MTL 101 Linear Algebra and Differential Equations 2018-19 II Semester
Quiz, April 22, 2019

Each question carries 2 marks.
Each wrong choice carries $-\frac{1}{2}$ mark.

Marks Obtained:

Maximum Marks: 10 Time: 40 Minutes

Name: **Group No.** **Entry No.:**

Instructions: There may be more than one correct answer for each question. Bubble the correct choice(s) with PEN in the table provided below each question. No additional sheet will be provided. Negative mark(s) may be awarded for wrong choice(s). All notations are standard. Use of any electronic gadget including calculator is NOT allowed. No query will be entertained.

---

1. For the differential equation $x(x-1)^2(x+3)\frac{d^2y}{dx^2} + x^2\frac{dy}{dx} - (x^2+x+1)y = 0$

   (A) $x = 1$ is an irregular singular point **(B)** $x = 1$ is a regular singular point
   (C) $x = 1$ is an ordinary point **(D)** $x = -3$ is a regular singular point

A	B	C	D
●	○	○	●

2. The roots of the indicial equation in solving the differential equation $9x^2\frac{d^2y}{dx^2} + (9x^2+2)y = 0$ by Frobenious method are

   (A) $\frac{1}{3}, \frac{2}{3}$ **(B)** $\frac{1}{9}, \frac{2}{9}$ **(C)** $\frac{2}{9}, \frac{5}{9}$ **(D)** $\frac{4}{9}, \frac{2}{3}$

A	B	C	D
●	○	○	○

3. $P_n(x)$ denotes Legendre polynomial of degree n in x. Then $P_n'(-x) =$

   (A) $(-1)^{n+1}P_n'(x)$ **(B)** $(-1)^nP_n'(x)$ **(C)** $(-1)^{n+1}P_{n+1}'(x)$ **(D)** $(-1)^{n+1}P_{n-1}'(x)$

A	B	C	D
●	○	○	○

4. $J_\nu(x)$ denotes Bessel function of the first kind of order ν. Then $J^2_{-\frac{1}{2}}(x) - J^2_{\frac{1}{2}}(x) =$

   (A) $\frac{2}{\pi x}\cos 2x$ **(B)** $\frac{2}{\pi x}\sin 2x$ **(C)** $\frac{2}{\pi x}\cos x$ **(D)** $\frac{2}{\pi x}\sin x$

A	B	C	D
●	○	○	○

5. $J_0(x)$ denotes Bessel function of the first kind of order zero. a is any non zero real number and $x > 0$, then $\int_0^1 xJ_0(ax)dx =$

   (A) $\frac{1}{a}J_1(a)$ **(B)** $\frac{1}{a}J_0(a)$ **(C)** $\frac{1}{a}J_{-1}(a)$ **(D)** $\frac{1}{a}J_{-\frac{1}{2}}(a)$

A	B	C	D
●	○	○	○