

THE PUBLIC ACCOUNTANTS EXAMINATIONS BOARD

A Committee of the Council of ICPAU

ATC (U) EXAMINATIONS

LEVEL ONE

BUSINESS MATHEMATICS & STATISTICS – PAPER 3

WEDNESDAY, 28 NOVEMBER 2012

INSTRUCTIONS TO CANDIDATES

1. Time allowed: **3 hours 15 minutes**.
The first 15 minutes of this examination have been designated for reading time. You may not start to write your answer during this time.
2. This examination contains Sections **A**, **B** and **C**.
3. Section **A** is bound separately from Sections **B** and **C**.
4. Attempt all the 20 multiple-choice questions in Section **A**. Each question carries $1\frac{1}{2}$ marks.
5. Attempt **two** of the **three** questions in Section **B**. Each question carries 20 marks.
6. Attempt **two** of the **three** questions in Section **C**. Each question carries 15 marks
7. Write your answer to each question on a fresh page in your answer booklet.
8. Please, read further instructions on the answer book before attempting any question.

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SECTION B*Attempt two of the three questions in this section***Question 2**

- (a) A tax of 20% was paid on a sum of Shs 4.5 million. The remainder was shared among three brothers. The eldest took 50%, the second 30%, and the youngest the remainder.

Required:

Find the percentage of the original sum that the youngest brother received.

(6 marks)

- (b) The marks scored by candidates in an examination marked out of 50 marks were:

Mark range	Frequency
21 – 25	95
26 – 30	82
31 – 35	72
36 – 40	28
41 – 45	14
46 – 50	9

Required:

Use the mid-interval values to estimate the mean mark for the candidates.

(7 marks)

- (c) A foreign exchange dealer used 100 dollars daily for three days to buy Uganda shillings at Shs 2,600, 2,605 and 2,610 respectively. After a week he converted all the shillings back into dollars at an exchange rate of Shs 2,607 per dollar.

Required:

Calculate how much gain or loss he made.

(7 marks)**(Total 20 marks)**

Question 3

- (a) Write **two** characteristics of a singular matrix, and write down one example of the matrix.

(3 marks)

- (b) The stocks of certain items at branches of a supermarket are given in the table:

	Sugar (kg)	Tea (kg)	Butter (kg)	Milk (litres)
Branch A	350	250	400	60
Branch B	400	300	80	40
Branch C	500	400	90	50

The sales on a particular day are given in the following table:

	Sugar (kg)	Tea (kg)	Butter (kg)	Milk (litres)
Branch A	300	100	300	50
Branch B	300	250	70	30
Branch C	450	350	20	40

Required:

Prepare the:

- (i) stock and sales, respectively as 3×4 matrices.

(2 marks)

- (ii) Matrix showing the stock at each branch at the end of that day.

(3 marks)

- (iii) Given that a kilogram of sugar costs Shs 3,200, a kilogram of tea leaves costs Shs 7,000, a kilogram of butter costs Shs 12,000 and a litre of milk costs Shs 2,600, write a cost matrix as a 4×1 and use it to find the value of stock at each branch.

(7 marks)

- (c) Given the equations:

$$3x + 5y = 2$$

$$2x + 3y = 0$$

Required:

Solve the simultaneous equations by matrix method.

(5 marks)**(Total 20 marks)**

Question 4

- (a) The table below shows how a man spends his monthly salary:

Items	Car expenses	Food	School fees	Savings	Others
Percentage (%)	15	20	x	15	10

Required:

- (i) Find the value of x. **(2 marks)**
- (ii) Calculate his monthly salary if he spent 60,000 on others. **(2 marks)**
- (b) Two pumps are used to fill petroleum in a tank. When pump A alone is used, it takes 20 minutes to fill. When pump B is turned on alone, it fills the tank in 10 minutes.

