

**W1-2-60-1-6**

**JOMO KENYATTA UNIVERSITY**

**OF**

**AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2015/2016**

**THIRD YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN MATHEMATICS AND COMPUTER SCIENCE**

 **SMA 2304: ORDINARY DIFFERENTIAL EQUATIONS I**

**DATE: APRIL, 2016 TIME: 2 HOURS**

**INSTRUCTIONS: QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTION**

**QUESTION ONE (COMPULSORY) (30 MARKS)**

1. Define the following terms, citing an example for each:
2. Ordinary differential equation [2 marks]
3. 1st order differential equation [2 marks]
4. Degree of differential equation [2 marks]
5. Find the differential equation whose solution is

 y = A cos 8x + B sin 8x [5 marks]

1. Solve (x3+y3)dx – 3xy2dy = 0 [8 marks]
2. Show that the equation (8x+5y)dx + (5x +y)dy = 0 is exact,

and solve the equation. [5 marks]

1. Find the general solution to the equation,

  [6 marks]

**QUESTION TWO (20 MARKS)**

1. Find the particular integral of the equation,

  [10 marks]

1. Show that  is homogeneous and use the substitution

 y = vx to transform the equation to contain v and x only,

 hence solve the resulting equation by the method of separation

 of variables. [10 marks]

**QUESTION THREE (20 MARKS)**

1. Solve  [10 marks]
2. Show that the equation (3x + 2y)dx + (2x +y) dy = 0 is exact

and solve the equation. [10 marks]

**QUESTION FOUR (20 MARKS)**

1. Solve the equation  [12 marks]
2. The population x of a certain city satisfies the law 

where t is measured in years.

Given that the population in this city is 200,000 in 1980;

determine the equation connecting the population x and

the time t, hence find the year when the population will be

double that of 1980. [8 marks]