ALUPE UNIVERSITY COLLEGE

...*Bastion of Knowledge*...

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OFFICE OF THE DEPUTY PRINCIPAL
ACADEMICS, STUDENT AFFAIRS AND RESEARCH

UNIVERSITY EXAMINATIONS

2017 /2018 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER REGULAR EXAMINATION

FOR THE DEGREE OF BACHELOR OF ECONOMICS

COURSE CODE: **ECO122**

COURSE TITLE: **INTRODUCTION MATHEMATICS II**

DATE: 30ᵀᴴ APRIL, 2018   **TIME: 2PM – 5PM**

INSTRUCTION TO CANDIDATES

- **SEE INSIDE**

THIS PAPER CONSISTS OF 3 PRINTED PAGES   **PLEASE TURN OVER**

ECO 122/ EDB 107: PRINCIPLES OF MACROECONOMICS   DURATION: 3 HOURS

INSTRUCTIONS TO CANDIDATES
- *Answer Question **ONE** and any other **TWO** questions*
- *Question ONE carries 30 marks*
- *Do not write on the question paper*

Question One

a) Define and explain the rules of differentiation   (5 marks)

b) Determine the derivative $Z = (2k^4 + 5)(3k^5 - 8)$. (5 Marks)

c) Differentiate the followings using power function rule $D_x (x^{2/4})$ (5marks)

d) Find the derivative of the following functions $f(x) = 5x - 3$ (5Marks)

e) The weekly demand function for a product sold by only one firm is $p = 600 - \frac{1}{2}x$ and

the average cost of production and sale is $= 300 + 200x$.

   Required:

   (i)   Derive equations for revenue, profit and cost   (4 Marks)

   (ii)   Find the quantity that will maximize profits   (4 Marks)

   (iii)   Find the price at this optimal level of production   (2 Marks)

   (iv)   What is the maximum profit   (2 Marks)

f) Expand the following: $(x + y)^6$ (3 Marks)

Question Two

Given the following demand and total cost functions:

P=1O-7Q

TC=20+3Q+4Q2+5Q3

Find :-

   (i)   The level of Q, P that will maximize profits   (8 Marks)

   (ii)   The level of Q that will maximize total revenue   (6 Marks)

   (iii)   The level of Q that will maximize MC and AVC   (6 Marks)

Question Three

a) Solve the following first order linear differential equations

   I)   dy/dt + 2ty = t   (4 Marks)

II) dy/dt + 4ty = 4t (4 Marks)

b) Suppose the demand per commodity is 24 if the price is \$16, 20 if the price is \$18, 16 if the price is \$20 and 12 if the price is \$22. Assuming a linear relationship, derive the demand function (4marks)

c) Find $\frac{dy}{dx}$ if $y = (x + 3)(x^2 - 2x)$ (5marks)

d) If $y = 2x^2 + 7x - 18$, write the derivative of the equation (3mks)

Question Four

a) If the demand and supply functions are given by $p = 600 - q$ and $p = 200 + \frac{1}{3}q$ respectively, find the tax rate that will minimize the total tax revenue T. (6 Marks)

b) Find the derivative of the following function : $y = (17 + x^2 + 3x^4)^8$ (4 Marks)

c) Consider the following production with labor (L) as the only input: $= 49L^{\frac{2}{7}}$. Compute marginal productivity of labor (MPL) and then use second order derivative to determine whether the function obeys the law of diminishing return (4 Marks)

d) Given that consumption function is as follows : $C = 120 + 0.75Y$ where C is consumption and Y is income , determine saving function and then compute marginal propensity to consume and save (6 Marks)

Question Five

a) Integrate the following function (5 Marks)

$\int X(x+3)^{2/3} dx$

b) Find the 5th derivative of the function $y = 4x^4 + 7x^3 + 2x^2$.(5 Marks)

c) Given that y is equal to the following functions below, find their respective derivatives. (5Marks)

i) $7x^3$

ii) $\frac{8}{x}$

iii) $(-6x)$

d) If z is a function of the function given below, determine the derivative. (5Marks)
   $(2k^4 + 5)(3k^5 - 8)$.

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