MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR
FIRST YEAR SECOND SEMESTER(RESITS)

SCHOOL OF PURE SCIENCES
BACHELOR OF SCIENCE IN STATISTICS AND
MATHEMATICS

COURSE CODE: STA 1210
COURSE TITLE: FUNDAMENTALS OF ACTUARIAL
MATHEMATICS

DATE: APRIL 2023   TIME:2 HRS

INSTRUCTIONS TO CANDIDATES

1. Answer Question ONE and may any other THREE questions
2. Question ONE carries 30 marks
3. Involvement in exam cheating will lead to discontinuation

QUESTION ONE

a) A certain factory machine costs sh 50,000 new. Thereafter its value depreciates at an annual rate of 10% i.e. its value at the end of every successive 12 month period is 10% less than it was at the beginning of the same period. What will be its value after n years?   (5 mks)

b) Mr. Kipkorir takes out a mortgage form a building society to buy a house worth sh. 200 000. The building society charges compound interest at 5% p.a. Mr. Kipkorir pays a deposit f 20% of the total amount f the mortgage, the balance to be paid in equal monthly installments over a period of 15 years. Calculate the following

   a) The amount of the mortgage   (5mks)

   b) The value of the down payment   (5mks)

   c) The balance to be paid over 15 years   (3mks)

   d) Amount of each monthly installment   (2mks)

c) (i) Find the total revenue function corresponding to the following average revenue function

   $Q + 3P = 6$ (4mks)

c(ii)Given the following quadratic total cost function

$$TC = \alpha_0 + \alpha_1 Q + \alpha_2 Q^2$$

Where $\alpha_0 \alpha_1 \alpha_2 > 0$

   i)   Find the corresponding average total cost (ATC)?   (4mks)

   ii)   Average fixed cost (AFC)?   (4mks)

   iii)   Average variable cost (AVC)   (3mks)

QUESTION TWO

Mwangi takes takes along of sh 200 000 due in 4 years. The creditor charges 5% interest payable annually. Mwangi decides to pay equal amounts at the end of each year into a sinking fund which earns 8% compounded annually so as to accumulate sh 200 000 in 4 years, find,

    a) The annual payment to the creditor   (10 mks)

    b) The annual payment into the sinking fund.   (10mks)

QUESTION THREE

An investor buys 350 shares in a company. The nominal value of the shares is sh 20. The investor buys at shs 21.50. at the end of the financial year, the company declares a dividend of 7 ½ %. Calculate

    a) The cost of the shares   (10 mks)

    b) The amount of dividend the investor receives   (10 mks)

QUESTION FOUR

An investor held 888 sh 20 shares in Super industries Ltd. The market price per share was sh 22 and they had been paying a dividend of 7%. He decided to ell this holding and was charged 25 cents per share brokerage. He invested the proceeds from this sale in Central holding Ltd. Whose sh 5 shares were selling for sh 27.50. again, he paid brokerage at 25 cents per share. If a dividend of 12% was declared on his central holdings shares, determine:

    a) How many central holdings shares the investor acquired   (10mks)

b) The change in his income   (10mks)

QUESTION FIVE

Anunda invests K $ 16 500 in Kenya Growers 8% stock at K$ 132. Find the change in his

income if he sells out at K$ 130 and reinvest in Kenya packers 12% stock at K$ 125. (20mks)