Total Marks: 15 **AMTL101 Quiz-2** **Time: 30 mins**

Name: **Entry No:**

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1. Consider the matrix $A = \begin{pmatrix} -4 & 0 & -2 \\ -1/2 & 1 & -1/2 \\ 15 & 0 & 7 \end{pmatrix}$.

   (a) Find the characteristic polynomial of A. [2]

   (b) Find the eigenvalues of A. [2]

   (c) Determine whether the matrix A is diagonalizable or not. [4]

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2. Consider the following ODE:

$$\left[2y + \frac{y^2}{x} + e^x\left(1 + \frac{1}{x}\right)\right] dx + (x + 2y)dy = 0.$$

(a) Find an integrating factor to convert the above equation into an exact ODE. [2]

(b) Find a general solution to the given ODE. [3]

(c) Find a particular solution in *explicit form* to the given ODE satisfying the initial condition $y(1) = 0$. [2]