

Model Question Paper
Differential Equations - Part II

12th Standard

Maths

Reg.No. :

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I. Answer all questions.

II. Use blue pen only.

Time : 01:00:00 Hrs

Total Marks : 75

3 x 1 = 3

Section-A

- 1) Solution of $\frac{dy}{dx} + mx = 0$ when $m < 0$ is
(a) $x = ce^{my}$ (b) $x = ce^{-my}$ (c) $x = my + c$ (d) $x = c$
- 2) $y = cx - c^2$ is the general solution of the differential equation
(a) $(y')^2 - xy' + y = 0$ (b) $y'' = 0$ (c) $y' = c$ (d) $(y')^2 + xy' + y = 0$
- 3) The differential equation $\left(\frac{dx}{dy}\right)^2 + 5y^{1/3} = x$ is
(a) of order 2 and degree 1 (b) of order 1 and degree 2 (c) of order 1 and degree 6 (d) of order 1 and degree 3

Section-B

5 x 3 = 15

- 4) Solve the following: $(x^2 + y^2)dy = xy dx$
- 5) Form the differential equations by eliminating arbitrary constants given in brackets
 $y = ax^2 + bx + c$ {a, b}
- 6) Form the differential equations by eliminating arbitrary constants given in brackets $y = Ae^{2x} + Be^{-5x}$ {A, B}
- 7) Form the differential equations by eliminating arbitrary constants given in brackets $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ {a, b}
- 8) Form the differential equations by eliminating arbitrary constants given in brackets $y = (A + Bx)e^{3x}$ {A, B}

Section-C

5 x 6 = 30

- 9) Solve: $\frac{dy}{dx} + \left(\frac{1-y^2}{1-x^2}\right)^{\frac{1}{2}} = 0$
- 10) Solve: $e^x \sqrt{1-y^2} dx + \frac{y}{x} dy = 0$
- 11) Solve: $xdy = (y + 4x^5 e^{x^4}) dx$
- 12) Solve: $(x^2 - y) dx + (y^2 - x) dy = 0$, if it passes through the origin.
- 13) The normal lines to a given curve at each point (x, y) on the curve pass through the point (2, 0). The curve passes through the point (2, 3). Formulate the differential equation representing the problem and hence find the equation of the curve.

Section-D

3 x 10 = 30

- 14) Solve: $(1 + y^2) dx = (\tan^{-1} y - x) dy$
- 15) a) In a certain chemical reaction the rate of conversion of a substance at time t is proportional to the quantity of the substance still untransformed at that instant. At the end of one hour, 60 grams remain and at the end of 4 hours 21 grams. How many grams of the first substance was there initially?
(OR)
b) A bank pays interest by continuous compounding, that is by treating the interest rate as the instantaneous rate of change of principal. Suppose in an account interest accrues at 8% per year compounded continuously. Calculate the percentage increase in such an account over one year. [Take $e^{0.08} = 1.0833$]
