



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 n th 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 $\frac{a^{1/6} \times b^{-2/7} \times a^{3/5}}{a^{5/24} \times b^{13/21}}$ (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 $a = 34\text{cm}$, $b = 17.4\text{cm}$ and $c = 12.9\text{cm}$ 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:

- The Mean (5 marks)
- The Median (5 marks)
- 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)