ODE S5

MOUNT KENYA UNIVERSITY
5th Year Bachelors' of BEDA, BEDSC AND BAS

UNIT NAME: ODINARY DIFFERENTIAL EQUATIONS **UNIT CODE: BMA 2108**

C.A.T 1 **DATE 12th /Dec/2015**

WRITE ALL YOUR DETAILS CORRECTLY, INCLUDING YOUR COURSE

ATTEMPT ALL QUESTIONS:

(a) Write the order and the degree of the differential equation

$\left\{2x - \left(\frac{dy}{dx}\right)\right\} = (d^2y/dx^2)^{5/3} + (d^5y/dx^5)$ (3 marks)

(b) Show that $y = c_1e^{2x}\sin x + c_2 e^{2x}\cos x$ is a primitive of the differential equation

$y^{II} - 4y^{I} + 5y = 0$ (4 marks)

(c) If the equation $(x^2 + 3xy)dx + (Ax^2 + 4y)dy = 0$ is exact, determine the constant A and solve the resulting exact equation. (5 marks)

(d) Write the differential equation $xy^3dx + ex^2 dy = 0$ as a separable differential equation and hence solve it. (4 marks)

(e) Show that the equation $(3xy - 2ay^2)dx + (x^2 - 2axy)dy$ has an integrating factor which is a function of x alone hence solve the equation (5 marks)

(f) Solve the Bernoulli equation $y^{I} - y/x - x^4y^k = 0$ (6 marks)

(g) Use the substitution $y = vx$ to solve the equation

$x(x-y)dy/dx + y^2 = 0$ (3 marks)