

# **DTL Assignment 2**

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2022-22-11

## **ORDINARY DIFFERENTIAL EQUATIONS & MULTIVARIATE CALCULUS**

### Instructions :

- All questions are compulsory.
- Writing anything on the question paper is not allowed.
- Mobile phone and programming calculators are strictly prohibited.
- Exchange/Sharing of stationary, calculator etc. is not allowed.

1. Find an equation for the tangent line to the following curve at the point (0,1).

$$2xy^3 + y^4 = 1 + x^3y \quad (1)$$

2. Use the linearization of

$$f(x) = \sqrt[3]{x} \quad (2)$$

at  $x = 8$  to approximate  $\sqrt[3]{8.24}$ .

3. A thermometer reading  $10^\circ\text{C}$  is brought into a room whose temperature is  $27^\circ\text{C}$ . One minute later the thermometer reading is  $15^\circ\text{C}$ . How long does it take for the thermometer reading to become  $26.99^\circ\text{C}$ ?
4. Under what conditions for the constants is the following exact? Solve it.

$$(ax + by)dx + (px + qy)dy = 0 \quad (3)$$

5. Find the orthogonal trajectories of the family

$$y = \sqrt{x + c} \quad (4)$$

6. Solve

$$xy'' + 2y' + xy = 0 \quad (5)$$

by reduction of order given that

$$y_1 = \frac{\cos(x)}{x} \quad (6)$$

is a solution.

7. If the roots of the auxiliary equation of *2nd* order homogeneous linear ODE

$$y'' + by' + cy = 0 \quad (7)$$

are real and equal then find the first solution, and the second solution using the method of reduction of order, and hence write the basis.

...END OF QUESTION PAPER ...