TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF BUSINESS

DEPARTMENT OF MANAGEMENT SCIENCE

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)Multiply the two matrices

$A = \begin{bmatrix} 2 & 3 \\ 8 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 7 & 5 & 2 \\ 4 & 8 & 1 \end{bmatrix}$ (3marks)

(ii) Find the differential coefficient of

$y = 7Sin\ 2x - 3\ Cos\ 4x$ (3marks)

(b) If $MR = 520 - 3q^{0.5}$ what is the corresponding TR function (3marks

(c) Differentiate the following functions

(i)

$$y = \frac{2}{\left(2t^3 - 5\right)^4}$$ (5marks)

(ii)

$y = 3x^2 Sin2x$ (3marks)

(d) Minimization problem; Determine the optimal solution to the linear programming problem

Minimize $z = 3x_1 + 6x_2$

Subject to:

$$4x_1 + x_2 \geq 20$$
$$x_1 + x_2 \leq 20$$
$$x_1 + x_2 \geq 10$$
$$x_1, x_2 \geq 0$$

(6marks)

(b)Differentiate the following funtions

$\left(3x^2 - 5x + 8\right)^{10}$ (3marks)

(c)Differentiate the following

(i) $X^2 e^{2x}$

(4marks)

QUESTION TWO

(a) Differentiate the following functions.

(i) $Y = (3x^2 - 7x + 4)^6$ (4marks)

(ii) $y = 10e^{5x^2 - 4x}$

(4marks)

(b) 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)

(c)Differentiate

$$y = \left(\frac{3x}{1 - x^2}\right)^5$$

(5 marks)

(c) Minimization problem; Determine the optimal solution to the linear programming problem

Minimize $z = 3x_1 + 6x_2$

Subject to:

$$4x_1 + x_2 \geq 20$$
$$x_1 + x_2 \leq 20$$
$$x_1 + x_2 \geq 10 \qquad \text{(4marks)}$$
$$x_1, x_2 \geq 0$$

QEUSTION THREE

(a) If a firm's Marginal cost $MC = 180 + 0.3q^2$

$$MR = 540 - 0.6q^2$$

And total fixed costs are £65, what is the maximum profit it can make. (5marks).

(b) Integrate the following

i. $\int (x^2 - 1)^2 dx$ (3marks).

(c) Epidemic Control:

An epidemic is spreading through Cape Town in South Africa. Doctors estimate that the number of persons who will be afflicted by the disease is a function of time since the disease was first detected. The function is $n = f(t) = 300t^3 - 20t^2$ where n equals the number of persons and $0 \leq t \leq 60$, measured in days.

a) How many persons are expected to have caught the disease

(1) After 10 days?

(2 marks)

(2) After 30 days

(2 marks)

b) What is the instantaneous rate at which the disease is expected to be spreading at $t = 20$

(2marks)

(c) Integrate the following

i. $\int 5x \; dx$ (2marks)

ii. $\int \frac{x^2}{2}$ dx

(2marks)

QUESTION FOUR

(a) Differentiate the following functions

(i) $y = x^2 e^x$

(4mark)

(b) Solve the following LPP by graphical method

Maximize Z = 5X1 + 3X2

Subject to constraints

2X1 + X2 ≤ 1000

X1 ≤ 400

X1 ≤ 700

X1, X2 ≥ 0

(c) Differentiate $\frac{2Cos3x}{x^3}$ (4marks)

(d) Integrate the following

i. $\int (x^2 - 1)^2 dx$ (3marks)

QUESTION FIVE

a)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

X1 , X2 $\geq$ 0

(5marks)

(b) Discuss the application of Linear Programming

(5marks)

(c) A firm produces bread and biscuits and sells them at shs 5 and shs 3 per kg. The flour required for a unit of bread is twice that for biscuits. The supply of flour is sufficient for only 1000 kg of bread and biscuits per day. Bread requires a special additive unit of which only 400 are available per day. For biscuits, additive units are also required and 700 of them are available per day. Find the production combination for maximum profit.

Determine solution to the system of equations (3marks)

(d) Differentiate

$y = 10e^{5x^2 - 4x}$

(4marks)

a. (e) Differentiate

$$Y = 3(2x^4 + 1 - 5x^3)^{10}$$

(3marks)