"Investing in Africa's Future"

FACULTY OF MANAGEMENT AND ADMINISTRATION

MMS 105 MATHEMATICS FOR BUSINESS II-(PARALLEL)

END OF FIRST SEMESTER EXAMINATIONS

NOVEMBER/DECEMBER 2016

LECTURER: MR A.C MUZENDA

DURATION: 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

Answer all questions in this Section

Question One

i). Differentiate

a. $Y = x^2 - 18x^2$ [2]

b. $Y = (3x - 4)^9$ [2]

c. $Y = (x^2 + 5x + 49)^4$ [3]

d. $Y = \sqrt[3]{x} + 16x^{-2}$ [3]

e. $Y = \frac{2x}{5\sqrt{x}}$ [3]

ii). Integrate

a. $\int 15x^2\, dx$ [2]

b. $\int ((2x - 1)/\sqrt{x}) dx$ [3]

c. $\int (48x - 0.4e^{-1.4x}) dx$ [3]

d. $\int (6 + 3^x)\, dx$ [2]

Question Two

a. Find the point elasticity when price is 12 for the demand function $p = 60 - 3q$. [5]

b. Given the demand function $q = (1{,}200 - 2p)^{0.5}$, what is elasticity of demand when quantity is 30? [7]

c. Show that the function $y = 60x - 0.2x^2$ satisfies the second-order condition for a maximum when $x = 150$. [5]

SECTION B

Answer any three questions.

Question Three

a. Solve the following system of equations

$4x + y - 2z = 0$

$2x - 3y + 3z = 9$

$-6x - 2y + z = 0$ [10]

b. Find the equation of the tangent to the curve $y = x^2 - 4x + 6$ at each of the points where the curve crosses the x-axis. Find also the coordinates of the point where these tangents meet. [10]

Question Four

i). A firm faces the demand schedule $p = 200 - 2q$ and the total cost function

$$TC = \tfrac{2}{3}q^3 - 14q^2 + 222q + 50$$

Derive expressions for the following functions and find out whether they have maximum or minimum points. If they do, say what value of q this occurs at and calculate the actual value of the function at this output.

a. Marginal cost
b. Average variable cost
c. Average fixed cost
d. Total revenue
e. Marginal revenue
f. Profit [18]

ii). Solve the equation $S = P(1 + rt)$ for t. [2]

Question Five

a. For the function $y = 4x\text{-}8$ find the elasticity and also obtain the value when $x = 6$. [5]

b. If a firm faces the demand schedule $p = 120 - 3q$ and the total cost schedule $TC = 120 + 36q + 1.2q^2$

What output levels, if any, will (a) maximize profit, and (b) minimize profit? [10]

c. Find the area enclosed between the curve $y = x^2(x - 2)(x - 1)$ and the x-axis. [5]

Question Six

a. $\int x\sin x \, dx$ [3]

b. A cylinder has a radius r meters and a height h metres. The sum of the radius and height is 3m. Find an expression for the volume, V cubic metres, of the cylinder in terms of r only. Hence find the maximum volume. [6]

c. Show that the elasticity of demand at all points on the curve $xy^2 = c$ (c is constant), where y represents price will be numerically equal to 2. [4]

d. Given that $P = \begin{bmatrix} 3 & 1 \\ 0 & 1 \end{bmatrix}$, $Q = \begin{bmatrix} 5 & -3 \\ 7 & d \end{bmatrix}$ and $R = \begin{bmatrix} \frac{1}{3} & n \\ 0 & \frac{1}{2} \end{bmatrix}$, find

i) The inverse of P. [2]

ii) The value of d which makes the determinant of P equal to the determinant of Q. [2]

iii) The value of n for which $PR = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ [3]

THE END