MACHAKOS UNIVERSITY

University Examinations for 2022/2023 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (ACTUARIAL SCIENCE)

SAC 304 PENSION FOR MATHS

DATE: 17/4/2023 **TIME: 8:30 – 10:30 AM**

INSTRUCTIONS

Answer Question One and Any Other Two Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

a) A company currently provides a defined benefit pension scheme for its employees. The benefits provided by the scheme are a pension equal to 1/60th of final salary for each year of service, plus a death benefit lump sum of two times salary. The company is proposing to replace the current scheme with a flexible benefit scheme.

i) Explain what is meant by a flexible benefit scheme. (1 mark)

ii) List the benefits that could be included in the proposed scheme (5 marks)

The company decides to set up a flexible benefit scheme, offering a range of benefits to employees. The scheme has been designed such that the overall benefit provision will have the same expected cost to the employer as the current scheme.

iii) Explain why the employer might want to provide a core level of certain benefits under the flexible benefit scheme. (2 marks)

iv) Set out the advantages and disadvantages of this new scheme to:

a) the employer; and

b) the employees. (5 marks)

b) Outline the benefits that can be provided to members of a defined contribution pension scheme. (2 marks)

c) Compare the financial risks of a defined contribution pension scheme with those of a defined benefit pension scheme for:

i) a member and (5 marks)

ii) an employer.

d) State four methods by which the government could have a role in the provision of retirement benefits. (2 marks)

e) List four different situations in which pension rights can be converted to ra cash sum under a trust based defined benefit pension scheme. (2 marks)

f) The government of a country is considering offering life assurance benefits to the entire adult population. Compare the effectiveness of the State and the employer as a potential provider of these benefits. (4 marks)

QUESTION TWO (20 MARKS)

The trustees of the above scheme are reviewing the terms upon which a member can convert their pension rights to a cash sum to ensure they are consistent in all situations. In particular, they are considering whether to set the same conversion terms for cash commutation at retirement and transfer value payments prior to retirement.

a) Outline the underlying principles that the trustees should consider when determining the approach to adopt for:

i) cash commutation factors.

ii) transfer values. (12 marks

b) Discuss the use, and limitations, of benefit projection statements as an education tool within a fund's communication strategy. (8 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.

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

ii. 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)

ii. 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.

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

QUESTION FOUR (20 MARKS)

a) An actuary to a very large defined benefit pension scheme has undertaken a review of the mortality experience of the pensioner members over the previous year. A scheme manager has suggested that the mortality assumption for the forthcoming actuarial valuation should be set in accordance with the crude rates underlying this experience.

(i) Outline the reasons why this may not be a suitable proposal. (3 marks

(ii) Suggest how the proposal could be adapted to provide a more reliable mortality assumption. (5 marks)

b) List the benefits that can be offered to individuals by the State. (5 marks

c) 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. (6 marks)

d) 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.

(6 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)