JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF MATHEMATICS AND ACTUARIAL SCIENCE

UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF SCIENCE ACTUARIAL

SPECIAL RESIT 2015/2016 ACADEMIC YEAR

MAIN CAMPUS RESIT

COURSE CODE: SMA 3111/SMA 105

COURSE TITLE: MATHEMATICS 1

EXAM VENUE: LAB 1 **STREAM: (BSc. Actuarial/AGRICULTURE)**

DATE: 05/05/2016 **EXAM SESSION: 9.00 – 11.00 AM**

TIME: 2.00 HOURS

Instructions:

1. **Answer question 1 (Compulsory) and ANY other 2 questions**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION ONE

(a) What is the power set of the set {0, 1, 2}? (4 marks)

(b) What is the Cartesian product $A \times B$, where $A = \{0, 1\}$, $B = \{1, 2\}$, (4 marks)

(c) Given $f(x) = 2x + 3$ and $g(x) = -x^2 + 5$, find $(f \circ g)(x)$. (4 marks)

(d) Use the binomial expansion to write down the first four terms, in ascending powers of *x*, of $(1- 3x)^7$. Simplify the terms. (3 marks)

(e) Use the completing square method to solve the equation $2x^2 + x = \frac{1}{2}$ (4 marks)

(f) Find the difference $(3x^4 - 4x^3 + 6x^2 - 1) - (2x^4 - 8x^2 - 6x + 5)$ (3 marks)

(g)Find the inverse of the function $y = \sqrt{2x - 3}$ (4 marks)

(h). Solve:

i. (a) $\log_3 14x - 72 = 2$ (4 marks)

QUESTION TWO

a) The training programme of a pilot requires him to fly 'circuits' of an airfield. Each day he flies 3 more circuits than the day before. On the fifth day he flew 14 circuits. Calculate how many circuits he flew: (10 marks)

(i) On the first day

(ii) In total by the end of the seventh day

(iii) In total by the end of the nth day

b) The fifth term of a geometric progression is 48 and the ninth term is 768. All the terms are positive. (10 marks)

(i) Find the common ratio.

(ii) Find the first term.

(iii) Find the sum of the first ten terms.

QUESTION THREE

(a) Express $\frac{30+\sqrt{15}}{-71+\sqrt{17}}$ with a rationalized denominator in its simplest form. (5 marks)

(b) Simplify $\frac{a^{1/6} X b^{-2/7} X a^{3/5}}{a^{5/24} X b^{13/21}}$ (5 marks)

(c) Suppose Karen has $1000 that she invests in an account that pays 3.5% interest compounded quarterly. How much money does Karen have at the end of 5 years? (5 marks)

(d) A triangle has the vertices labeled A, B, and C. If the corresponding opposite lengths have dimensions a = 34cm, b = 17.4cm and c = 12.9cm respectively, calculate the value of angle A (5 marks)

QUESTION FOUR

(a) How many ways are there to select five players from a 10-member tennis team to make a trip to a match at another school? (4 marks)

b)The data below represents the masses of some containers sampled from a warehouse

Mass	10 – 14	15 – 19	20 – 24	25 – 29	30 – 34	35 – 39	40 – 44	45 – 49	50 – 54
Frequency	1	2	4	5	10	8	5	2	1

Use the data to calculate:

a. The Mean (5 marks)
b. The Median (5 marks)
c. The Standard deviation (6 marks)

QUESTION FIVE

(a) When the first *n* positive integers are added together, their sum is given by $2n(n + 1)$. (14 marks)

(i)Demonstrate that this result holds for the case $n = 5$.
(ii) Find the value of *n* for which the sum is 105.
(iii) What is the smallest value of *n* for which the sum exceeds 1000?

(b)Let $A = \{0, 2, 4, 6, 8\}$, $B = \{0, 1, 2, 3, 4\}$, and $C = \{0, 3, 6, 9\}$. What are $A \cup B \cup C$ and $A \cap B \cap C$? (6 marks)