Department of Computer Science
COMSATS University Islamabad, Lahore Campus
M. A. Jinnah Campus, Lahore

Final-Term Examination– FALL 2023

Course Title:	Differential Equations				Course Code:	MTH242	Credit Hours: 3 (3,0)
Course Instructor/s:	Farrukh Shehzad				Programme Name:	BS Computer Science	
Semester:	7th	Batch:	FA20	Section: [redacted]	Date:	16-01-2024	
Time Allowed:	**3 hours**				**Maximum Marks:**	**50**	
Student's Name: [redacted]					Reg. No. [redacted]	LHR	

Important Instructions / Guidelines:

- Creativity and thinking are required.
- Attempt all questions.

(5*10=50)

Question #1

Find the power series solution of Legendre's differential equation

$$(1-x^2)\frac{d^2y}{dx^2}-2x\frac{dy}{dx}+p(p+1)y=0$$

near the ordinary point x=0

Question #2

What is the Wronskian function? Solve the higher-order differential equation

$$\frac{d^2y}{dx^2}-y=\frac{1}{x}$$

by variation of parameters.

Question #3

Solve the heat equation $\frac{\partial u}{\partial t}=c\frac{\partial^2 u}{\partial x^2}$ with boundary conditions u(0,t)=0=u(l,t)

and initial condition u(x,0)=f(x)

Question #4

Solve non-homogenous linear differential equation

$$x\frac{dy}{dx}-4y=x^6e^x$$

Question #5

Solve the homogenous higher-order differential equation

$$\frac{d^2y}{dx^2}+xy=0$$