MACHAKOS UNIVERSITY

University Examinations for 2022/2023 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

Third YEAR FIRST SEMESTER EXAMINATIONS FOR

BACHELOR OF SCIENCE (ACTUARIAL SCIENCES)

SAC 304: PENSION FOR MATHS

DATE: **TIME:**

INSTRUCTIONS TO CANDIDATES.

Answer Question One and Any Other Two Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

a) i. Explain why the approach to carrying out an analysis of surplus in a defined contribution (DC) fund will differ from the approach applied in a defined benefit (DB) fund. (2 marks)

ii. Outline items of significance that should generally be considered when carrying out an analysis of surplus arising in a DC fund, explaining how a surplus or deficit could arise. (3 marks)

b) i. List the steps required to perform a statutory valuation for a defined benefit fund. (4 marks)

ii. State two deterministic approaches for projecting mortality. (1 mark)

c) List five retirement benefit providers. (5 marks)

d) You are the actuary to a medium-sized defined contribution pension fund where the sponsor is a very large multinational employer. In your country, the sponsoring company's operations are concentrated mainly on the manufacture and distribution of consumer goods. The sponsor has member investment choice in its funds in other countries and wants it to be introduced locally. The trustees have asked for your input in setting up investment choice. Outline the suggestions you would make in your response. (5 marks)

e) i. The government of Pontus provides free primary healthcare to citizens over 65, pregnant women and children under 6. This benefit is paid from general tax revenue on a pay-as-you-go basis. ii. Explain the effect that an ageing population would have on the cost of this benefit. (3 marks)

ii. A politician has suggested that the system moves from pay-as-you-go to a partially funded model as this will "stimulate great economic growth". Comment on this reasoning (2 marks)

f) A certain employer has a relatively generous leave offering for employees. However, the employer requires that at the financial year-end, employees must have an outstanding leave balance of 5 days or less. For the purposes of this calculation, any leave booked in the following year is not counted towards the outstanding balance. Explain the reasons why the employer may have such a rule in place together with the generous leave allowance. (5 marks)

QUESTION TWO (20 MARKS)

a) Explain why it is necessary to perform an analysis of surplus on defined contribution (DC) retirement funds. (5 marks)

Consider a DC retirement fund that allows members to make ad-hoc additional voluntary contributions. The fund has insured risk benefits in place. A statutory valuation reveals there is a surplus on the fund.

b) List the data that you would require in order to assess the how the excess assets have arisen. (6 marks)

c) Describe how you would find the source or sources of the excess assets. (6 marks)

d) The employer is considering allowing members to swap vacation leave days for additional voluntary contributions to the retirement fund. Comment on this suggestion. (3 marks)

QUESTION THREE (20 MARKS)

MO Industries (MOI) is a very large multinational company. They plan to open operations in your country for the first time and anticipate employing around 100 000 people by the end of their first year of operation. They have decided to create a defined-contribution pension fund for their employees. They are currently considering the risk benefits that they will make available on their fund.

a) List the risks that absenteeism and morbidity pose to the employer. (5 marks)

b) The sponsor is considering having an insured disability income benefit offered within the fund. Outline factors to consider in terms of its design. (8 marks)

c) In addition to this disability income benefit, the sponsor would like to provide for a return of fund credit on death plus a small flat-rate funeral benefit for death-in-service. The sponsor would like to self-insure the funeral insurance, which is payable only on the death of the member.

d) Discuss the implications of the decision to self-insure in terms of mortality and other risks. (7 marks)

QUESTION FOUR (20 MARKS)

a) Some of the Forms require information about the spouse's "entitlement date." What is the entitlement date? (6 marks)

You are the actuary to a large defined contribution umbrella scheme. The scheme membership consists mainly of blue-collar workers some of whom perform high-risk jobs (e.g. mining). The scheme design includes the following aspects:

– Members all contribute at a single fixed rate, irrespective of their employer.

– All employers choose a single fixed contribution rate to apply to all of their employees.

-– This fixed rate can differ between employers.

–Death and disability benefits are provided by insurance policies held by the fund.

–The same level of risk benefits is available to all members.

–The cost of risk benefits and administration fees are deducted from the employer contributions as a fixed percentage of salary which is revised annually.

–All other expenses are deducted from investment returns.

b) A member trustee has suggested that flexible risk benefits be introduced so that members can select their own level of death and disability cover, subject to certain minimum levels. Assess this suggestion, with reference to the role of the trustees and the needs of the members. (7 marks)

c) One of the trustees has raised a concern that the actual expenses paid by the fund exceed the contributions being made towards expenses from the employer contribution. Outline the factors you would cover in your response to the trustee.

(7 marks)

QUESTION FIVE (20 MARKS)

a) Compare and contrast book reserving and funding. (4 marks)

Easy Trading ('ET') is currently owned by JK Industries ('JKI'). ET has a large, mature Defined Benefit (DB) pension fund funded by regular contributions that is open to new members. In recent years, ET's financial results have been poor and JKI is looking to sell ET to Big Corp. After months of negotiations, the two sides have yet to agree on a value for the pension fund.

b) A director at Big Corp has suggested that in order to save time and actuarial fees, the pension fund liability value from the last statutory actuarial valuation can be used in negotiations. Comment on her suggestion. (6 marks)

c) Calculate the actuarial liability and standard contribution rate using the Attained Age Method and information below. Define all symbols used.

Average age (x):	37
Retirement age (R):	63
Past service (P):	10
Accrual rate (1/A):	2%
Annual salary bill (S):	R96 123 321
Real salary inflation (e):	1.9231%
Assumed real investment return (i):	6%
$a63\,'$	16

where $a63\,'$ is the value of an annuity paid on retirement at age 63. (7 marks)

An actuarial student has suggested that as the Current Unit Method actuarial liability is lower than the Attained Age Method actuarial liability, JKI should use the Current Unit Method to calculate the actuarial liability, for example a discontinuance valuation. Comment on this suggestion. (3 marks)