Mahindra University École Centrale School of Engineering
Hyderabad
Minor II Examination

Program: B. Tech. Branch: CSE, ECM, ECE, AI, CE, ME, CM, MT, NT
Year: I Semester: Spring
Subject: Mathematics II (MA 1202)
(2022 Batch)

Date: 29/04/2023 Start Time: 10.00 AM
Time Duration: 90 Minutes Max. Marks: 20

Instructions:

1. All questions are compulsory.
2. The order of answers should be same as the order of questions.
3. Justify your answer wherever required. Guesswork will not be considered in evaluation.

1. Let $f : \mathbb{C} \to \mathbb{C}$ be defined as $f(x+iy) = (x-1)^2 + iy^2$. Is f differentiable at $(2,1)$? Is f analytic at $(2,1)$? Justify your answers. **5M**

2. Show that $u(x,y) = x^3 - 3xy^2$ is a harmonic function in $\mathbb{R}^2$. Find the harmonic conjugate of $u(x,y)$ in $\mathbb{R}^2$. **5M**

3. Evaluate the contour integral $\int_C (x^2 + iy^2)dz$, where C is the straight line from $z = 1$ to $z = i$. Write the answer in the form $p + iq$, where $p, q \in \mathbb{R}$. **5M**

4. Using Cauchy Integral formula for derivatives find the integral $\int_C \frac{dz}{(z^2+4)^3}$ where C is the circle $|z - i| = 2$. **5M**

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