

ODE I

SESSION FIVE

TAKE AWAY HOME

Mount Kenya



University

ODE II

5<sup>th</sup> Session Bachelors' of BEDA AND BEDSC

UNIT NAME: ORDINARY DIFFERENTIAL EQUATIONS

UNIT CODE: BMA 2108

C.A.T 2.

DATE: 17<sup>th</sup> /Dec/2015

ATTEMPT ALL QUESTIONS:

- a) Find the general solution of the given function

$$d^2y/dx^2 + 6\frac{dy}{dx} + 13y = 2x + 40 \sin x$$

- b) A capacitor  $C$  is charged by applying a steady voltage  $E$  through a resistance  $R$ . The p.d. between the plates,  $V$ , is given by the differential equation:

$$CR \frac{dv}{dt} + v = E$$

- (i) Solve the equation for  $E$  given that when time  $t=0$ ,  $V=0$ .

- (ii) Evaluate voltage  $V$  when  $E=50$  V,  $C=10$   $\mu$ F,  $R=200$  k $\Omega$  and  $t=1.2$  s.

- c) Use the substitution  $y = vx$  to solve the equation  $x(x-y) \frac{dy}{dx} + y^2 = 0$

- d) Solve the Bernoulli equation

$$2x \frac{dy}{dx} + y = 2x^2(x+1)y^3 \text{ given that } y=1 \text{ when } x=1$$

- e) The non-exact equation  $(-3x-1-2y^4)dx + (-3y-1+xy^3)dy = 0$  has an integrating factor of the form  $u(x,y) = x^r y^s$ . Find  $r$  and  $s$  and solve the equation.

- f) find power series solution by Taylor's series expansion method

$$(x-1) d^2y/dx^2 - (3x-2) dy/dx + 2xy = 0$$

ALSO READ ABOUT POWER SERIES

To be submitted first Saturday of April Session