

**W1-2-60-1-6**

**JOMO KENYATTA UNIVERSITY**

**OF**

**AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2014/2015**

**YEAR 1 SEMESTER I EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE ACTURIAL SCIENCE AND BACHELOR OF SCIENCE MATHEMATICS AND COMPUTER SCIENCE**

**YEAR 1 SEMESTER II BACHELOR OF INFORMATION TECHNOLOGY**

**SMA 2100: DISCRETE MATHEMATICS**

**DATE: April 2015 TIME: 2 HOURS**

**INSTRUCTIONS: Answer question ONE and any other TWO questions**

**QUESTION ONE (30 MARKS)**

1. Define the following terms:
2. Union of a set (1mark)
3. Relative complement (1mark)
4. Tautology (1mark)
5. Injection function (1mark)
6. Given that ε is the set of natural numbers less than or equal to 20, list the members of the following subset of ε
7. the multiples of 3 (2marks)
8. the multiples of 4 (2marks)
9. (2marks)
10. (2marks)
11. (2marks)
12. (2marks)
13. Represent the following in a Venn diagram
14. Disjoint of set and (2marks)
15. (2marks)
16. Suppose , evaluate the power(s) (3marks)
17. Determine the validity of the following arguments

S1:

S2:

S3: (3marks)

1. Write the negation of the statement ‘No cats have fleas’ (2marks)

**QUESTION TWO (20 MARKS)**

1. Construct a truth table for the statement (6marks)
2. If and find
3. (6marks)

c) Determine whether each set defines a function

1. (2marks)
2. (2marks)
3. (2marks)
4. (2marks)

**QUESTION THREE (20 MARKS)**

1. Define the following words
2. Injection (2marks)
3. Surjections (2marks)
4. Bijections (2marks)

b) Give a direct proof of the theorem

“If is an odd integer, then is an odd integer” (5marks)

c) Give an indirect proof of the theorem

“If is odd then is odd” (4marks)

d) Construct a truth table for (5marks)

**QUESTION FOUR**

100 students were asked whether they have taken courses in any of the three areas, physics, chemistry and biology. The results were as follows;

45 have taken Physics

38 have taken Chemistry

21 have taken Biology

18 have taken Physics and Chemistry

9 have taken Physics and Biology

4 have taken Chemistry and Biology

23 have taken no course in any of the three areas

1. How many took all the three subjects? (8marks)
2. Draw a Venn diagram to represent this findings (8marks)
3. Determine the number k of students who had taken classes in exactly; one of the areas (4marks)