SB—147—2022
FACULTY OF SCIENCE
B.Sc. (Third Semester) EXAMINATION
MAY/JUNE, 2022
(New Course)
MATHEMATICS
(Paper–VIII)
(Ordinary Differential Equations)

(Tuesday, 21-6-2022)   **Time : 2.00 p.m. to 4.30 p.m.**

Time— 2½ Hours   *Maximum Marks—40*

N.B. :—   (*i*)   *All* questions are compulsory.

       (*ii*)   Figures to the right indicate full marks.

       (*iii*)   Attempt (A) or (B) (*a*), (*b*) in Question Nos. **1** and **2**.

1.   (A)   Define order and degree of differential equation with example and also explain method to find solution of homogeneous differential equation and solve :

$$(x^2 + y^2)dx - 2xy\,dy = 0 \qquad\qquad 15$$

<div align="center">Or</div>

     (B)   (*a*)   Define Clairaut's equation and solve :   8

          (*i*) $y = (1 + p)x + p^2$;

          (*ii*) $x^2(y - px) = yp^2$.

       (*b*)   Solve :

$$x\frac{dy}{dx} - ay = x + 1 \qquad\qquad 7$$

2.   (A)   Explain finding complementary function of linear differential equation when the auxiliary equation having equal roots, and solve :   15

$$\frac{d^3y}{dx^3} - 3\frac{d^2y}{dx^2} + 4y = 0$$

<div align="right">P.T.O.</div>

Or

(B) (*a*) Explain the method of finding particular integral corresponding to a term of the form $e^{\alpha x}v$ in the second member, where v being any function of x, and solve : 8

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

(*b*) Solve :

$$\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2} - \frac{dy}{dx} - y = \cos 2x$$ 7

3. Attempt any *two* out of four of the following : Each of 5 marks

(*a*) Solve : $(1 + xy)y\, dx + (1 - xy)\, x dy = 0$;

(*b*) Explain the Rules I and II for finding Integrating Factors of Mdx + Ndy = 0;

(*c*) Solve : $9\dfrac{d^2y}{dx^2} + 18\dfrac{dy}{dx} - 16y = 0$;

(*d*) Solve : $\dfrac{d^4y}{dx^4} + 4y = 0$.