INTERNATIONAL ISLAMIC UNIVERSITY CHITTAGONG
Department of Electronic & Telecommunications Engineering
B. Sc. in ETE, Final Examination, Spring-2019
Course Code: **Math-1207** Course Title: **Geometry & Differential Equations**
Time: 2:30 hours Marks: 50

***(Answer any two (02) questions from Group-A. and any three (03) questions from Group-B.** Separate answer script must be used for separate group. Figures in the right margin indicates full marks)*

Group A

2+4+4=10

1.
(a) Define with example of ordinary differential equations and partial differential equations.
(b) Form the differential equation corresponding to the family of curves $y = c(x-c)^2$ where c is an arbitrary constant.
(c) Eliminate the constants from $y = ax+bx^2$

2+3+5=10

2.
(a) Define Order and Degree of differential equations.
(b) Solve $\sec^2x \tan y\, dx + \sec^2y \tan x\, dy=0$
(c) Solve $(1-x^2)dy/dx - xy = 1$

1+4+5=10

3.
(a) Define linear differential equations.
(b) Solve $(x^3-x)\, dy/dx - (3x^2-1)y=x^5-2x^3+x$
(c) Solve $dy/dx - 2y\cos x = -2\sin 2x$

Group-B

2+4+4=10

4.
(a) Define Bernoulii's differential equations and Integrating factors.
(b) Solve $dy/dx = x^3y^3 - xy$
(c) Solve $dy/dx + 2y/x = y^3/x^3$

1+4+5=10

5.
(a) Define linear equations of second degree.
(b) Solve $x(x^2+y^2-a^2)\, dx + y(x^2-y^2-b^2)\, dy = 0$
(c) Solve $d^3y/d^3x - 13\, dy/dx - 12y = 0$

5+5=10

6.
(a) Solve $d^2y/d^2x - x^2\, dy/dx + xy = x$
(b) Solve $d^2y/d^2x - 3/x\, dy/dx + 3y/x^2 = 2x - 1$

5+5=10

7.
(a) Define Bessel's equation. Prove that, $J_{\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \sin x$
(b) Define Legendre's equation. Show that, $\int_{-1}^{1} [P_n(x)]^2\, dx = \frac{2}{2n+1}$