

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

MARCH/APRIL-2026 (As Per Syllabus Year June-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 out of two (05)
- (1) Solve: $\frac{dy}{dx} = (4x+y+1)^2$ if $y(0)=1$.
 - (2) Solve: $(y^2-2xy)dx = (x^2-2xy)dy$
- Que.1(B) Answer any one out of two (05)
- (1) Solve: $x \log x \frac{dy}{dx} + y = \log x^2$
 - (2) Explain method to find solution of Bernaulli's differential equation.
- Que.2(A) Answer any one out of two (05)
- (1) Solve: $yp^2 + (x-y)p - x = 0$
 - (2) Solve $p^3 + 2xp^2 - y^2 p^2 - 2xy^2 p = 0$
- Que.2(B) Answer any one out of two (05)
- (1) Solve: $y^2 p^2 - 3xp + y = 0$
 - (2) Solve: $y = 2px + y^2 p^3$
- Que.3(A) Answer any one out of two (05)
- (1) Solve: $(D^3 - 7D - 6)y = 0$.
 - (2) Solve: $(D^4 - 2D^3 + 5D^2 - 8D + 4)y = 0$.
- Que.3(B) Answer any one out of two (05)
- (1) In usual notations prove that $\frac{1}{f(D)} e^{ax} = \frac{1}{f(a)} e^{ax}$ if $f(a) \neq 0$.
 - (2) Solve $(D^3 - 12D^2 + 6D - 8)y = e^{2x}$.
- Que.4(A) Answer any one out of two (05)
- (1) Solve: $(x^2 D^2 + 7xD + 5)y = x^5$.
 - (2) Solve: $(x^2 D^2 - 2xD + 2)y = x^3$.
- Que.4(B) Answer any one out of two (05)
- (1) Solve: $(x^3 D^3 + 2x^2 D^2 + 2)y = 0$.
 - (2) Solve: $(x^2 D^2 - xD + 1)y = 2 \log x$.
- Que.5(A) Answer any one out of two (05)
- (1) Find integrating factor for $(x^2 y - 2x y^2)dx + (3x^2 y - x^3)dy = 0$ and find it's solution.
 - (2) Solve: $(x-a)p^2 + (x-y)p - y = 0$.
- Que.5(B) Answer any one out of two (05)
- (1) Solve: $(D^2 - 7D + 12)y = e^{5x}$
 - (2) Solve: $(x^2 D^2 + 7xD + 5)y = x^5$.
