

**Faculty of Science**  
**B.Sc (Mathematics) I-Year, CBCS –II Semester Examinations, May/June 2019**  
**PAPER: DIFFERENTIAL EQUATIONS**

Time: 3 Hours

Max Marks: 80

**Section-A**

I. Answer any FIVE of the following questions.

(5x4=20 Marks)

1. Solve  $(x^2 - y^2)dx + 2xy dy = 0$
2. Solve  $P^2 - 7P + 12 = 0$
3. Solve  $\frac{d^4y}{dx^4} - 2\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = 0$
4. Solve  $y'' + 3y' + 2y = 4$
5. Solve  $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = \sin x$ , by the method of undetermined co-efficient.
6. Solve  $x^2 \frac{d^2y}{dx^2} - 2x \frac{dy}{dx} + 2y = 4x^3$
7. Solve  $(x^2 - y^2 - z^2)P + 2xyq = 2xz$
8. Solve  $y \frac{\partial^2 z}{\partial x \partial y} + \frac{\partial z}{\partial x} = 4xy$

**Section-B**

II. Answer the following questions.

(4x15=60 Marks)

9. (a) (i) Solve  $x \frac{dy}{dx} + 2y = x^2 \log x$   
(ii) Solve  $3x^2 y dx - (x^2 + 2y^4) dy = 0$   
(OR)  
(b) (i) Solve  $(x + z)^2 dy + y^2(dx + dz) = 0$   
(ii) State and prove Clairaut's equation.
10. (a) (i) Solve  $(D^2 + 1)y = \sin x \sin 2x$   
(ii) Solve  $(D^4 + 2D^2 + 1)y = x^2 \cos x$   
(OR)  
(b) (i) Solve  $(D^2 - 4D + 4)y = 8(x^2 + e^{2x} + \sin 2x)$   
(ii) Solve  $(D^2 + 4D + 4)y = e^{2x} - e^{-2x}$
11. (a) (i) Solve  $y'' + y = \sin x + e^{-x}$ , by the method of undetermined co-efficients  
(ii) Solve  $(x - 1)y'' - xy' + y = 0$ , given  $y_1 = x$  is a solution.  
(OR)  
(b) (i) Solve  $y'' + 4y = 4 \sec^2 2x$ , by the method of variation of parameters.  
(ii) Solve  $x^2 y'' - 6y = 5x^3 + 8x^2$
12. (a) (i) Solve  $(D^2 + 2DD^1 + D^{12} - 2D - 2D^1)Z = \sin(x + 2y)$   
(ii) Solve  $\frac{\partial^2 z}{\partial x^2} - \frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 0$   
(OR)  
(b) (i) Write the Charpit's Method  
(ii) Solve  $(P^2 + q^2)y = qz$  by using Charpit's Method.

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