name and scholar number** on each page of the response sheet.

S.No	Question	Marks
1	Solve the following integral $\int_0^{\infty}\int_{-\infty}^{\infty} 5\, e^{-(x^2+y^2)}\, dxdy$	04
2	Trace the curve for the equation $y(x^2 - a^2) = (x^2 + a^2)$ after calculating the following: i) Check the concavity and coordinates of inflection points of f(x). ii) Identify symmetry and asymptotes	04
3	Find the Tayler Series around (1, 1) of $f(x,y) = \tan^{-1}(xy)$, and then compute the value of *f (1.1, 0.8)* using Taylor Series quadratic approximation.	04
4	If the temperature T at any point (x, y, z) in space is $T = 4\,xyz^2$, then using Lagrange's Multiplier method, find the highest temperature on the surface of the unit sphere $x^2 + y^2 + z^2 = 1$.	04
5	If $u = \sin^{-1}\left(\frac{x^6+y^6}{x+y}\right)$, then calculate $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$.	04