MACHAKOS UNIVERSITY

University Examinations for 2018/2019 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

DIPLOMA IN EDUCATION ARTS

EET 0104: INTRODUCTION TO MATHEMATICS FOR ECONOMICS I

DATE: 6/5/2019 **TIME:2.00-4.00 PM**

INSTRUCTIONS

Answer question one (Compulsory)

Write your answers neatly and show all your workings clearly in the answer booklet provided

Remember to include your registration number and date of examination

QUESTION ONE (COMPULSORY)- (30 MARKS)

a) The Universal set T and its subsets A, B and C are as follows:-

A= {5,6,7,9}

B= {6,8,13,14}

C= {6,7}

T=| {X4≤X≥15}

Find the following; without drawing the Venn diagrams. (5 marks)

i) $A \cup B$

ii) $B \cap C$

iii) $A' \cup C'$

iv) $B' \cap C'$

v) $(A \cap B \cup B)'$

b) Evaluate the following: (12 marks)

i) $\text{Log}_3\ 81$

ii) $\text{Log}_7\ (1/2401)$

iii) $\text{Log}_{15}\ 30$

iv) $(2x-3y)^6$

v) $2x^2-9x-20= -2$

vi) ¼ of 16x2-20÷4+3

c) In a college, 500 students appeared for mathematics and statistics paper. 400 students passed in mathematics while 350 students passed in statistics.

If 50 students failed in both papers, use a Venn diagram to find out how many students passed both papers. (4 marks)

d) A thousand people took part in a survey to reveal which newspaper A, B or C they read on any particular day.

The responses showed that 420 read A, 316 read B and 160 read C. These figures include 116 who read both A and B, 100 who read A and C and 30 who read B and C.

Given that 16 people read all the three papers:

i) Present this information on a Venn diagram (1 mark)

ii) How many people read one newspaper only (1 mark)

iii) How many people read at least two newspapers (2 marks)

iv) How many read A but not B (2 marks)

v) How many people do not neither of the three newspapers (1 mark)

e) A Cobb-Douglas production function is given by Q=AKL where Q is output, L is labour input and K is the capital input and A, and are constants.

Determine the;

i) Average product labour and capital (1 mark)

ii) Marginal product of labour and capital (1 mark)

QUESTION TWO (20 MARKS)

a) Consider the following consumption and tax functions:

$C=70+0.95Y^d$

$T=20+0.4Y$

$Y^d=Y-T$

i) Express C as a function of Y and sketch the function (5 marks)

ii) What is C when Y=100? (1 mark)

iii) What is Y when C=308? (1 mark)

b) From the functions given, distinguish between:

i) Autonomous Consumption and autonomous tax (1 mark)

ii) Marginal propensity to consume and marginal propensity to tax (2 marks)

c) The demand and average total cost facing a firm are given below:

P=6-3/5 Q

ATC=O-2/5+3/Q

i) Find the profit function (3 marks)

ii) What is the level of profit when output is zero? (1 mark)

iii) At what level of output will profit be:

- Profit=zero (0) (3 marks)
- Profit =117 (3 marks)

QUESTION THREE (20 MARKS)

Given a demand function of a product as P=14-q and the unit variable cost v=q-4 while fixed cost is Sh.32.

Determine the following:

a) Total cost function (3 marks)

b) Profit function (3 marks)

c) Output and price for maximum profit (5 marks)

d) Sketch a diagram to show the relationship between revenue, cost and profit (3 marks)

e) Show that the output for maximum profit is not necessarily the same as the output for maximum revenue. (6 marks)

QUESTION FOUR (20 MARKS)

Fourth Street Economists consultants have recently started to offer business advice to their clients. Acting as consultants, they have estimated the demand curve of a client's firm to be:

AR=200-8q

Where AR is average revenue in millions of shillings and q is the output in units. Investigations of the client firm's profile shows that marginal cost (MC) is given by:

$MC=q^2-28q+173$ (in millions of shillings)

Further investigations have shown that the firm's cost is Sh. 10 million.

Required:

a) Determine:

i) Total revenue function, (3 marks)

ii) Total cost function and hence, (3 marks)

iii) The profit function (2 marks)

b) What advice would you give the client in terms of production level and price to charge if its objective is to maximize profit? What is the maximum profit? (6 marks)

c) Compare the marginal revenue and average cost values when q=5 units. (3 marks)

d) Determine the firm's break-even point (point where revenue=cost) (3 marks)

QUESTION FIVE (20 MARKS)

a) A cost function is given by: $TC=15+3Q^2+14Q^3$, determine the following:

i. Average fixed cost (2 marks)

ii. Average variable cost (2 marks)

iii. Marginal cost (2 marks)

iv. The level of Q that will minimize: (a) Total cost? (b) AVC (2 marks)

v. The stationary level of TC (2 marks)

b) Differentiate the following functions with respect to X and state the rule used:

i. $Y=(X^2=3)(2X^3+X^2-5)$ (5 marks)

ii. $Y= \frac{3X^3+4X^2}{X^2+3}$ (5 marks)