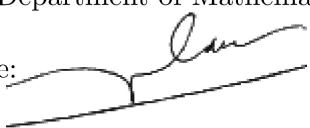



MIDTERM EXAMINATION

Academic year 2023-2024, Semester 1

Duration: 120 minutes

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

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) (Newton's Law of Cooling) A cup of tea at 90°C cools to 85°C in ten minutes. If the room temperature is 25°C , what is its temperature after 35 minutes?

Question 2. (20 marks) Solve the following differential equation

$$(2x \sin y - 3x^2 y^2 + y^2)dx + (x^2 \cos y - 2x^3 y + 2xy)dy = 0.$$

Question 3. (20 marks) Find the solution to the initial value problem

$$xy' + (4x + 3)y = x^2 e^{-4x}, \quad y(1) = -1.$$

Question 4. (20 marks) Find a particular solution of the following differential equation

$$y'' - 6y' + 9y = xe^x - e^{3x}.$$

Question 5. (20 marks) Find the general solution of the following differential equation

$$x^2 y'' - 5xy' + 9y = x^3 + x^2, \quad x \in (0, \infty).$$

END.