HO CHI MINH CITY INTERNATIONAL UNIVERSITY

FINAL EXAMINATION

Academic year 2021-2022, Semester 3; Duration: 120 minutes

SUBJECT: Differential Equations(MA024IU)	
Head of the Department of Mathematics Professor Pham Huu Anh Ngoc	Lecturer: Pham Huu Anh Ngoc Signature:

Instructions:

- *Each student is allowed a scientific calculator and a maximum of two double-sided sheets of reference material (size A4 or similar), stapled together and marked with their name and ID. All other documents and electronic devices are forbidden..*

Question 1. (20 marks) *Determine the form* of a particular solution of the following differential equation:

$$y^{(5)} - 5y^{(4)} + y''' - 5y'' = x^3 - (x^2+1)e^{5x}.$$

Question 2. (i) (10 marks) Find $\alpha \in \mathbb{R}$ such that $y(x) = x^\alpha$ is a solution of the following differential equation

$$x^2y''' + 10xy'' + 18y' = 0, \quad x \in (0, \infty).$$

(ii) (10 marks) Find the general solution of the following differential equation:

$$x^2y''' + 10xy'' + 18y' = x^2, \quad x \in (0, \infty).$$

Question 3. (20 marks) Find the general solution of the following differential equation

$$y^{(4)} - 3y''' + 2y'' = 2020 + 2022e^{-2x}.$$

Question 4. (20 marks) Find a particular solution of the following linear system of differential equations

$$\frac{dx}{dt} = 4x + y + t; \quad \frac{dy}{dt} = 9x + 6y - 2t + 1.$$

Question 5. (20 marks) Find the general solution of the following linear system of differential equations

$$\frac{dx}{dt} = 4x + \frac{1}{3}y + e^t; \quad \frac{dy}{dt} = 9x + 6y - 2e^t.$$

The end.