UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME: BSc. in Agricultural Economics and Agribusiness Management Year II & III

COURSE CODE: AEM 203

TITLE OF PAPER: INTRO. TO MATHEMATICS FOR ECONOMICS

TIME ALLOWED: 2: 00 HOURS

INSTRUCTION: 1.ANSWER ALL QUESTIONS
2. EACH QUESTIONS CARRIES 25 MARKS

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Question 1.(25 marks)

I. The technology matrix for a three sector open economy is

$$\begin{pmatrix} 0.2 & 0.3 & 0.5 \\ 0.1 & 0 & 0 \\ 0 & 0 & 0.3 \end{pmatrix}$$

i.e each unit of output in sector 1 requires inputs of 0.2 units from sector 1 and 0.1 for sector 2 ,etc.

There is an exogenous demand for 500 units from sector 1,400 units from sector 2 and 700 units from sector 3. Find ,to the nearest unit, the output that each sector must produce?

II. The income and cost functions of a sugar producer are

$$I (x) = 102x - x^2$$

and $C (x) = x^2 + 4x + 50$ respectively where x is daily production in tons and $I (x)$ and $C(x)$ are measured in E .

a)   For which value of x will the income be maximized?

b)   Determine the gross profit and the value of x which will maximize the gross profit.

c)   The producer is taxed at a rate of 40% on the value of x for which it is a maximum. Determine his net profit and the value of x for which if is a maximum.

Question 2. (25 marks)

I. Calculate the definite integrals.

a) $\displaystyle\int_{0}^{1} 2^{x}\,dx$

b) $\displaystyle\int_{1}^{2} x(x^{2}+6)\,dx$

c) $\displaystyle\int_{1}^{\infty} e^{2x}\,dx$

II. The marginal cost function of a producer in terms of production (P) is given by:

$$C'(P) = 2P + P^{3} + eP$$

Where the total cost is in E

If the fixed cost C_{F} = E100, find the total-cost function C(P)?

Question 3.   (25 marks)

I. Given Q = 100 – 2p + 0.03 Y, where Q is quantity demanded, p is
 Price, and y is income, and given p = 20 and y = 3000
 Find ;
    a) the price elasticity of demand. .
    b) the income elasticity of demand.

II. Consider the following differential equation for y(x)
    $Y`` - 4y = 3e^x$
  a. Find the complementary function
  b. Find the particular function.
  c. Write down the solution to this equation, given the initial condition
    y(0) = -1 and   y`(0) =3

Question 4.   (25 marks)

I   Use the Lagrange –multiplier method to find the stationery value of Z and
    use the bordered Hessian to determine the stationary value of Z is a
    maximum or a minimum.
        Z = x-4y -3xy, subject to x +y = 6.

II.   The demand and the supply for a certain product (in hundreds) in terms
    of its price (in cents)   are given by the following equations:

$D(P) = \dfrac{80}{p} - 2$ (demand)

$S(P) = P - 2$ (supply)

Find;   a) the consumers surplus

      b) the producers` surplus, when the market is in equilibrium.

END OF PAPER

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