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MANJARA CHARITABLE TRUST

RAJIV GANDHI INSTITUTE OF TECHNOLOGY, MUMBAI

Department of Applied Sciences & Humanities

INTERNAL ASSESMENT EM & AM-I (IA) - II

Date: - 04/12 /2024

Max. Marks: 20**Duration:** 1 Hour
Class: F.E.SEM-I
Name of the Course: Applied Mathematics-I
Branch: All

Instructions:

1. Question 1(i,ii,iii)is **compulsory for 10 Marks**
2. From Question 2 to 4 (**Solve any Two**)
3. Figures to the right of the question indicate full marks.
4. Assume the suitable data wherever necessary.
5. Illustrate your answers using neat diagrams wherever necessary.

Questions	Max Marks	Blooms Taxonomy Level	Course Outcomes
Q1. i) If $u = tan^{-1}\frac{y}{x}$, find the value of $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}$	3	2	CO3
Q1. ii)Discuss the maxima and minima of $x^3 + 6x^2 - y^2$	3	2	CO4
Q1. iii)Find the rank of the matrix by reducing it to normal form $\begin{bmatrix} 1 & 1 & 1 \\ 0 & -1 & -1 \\ 0 & 1 & 1 \end{bmatrix}$	4	2	CO5
Q2 If $u = Sin^{-1}\sqrt{x^2 + y^2}$, then show that $x^2\frac{\partial^2 u}{dx^2} + 2xy\frac{\partial^2 u}{\partial x \partial y}+y^2\frac{\partial^2 u}{dy^2} = tan^3 u$	5	3	CO3
Q3 If $y = e^{tan^{-1}x}$ prove that $(1 \mp x^2)y_{n+1} + (2nx - 1)y_n + n(n-1)y_{n-1} = 0$	5	2	CO4
Q4 Investigate for what values of λ *and* μ the equations x+y+z =6 , x+2y+3z = 10 , x+2y+$\lambda z = \mu$ have i)No solution ii) a Unique solution iii) Infinite number of solution	5	3	CO5