

**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE  
AND TECHNOLOGY.  
FACULTY OF HEALTH SCIENCES  
DEPARTMENT OF SCIENCE**

**COURSE** : SMA 2111 – MATHEMATICS 1

**CLASS** : YEAR 1 SEMESTER 1

**DURATION** : MAY TO AUGUST 2013

**MEETING** : SUNDAY 7.00 A.M. TO 10.00 A.M.

**LECTURER** : MR. SAMSON NYANDONDI - M.SC  
( MATHEMATICS), B. ED, KENYATTA  
UNIVERSITY

**CONTACT** : 0735 – 571129

## **COURSE DESCRIPTION**

The course deals with elementary set theory and Venn diagrams, relations and function. Definition, domains, co-domains, range, inverse of a function and composition of functions. Trigonometry: functions, their graphs, sine and cosine formulae, trigonometric identities and equations. Algebra, quadratic equations. Surds, logarithms and indices. Sequences and series: Arithmetic and geometric progressions. Permutation and combinations. Binomial theorem and applications such as approximations. Simple and compound interest.

Statistics: collection and representation of data. Introduction to measures of central tendencies and variability.

## **OBJECTIVES**

*By the end of this course, the learner should be able to:-*

- (i) Represent sets on a Venn diagram.
- (ii) Define and determine domains, co- domains, range and inverse of a function.
- (iii) Draw graphs of simple trigonometric functions.
- (iv) Apply sine and cosine formula to solve triangles.
- (v) Solve simple quadratic equations.
- (vi) Rationalize denominators of surds
- (vii) Solve simple logarithmic problems
- (viii) Solve simple problems on indices
- (ix) Define and solve problems on sequences and series.
- (x) Solve questions on permutation and combinations.
- (xi) Apply the knowledge of Binomial theorem on numerical approximations
- (xii) Solve questions on simple and compound interest.
- (xiii) Collect and represent data.
- (xiv) Define and calculate mean, median and mode.

## **REFERENCES**

1. Understanding pure mathematics by A.J. Sadler and D.W.S Thorning.
2. Finite mathematics and its applications by K.A Ross.
3. Logic, sets and numbers by K.G. Binmore
4. Discrete Mathematics with graphs by K. A . Ross.

## **BREAKDOWN OF FINAL EXAM**

A candidate to answer question one and any other two questions.

### **UNIVERSITY GRADING SYSTEMS.**

70	-	100	-	A
60	-	69	-	B
50	-	59	-	C
40	-	49	-	D
0	-	39	-	E

### **MODE OF TESTING**

<b>TASK</b>	<b>MAXIMUM SCORE</b>
CAT 1	15
CAT 2	15
FINAL EXAM	70
<b>TOTAL</b>	<b>100</b>

## **CONTENT**

### **ELEMENTARY SET THEORY**

- Sets
- Venn diagrams
- Equality of sets
- Universal sets
- Intersection of sets
- Union of sets

### **RELATIONS AND FUNCTIONS**

- Relation.
- Domains and range.
- Co –domains.
- Functions.
- Inverse of functions.
- Composition of functions.

## **TRIGONOMETRY**

- Functions and their graphs
- Sine and cosine formulae
- Trigonometric identities
- Trigonometric equations

## **ALGEBRA**

- Quadratic equations
- Surds
- Logarithms
- Indices

## **SEQUENCES AND SERIES**

- Sequences
- Series
- Arithmetic progression
- Geometric progression.

## **PERMUTATION AND COMBINATIONS**

- Permutation
- Combination

## **BINOMIAL THEOREM**

- Pascal's triangle
- Expansion of binomials.
- Application on numerical cases.

## **SIMPLE AND COMPOUND INTEREST**

- Simple interest
- Compound interest

## **STATISTICS**

- Collection of data
- Representation of data
- Mode
- Mean
- Median

### COURSE OUTLINE AND SCHEDULE

<b>WEEK</b>	<b>TOPIC</b>	<b>SUB TOPIC AND DETAILS</b>
1 &2	Elementary set theory	Sets, Venn diagrams, equality of sets, universal sets, intersection of sets and union of sets.
3 &4	Relations and functions	Relation, domain and range, co-domain, functions, inverse of functions and composition of functions.
5	Trigonometry	Functions and their graphs, sine and cosine formulae, trigonometric identities and equations.
6	Algebra	Quadratic equations, surds, logarithms and indices
	<b>CAT</b>	<b>CAT 1</b>
7	Sequences & Series	Sequences, series arithmetic progression and geometric progression
8	Permutation and combination	permutation and combination
9	Binomial Theorem	Pascal's triangle, expansion of binomials and its application on numerical cases
10	Simple and compound interest	simple interest, compound interest
11 &12	Statistics	collection of data, representation of data, definition and calculation of mode, mean and median
	<b>CAT</b>	<b>CAT 2</b>

