



I B.Sc. MATHEMATICS

SEMESTER –I, PAPER – I

DIFFERENTIAL EQUATIONS

MODEL QUESTION PAPER

Time : 3 hours

Max. Marks: 60

Section – A

Answer any FIVE questions

(5 x 4 = 20 marks)

1. Solve $2xy \, dy - (x^2 + y^2 + 1) \, dx = 0$
2. Solve $(1 + y^2) \, dx = (\tan^{-1}y - x) \, dy$
3. Solve $x = y + p^2$
4. Solve $4y^2p^2 + 2xy(3x+1)p + 3x^3 = 0$.
5. Solve $(D^2 - 3D + 2)y = \text{Cos h } x$.
6. Solve $(D^3 + 4D)y = \text{Sin } 2x$
7. Solve $(D^2 - 4D + 4)y = x^3$
8. Solve $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 13y = 8e^{3x} \sin 2x$
9. Solve $[(1+x)^2D^2 + (1+x)D + 1]y = 4 \cos \log(1+x)$.
10. Solve $\frac{d^2y}{dx^2} + y = \text{cosec } x$ by the method of variation of parameters

Section - B

Answer ALL questions

(5 x 8 = 40 marks)

- 11 (a). Solve $x(1 + xy) \, dy + y(1 - xy) \, dx = 0$
(OR)
(b). Solve $x\frac{dy}{dx} + y = y^2 \log x$
- 12 (a). Solve $(py+x)(px-y) = 2p$
(OR)
(b). Find the orthogonal trajectories of family of curves $r = a(1 - \text{Cos } \theta)$ whose 'a' is a parameters
13. (a). Solve $(D^2 - 2D + 4)y = 8(x^2 + e^{2x} + \sin 2x)$
(OR)
(b). Solve $(D^2 - 3D + 2)y = 2x^2$
14. (a). Solve $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = xe^x \sin x$
(OR)
(b). Solve $(D^2 + 4)y = x \text{Sin } x$
15. (a). Solve $(x^2D^2 - xD + 2)y = x \log x$
(OR)
(b). Solve $\frac{d^2y}{dx^2} + 4y = 4 \tan 2x$ by the method of variation of parameters.