

Roll No.

21182

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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 - I

1. (a) Solve : 3 1/2

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

(b) Solve : 3 1/2

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

P. T. O.

2. (a) Solve Lagrange's equation : 3 1/2

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

(b) Obtain the complete primitive and singular solution of : 3 1/2

x (dy/dx)^2 + 4x - 2y dy/dx = 0

SECTION - II

3. (a) Find the orthogonal trajectories of the curves : 3 1/2

r^n sin n theta = a^n

(b) Solve the differential equation : 3 1/2

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

4. (a) Solve : 3 1/2

d^2y/dx^2 - 4 dy/dx + 4y = 3x^2 e^2x sin 2x

(b) Solve the differential equation : 3 1/2

x^2 d^2y/dx^2 - x dy/dx + 2y = x log x

(2)

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SECTION - III

5. (a) Solve :

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

(b) Solve :

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

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

method of Variation of Parameters.

(b) Solve :

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

SECTION - IV

7. (a) Solve simultaneous equation :

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

(b) Solve the equations :

3 $\frac{1}{2}$

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

8. (a) 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

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