

 W1-2-60-1-6

**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2013/2014**

**EXAMINATION FOR THE DEGREE OF BACHELOR OF ACTUARIAL SCIENCE**

**STA 2190: INTRODUCTION TO ACTUARIAL SCIENCE**

**DATE: DECEMBER 2013 TIME: 2 HOURS**

**INSTRUCTIONS: ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS**

QUESTION ONE (30 MARKS)

1. Explain the meaning of the following terms in the context of mathematics of finance:
2. Effective rate of discount
3. Force of interest
4. Annuity
5. Actuarial Science

[4 marks]

1. Calculate 10 values for *i* of 2%, 5%, and  for *i* of 10%, and 15% [4 marks]

1. Distinguish between simple interest and compound interest. [ 2marks]
2. Show that the present value of an annuity in arrear is  [4 marks]
3. Clearly explain the difference between moral hazard and malice hazard. [4 marks]
4. An investor deposits Ksh.25,000 into a bank account on 1st July from 2012. What is the maximum amount that he can withdraw on 31st July 2015, if the interest is earned at a rate of 12.5% per annum? [3 marks]
5. Define the following:

(i) Pure endowment

(ii) Turn Assurance [5 marks]

1. List any FOUR assumptions that are made during the calculation of benefits in a defined benefit scheme. [4 marks]

**QUESTION TWO (20 MARKS)**

1. Distinguish between the following:

(i) Valuation actuaries

(ii) Pricing actuaries

(iii) Consulting actuaries [10 marks]

(b)(i) Define the meaning of maturity rate [2 marks]

 (ii) In determining the premium payable on a life insurance policy, it is important to

 consider the different factors that affect mortality. State FOUR such factors and

 explain the impact that they have on mortality. [8 marks]

**QUESTION THREE (20 MARKS)**

1. A sum of Ksh.20,000 is to be paid out at the end of each year for twenty years. The effective interest rate is 10% p.a. for the first five years, 7% per half year for the next ten years, and 3% per quarter year for the remaining five years. What is the accumulated value of the payment at the end of twenty years? [10 marks]
2. An amount of Ksh.850 is invested now and accumulated for twenty years. The interest rate is 8% p.a. payable half yearly. Calculate:

(i) The effective annual rate earned.

(ii) The nominal rate p.a. payable monthly

(iii) The nominal rata p.a. payable quarterly

(iv) The accumulation at the end of two years.

(v) The total interest earned on the investment. [10 marks]

**QUESTION FIVE (20 MARKS)**

1. Write short notes on the following:

(i) Defined benefit pension plans

(ii) Defined contribution pension plans

(iii) Personal pension plans. [9 marks]

1. Compute values of lx, dx, qx and px that complete the table below

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | lx | dx | qx | dx |
| 0 | 100,000 | 2,449 |  |  |
| 1 | 97,551 |  |  | 0.99843 |
| 2 |  | 96 | 0.00099 |  |
| 3 | 97,302 |  | 0.00069 |  |
| 4 |  | 60 |  | 0.99938 |
| 5 |  |  |  |  |

 [11 marks]