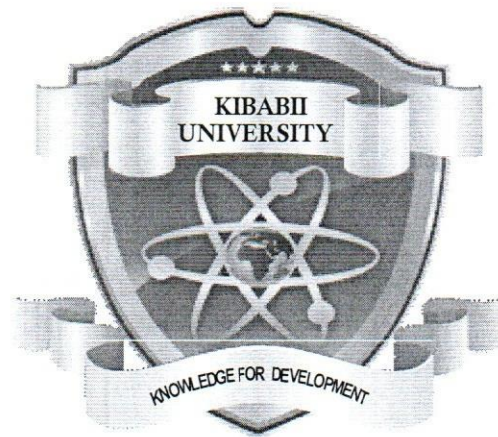


KIBABII UNIVERSITY



**UNIVERSITY EXAMINATIONS
SPECIAL/SUPPLEMENTARY EXAMINATIONS
2017/2018 ACADEMIC YEAR
FOURTH YEAR SECOND SEMESTER
FOR THE DEGREE OF BACHELOR OF
COMMERCE**

COURSE CODE: BCO 433

COURSE TITLE: ACTUARIAL SCIENCE

DATE: 12/10/18

TIME: 11.30AM – 1.30PM

INSTRUCTIONS TO CANDIDATES

Answer Question ONE (compulsory) and ANY OTHER TWO questions

QUESTION ONE;

a)

Suppose that the death-rates $q_x = d_x/l_x$ for integer ages x in a cohort life-table follow the functional form;

$$q_x = \begin{cases} 0.0004 & \text{for } 5 < x < 30 \\ 0.0008 & \text{For } 30 < x < 55 \end{cases}$$

between the ages x of 5 and 55 inclusive. Find analytical expressions for $S(x)$; l_x ; d_x at these ages if $l_0 = 105$; $S(5) = .96$. (15 marks)

b)

Highlight FIVE probability distributions and explain their use in Actuarial Science. (10 marks)

d)

Find the $\Pr(\text{life aged 29 dies between exact ages 35 and 41 or between 52 and 60})$ (5 marks)

[TOTAL = 30 MARKS]

QUESTION TWO;

a) Fill the following blank spaces in the given life table;

Age	L_x	nq_x	nd_x	T_x
<1	100,000	0.00723		
1-4	99277	0.0144		
5-9	99135	0.0097		
10-14	99043	0.0016		
15-20	98929	0.00374		

(10 marks)

b) Show variables considered in the calculation of insurance life premiums [10 marks]

QUESTION THREE;

a)

The government of a country is considering whether to set up a new social security scheme following pressure from citizens. Currently there is no government social security provision at all.

(i) List four possible financing methods for social security schemes. [2 marks]

(ii) Describe how the costs of providing the social security scheme could be forecast . [8maks]

b)

The government would like to limit the costs of benefits by imposing a minimum residency period of two years before citizens can access benefits.

Comment on the likely consequences of such a policy [10 marks]

QUESTION FOUR;

a)

Apart from pricing policies , describe the scope of insurance [10 marks]

b)

Determine the Bühlmann-Straub credibility estimate of the number of claims in Month 4.

MONTH	NUMBER OF INDIVIDUALS INSURED	NUMBER OF CLAIMS
1	100	6
2	150	8
3	200	11
4	300	?

[10

marks]

[TOTAL = 20 MARKS]

QUESTION FIVE;

The function $G(x) = (18\,000 - 110x - x^2) / 1800$, has been proposed as the survival function $S_0(x)$ for a mortality model.

(a) What is the implied limiting age ω ?

(b) Verify that the function G satisfies the criteria for a survival function.

(c) Calculate ${}_{20}p_0$.

(d) Determine the survival function for a life aged 20.

(e) Calculate the probability that a life aged 20 will die between ages 30 and 40.

[20 marks]

[TOTAL = 20 MARKS]