

**MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**P.O. Box 972-60200 – Meru-Kenya.**

**Tel: 020-2069349, 061-2309217. 064-30320 Cell phone: +254 712524293, +254 789151411**

**Fax: 064-30321**

**Website:** [**www.must.ac.ke**](http://www.must.ac.ke) **Email:** [**info@must.ac.ke**](mailto:info@must.ac.ke)

**University Examinations 2016/2017**

SECOND YEAR, FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN ACTUARIAL SCIENCE.

**SMS 3214: ACTUARIAL MATHEMATICS I**

**DATE: DECEMBER, 2016 TIME: 2 HOURS**

**INSTRUCTIONS: -** *Answer question* ***one*** *and any other* ***two*** *questions*

**QUESTION ONE (30 MARKS)**

1. Calculate 0.5q72.25 using the assumption of a constant force of mortality basis pmA92 Base. (4 marks)
2. A population is subject to a constant force of mortality of 0.015 calculate
3. The probability that a life aged 20 exact will die before age 21.25 exact. (3 marks)
4. The curtate expectation of a life aged 20. (2 marks)
5. In a special mortality table with a select period of one year, the following relationship are true for all ages





Express  in terms of  (4 marks)

1. Briefly explain why a life insurance company will need to set-up reserves for the endorsement contracts it sells (4 marks)
2. Define and calculate . Basis Am92 select (5 marks)
3. Calculate the following factors
4.  (4 marks)
5.  (2 marks)

Basis . Interest 4% per annum.

1. Explain why study Actuarial mathematics and its benefits to the society. (2 marks)

**QUESTION TWO (20 MARKS)**

1. Calculate the exact value of  assuming the force of mortality is constant between consecutive integer ages.

Basis: Mortality ELT 15 (males)

Interest 7.5% per annum (10 marks)

1. For a certain group of pensioners,  and . Calculate the probability that a pensioner aged 75 exact will die between ages 75.5 and 76.6 assuming;
2. A uniform distribution of deaths between consecutive birthdays. (5 marks)
3. A constant force of mortality between consecutive birthdays. (5 marks)

**QUESTION THREE (20 MARKS)**

1. A population with limiting age of 100 has the following survival function for . Calculate the complete expectation of life at 50. (10 marks)
2. Calculate the values of  and  using AM92 mortality and 4% p.a interest. (10 marks)

**QUESTION FOUR (20 MARKS)**

1. Calculate
2.  (3 marks)
3.  (3 marks)
4.  using Am92 mortality and 40% p.a interest (4 marks)
5. An impaired life aged 40 experiences 5 times the force of mortality of a life of the same age subject to standard mortality. A two-year assurance policy is sold to this impaired life, and another two-year term assurance is sold to a standard life aged 40. Both policies have a sum assured of ksh 10,000 payable at the end of the year of death. Calculate the expected present value of the benefit payable to each life assuming that standard mortality is Am92 ultimate and interest at 4% p.a. (10 marks)

**QUESTION FIVE (20 MARKS)**

1. A life aged exactly 50 buys a 15 year endowment assurance policy with a sum assured of ksh 50,000 payable on maturity of at the end of the year of earlier death. Level premiums are payable monthly in advance. Calculate the monthly premiums assuming Am 92 ultimate mortality and 4% p.a interest. Ignore expenses. (10 marks)
2. Write down an alternative expression for each of the following statements. Use notation set out ie the “International Actuarial Notation”, section of the “Formula and Tables for Examinations”, where appropriate and express your answer as concisely as possible.
3. probability (2 marks)
4.  (2marks)
5. Probability  (2 marks)
6. probability  (2 marks)
7.  (2 marks)