TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSISCS

UPGRADING MATHEMATICS

AMA 1104: COMMERCIAL ARITHMETIC & STATISTICS

END OF SEMESTER EXAMINATION
SERIES: APRIL 2014
TIME ALLOWED: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer Booklet*

This paper consist of **FIVE** questions
Answer question **ONE (COMPULSORY)** and any other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **FOUR** printed pages

Question One (Compulsory)

a) Define the following terms as used in Mathematics:

- **(i)** A set **(1 mark)**
- (ii) A matrix **(1 mark)**

b) Use Gaussian elimination to solve for the unknowns below:

$$x_1 + 2x_2 - 3x_3 = 3$$
$$2x_1 - x_2 - x_3 = 11$$
$$3x_1 + 2x_2 + x_3 = -5$$

(7 marks)

c) Write down all possible integral values of x if:

- **(i)** $-3 < x < 5$ **(1 mark)**
- **(ii)** $-2 \leq x < 4$ **(1 mark)**
- **(iii)** $0 \leq x \leq 6$ **(1 mark)**

d) Given that x_1, x_2 …x_n is a sample of a given population, show that the sum of squares of the deviations of a set of data from any number say R is least only when $R - \overline{X} = 0$ where $\overline{X}$ is the arithmetic mean. **(4 marks)**

e) A racing car counts five laps of a circuit in a race each lap covered at the following average speeds (in mph). 123.4, 132.8, 125.7, 126.9, 134.9. Find the average speed of the car for the whole race. **(3 marks)**

f) Given the following data below, find the arithmetic mean using an approximate assumed mean. **(7 marks)**

Class	5 – 20	21 – 36	37 – 52	53 – 68	69 – 84	85 - 100
Frequency	6	12	17	11	3	1

g) List any FOUR desirable properties of the mean. **(4 marks)**

Question Two

a) Given the following sets below:

$A = \{, 2, 3\}$ $B = \{3\}$ find $A \Delta B$ and represent this on a venn diagram. **(5 marks)**

b) Let A, B and C be subsets of the universal set $\cup$ show that $(A \cup B) \cup C = A \cup (B \cup C)$

(6 marks)

c) Define the term "A frequency polygon" and hence draw the frequency polygon from the following data given below.

Class	10.0 – 15.9	16.0 – 21.9	22.0 – 27.9	28.0 – 33.9
Frequency	1	3	7	4

(5 marks)

d) List FOUR identity laws in set theory. **(4 marks)**

Question Three

a) The lengths (in mm) of 40 spindles were measured with the following results obtained:

20.9	20.5	20.8	20.7	20.8	20.6	20.5	20.8	20.7	20.6
0	7	6	4	2	3	3	9	5	5
20.7	21.0	20.7	20.4	20.9	20.7	20.7	20.6	21.0	20.8
1	3	2	1	4	5	9	5	8	9
20.5	20.8	20.9	20.7	20.6	20.9	21.0	21.1	20.8	20.7
1	8	7	8	1	2	7	6	0	7
20.8	20.7	20.6	20.9	20.8	20.6	20.7	20.8	20.5	20.9
2	2	0	0	6	8	5	8	6	4

Represent this data on a frequency distribution table taking a class interval of 0.10 **(8 marks)**

b) During a tournament the probabilities of Mirithu girls winning volleyball, netball and hockey were:

2/3, 1/5, 3/5 respectively.

At the end of the tournament what was the probability that Mirithu girls:

(i) Doesn't lose at least one game **(1 mark)**
(ii) Wins at least one game **(2 marks)**
(iii) Wins two games **(3 marks)**

c) Define the following terms as used in probability:

(i) Dependant events **(1 mark)**
(ii) Random variable **(1 mark)**

d) List FOUR steps involved in a statistical exercise. **(4 marks)**

Question Four

a) Define the term "A power set" and hence form the power set from the given subset below:
$A = \{12\ 3\}$

(4 marks)

b) Differentiate between symmetric and skew-symmetric matrices and give one example of each.
(4 marks)

c) Given that $A=\begin{pmatrix}4 & 2 & 6\\1 & 8 & 7\end{pmatrix}$ determine:

(i) A^T **(1 mark)**

(ii) $A.A^T$ **(2 marks)**

d) Given that $A=\begin{pmatrix}2 & 3 & 5\\4 & 1 & 6\\1 & 4 & 0\end{pmatrix}$

Determine:

(i) $|A|$ **(1 mark)**

(ii) A^{-1} **(6 marks)**

e) Given that matrix B is of order p x q, C is of order mxn. Predict the order of B.C **(2 marks)**

Question Five

a) List FOUR advantages of the median. **(4 marks)**

b) Solve the following inequality and illustrate the solution on a number line $4-3x\leq 10$ **(4 marks)**

c) Draw a graph to represent:

(i) $-2 < x \leq 2$ **(2 marks)**

(ii) $1 \leq y < 5$ **(2 marks)**

d) Given that $\cup=\{2\ 4\ 6\ 8\ 10\ 12\ 14\ 16\},\ A=(2\ 6\ 10\ 16)$ find A' and represent the solution on an Argand diagram. **(4 marks)**

e) Compute the standard deviation of the following data:

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
No of students	7	6	15	12	10

(4 marks)