International Islamic University Chittagong (IIUC)
Department of Electronic and Telecommunication Engineering
Final Examination

Program: **B.sc (Engg.)** Semester: **Autumn 2023**
Course Code: **Math-1207** Course Title: **Geometry & Differential Equations**
Total Marks: **50** Time: **2 Hours 30 Minutes**

(i) Answer all the questions. The figures in the right-hand margin indicate full marks.
(ii) Course Learning Outcomes (CLOs) and Bloom's Levels are mentioned in additional Columns.

Course Learning Outcomes (CLOs) of the Questions

CLO1 Reflect a basic understanding of change of axes, system of circles, Pair of straight lines and their properties, rectangular co-ordinate System, coplanar lines, equation of planes and sphere, basic idea of finding shortest distance.

CLO2 Developing ability to be manipulated and identify the linear, nonlinear, partial and ordinary differential equations and solve the complete solution of a differential equation with constant coefficients .Applying the ordinary and partial differential equations to solve the real world problems such as Electrical Circuits problems, Growth and Decay Problems, Temperature Problems, Falling Body Problems and Dilution Problems.

Bloom's Levels of the Questions

Letter Symbols	R	U	Ap	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Part A

Answer Two of the following Questions

Q1.	a)	Define with example of the followings: i) Differential equations ii) Ordinary differential equations iii) Partial differential equations iv) Order and Degree	CLO2	R	5
	b)	Solve the followings: i) $(x+1)\frac{dy}{dx} = x(y^2+1)$	CLO2	U	5
		OR			
Q1.	a)	Define Bernoulli's Differential equation with example. Solve the DE: $\frac{dy}{dx} = x^3y^3 - xy$	CLO2	R, U	5
	b)	Solve the Bernoulli's Differential equation: $\frac{dy}{dx} - \frac{1}{x}y = xy^2$	CLO2	U	5
Q2.	a)	Define Linear Differential equation with example and solve the DE: $\frac{dy}{dx} + 4y = x$	CLO2	U	5
	b)	Solve the differential equation: $x\frac{dy}{dx} + 2y = x^3$	CLO2	Ap	5
		Part B **Answer Three of the following Questions**			
Q3.	a)	Define Homogeneous Differential equation with example and Analyse the DE: $x^2y\,dx - (x^3+y^3)\,dy = 0$	CLO2	U, An	5
	b)	What is the condition foe exact differential equation? Evaluate the DE: $x(x^2+y^2-a^2)dx + y(x^2-y^2-b^2)\,dy = 0$	CLO2	E	5
Q4.	a)	Define Linear Differential Equation with constant coefficient. Solve the followings: i) $(d^2 - 7d + 12y) = 0$ ii) $(d^2 + d + 1)\,y = 0$	CLO2	R, U	5
	b)	Evaluate the Differential Equation: $(d^2 + d + 1)\,y = \sin 3x$	CLO2	E	5

Q5.	a)	What is the condition for non-exact differential equation? Solve the DE: $(y^4+2y)\,dx + (xy^3 + 2y^4 - 4x)\,dy = 0$	CLO2	An	5
	b)	Evaluate the following DE: $(d^3 + 3d^2 + 3d + 1)\,y = e^{-x}$	CLO2	E	5
		OR			
Q5.	a)	Apply the Picard's method up to 3rd approximation $\frac{dy}{dx} = x + y$ [where y = 0, when x = 0]	CLO2	Ap	5
	b)	Apply the Picard's method up to 3rd approximation $\frac{dy}{dx} = 2y - 2x^2 - 3$ [where y=2, when x = 0]	CLO2	Ap	5