



(c) Define total differential equation.

(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:

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

(f) Solve the differential equation:

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

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:

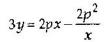
6

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

9 1555- So (P4)(Q9)(16)

P. T. O.

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



SECTION - II

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

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

(b) Solve the differential equation:

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

6

4. (a) Solve the differential equation:

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

(b) Solve the differential equation:

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

SECTION - III

5. (a) Solve the differential equation:

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

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

91555- 60 -(P-4)(Q-9)(16) (2)

first de rivati ve.

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 undermined coefficients: 6

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

SECTION - IV

7. (a) Solve the simultaneous equations: 6 $\frac{dx}{dt} + 5x + y = e^{t} \text{ and } \frac{dy}{dt} - x + 3y = e^{2t}$

(b) Solve the equations:

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

8. (a) Solve the total differential equations:

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

(b) Solve the equation:

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

SECTION - V

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

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

91555.5'10 (P-4)(Q-9)(16) (3)

P.T.O.

6

6

2