AFRICA UNIVERSITY
(A United Methodist-Related Institution)

"Investing in Africa's Future"

FACULTY OF MANAGEMENT AND ADMINISTRATION

COURSE TITLE: MMS 105 MATHEMATICS FOR BUSINESS II-(CONVENTIONAL)

SEMESTER II: FINAL EXAMINATION – NOVEMBER 2013

LECTURER : MR T MAKAMBWA

TIME 3 HOURS

INSTRUCTIONS

Answer all Questions in Section **A** and ***any*** three questions from Section **B**

Total possible mark is 100

Start **each** question on a new page in your answer Booklet.

The marks allocated to **each** question are shown at the end of the section.

Section A (40 Marks)

Answer ***all*** Questions in this section

Question One

Differentiate

a) $y = (3x - 4)^3$
b) $y = (x^2 + 3x + 5)^5$
c) $= x^2(2x + 1)^5$
d) $y = x^3\sqrt{(2x + 3)}$
e) $y = \dfrac{x^2}{x^2 + 4}$

[15]

Question Two

Integrate

a) $\int 2x\,dx$
b) $\int \sqrt{x}\,dx$
c) $\int e^{2x}dx$
d) $\int \dfrac{0.5}{x}\,dx$
e) $\int (65x + 3^x)dx$

[15]

Question Three

If the supply equation is
$Q = 150 + 5P + 0.1P^2$
Calculate the price elasticity of supply
(a) Averaged along an arc between $P = 9$ and $P = 11$
(b) At the point $P = 10$ **[10]**

Section B (60 marks)

Answer ***any*** there questions in this section

Question Four

a) A firm produces x tonnes of output at a total cost

$C(x) = \frac{x^3}{10} - 4x^2 + 20x + 5$

Find

(i) Average cost [2]

(ii) Average Variable Cost [2]

(iii) Average Fixed Cost [2]

(iv) Marginal Cost and [3]

(v) Marginal Average Cost. [3]

b) The demand curve for a monopolist is given by $x = 100-4p$

(i) Find the total revenue, average revenue and marginal revenue.

(ii) At what value of x, the marginal revenue is equal to zero? [8]

Question Five

Find the minimum and maximum of the objective function subject to the constraints

a) Objective function: 4x+5y
   Constraints
   $x \geq 0$
   $y \geq 0$
   $x+6y \leq 6$ [4]

b) Objective function:3x+2y
   Constraints
   $x \geq 0$
   $y \geq 0$
   $x+3y \leq 15$
   $4x+y \leq 16$ [8]

c) Objective function: 6x+7y
   Constraints
   $x \geq 0$
   $y \geq 0$
   $4x+3y \geq 24$
   $x+3y \geq 15$ [8]

Question Six

a) Find the general solution of the difference equation $Y_{t+1} - 0.95Y_t = 1000$
b) Find the particular solution, given $Y_5 = 20950$.
c) Determine whether the system will stabilize and if so ,what the stable value is .Plot the time to stability for t = 0 to 10 in steps of one
d) Solve the difference equation $3Y_{t+1} + 2Y_t = 44(0.8)^t$ given $Y_0 = 900$.
e) Show that the solution stabilizes and plot the time path to stability.

[20]

Question Seven

Find the inverse of the matrix A = $\begin{pmatrix} 2 & 1 & 1 \\ 6 & 5 & -3 \\ 4 & -1 & 3 \end{pmatrix}$

Hence or otherwise solve the equation

$$2x+y+z = 12$$
$$6x+5y-3z = 6$$
$$4x - y + 3z = 5$$

[20]

Question Eight

a) Solve and find a general solution of the equation $y^1e^{-x}+e^{2x} = 0$
b) Solve the differential equation $y^1 = 12e^{0.6t}$, given y=80 when t=0

c) find the particular solution of $y^1 + 2y = 6$,given y=1 when x=0

[20]

Question Nine

a) The marginal cost function of manufacturing *x* units of a commodity is $6 + 10x - 6x^2$ Find the total cost and average cost, given that the total cost of producing 1 unit is 15.
b) The marginal cost function of manufacturing *x* units of a commodity is $3x^2 - 2x + 8$. If there is no fixed cost find the total cost and average cost functions.
c) If the marginal revenue for a commodity is $MR = 9 - 6x^2 + 2x$, find the total revenue and demand function.

[20]

Question Ten

a) Find the consumers' surplus for the demand function $p = 25 - x - x^2$ when $p0 = 19$.
b) The supply function for a commodity is $p = x^2 + 4x + 5$ where x denotes supply. Find the producers' surplus when the price is 10.
c) The demand and supply functions under pure competition are $pd = 16 - x^2$ and $ps = 2x^2 + 4$. Find the consumers' surplus and producers' surplus at the market equilibrium price.

[20]

END OF PAPER