KISII UNIVERSITY

SHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND ACTUARIAL SCIENCES

BACHELOR OF ACTUARIAL SCIENCE

COURSE CODE: BACS 212: ACTUARIAL MATHS 1

FINAL EXAM AUGUST 2017

INSTRUCTIONS: Answer question one and any other 2 questions in section

SECTION A (30 MARKS)

QUESTION 1   (30 MARKS)

1.

A chef specializing in the manufacture of fluffy meringues uses a Whiskmatic disposable electric kitchen implement. The Whiskmaticis rather unreliable and often breaks down, so the chef is in the habit of replacing the implement in use at a given time, shortly before an important social function or after making the 1,000th fluffy meringue with that implement. The following times until mechanical failure (no asterisk) or replacement whilst in working order (asterisk) were observed (measured in days of use): **17, 13, 15*, 7*, 21, 18*, 5, 18, 6*, 22, 19*, 15, 4, 11, 14*, 18, 10, 10, 8*, 17** .

    i.   Define n,m,k,t_j,d_j,c_j,n_j, for this data assuming that censoring occurs just after the failures were observed.   (7mks)

    ii.   Calculate the Kaplan-Meier estimate of $F(t)$ for the Whiskmatic data.   (13mks)

iii. Calculate the value of $0.5q_{67.5}$ using the assumption of a constant force of mortality is $\mu = 0.017985$ Basis: AM92 Ultimate.

(7mks)

SECTION B

QUESTION TWO (20 MARKS)

2.

i. Define the term censoring and name and explain using examples four types of censoring.

(10mks)

ii. Define in words $4|5q_{[60]+1}$

(5mks)

iii. Calculate the complete expectation of life of a new-born baby assuming $\mu = 0.00245$.

(5mks)

QUESTION THREE (20 MARKS)

3.

i. Calculate $_{12}p_{23}$ and $_{10|5}q_{55}$.

(5mks)

ii. Define Gompertz' Law and Makeham's Law then express them in terms of force of mortality.

(5mks)

iii. Write the equation of the distribution function of T and its survival function.

(2mks)

iv. Explain the following terms q_x, q_x, p_x, p_x

(4mks)

v. Express the following in terms of l_x, d_x, p_x, p_x, q_x

(4mks)

QUESTION FOUR   (20 MARKS)

4.

i.   Calculate $_3p_{55.75}$ using the assumption of Uniform Distribution of Deaths.   (5mks)

ii. Below is an extract from English Life Table 15 (Males

Age. x l_x

58   88.792

59   87.805

Estimate $l_{58.25}$ assuming a uniform distribution of deaths between exact ages 58 and 59.

(5mks)

iii. Prove $_tq_x = t\,q_x$ (5mks)

iv. Name 3 methods of graduation and 3 desirable features of graduation.   (5mks)

QUESTION FIVE   (20 MARKS)

5.

i.   Express the formulae for variance of whole life assurance, term assurance pure

endowment assurance, temporary annuity due and net premium for endowment

assurance contract.   (5mks)

ii. Calculate value of the joint life $_4p_{50:51}$ and $\mu_{39:40}$ (5mks)

iii.   Calculate value of $q_{68:69}$ (5mks)

iv.   Explain in word the meaning of q_{xy} and p_{xy} (5mks)