

B.Sc. Semester - 2 (NEP-2020) Examination

MARCH/APRIL-2026 (As Per Syllabus Year June-2023)

MATH: Theory of Ordinary Differential Equations (Multidisciplinary Course)

Time: 2:00 Hours

Marks: 50

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

- Que.1(A) Answer any one question out of two. (05)
- (1) State and prove the necessary and sufficient condition for a differential Equation to be exact.
 - (2) Solve : $(y^2 - 2xy)dx = (x^2 - 2xy)dy$
- Que.1(B) Answer any one question out of two. (05)
- (1) Explain method to find solution of Bernoulli's differential Equation.
 - (2) Solve : $ye^y dx = (y^3 + 2xe^y)dy$
- Que.2(A) Answer any one question out of two. (05)
- (1) Solve : $\frac{dy}{dx} - \frac{dx}{dy} = \frac{x}{y} - \frac{y}{x}$
 - (2) Solve : $y^2 p^2 - 3xp + y = 0$
- Que.2(B) Answer any one question out of two. (05)
- (1) Write general form of Clairaut's differential equation and find it's solution.
 - (2) Solve : $y^2(y - xp) = x^4 p^2$
- Que.3(A) Answer any one question out of two. (05)
- (1) Prove : $\frac{1}{f(D)} e^{ax} V = e^{ax} \frac{1}{f(D+a)} V$; where V is a function of x .
 - (2) Find the general solution of the differential equation $(D+1)(D-3)^2 y = e^{3x} + e^{5x}$
- Que.3(B) Answer any one question out of two. (05)
- (1) For the linear differential equation $f(D)y = X$, Where $X = \sin ax$, Prove that.
 $\frac{1}{f(D^2)} \sin ax = \frac{1}{f(-a^2)} \sin ax$. Where $f(-a^2) \neq 0$.
 - (2) Find The general solution of differential equation $(D^2 - 5D + 6)y = xe^{4x}$
- Que.4(A) Answer any one question out of two. (05)
- (1) Explain one of the method for finding complementary function for a linear Differential equation with variable coefficients.
 - (2) Solve : $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} - 9y = 0$
- Que.4(B) Answer any one question out of two. (05)
- (1) Solve : $(x^2 D^2 - 3xD + 4)y = x^m$
 - (2) Solve : $(x^3 D^3 + 2x^2 D^2 + 2)y = 10(x + \frac{1}{x})$
- Que.5(A) Answer any one question out of two. (05)
- (1) Solve : $\frac{dy}{dx} + \frac{y \cos x + \sin y + y}{\sin x + x \cos y + x} = 0$
 - (2) Solve : $p^2 = (p-1)y$
- Que.5(B) Answer any one question out of two. (05)
- (1) Find the general solution of the differential equation $(D^2 - 4D + 3)y = e^{4x} \sin 2x$.
 - (2) Solve : $x^2 \frac{d^2 y}{dx^2} + 7x \frac{dy}{dx} + 5y = x^5$.
