TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Business & Social Studies

DEPARTMENT OF BUSINESS STUDIES

UNIVERSITY EXAMINATIONS FOR DEGREE IN

BACHELOR OF BUSINESS ADMINISTRATION

HBC 2111: MANAGEMENT MATHEMATICS II

END OF SEMESTER EXAMINATIONS

SERIES: AUGUST 2013

TIME: 2 HOURS

INSTRUCTIONS:

– Answer Question **ONE (Compulsory)** and any other **TWO** questions.

This paper consists of Three printed pages

QUESTION 1 (Compulsory)

a) Explain the following of the following types of matrices.

(3marks)

i) Square matrix
ii) Symmetric matrix
iii) Singular matrix

ii) Given that A= $\begin{pmatrix} 2 & 2 \\ 3 & 1 \end{pmatrix}$ B = $\begin{pmatrix} 1 & 1 \\ 3 & 4 \end{pmatrix}$ C = $\begin{pmatrix} 3 & 1 \\ 2 & 2 \end{pmatrix}$

Show that:

i) $(A + B)^T = A^T + B^T$

ii) $(AB)^T = B^T A^T$

iii) $(ABC)^T = C^T B^T A^T$ **(6marks)**

b)i) State the THREE characteristics (parts) of a linear programming model formulation. **(3marks)**

ii) A firm produces two products A and B with a contribution of sh16 and sh 20 per unit respectively. The production data (per unit) are as follows:

Products labour maternal x material y

		(units)	(units)
A	6	8	12
B	10	4	16

There are 1000 labour hours available are 700 units and 1600 units of materials X and Y respectively.

Formulate a linear programming model and use the graphical method to determine the optimal solution. **(14marks)**

c)Distinguish between definite and indefinite intergrals **(4marks)**

QUESTION 2

a) Given the following matrices

$$A = \begin{pmatrix} 1 & -2 \\ 4 & -1 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & -1 \\ 0 & 2 \\ -1 & 3 \end{pmatrix} \quad C = \begin{pmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \end{pmatrix}$$

Determine

I) A^{-1}

II) BC

III) 2A-B (6marks)

b) A factory is to install three types of machines A,B and C each of which requires supervisors, operators and output manager's Type A machine needs 3 supervisors 4 operators and 1 output manager. Type B needs 2 supervisors, 5 operators and 3 output managers. Type c needs 1 supervisor, 1 operators and 2 output managers.
The factory requires 23 supervisors, 40 operators and 31 output managers.

i)Formulate a system of simultaneous linear equations. **(3marks)**

ii) Use the inverse matrix method, to determine how many machines of each type the factory require. **(11marks)**

QUESTION 3

a) Determine the delivation of the following functions.

i) $Y = xe^{2x}$ **(5marks)**

ii) $Y = 3x^2 \cos 4x$ **(5marks)**

b) I)Given that $x^2 + y^2 + 6x + 7y + 3 = 0$ determine
dy/dx in terms of x and y **(4marks)**

ii) If the total costs are given by $C(x) = 360 + 10x + 0.2x^2$ and the total revenue are given by $R(x) = 50x - 0.2x^2$.

i) form the profit function. **(2marks)**

ii) Determine the maximum profit point. **(4marks)**

QUESTION 4

a) i) Determine $\int (5 + 1/4x - 2x^2)dx$ **(3marks)**

ii) Evaluate $\int (t+1/\sqrt{t})dt$ **(7marks)**

b) The marginal profit of a firm is given as MX=100-2x, where x is the sales units. It is also established that the firm break even point is 5units, determine the fixed cost of the firm. (10marks)

QUESTION 5

Evaluate the following integrals.

a) $\int_0^2 t\sqrt{(2x^2+1)}$ **dt** **(9marks)**

(11marks)

b) $\int 2xe^{3x}dx$