KARATINA UNIVERSITY

UNIVERSITY EXAMINATIONS

2024/2025 ACADEMIC YEAR

FIRST YEAR **FIRST** SEMESTER REGULAR EXAMINATION

FOR THE DEGREE OF

BACHELOR OF SCIENCE ACTUARIAL SCIENCE

COURSE CODE: ACS 111

COURSE TITLE: INTRODUCTION TO ACTUARIAL SCIENCE

DATE: 22/01/2025 **TIME: 9.00AM- 11.00AM**

INSTRUCTION TO CANDIDATES

- SEE INSIDE

INSTRUCTION: Answer all questions in section A and any other THREE in section B

SECTION A: 30MKS

a) Describe cash flow scenario for a student joining first year at Karatina University (2mks)

b) Find the present value as at 1 January 2005 of a series of 10 annual payments starting at £500 on 1 January 2006 and increasing by £100 each year. Assume an effective rate of interest of 8% pa. (4mks)

c) Describe two rules of professional conduct and standards of practice among actuaries (4mks)

d) If you deposit $4000 into an account paying 6% annual interest compounded quarterly, how much money will be in the account after 5 years?(4mks)

e) Identify three types of insurance (3mks)

f) Difference between an Ordinary Life Table and a Multiple-Decrement Life Table (3mks)

g) Describe project appraisal citing four aspects of project appraisal. (4mks)

h) Prove that

$$\bar{a}_{\overline{n}|} = \frac{i}{\delta} a_{\overline{n}|} \qquad (\text{if } \delta \neq 0)$$

(6mks)

SECTION B

Question Two (20 marks)

a) Describe the 5 stage process of risk assessment? (10mks)

b) i) A small-scale businessman deposits money into his savings account at the beginning of each year, depending on the returns of the business. He deposits $1000 in the first year, $2000 in the second year, $5000 in the third, and $7000 in the fourth year. The account credits interest at an annual interest rate of 7%. What is the closest

value of the accumulated money in the savings account at the beginning of year 4?

(5mks)

ii) Suppose that you borrowed $20k for 36 months to buy a car last year at an annual interest rate of 5% compounded monthly.What is the amount of monthly payment? (5mk)

Question three (20 marks)

a)

Calculate $a_{\overline{25}|}$ and $\ddot{a}_{\overline{15}|}$ using an interest rate of 13½% *pa* effective.

(5mks)

b) Prove that

$$\ddot{s}_{\overline{n}|} = (1+i)s_{\overline{n}|}$$

(5mks)

c) A man makes payments into an investment account of $200 at time 5, $190 at time 6, $180 at time 7, and so on until a payment of $100 at time 15. Assuming an annual effective rate of interest of 3.5%, calculate:

i) the present value of the payments at time 4 (4mks)

ii) the present value of the payments at time 0 (3mks)

iii) the accumulated value of the payments at time 15 (3mks)

Question Four (20 marks)

a) Explain five principles of insurance (10mks)

b) Explain Five techniques of managing risks (10mks)

Question Five (20 marks)

a) Describe roles of actuaries (10mks)

b) I will invest $500 per quarter for my retirement at 7.3% compounding quarterly for 32 years. I have a choice of making that payment of $500 at the beginning or the end of the quarter (regular annuity or annuity due). In which account will I have more money and by how much? Which account will earn the most interest and by how much? (7mks)

c) Outline 3 methods of appraising projects (3mks)