**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE  
AND TECHNOLOGY.**

**UNIVERSITY EXAMINATIONS**

**DIPLOMA IN COMMUNITY HEALTH DEVELOPMENT**

**Y1 S1**

**SMA 2111 – MATHEMATICS 1**

**TIME: 2 HOURS**

**DATE:.....**

**INSTRUCTIONS**

- 1. Answer question one and any two questions.**
- 2. Do not write on this question paper.**

**QUESTION 1 (30 MARKS).**

(a) In how many ways can a party of 12 children be divided into two groups? (2mks)

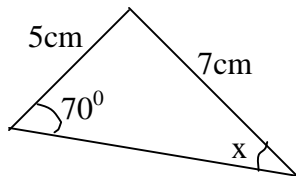
(b) If  $A = \{ 3, 4 \}$   $B = \{ 2, 4, 6, 8 \}$  and

$C = \{ 3, 6, 8, 10 \}$ . Find  $A \cap (B \cap C)$  (4mks)

(c) Applying the mapping  $x \rightarrow \frac{1}{2}x$  to the domain  $\{0, 1, 2, 3, 4\}$  list the Range. Suggest a co-domain. (4mks)

(d) If  $f(x) = 3x - 2$ , find its inverse (4mks)

(e) Find the angle  $x$  in the given triangle. (3mks)



(f) Define the word median as used in statistics and use the definition to calculate the median of the following set of data. (4mks)

13, 16, 20, 25, 30, 40

(g) Find the next three terms of the following sequence. (3mks)

$\frac{1}{3}, \frac{1}{9}, \frac{1}{27}$  \_\_\_\_\_

(h) If  $4^{2x} = 16$ , find the value of x. (3mks)

(i) Solve the equation  $\cos x = \frac{\sqrt{3}}{2}$ , for values of x such that  $0^\circ < x < 360^\circ$  (3mks)

**QUESTION 2 ( 20 MARKS)**

2 (a) (i) Copy and complete the following table for  $y = \sin x$  (3mks)

X	0	30	45	60	90	120	135	150	180	210	225	240	270	300	315	330	360
Y	0	0.5			1.00				0				-1.00			-0.50	0

(ii) Draw the graph of  $y = \sin x$  and use your graph to find approximate solutions to the equation  $\sin x = 0.2$  for  $0^\circ < x < 360^\circ$  (7mks)

(b) Find the simple interest that would accrue when a welfare group leads to a member Kshs. 15,000 at the rate of 12% in three years. (5mks)

(c) The sum of the first three of a geometric series is 26. If the common ratio is 3, find the sum of the first six terms. (5mks)

**QUESTION 3: ( 20 MARKS)**

3(a) A group of young men decided to raise Kshs. 480,000 to start a business. Before The actual payment was made, four of the members pulled out and each of these remaining had to pay an additional Kshs. 20,000. Determine the original number of members. (10mks)

(b) Rationalize and simplify the denominator in  $\frac{2\sqrt{3}}{7-\sqrt{5}}$  (5mks)

(c) Solve for x in  $\log x + \log 5 = \log 30$ . (5mks)

**QUESTIONS 4 (20 MARKS)**

4. (a) (i) The data below shows marks obtained by 20 students in an essay:

9, 5, 5, 4, 5, 3, 5, 11, 6, 3, 6, 8, 9, 6, 13, 8, 8, 13, 5, 10.

Prepare a frequency distribution table (5mks)

(ii) Using the table, calculate the mean score (3mks)

(iii) State the mode (2mks)

(b) The table below shows the number of letters collected from the post office by a school driven during a school year.

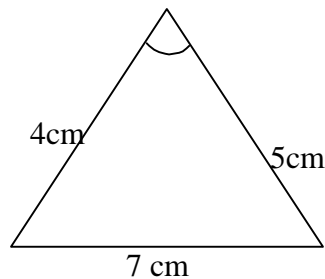
Letters per day	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50
Frequency	2	4	6	4	5	7	3	6	7

Draw a histogram to represent this information (10mks)

**QUESTION 5 (20 MARKS)**

5. (a) Expand  $(1 + x)^9$  up to the term in  $x^3$ . Use the expansion to estimate  $(0.98)^9$ . (6mks)

(b) Find the angle in the given triangle (5mks)



(c) Solve the quadratic equation  $6x^2 + 13x + 6 = 0$ . (4mks)

(d) Find the amount at the end of the fourth year if Kshs. 30,000 is deposited at 15% p.a compound interest. (5mks)