

Mark: a, b, c or d for the correct answer in the space provide bellow for **Q.1** to **Q.8**.

[12]

| Q. No | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|--------|---|---|---|---|---|---|---|---|
| Answer | | | | | | | | |

Q.1. Identify the differential equation: $(x^2 + 1)dy = (x - xy)dx$. Assume that $y = f(x)$.

- (a) Linear, (b) Separable, (c) Linear and separable, (d) None of these

Q.2. The differential equation: $(e + \exp(1 + \frac{x}{y}))y' = 5$ is:

- (a) Homogeneous, (b) Linear in x , (c) Linear in y , (d) Exact

Q.3. The DE: $xy' + y = 0$ is

- (a) Exact, linear and homogeneous, (b) Exact only, (c) Linear only, (d) Homogeneous only

Q.4. A general separable differential equation is a DE that can be written in the form

- (a) $f(x, y)dy = dx$, (b) $y' = f(x, y)$, (c) $f(x)dx - g(y)dy = 0$, (d) $f(x, y)dy = g(y)dx$.

Q.5. Identify the differential equation $x^2(y'')^4 + (y')^5 = 1 + x^4$. Assume that $y = f(x)$.

- (a) 2nd order, 3rd degree, (b) 2nd degree, 2nd order, (c) 2nd order, 4th degree, (d) 2nd order, 5th degree.

Q.6. Identify the DE $(y + e^{-y})y' = \sin x$, Assume that $y = f(x)$.

- (a) Linear, (b) Separable, (c) Linear and separable, (d) None of these.

Q.7. For the DE $(\cos 2y + x)dx + cx \sin(2y)dy = 0$ to be exact, the value of c must be

- (a) $c = 1$, (b) $c = 2$, (c) $c = -1$, (d) -2 .

Q.8. For the DE $\frac{dy}{dx} + (2x + \frac{1}{x})y = x^2$, the integrating factor is

- (a) x^2 , (b) $x \ln x^2$, (c) xe^{x^2} , (d) None of these

Q. 9. Determine whether the following initial value problem has a unique solution [6]

$$\frac{dy}{dx} = x + \sqrt{y-1}, \quad y(2) = 1$$

Q.10. Find m such that y^m will be an integrating factor for the DE: $(y^2 + 2xy)dx = x^2 dy$. [8]

Q.11. Find the family of orthogonal trajectories of the family of curves: $x^2 - y^2 = cx$. [6]

Q.12. The population of bacteria in a culture grows at a rate proportional to the number of bacteria present at time t . After 3 hours it is observed that 400 bacteria are present. After 10 hours 2000 bacteria are present. What was the initial number of bacteria. [8]