

(b) Solve $\frac{d^2y}{dx^2} + y = 0$, given that $y = 2$ for $x = 0$ and

$y = -2$ for $x = \frac{\pi}{2}$. 2

(c) Define total differential equation. 2

(d) Show that $\frac{1}{D-a}X = e^{ax} \int e^{-ax} X dx$, $n\theta$ arbitrary constant being added. 2

(e) In what condition $y = e^{mx}$ is solution of : 2

$$\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = 0$$

(f) Solve the differential equation : 2

$$(x^2 D^2 + 2xD + 2)y = 0$$

Roll No.

91555

**B. Sc. 2nd Sem. (Mathematics) (Hons.)
Old & New Examination – May, 2016**

ORDINARY DIFFERENTIAL EQUATIONS

Paper : BHM-122

Time : Three Hours]

[Maximum Marks : 60

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Section. Question No. 9 is compulsory.

SECTION - I

1. (a) Solve the differential equation : 6

$$(xy^2 + 2x^2y^3) dx + (x^2y - x^3y^2) dy = 0$$

(b) Solve the differential equation : 6

$$(2x^2y^2 + y) dx - (x^3y - 3x) dy = 0$$

2. (a) Solve the differential equation : 6

$$y = 3x + \log p$$

- (b) Solve and find the complete primitive and singular solution of the equation: 6

$$3y = 2px - \frac{2p^2}{x}$$

SECTION - II

3. (a) Find the orthogonal trajectories of the curves: 6

$$r^n \sin n\theta = a^n$$

- (b) Solve the differential equation: 6

$$2\frac{d^3y}{dx^3} - 3\frac{d^2y}{dx^2} + y = e^x + 1$$

4. (a) Solve the differential equation: 6

$$\frac{d^2y}{dx^2} + y = \operatorname{cosec} x$$

- (b) Solve the differential equation: 6

$$x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + y = \frac{\log x \sin(\log x) + 1}{x}$$

SECTION - III

5. (a) Solve the differential equation: 6

$$\frac{d^2y}{dx^2} - \cot x \frac{dy}{dx} - (1 - \cot x)y = e^x \sin x$$

- (b) Solve $\frac{d^2y}{dx^2} - 2\tan x \frac{dy}{dx} + 5y = 0$, by removing the first derivative. 6

91555-510 (P-4)(Q-9)(16) (2)

6. (a) Solve the equation by method of variation of parameters: 6

$$\frac{d^2y}{dx^2} + n^2y = \sec nx$$

- (b) Solve the differential equation by method of undetermined coefficients: 6

$$(D^2 + 1)y = \sin x$$

SECTION - IV

7. (a) Solve the simultaneous equations: 6

$$\frac{dx}{dt} + 5x + y = e^t \quad \text{and} \quad \frac{dy}{dt} - x + 3y = e^{2t}$$

- (b) Solve the equations: 6

$$\frac{dx}{z} = \frac{dy}{-z} = \frac{dz}{z^2 + (y+x)^2}$$

8. (a) Solve the total differential equations: 6

$$2yzdx + zxdy - xy(1+z)dz = 0$$

- (b) Solve the equation: 6

$$(yz + z^2)dx - xzdy + xydz = 0$$

SECTION - V

9. (a) Find the value of 'a', so that the equation: 2

$$(1 + x^2y^3 + ax^2y^2) + (2 + x^3y^2 + x^3y)dy = 0$$

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(3)

P.T.O.