KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

2008/2009 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

COURSE CODE: **MATH 410**

COURSE TITLE: **ORDINARY DIFFERENTIAL EQUATION I**

STREAM: **SESSION VII & VIII**

DAY: **TUESDAY**

TIME: **2.00 – 4.00 P.M.**

DATE: **01/12/2009**

INSTRUCTIONS:

Attempt question **ONE** and any other **TWO** questions

PLEASE TURN OVER

1. (a) Prove that complete integral of the equation
$(px + qy - z)^2 = l + p^2 + q^2$ is $ax + by + cz = (a^2 + b^2 + c^2)^{1/2}$

(6 marks)

(b) Solve $(yz + xyz)dx + (zx + xyz)dy + (xy + xyz)dz$ **(6 marks)**

(c) Find the surfaces which intersects the surface of the system $z(x + y) = c(3z + 1)$ Orthogonally and which passes through the circle $x^2 + y^2 = 1,\ z = 1$ **(8 marks)**

(d) Solve $p + 3q = 5z + \tan(y - 3x)$ **(7 marks)**

(e) Find the complete integral of $p_1^3 + p_2^2 + p_3 = 1$ using Jacobi's method. **(3 marks)**

2. (a) Find a complete integral of $px + qy = pq$ using char pit's method. **(7 marks)**

(b) Find a complete, integral of $(p^2 + qz)y = qz$ **(7 marks)**

(c) Find a complete and singular integral of $2xz - px^2 - 2qxy + pq = 0$ **(6 marks)**

3. (a) Find the integral surface of the linear partial differential equation
$x(y^2 + z)p - y(x^2 + z)q = (x^2 - y^2)z$ which contains the straight line
$x + y = 0$ and $z = 1$

(6 marks)

(b) Find the complete integral of $p_1x_1 + p_2x_2 = p_3^2$ using Jacobi's method. **(6 marks)**

(c) Solve; $zydx = zxdy + y^2zdz$ **(5 marks)**

4. (a) Solve;

$$y(y + z)dx + x(x - z)dy + x(x + y)dz = 0$$ **(10 marks)**

(b) Find a partial differential equation by eliminating a and b from the equation
$z = ax + by + a^2 + b^2$ **(3 marks)**

(c) Solve; $p \tan x + q \tan y = \tan z$ **(7 marks)**

5. (a) Solve $x(y^2 + z)p - y(x^2 + z)q = z(x^2 - y^2)$ **(5 marks)**

   (b) Solve; $(y + z)p + (z + x)q = x + y$ **(5 marks)**

   (c) Solve $2(y + z)dx - (x + z)dy + (2y - x + z)dz = 0$ **(10 marks)**