TECHNICAL UNIVERSITY OF MOMBASA

UNIVERSITY EXAMINATION FOR:

BACHELOR OF COMMERCE/BACHELOR OF BUSINESS ADMINISTRATION

BMS 4102: MANAGEMENT MATHEMATICS II

END OF SEMESTER EXAMINATION

ORDINARY EXAMINATIONS

SERIES: DECEMBER 2016

TIME: 2 HOURS

DATE: DECEMBER 2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of FIVE questions. Attempt Question ONE and any other TWO Questions

Do not write on the question paper.

QUESTION ONE

(a) (i) Derive the determinant of matrix $A = \begin{bmatrix} 4 & 6 & 1 \\ 2 & 5 & 2 \\ 9 & 0 & 4 \end{bmatrix}$ (3marks)

(ii) Find x_1 and x_2 using Cramer's rule from the following set of simultaneous equations.

$$A = \begin{matrix} 5x_1 + 0.4x_2 = 12 \\ 3x_1 + 3x_2 = 21 \end{matrix}$$ (4marks)

(iii) Find the inverse matrix A^{-1} for $A = \begin{bmatrix} 20 & 5 \\ 6 & 2 \end{bmatrix}$ (4 marks)

(b) (i) Solve the following system of equations

$$4x_1 + 3x_2 = 4$$
$$-2x_1 - x_2 = 0$$ (3marks)

(ii) Determine the inverse of the following matrix

$$B = \begin{pmatrix} 1 & 2 & 0 \\ 1 & 0 & -1 \\ -1 & 3 & 2 \end{pmatrix}$$ (5marks)

(iii) Solve the following LPP by graphical method

Minimize Z = 20X1 + 40X2

Subject to constraints

$36X1 + 6X2 \geq 108$

$3X1 + 12X2 \geq 36$

$20X1 + 10X2 \geq 100$ (5marks)

$X1 , X2 \geq 0$

(c) integrate the function:

    i) $y = \int \left(12x + 24x^2\right) dx$ (2marks)

(ii) $\int \left(48x - 0.4x^{-1.4}\right) dx$ (2marks)

(b) The population of a country is estimated by the function $p = 125e^{0.035t}$ where p equals the population (in millions) and t equals time measured in years since 1990.

a) What is the population expected to equal in the year 2000?   (3marks)

b) Determine the expression for the instantaneous rate of change in the population.

    $P = 125e^{0.035t}$

                                   (2marks)

    a) $y = 3x^{\frac{1}{2}}$ (2marks)

    b) $y = \dfrac{1}{x^3}$

                                     (2marks)

QUESTION TWO

(a) (i) Differentiate $y = e^{-x^2+2x}$

(3marks)

(ii) Determine $\int 5e^{3x} =$

(3marks)

(iii) Determine $\int \frac{2}{5} x^2 dx$ (3marks)

(b) (i)Differentiate $\dfrac{2Cos3x}{x^3}$

(4marks)

(c) (i)Differentiate the following

$y = 2x^3 \, Cos \, 3x$

(4marks)

(ii)Differentiate the following functions

$y = (3x+2)(5x^2 - 1 + 2x)$ (3marks)

QUESTION THREE

(a) (i) If $Y = \dfrac{2x^2 + 3}{x}$

(4marks)

(ii)Differentiate the following functions

$y = (3x+2)(5x^2 - 1 + 2x)$ (4marks)

(b)(i) If $Y = \dfrac{2x^2 + 3}{x}$

(4marks)

(c)Given a firms marginal revenue function, find the total revenue function.

$MR = 360 - 2.5q$ (3marks)

(d)Solve the system of equation,using,matrices.

$x_1 + 2x_2 = 5$
$x_1 - x_3 = -15$
$-x_1 + 3x_2 + 2x_3 = 40$ (5marks)

QUESTION FOUR

(a) Solve for x and y by use of Cramer's rule.

$4x + 2y = 2$
$3x - 5y = 21$ (3marks)

(b) Differentiate the following function

$$y = \sqrt{7x^4 - 5x - 9}$$

                 (4marks)

b. Differentiate with respect to x

i. $\dfrac{x^2}{1+x}$ (3marks)

ii. $Y = \dfrac{3 - x^2}{\sqrt{x^2 - 6x + 2}}$ (3marks)

(iii) $f(t) = 2\,Cos(5t + 0.20)$ (3marks)

Differentiate

$\dfrac{f(t)}{dt} = 2\,Cos\,3t$ (3marks)

QUESTION FIVE

(a) Determine the inverse of the following matrix

$$B = \begin{pmatrix} 1 & 2 & 0 \\ 1 & 0 & -1 \\ -1 & 3 & 2 \end{pmatrix}$$ (5marks)

(b)   Differentiate

$y = \dfrac{-3}{x}$ (3marks)

(c) Find the product matrix $c = AB$ when

$$A = \begin{bmatrix} 4 & 2 & 12 \\ 6 & 0 & 20 \\ 1 & 8 & 5 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 10 & 0.5 & 1 & 7 \\ 6 & 3 & 8 & 2.5 \\ 4 & 4 & 2 & 0 \end{bmatrix}$$ (3marks)

(d) Differentiate

$\dfrac{Sinx}{x}$ (5marks)

(e) Differentite the following functions

(i) $e^{3t}\,Sin\,4t$ (3marks)