Mount Kenya University

5th Session Bachelors' of BEDA AND BEDSC

UNIT NAME: ODINARY DIFFERENTIAL EQUATIONS UNIT CODE: BMA 2108

C.A.T 2

DATE of Submission DEC 2015

WRITE ALL YOUR DETAILS CORRECTLY, INCLUDING YOUR COURSE

ATTEMPT ALL THE QUESTIONS:

1. A radioactive isotope remains unused in a lab for 10 years, after which it is found to contain only 80% of the original mass. Find
   i) The half - life of the isotope
   ii) How many additional years it will take until only 15% of the original amount is left?
2. Find the complete (general) solution of
   i) $d^2y/dx^2 + \frac{dy}{dx} + 9y = 5e^{3x}$
   ii) $(D^2 - 3D + 2)y = 2x^2 + 3e^{2x}$
3. Solve the Bernoulli's equation $x\frac{dy}{dx} + y = y^3 \ln x$
4. Finding the particular solution of the differential equation
   $x^2 d^2y/dx^2 - 4x\, dy/dx + 4y = 4x^2 - 16x^3$ given $y(2) = 4$, $y^I(2) = -1$
5. Using the transformation
   i) $3x + 2 = e^z$ solve the non-homogeneous equation
   $(3x + 2)^2 d^2y/dx^2 + 3(3x + 2)\frac{dy}{dx} - 36y = 3x^2 + 4x + 1$
   ii) $z = 2x + 3y$ solve the differential equation by separation of variable methods $\frac{dy}{dx} = \frac{4x+6y+5}{2x+3y+4}$
6. find power series solution by Taylor's series expansion method
   $(x - 1) d^2y/dx^2 - (3x - 2) dy/dx + 2xy = 0$