

Roll No.

3) Solve the equations : $3\frac{1}{2}$

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

4. (ii) Solve and verify the equation : $3\frac{1}{2}$

$$(y-z)(y+z-2x)dx + (z-x)(z+x-2y)dy + (x-y)(x+y-2z)dz = 0 \text{ is exact.}$$

(b) Solve : $3\frac{1}{2}$

$$(x-3y-z)dx + (2y-3x/dy) + (z-x)dz = 0$$

SECTION - V(a) Write the condition for exactness of $Mdx + Ndy = 0$. 2

(b) What is integrating factor of a differential equation? 2

(c) Define Clairaut's equation. 2

(d) Define differential operator D. 2

(e) Differentiate between orthogonal and oblique trajectory. 2

(f) Solve the equation : 2

$$\frac{dx}{y} = \frac{dy}{-x} = \frac{dz}{yz}$$

21182**B. Sc. (Pass Course) 2nd Semester Examination - May, 2019****MATHEMATICS - II (ORDINARY DIFFERENTIAL EQUATIONS)**

Paper : 12BSM 122

Time : Three hours] *Maximum Marks : 40*

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. Section - V is *compulsory*.

SECTION - I1. (a) Solve : $3\frac{1}{2}$

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

(b) Solve : $3\frac{1}{2}$

$$(y^4 + 2y)dx + (xy^3 + 2y^4 - 4x)dy = 0$$

2. (a) Solve Lagrange's equation :

$$3\frac{1}{2}$$

$$y = (1+p)x + p^2$$

(b) Obtain the complete primitive and singular solution of :

$$3\frac{1}{2}$$

$$x \left(\frac{dy}{dx} \right)^2 + 4x - 2y \frac{dy}{dx} = 0$$

SECTION - II

3. (a) Find the orthogonal trajectories of the curves : $3\frac{1}{2}$

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

(b) Solve the differential equation :

$$3\frac{1}{2}$$

$$(D^4 + 1)y = \sin^2 x$$

4. (a) Solve :

$$3\frac{1}{2}$$

$$\frac{d^2y}{dx^2} - 4 \frac{dy}{dx} + 4y = 3x^2 e^{2x} \sin 2x$$

(b) Solve the differential equation :

$$3\frac{1}{2}$$

$$x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + 2y = x \log x$$

(2)

SECTION - III

5. (a) Solve :

$$x \frac{d^2y}{dx^2} - (2x-1) \frac{dy}{dx} + (x-1)y = 0$$

(b) Solve :

$$\left[\frac{d^2y}{dx^2} + y \right] \cot x + 2 \left[\frac{dy}{dx} + y \tan x \right] = \sec x$$

6. (a) Solve $x^2 \frac{d^2y}{dx^2} - 2x(1+x) \frac{dy}{dx} + 2(1+x)y = x^3$

method of Variation of Parameters.

(b) Solve :

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

SECTION - IV

7. (a) Solve simultaneous equation :

$$\frac{dx}{dt} = ax + by, \quad \frac{dy}{dt} = a'x + b'y$$

(3)