

# THE PUBLIC ACCOUNTANTS EXAMINATIONS BOARD

*A Committee of the Council of ICPAU*

## ATC(U) EXAMINATIONS

### LEVEL ONE

#### BUSINESS MATHEMATICS & STATISTICS – PAPER 3

**WEDNESDAY, 27 NOVEMBER 2013**

#### 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. Formulae are provided on page 6.
8. Write your answer to each question on a fresh page in your answer booklet.
9. Please, read further instructions on the answer book before attempting any question.

**SECTION B**

Attempt **two** of the **three** questions in this section

**Question 2**

- (a) Three boys John, Peter and Andrew went shopping. John bought 6 kgs of rice, 3 kgs of maize flour and 2 litres of milk. Peter bought 5 kgs of rice, 10 kgs of maize flour and 5 litres of milk and Andrew bought 10 kgs of rice and 3 litres of milk. The prices of 1 kg of rice, 1 kg of maize flour and 1 litre of milk are Shs 4,000, 1,500 and 600 respectively.

**Required:**

- (i) Form a  $3 \times 3$  matrix for the items bought. **(1 mark)**
- (ii) Form a  $3 \times 1$  price matrix. **(1 mark)**
- (iii) Using matrix multiplication, find the amount of money spent by each boy and hence the total amount of money spent by all boys. **(6 marks)**

- (b) In a class of 40 ATC candidates at level two, 16 registered for Principles of Accounting II (P), 17 registered for Economics (E) and 13 registered for Information systems (I). 5 registered for both P and E, 6 registered both E and I and 3 registered for both P and I. Six candidates did not register for any of the three subjects.

**Required:**

- (i) Draw a Venn diagram to represent the above information. **(5 marks)**
- (ii) Use the Venn diagram above to find the number of candidates who registered for all the three subjects. **(4 marks)**
- (iii) Find the number who registered for only one subject. **(1 mark)**
- (iv) Find the number who registered for at least two subjects. **(2 mark)**
- (Total 20 marks)**

### Question 3

- (a) A sales agent gets a commission of 6 % on the sales he makes. In a particular month he sold 48 pairs of trousers at US\$ 18 each. The exchange rate is US\$ 1 = UShs 2,650.

**Required:**

Calculate his commission in UShs.

**(4 marks)**

- (b) Okello deposited Shs 20,000,000 on an account in a bank offering a k % per annum compound interest for a period of 2 years. It accumulated to Shs 24,200,000.

**Required:**

- (i) Determine how much interest he earned during the 2 years

**(2 marks)**

- (ii) Find the value of k.

**(6 marks)**

- (c) Differentiate t:  $y = \frac{(x^2-1)^2}{4x}$  with respect x and simplify your result.

**(5 marks)**

- (d) Distinguish between the terms 'simple interest' and 'compound interest'.

**(3 marks)**

**(Total 20 marks)**

### Question 4

- (a) A sales company keeps records for its customers, identify any 4 examples of data that can be obtained from such records.

**(4 marks)**

- (b) List any **three** sources of secondary data.

**(3 marks)**

- (c) Scores of 40 students in a moral studies examination marked out of 100 are shown in the table below.

Marks	Students
0 - 9	1
10 - 19	4
20 - 29	6
30 - 39	8
40 - 49	2
50 - 59	10
60 - 69	8
70 - 79	1

**Required:**

- (i) Calculate the median mark. (7 marks)
  - (ii) Given that the mean of the above marks is 43, calculate the variance. (6 marks)
- (Total 20 marks)**

**SECTION C**

Attempt any **two** of the **three** questions in this section.

**Question 5**

- (a) The Pearson's coefficient of skewness of a certain distribution is + 0.26. Its standard deviation is 4.5 and mode is 12.

**Required:**

- (i) Find the mean of the distribution. (3 marks)
- (ii) Calculate the median of the distribution. (3 marks)
- (b) Using valid examples outline the **three** uses of index numbers. (3 marks)
- (c) The following table below shows the changes in the prices and quantities of different products in Uganda from 2011 to 2012.

