THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering & Technology

DEPARTMENT OF CIVIL AND BUILDING ENGINEERING

DIPLOMA IN CIVIL AND CONTRUCTION &

DIPLOMA IN BUILDING AND CIVIL (08)

END OF FINAL EXAMINATIONS

APRIL/MAY 2010 SERIES

AH 2203 - ORDINARY DIFFERENTIAL EQUATIONS (ODE)

TIME: 2 HOURS

Instructions to Candidates

This paper consists of **TWO** Section i.e.
Section A which is **COMPULSORY,** and Section **B**.
In Section **B,** choose any **TWO** Questions and
maximum marks for each question is shown.

SECTION A - (COMPULSORY)

Question ONE

(a). (i). Using Laplace transform, solve the equation.
$(D^2 + 2D + 2)y = e^{-t}$
Assume zero initial conditions.

(10 Marks)

(ii). Solve $\frac{2d^2y}{dx^2} - 5\frac{dy}{dx} - 3y = 4\sin 2x$ **(20 Marks)**

SECTION B - (CHOOSE ANY TWO)

Question TWO

(a). Using Laplace transform, solve $(D^2 - 3D + 2)x = 0$, given that when t=0, x=4 and $\frac{dx}{dt} = 3$. **(10 Marks)**

(b). Determine Laplace transform of the following:

(i). $L\{\cos at\}$

(ii). $L\{t\}$

(iii). $L\{e^{-t}\cos 3t\}$

(iv). $L\{5/3\, e^{-2t}\sin 3t\}$

(10 Marks)

Questions THREE

(a). Solve, $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = 3e^x$ **(15 Marks)**

(b). Determine solution of the following Lagurres differential polynomial,
$x\frac{d^2y}{dx^2} + (1-x)\frac{dy}{dx} + ny = 0$ **(5 Marks)**

Question FOUR

(a). Solve $\frac{d^2y}{dx^2} + 4.\frac{dy}{dx} = 6$ **(8 Marks)**

(b). Using Laplace transform, solve the following simultaneous differential equations.

$(D^2 + 4)x - 2Dy = 2$

$Dx + CD^2 + 4jy = 0$

Given that $x = 1,\ y = Dx = Dy = 0,\quad at \quad t = 0.$ **(12 Marks)**

Question FIVE

Find the solution following Bessel's equation;

$x^2 \frac{d^2y}{dx^2} + x\frac{dy}{dx} + \left(x^2 - n^2\right)y = 0$ **(20 Marks)**