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**UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR**

FIRST YEAR FIRST SEMESTER

SPECIAL / SUPPLEMENTARY EXAMINATION

FOR THE DEGREE OF BACHELOR OF EDUCATION.

COURSE CODE: ECO 103 COURSE TITLE: MATHEMATICS FOR ECONOMICS

DATE: 12.10.2018

TIME: 3 Pm.

INSTRUCTIONS TO CANDIDATES

Answer Question One in Section A and Any other TWO (2) Questions in Section B

TIME: 2 Hours

KIBUCO observes ZERO tolerance to examination cheating

This Paper Consists of 2 Printed Pages. Please Turn Over.

QUESTION ONE (COMPULSORY).

a) (i) Explain the importance of mathematics in analyzing economic phenomena.

3 marks

ii) Differentiate between the terms below

Domain and range

1 mark

Dependent and independent variables

1 mark

A universal set and a complementary set

1 mark

b) i) Work out the ratio below:

2 marks

$$\frac{(1-v)^4}{(1-v)^2}$$

ii) Given the function $q = (v^2 + v - 56)$ find the left- side limit and the right-side limit of q as v approaches 7.

$$v - 7$$

2 marks

c) Given a short –run total cost function

$C = Q^3 - 4Q^2 + 10Q + 75$, find the second partial derivative of the function. 2 marks

d) Draw a curve to show the relation of x and y in the function below.

$$y = 2x^3 - 5x^2 - 2x + 5$$

10 marks

e) Work out $\int_{-3}^2 2x^2 - 3x + 2 \frac{dy}{dx}$

4 marks

f) What are the values of the following logarithms?

i) $\log_{10} 0.0001$

ii) $\log_e e^{-4}$

4 marks

Question 2

i) Given the set $J = \{x | 2 < x < 9\}$.

Determine any three subsets of J .

3 marks

- ii) Suppose that the demand and supply functions for two commodity market are as follows

$$Q_{d1} = 10 - 2p_1 + p_2 \quad Q_{d2} = 15 + p_1 - p_2$$

$$Q_{s1} = -2 + 3p_1 \quad Q_{s2} = -1 + 2p_2$$

Determine

- i) Equilibrium prices (p_1 and p_2) 4 marks
- ii) Equilibrium quantity (Q_1 and Q_2) 4 marks
- iii) The total cost C of a firm per day is a function of its daily output Q : $C = 50 + 19Q$.
The firm has a capacity limit of 200 units of output per day. Work out the domain and the range of the cost function. 2 marks
- iv) Graph the function below.

$$y = \frac{4}{2x}$$

The domain $\{x \mid -4 < x < 4\}$

7 marks

Question 3

- a) A researcher in Kibabii carried out an interview on 650 students: 170 were Physics students; 50 were registered in Chemistry; 90 were Biology students; 30 were registered in physics and chemistry; 20 registered in Chemistry and Biology; 30 registered in physics and Biology and 10 registered in Chemistry, Biology and Physics. Using a Venn diagram, find the following:
- i) The number of students registered in two courses only.
- ii) The number of students registered in only one course.

- iii) The number of students registered in none of the three courses.
- iv) The number of students registered in at least two courses. 8 MKS

b) Determine the coordinates and nature of any turning points on the curve represented by the function $y = x^3 - 7.5x^2 + 18x + 6$ 12 marks

Question 4

a) Solve by formula:

$$5x^2 + 2x - 3 = 0$$

5Mks

b) The market for oranges is represented by the following model with linear demand and supply functions:

$$Q_D = 36 - \frac{1}{3} P$$

$$Q_S = -9 + \frac{1}{2} P$$

Q_D is quantity demanded; Q_S is quantity supplied and p is price.

- i) Find the level of output and price at which the market is at equilibrium. 3.5 marks
- ii) Explain what is likely to happen in the market when the price level is at $p = 18$ 3.5mks
- iii) Explain four factors that determine demand for a product. 8 marks.