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MAIN EXAMINATION

JANUARY – APRIL 2014 TRIMESTER

FACULTY OF COMMERCE

DEPARTMENT OF ACCOUNTING AND FINANCE

ORDINARY DIPLOMA PROGRAMME

CID 072: FOUNDATION OF BUSINESS MATHEMATICS

Date: APRIL 2014	Duration: 2 Hours

INSTRUCTIONS: Answer Question ONE and ANY OTHER TWO Questions

Q1. a) Define the following terms as used in set theory and give an example.
- i) Universal set **(1 mark)**
- ii) Union of sets (A and B) **(2 marks)**
- **iii)** Intersection of sets (A and B) **(2 marks)**
- iv) Powers set of A **(2 marks)**

b) Given that the matrices $A = \begin{pmatrix} 2 & 8 \\ 3 & 0 \\ 5 & 1 \end{pmatrix}$ $B = \begin{pmatrix} 8 & 0 \\ 0 & 1 \\ 3 & 5 \end{pmatrix}$ $C = \begin{pmatrix} 6 & 5 & -1 \\ 1 & 0 & 4 \end{pmatrix}$. Find:

- i) CA **(2 marks)**
- ii) $A'B$ **(2 marks)**
- iii) $A'BC$ **(2 marks)**

c) Solve the following equation by competing square method $ax^2 + bx + c = o$ where a, b and c are constants. **(6 marks)**

d) Find the solution to the system of equations

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$$5xy + 3x_2 = 30$$
$$6x_1 - 2x_2 = 8$$
by matrix method. **(4 marks)**

e) Solve the following equation $4^x - 15(2^x - 2) = -6$ **(6 marks)**

Q2. a) Define the following terms as used in Boolean algebra:
   i) Conjunction
   ii) A conditional
   iii) Disjunction

b) Given the proposition p and q find:

   i) $p \wedge q$ **(2 marks)**
   ii) $p \rightarrow q$ **(2 marks)**

c) A trader knows that if y (hundreds) products are demanded in a particular month the total expenditure he incurs (in Ksh. 000) is $14 + 3y$ and the revenue generated from doing this business is (in Kshs) $19y - 2y^2$
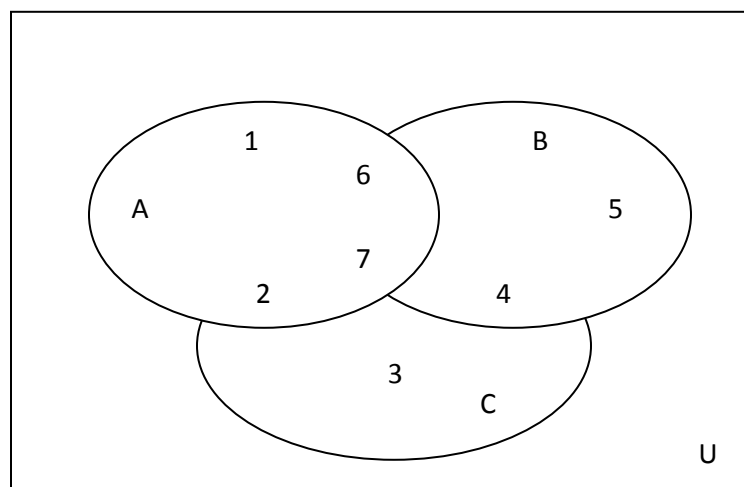   i) Derive the profit function **(4 marks)**
   ii) Find the break-even points **(9 marks)**

Q3. a) Three sets A, B and C divide the universal set U into 8 parts, the 8th part not numbered in the diagram.

Prove that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ **(8 marks)**

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b) Solve the equation $3^x\left(7^{2x+1}\right)=37$ correct to three significant figures.

(7 marks)

c) Given that the following matrix has no inverse, determine the value of k. $\begin{pmatrix} k & 5k-6 \\ 1 & k \end{pmatrix}$ **(5 marks)**

Q4. a) A firm produces products A, B and C which required processing by three machines. Time in hours required for processing one unit of each product by the three machine is as follows:

$$\begin{array}{c} \Pr oduct \\ \begin{array}{c} Machine\ (I) \\ (II) \\ (III) \end{array} \begin{pmatrix} A & B & C \\ 3 & 1 & 2 \\ 1 & 2 & 4 \\ 2 & 1 & 1 \end{pmatrix} \end{array}$$

Machine I is available for 850 hours, machine II is available for 1200 hours while machine III is available for 550 hours. How man units of each product should be produced to make use of all available time on the machines. **(10 marks)**

b) A company's total profit (£000) over a particular period is given by the function $17x^2 - 12x - 5x^3$ where x is the number of terms produced (in hundreds). If it is known that the maximum production possible for the period is 300 items, plot the company's profit per unit cost.

(10 marks)

END