ALUPE UNIVERSITY COLLEGE

...Bastion of Knowledge....

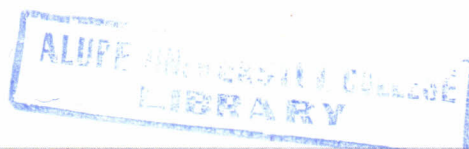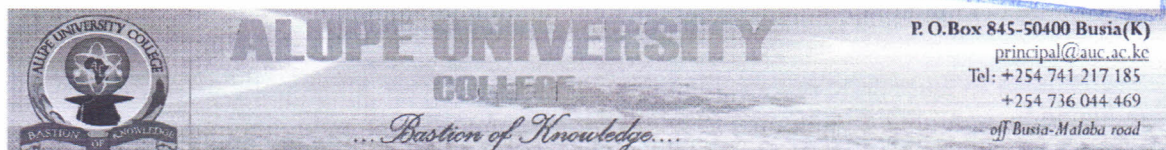**OFFICE OF THE DEPUTY PRINCIPAL**
ACADEMICS, RESEARCH AND STUDENTS' AFFAIRS

UNIVERSITY EXAMINATIONS

2018 /2019 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER REGULAR EXAMINATION

FOR THE DIPLOMA IN ECONOMICS

COURSE CODE: **DECO 014**

COURSE TITLE: **BASIC MATHEMATICS**

DATE: 14TH DECEMBER, 2018   **TIME: 9.00 AM – 12.00 PM**

INSTRUCTION TO CANDIDATES

- **SEE INSIDE**

THIS PAPER CONSISTS OF 4 PRINTED PAGES   **PLEASE TURN OVER**

DECO 014: BASIC MATHEMATICS

STREAM DECO   **DURATION 3HRS**

INSTRUCTIONS:-
- *Answer **Question ONE** and any other **THREE***
- ***QUESTION ONE** carries 30 Marks.*

QUESTION ONE – Compulsory
(a) Define the following terms as used in set theory:
    (i) Finite set.   **[1 Mark]**
    (ii) Infinite set.   **[1 Mark]**
    (iii) Universal set.   **[1 Mark]**
    (iv) Null set.   **[1 Mark]**
(b) Explain **four** applications of mathematics in business management.   **[4 Marks]**

(c) Consumption, C is a function of income, Y, given by the following expression:
$C = 10 + 0.45 Y$.
    (i)   Determine the slope of the consumption function.   **[1 Mark]**
    (ii)   Is the function positively or negatively sloped? Give reason.   **[1 Mark]**
    (iii) What is the level of consumption when $Y = 20$.   **[1 Mark]**

(d) A sales-representative's income is composed of fixed amount and a variable component which is dependent on the number of units sold. If she sells 10 units on a given day, she earns Ksh. 1,200, whereas when she doubles her sales, her income increase by Ksh. 200.
Required:
    (i)   The fixed daily earnings.   **[3 Marks]**
    (ii)   The level of commission per unit sold.   **[1 Mark]**
    (iii) The income if 100 units are sold.   **[2 Marks]**
    (iv) On a given day, the sales-representative is determined to earn Ksh. 7,000. Suppose on the previous day she had guaranteed order to achieve her target income, how many units must she sell over 40 units to achieve her target?   **[3 Marks]**

(d) Solve the following systems of linear simultaneous equations by matrix algebra.
    $15x + 10y = 600$
    $5x = 340 – 8y$ **[3 marks]**

(e) For the universal set $T = \{a, b, c, d\ e, f\}$ and its subset $A = \{a, d\}$, $B = \{b, c, f\}$ and $C = \{a, c, e, f\}$
Find:
    (i) $A \cap B$ **[1 mark]**
    (ii) $(A \cup B) \cap C^{I}$ **[1 mark]**
    (iii) $A \cup B \cup C$ **[1 mark]**

QUESTION TWO

A food processing plant has a particular problem with delivery and processing of perishable goods with a short life. All deliveries must be processed in a single day and, although there are a number there are a number of processing machines available, they are very expensive to run. A researcher has developed the function $Y = 12x - 2a - ax^2$ to describe the profit (y, in kshs 000) given the number of machines used (x) and the number of deliveries (a) in a day.

a) Show that the system is uneconomic if 4 deliveries are made in one day (i.e a=4)   (8 mks)

b) If three deliveries are made in one day,find the number of processing machines that should be used in order that the profit is maximized.in this case, what is the maximum profit   (12 mks)

QUESTION THREE

In a particular insurance life office, employees Smith, Jones, Williamson and Brown have A levels with Smith and Brown also having degrees. Smith, Melville, Williamson, Tylor, Moore and Knight are associate members of of the chartered insurance institute (ACII) with Tylor and Moore having A levels. Identifying set A as those employees with A levels, set C as those employees who are ACII and set D as graduates

a) Specify the elements of sets A,C and D.

b) Draw a Venn diagram representing sets A, C and D together with their know

c) What special relationship exist between sets A and D

d) Specify the elements of the following sets and for each set, state in words what information is being conveyed

i)   A n C ii) DUC iii) D n C

e) What would be suitable universal set for this situation?

QUESTION FOUR

(a) Explain the importance of set theory in business.   [4 marks]

(b)*The Standard Group* deals with the distribution of three types of newspapers namely *The Standard, The Business Daily* and *The Nairobian*. The company recently conducted a market survey to determine the newspaper preferences of 100 households in a certain estate in Nairobi. The following results were obtained from the survey.

- 320 households read *The Standard* newspaper.
- 200 households read *The Business Daily* newspaper.
- 450 households read *The Nairobian*.
- 150 households read *The Standard* and *The Nairobian* newspapers.
- 70 households read *The Standard* and *The Business Daily* newspapers.
- 100 households read *The Nairobian* and *The Business Daily* newspapers.
- 300 households read none of the three newspapers.

Required:

(i)   Represent the above information using a Venn diagram.   [3 Marks]

(ii)   The number of households that read all the three newspapers.   [3 Marks]

(iii)   The number of households that read exactly one of the three newspapers.[3 Marks]

(iv)   The number of households that read two types of the newspapers.   **[2 Marks]**

QUESTION FIVE

a) Differentiate between a function and an equation.   **[2 Marks]**

b) A company invests in a particular project and it has been estimated that after x months of running, the cumulative profit (Shs '000') from the project is given by the function $31.5x-3x^2-60$, where x represents time in months. The project can run for nine months at the most.

i)   Draw a graph which represents the profit function for the nine months. **[5 Marks]**

ii)   Calculate the 'break even' time points for the project.   **[3 Marks]**

iii)   Determine the initial cost of the project.   **[3 Marks]**

iv)   Use the graph to estimate the best time to end the project.   **[2 Marks]**

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