

International Islamic University Chittagong (IIUC)  
Department of Electronic and Telecommunication Engineering (ETE)  
**Midterm Examination**

Program: **B.sc (Engg.)**  
Course Code: **Math-1207**  
Total Marks: **30**

Semester: **Autumn 2023**  
Course Title: **Geometry & Differential Equations**  
Time: **1 Hour 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

Q1.	a)	Explain Co-ordinate Geometry with diagram.	CLO1	R	2
	b)	Calculate the midpoint and distance between two points (10, 4, -20) & (30, -13, 15).	CLO1	U	2
	c)	Define slope and classify different types of slope with diagram. Determine the slope and intercept of the followings: i) $2x+8y-10=0$ ii) $4x-20=0$	CLO1	Ap	6
Q2.	a)	Evaluate the equation of the curve $2x^2 + y^2 - 4x + 4y = 0$ when the origin is transferred to the point (1, -2).	CLO1	E	5
	b)	Determine the equation of the parabola $x^2 - 2xy + y^2 + 2x - 4y + 3 = 0$ after rotating of axes through $45^\circ$	CLO1	Ap	5
OR					
Q2.	a)	Evaluate that the homogeneous quadratic equation represents a pair of straight lines passing through at origin.	CLO1	R,U	5
	b)	Evaluate the angle between lines represent by the homogeneous quadratic equation. Also find the angle when lines are i) parallel and ii) perpendicular to each other's.	CLO1	Ap	5
Q3.	a)	Define plane. Determine the equation of the plane passing through the lines of intersection of the planes $3x-y=0$ and $4z-2y=0$ and perpendicular to the plane $4x+5y-3z+1=0$	CLO1	An	5
	b)	Define sphere. Evaluate the centre and radius of the sphere given by $4x^2 + 4y^2 + 4z^2 - 16x + 24y - 8z + 5 = 0$	CLO1	E	5