2022

(February)

MATHEMATICS

(Honours)

(Differential Equations)

[GHS–53]

Marks : 30

Time : 2 hours

The figures in the margin indicate full marks for the questions

Answer **two** questions, choosing **one** from each Unit

UNIT—I

1. *(a)* Solve : 6

$$x^2 \frac{d^2y}{dx^2} (x^2 2x)\frac{dy}{dx} (x 2)y x^3 e^x$$

(b) Solve the following exact differential equation : 5

$$\sin x \frac{d^2y}{dx^2} \cos x \frac{dy}{dx} 2y \sin x 0$$

(c) Solve the following equation : 4

$$\frac{dx}{y z} \frac{dy}{z x} \frac{dz}{x y}$$

2. *(a)* Find $f(y)$, if

$$f(y)\,dx zx\,dy xy \log y\,dz 0$$

is integrable. 5

(b) Solve : 5

$$(2x^2 2xy 2xz^2 1)dx dy 2z\,dz 0$$

(c) Solve : 5

$$\frac{dx}{dt} 7x y 0$$

$$\frac{dy}{dt} 2x 5y 0$$

UNIT—II

(In this unit, $p \frac{z}{x}$; $q \frac{z}{y}$)

3. *(a)* Form a partial differential equation by eliminating a, b, c from

$$\frac{x^2}{a^2} \frac{y^2}{b^2} \frac{z^2}{c^2} 1$$

5

(b) Solve : 5

$$y^2 p xy q x(z 2y)$$

(c) Find a complete integral by Charpit's method of $(p^2 q^2)\ y q\ z$. 5

4. *(a)* Find the general integral of the equation

$$(x^2 \quad yz)p \quad (y^2 \quad zx)q \quad z^2 \quad xy$$ 5

(b) Solve : 6

$$p \quad (qy \quad z)^2$$

(c) Solve : 4

$$a(p \quad q) \quad z$$

★ ★ ★