Commodity	2011		2012	
	Price(Shs '000')	Quantity (Kg)	Price (Shs '000')	Quantity (Kg)
X	10	80	12	110
Y	8	90	10	108
Z	5	45	60	50
P	16	37	20	50

Using 2011 as the base year, calculate the quantity index using Paasche's method.

**(6 marks)**  
**(Total 15 marks)**

**Question 6**

- (a) Two pairs of trousers and three shirts cost Shs 35,000. One pair of trousers and two shirts cost Shs 20,000.

**Required:**

Find the respective prices of a pair of trousers and a shirt.

**(5 marks)**

- (b) Mr Mandazi is planning to start a business of Shs 4.8 million in a Kampala suburb of selling bakery products. He has decided to acquire a loan of Shs 4.8 million in one of the upcoming financial institutions which charges 1 % per month compound interest. He would like to settle the loan by paying equal amounts every month to clear the loan.

**Required:**

- (i) How much money will be required per month for 2 ½ years in order to clear the loan.
- (ii) Determine how much of the money paid back is interest.
- (c) Explain the term annuity as applied in financial mathematics.

**(5 marks)****(3 marks)****(2 marks)****(Total 15 marks)****Question 7**

- (a) Outline any **four** qualities of a good questionnaire.
- (b) A follow up survey of the 300 households which had purchased TV sets revealed the following:

**(4 marks)**

Type of TV set	Satisfied with purchase		
	Yes	No	Total
Plasma screen	64	16	80
Non-plasma screen	<u>176</u>	<u>44</u>	<u>220</u>
Total	240	60	300

**Required:**

Determine whether being satisfied with the purchase and type of television purchased are independent.

**(5 marks)**

- (c) A bag contains 3 red balls and 4 green balls. Two balls are drawn from the bag at random in succession with replacement.

**Required:**

Find the probability that both balls are of:

- (i) the same colour.

**(3 marks)**

- (ii) different colours.

**(3 marks)**

**(Total 15 marks)**

### LIST OF FORMULAE

1. Coefficient of variation, for samples  $= \frac{s}{\bar{x}} \times 100\%$
2. Coefficient of variation, for populations  $= \frac{\sigma}{\mu} \times 100\%$
3. Weighted average  $= \frac{\sum xw}{\sum w}$
4. Arithmetic mean  $= \bar{x} = \frac{\sum fx}{\sum f}$
5. Median  $= l_b + \frac{\left(\frac{n}{2} - cf_b\right)w}{fm}$
6. Sample standard deviation,  $\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$
7. Population variance  $= \frac{\sum (x - \bar{x})^2}{\sum f}$
8. Pearson coefficient of skewness (Sk)  $= 3 \frac{(\bar{x} - \text{median})}{\sigma}$
9. Pearson coefficient of skewness (Sk)  $= \frac{(\bar{x} - \text{mode})}{\sigma}$
10. Financial mathematics
  - (a) Amount under a compound rate after n years  $= p \left[ 1 \pm \frac{r}{100} \right]^n$
  - (b) Loan repayment under annuity  $R = P \left[ \frac{i}{1 - (1+i)^{-n}} \right]$
  - (c) Sinking fund of ordinary annuity  $P_n = m \left[ \frac{(1+i)^n - 1}{i} \right]$
11. Combinations  ${}_nC_r = \frac{n!}{(n-r)!r!}$
12. Permutations  ${}_nP_r = \frac{n!}{(n-r)!}$
13. Index numbers:
  - (a) Price relative index  $= \frac{p_1}{p_0} \times 100$
  - (b) Weighted aggregate price index  $= \frac{\sum (p_1 \times w)}{\sum (p_0 \times w)} \times 100$

(c) Laspeyres's price index =  $\frac{\sum (p_1 \times q_0)}{\sum (p_0 \times q_0)} \times 100$

(d) Paasche's price index =  $\frac{\sum (p_1 \times q_1)}{\sum (p_0 \times q_1)} \times 100$

(e) Paasche's quantity index =  $\frac{\sum (q_1 \times p_1)}{\sum (q_0 \times p_1)} \times 100$