



THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

A. M. E. C. E. A

P.O. Box 62157

00200 Nairobi - KENYA

Telephone: 891601-6

Ext 1022/23/25

MAIN EXAMINATION

SEPTEMBER –DECEMBER 2021

FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS

REGULAR PROGRAMME

ACS 405: PENSION FUNDS AND SOCIAL SECURITY

Date: DECEMBER 2021

Duration: 2 Hours

INSTRUCTIONS: Answer Question ONE and any TWO Questions

Q1.

- a) Discuss the two major factors that affect the forms and levels of benefits needed pre and post retirement. **(4marks)**
- b) Discuss the limitations of using the net replacement ratio as a measure for individual needs for post-retirement pension. **(5marks)**
- c) List the four roles the state is likely to play in relation to retirement benefits provision. **(4marks)**
- d) Outline arguments for and against advanced funding for social security system. **(4marks)**
- e) List 4 cost control elements that employers consider while setting up a pensions fund for their employees. **(4marks)**
- f) Describe how the state may use taxation system to encourage provision for retirement by or on behalf of individuals. **(4marks)**

- g) Outline the advantages of the state offering a flat rate scheme compared to an earnings linked scheme. **(4marks)**
- h) Write down the formula for the Net Replacement Ratio **(1mark)**

Q2.

- a) A defined benefit scheme provides a range of benefits available on retirement, death and living service. Briefly describe six benefit options which trustees might wish to consider granting to scheme members. **(6marks)**
- b) Discuss the four ways in which the spending pattern can change pre and post retirement. **(8marks)**
- c) List six options that may exist for providing accrued benefits when a defined benefit scheme is discontinued. **(6 marks)**

Q3.

- a) Calculate the EPV of a lump sum benefit of £50,000 Paid on normal age retirement, for a scheme member aged 52, assuming that this benefit is paid:
Only if the member retires after the 64th birthday. **(6marks)**
Use the assumptions underlying the pension scheme tables and 4% p.a interest.
- b) Write down an expression, using commutation functions, for the EPV of a lump sum of £150,000 paid immediately on the event of ill-health retirement, for an active pension scheme member aged exactly 48. Assume that ill-health retirement is only permitted before the member reaches his 60th birthday.
Define all the symbols that you use. **(9 marks)**
- c) In order to ensure adequate security of a non-State fund, the state might consider a form of regulation that takes into consideration, one of the key factors is **financial regulation requirement**. Mention five of the requirements that the state can impose on the private pension fund. **(5marks)**

Q4.

- a) Discuss three disadvantages of state using means-tested benefits method to provide for its citizens. **(3marks)**
- b) Outline the 8 steps followed when deciding on a scheme design **(8marks)**
- c) Discuss the three approaches that can be invoked in order to provide for pensions following a divorce. **(9marks)**

Q5. A man aged exactly 40 is a member of a pension scheme that pays a retirement pension of $1/60^{\text{th}}$ of the final pensionable salary for each past year of service. Final pensionable salary is defined to be the average salary earned over the previous three years. Retirement can take place at any age between 60 and 65. The member has earned £20,000 over the past year and currently has 5 years past service.

Defining all your terms, and stating any assumptions made, derive expressions in terms of suitable communication functions for valuing the past service benefits and future service benefit for this member.

- (i) Term definitions **(6marks)**
- (ii) Past service benefits **(7marks)**
- (iii) Future service benefit **(7marks)**

END