University of Information Technology & Sciences (UITS)
Faculty of Science and Engineering
Department of CSE, EEE and IT
Mid Term Examination, Spring 2025
Course Title: Ordinary and Partial Differential Equations
Course Code: MATH 0541121/MATH 0541165/ MATH 05411201

Marks: 20   Time: 1*(One)* hour

(Answer all questions)

Q. No.	Questions	Marks

1. a) Define order and degree of a differential equation. Find the order and degree of the following differential equations: **[04]**

(i) $\left(\frac{dy}{dx}\right)^2 = \sqrt{y}$ (ii) $\left(\frac{dr}{ds}\right)^3 = \sqrt{\frac{d^2r}{ds^2} + 1}$ (iii) $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + u = 0$.

   b) Form the differential equations of the following equations: **[06]**

     (i) $y = E\cos 3x + F\sin 3x$, where E, F are arbitrary constants.

     (ii) $xy = Ae^{3x} + Be^{-3x}$, where A and B are arbitrary constants.

2. a) Solve the differential equations by variable separation method.   **[06]**

     (i) $\frac{dy}{dx} = e^{x-y} + x^2 e^{-y}$

     (ii) $x\sqrt{y^2 + 1}\, dx + y\sqrt{x^2 + 1}\, dy = 0$

   b) Verify the differential equation $(2x\cos y + 3x^2 y)dx + (x^3 - x^2\sin y - y)dy = 0$ is exact, and solve this equation.   **[04]**