

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

MARCH/APRIL-2025

MATH: Theory of Ordinary Differential Equations (Minor-2)

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 (05)
- (1) Explain method to find solution of Bernoulli's differential Equation.
 - (2) Solve: $\frac{dy}{dx} = (4x + y + 1)^2$ if $y(0) = 1$.
- Que-1(B) Answer any one (05)
- (1) State and prove necessary and sufficient condition for a differential eq. to be an exact.
 - (2) Solve: $(x + 2y^3)\frac{dy}{dx} = y$.
- Que-2(A) Answer any one (05)
- (1) Solve: $p^2(x-5) + (2x-y)p - 2y = 0$.
 - (2) Solve: $y^2p^2 - 3xp + y = 0$
- Que-2(B) Answer any one (05)
- (1) Write general form of Clairaut's differential equation also find it's solution.
 - (2) Solve: $p^3 + 2xp^2 - y^2p^2 - 2xy^2p = 0$
- Que-3(A) Answer any one (05)
- (1) Define Auxiliary equation and discuss the solution of it when all the roots are real and distinct.
 - (2) Prove that $\frac{1}{f(D^2)} \sin ax = \frac{1}{f(-a^2)} \sin ax$; Where $f(-a^2) \neq 0$.
- Que-3(B) Answer any one (05)
- (1) Find particular integral of the linear differential equation with constant coefficient $f(D)y = X$, when $X = e^{ax}$, $f(a) \neq 0$.
 - (2) Solve: $(D^2 - 1)y = x^2 - 1$
- Que-4(A) Answer any one (05)
- (1) Solve: $(x^2D^2 - 2xD + 2)y = x^3$.
 - (2) Solve: $(x^3D^3 + 2x^2D^2 + 2)y = 10(x + \frac{1}{x})$
- Que-4(B) Answer any one (05)
- (1) Solve: $x^3 \frac{d^3y}{dx^3} + 3x^2 \frac{d^2y}{dx^2} - 6x \frac{dy}{dx} + 6y = \left(x^2 - \frac{1}{x^2}\right)^2$
 - (2) Solve: $(x^2D^2 + 7xD + 5)y = x^5$
- Que-5(A) Answer any one (05)
- (1) Solve: $\frac{dy}{dx} + \frac{y \cos x + \sin y + y}{\sin x + x \cos y + x} = 0$
 - (2) Solve: $(D^2 + 4)y = \sin 2x$
- Que-5(B) Answer any one (05)
- (1) Solve: $\frac{d^2y}{dx^2} + \frac{dy}{dx} + y = \sin 2x$
 - (2) Solve: $(D^2 - 4D + 3)y = e^{4x} \sin 2x$.
