Quality Checkers Only way to fulfill your dreams	12th Science- : Maths Differential Equations	DATE: TIME: 1 Hours MARKS: 25 SEAT NO:

Note:-

1. All Questions are compulsory.
2. Numbers on the right indicate full marks.

Section A

Q.1 Select and write the correct answer. **(4)**

1. The order and degree of the differential equation $\sqrt{1+\left(\frac{dy}{dx}\right)^2} = \left(\frac{d^2y}{dx^2}\right)^{\frac{3}{2}}$ are respectively _____

   A) 2, 1 B) 1, 2

   C) 3, 2 D) 2, 3

2. The decay rate of certain substance is directly proporational to the amount present at that instant. Initially there are 27 grams of substance and 3 hours later it is found that 8 grams left. The amount left after one more hour is _____

   A) $5\frac{2}{3}\text{grams}$ B) $5\frac{1}{3}\text{grams}$

   C) 5.1 grams D) 5 grams

Q.2 Answer the following. **(3)**

1. Solve the differential equation xdy + 2y·dx = 0, when x = 2, y = 1
2. Determine the order and degree of $(y''')^2 + 3y'' + 3xy' + 5y = 0$
3. Solve the differential equation $\frac{dy}{dx} = x^2y + y$

Section B
Attempt any Four

Q.3 Determine the order and degree of $\left(\frac{d^3y}{dx^3}\right)^{\frac{1}{2}} - \left(\frac{dy}{dx}\right)^{\frac{1}{3}} = 20$ **(2)**

Q.4 An ellipse whose minor axis is twice its major axis. Form the differential equation. **(2)**

Q.5 Verify that the $y = x^m$ is a solution of the differential equation $x^2\frac{d^2y}{dx^2} - mx\frac{dy}{dx} + my = 0$ **(2)**

Q.6 Obtain the differential equation of $x^3 + y^3 = 4ax$ by elliminating arbitrary constants c_1 and c_2. **(2)**

Q.7 Obtain the differential equation of $y^2 = a(b - x)(b + x)$ eliminating the arbitrary constant. **(2)**

Q.8 Solve the differential equations $y - x\frac{dy}{dx} = 0$ **(2)**

Section C
Attempt any Two

Q.9 Solve the differential equation $x\sin\left(\frac{y}{x}\right)dy = \left[y\sin\left(\frac{y}{x}\right) - x\right]dy$ **(3)**

Q.10 Solve the differential equation $(1 + x^2)\frac{dy}{dx} + y = e^{\tan^{-1}x}$ **(3)**

Q.11 For $(e^y + 1)\cos x + e^y \sin x \frac{dy}{dx} = 0$, when $x = \frac{\pi}{6}$, $y = 0$ differential equation find the particular solution satisfying the given condition. **(3)**

Section D
Attempt any One

Q.12 Solve the differential equation $x\frac{dy}{dx} - y + x\sin\left(\frac{y}{x}\right) = 0$ **(4)**

Q.13 Find the particular solution of the differential equation (x + y) dy + (x – y) dx = 0, when x = 1 = y **(4)**