Required:

- (i) Calculate the time that the two pumps take to fill the tank when they are both turned on at the same time. **(5 marks)**
- (ii) Find the amount of petroleum that the tank holds when full if both pumps pour 36 litres of petroleum per minute. **(2 marks)**
- (c) Three tourists A, B and C, agreed to share their total expenses in the ratio 2:3:4. Tourist A paid Shs 25,000 for the hire of a vehicle, B paid Shs 70,000 for meals, while C paid Shs 49,000 for entrance fees.

Required

Find how much A and C must each pay B to settle their agreed shares.

(9 marks)

(Total 20 marks)

SECTION C

Attempt two of the three questions in section

Question 5

- (a) A linear regression analysis has produced the following equation relating profits, P Shs to hours, h of managerial time spent developing the past year's projects at a firm: $P = -957 + 85h$.

Required:

- (i) Use this estimated relationship to find the profits or losses if no time were spent in planning.

(2 marks)

- (ii) Find the number of hours for which the estimated profits would be zero.

(2 marks)

- (iii) Determine the rate of change of profit with time.

(1 mark)

- (b) Suppose the demand and supply for milk are described by the following equations: $Q_d = 60,000 - 100P$; $Q_s = -15,000 + 150P$, where P is price in shillings, Q_d is the quantity demanded in millions of litres per year, and Q_s is the quantity supplied in millions of litres per year.

Required:

Solve the equations mathematically to obtain the equilibrium price and equilibrium quantity.

(4 marks)

- (c) A couple is planning to have two children. Suppose that each child is equally likely to be a boy (B) or girl (G).

Required:

- (i) Write all the sample space outcomes.

(4 marks)

- (ii) Find the probability that the couple will have at least one girl.

(2 marks)**(Total 15 marks)**

Question 6

- (a) Distinguish between simple index and aggregate index. **(2 marks)**
- (b) The following table gives the price index and weighting for each of four commodities.

	Price Index Number	Weighting
Food	112	6
Rent	125	3
Fuel	106	1
Clothing	107	2

Required:

Calculate the simple weighted price index.

(5 marks)

- (c) A principal of Shs 8 million is invested for four years at 5% per annum compound interest, interest being paid at the end of the year.

Required:

Calculate the amount at the end of four years.

(3 marks)

- (d) A man has various amounts of money in the following currencies:
5,500 Kenya shillings (KShs), 240 United States dollars (US\$), and 200,000 Uganda shillings (UShs).

The exchange rates are: US \$1 = Ug Shs 2450, KShs1 = UShs 28 and a pound sterling (£) = UShs 3,900

Required:

- (i) Find the total amount of money, in Uganda shillings, the man has. **(3 marks)**
- (ii) Find the value of the total amount in pound sterling (£). **(2 marks)**

(Total 15 marks)

Question 7

- (a) In a group of students sitting for examinations, it was found that 58 sat for law (L) paper, 49 for economics (E) paper, and 36 for statistics (S) paper. All sat for one or more of these papers except 3 students who did not sit for any. 31 students sat for law paper only, 19 for economics paper only, 10 sat for law and economics but not statistics, and 39 sat for more than one of these papers.

Required:

Use a venn diagram, to find how many students:

- (i) were in the group. **(5 marks)**
 - (ii) sat for the statistics paper only. **(2 marks)**
 - (iii) in the group sat for one paper only. **(2 marks)**
- (b) Mr. Nyeko and Mrs. Kiwa are both retired civil servants living in Gulu town. Suppose the probability that a retired man will live for another 10 years is 0.6; and the probability that a retired woman will live another 10 years is 0.7 in this town:

Required:

Find the probability that:

- (i) both Mr. Nyeko and Mrs. Kiwa will be alive 10 years from now. **(2 marks)**
- (ii) in 10 years, Mr. Nyeko will not be alive and Mrs. Kiwa will be living. **(2 marks)**
- (iii) in 10 years, at least one will be living. **(2 marks)**

(Total 15 marks)