

# THE PUBLIC ACCOUNTANTS EXAMINATIONS BOARD

*A Committee of the Council of ICPAU*

## ATC(U) EXAMINATIONS

### LEVEL ONE

#### BUSINESS MATHEMATICS & STATISTICS – PAPER 3

**THURSDAY, 6 JUNE 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 7.
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) Give any **three** disadvantages of collecting data by interviewing. **(3 marks)**
- (b) A group of people hired a vehicle for a trip, each person paying Shs 18,000. Three people were unable to turn up for the trip, and the rest agreed that each should pay Shs 500 more than the original pay. This resulted in a surplus of Shs 9,000.

**Required**

Find the number of people who actually went on the trip.

**(5 marks)**

- (c) The following frequency distribution shows the marks for 108 randomly selected candidates who sat for the Business Mathematics and Statistics paper in November 2012:

Class limits	Frequency
50 – 58	6
59 – 67	22
68 – 76	43
77 – 85	28
86 – 94	9

**Required:**

- (i) Determine the number of candidates in the group who scored more than 67 marks. **(2 marks)**
- (ii) Calculate the mean score of all the candidates. **(6 marks)**
- (iii) Construct a histogram to represent the data given in the table above. **(4 marks)**

**(Total 20 marks)**

**Question 3**

- (a) A bicycle shop owner has 12 mountain bicycles in the showroom. The owner wishes to select 5 of them to display at a bicycle show.

**Required:**

Find the number of different ways in which a group of 5 bicycles can be selected.

**(3 marks)**

- (b) A fruits dealer recorded her sales at the end of each week for the months of March and April, 2013 in matrix form, as follows:

March	Week	April	Week
	1 2 3 4		1 2 3 4
<i>Pineapple</i>	$\begin{bmatrix} 12 & 8 & 12 & 15 \end{bmatrix}$	<i>Pineapple</i>	$\begin{bmatrix} 15 & 20 & 20 & 10 \end{bmatrix}$
<i>Mangoes</i>	$\begin{bmatrix} 150 & 200 & 65 & 25 \end{bmatrix}$	<i>Mangoes</i>	$\begin{bmatrix} 70 & 60 & 30 & 20 \end{bmatrix}$
<i>Avocado</i>	$\begin{bmatrix} 100 & 50 & 10 & 50 \end{bmatrix}$	<i>Avocado</i>	$\begin{bmatrix} 75 & 50 & 5 & 5 \end{bmatrix}$

**Required:**

Find:

- (i) the number of pineapples that she sold in the 3<sup>rd</sup> week of March.

**(1 mark)**

- (ii) the number of mangoes she sold in April.

**(2 marks)**

- (iii) a  $3 \times 4$  matrix, that shows the total sales for the two months.

**(2 marks)**

Given that pineapples were sold at Shs 3,500 each, mangoes at Shs 1,000 each and avocado at Shs 500 each:

- (iv) write the cost matrix as  $1 \times 3$

**(1 mark)**

- (v) find, by matrix multiplication, her total earnings for the two months.

**(5 marks)**

- (c) A trader purchased a number of kilograms of Irish potatoes for Shs 72,000. He was unable to sell 10% of them but made a profit of Shs 14,400 by selling the rest at a profit of Shs 800 per kilogram.

**Required:**

Find the number of kilograms that he purchased.

**(6 marks)**

**(Total 20 marks)**

**Question 4**

- (a) Of the jobs advertised by an organization, 350 of the applicants were female and 600 were male. When the interviews were conducted 30% of the female and 40% of the male applicants passed.

**Required:**

Find the percentage of the total number of applicants that failed.

**(7 marks)**

- (b) At an international languages institute, there were 100 students, where every student studied at least one language; French, German or Russian. 10 students studied Russian only; 18 studied Russian but not German; 38 studied Russian and French; 59 studied Russian; 60 studied French; 42 studied French and German. Setting F for those who studied French, R for those who studied Russian and G for those who studied German:

**Required:**

- (i) represent the information on a Venn diagram.

**(8 marks)**

- (ii) determine the number of students who studied only one language.

**(2 marks)**

- (iii) determine the number of students who studied two and only two languages.

**(2 marks)**

- (iv) determine the number of students who studied all the three languages.

**(1 mark)**

**(Total 20 marks)**

**SECTION C**

*Attempt two of the three questions in section*

**Question 5**

- (a) The following are population values of five variables collected by a student. 5, 8, 10, 12 and 15.

**Required:**

Calculate the standard deviation.

**(6 marks)**

- (b) A student received percentage quiz grades of 70, 65 and 90. The same student earned 85% from the final examination. Each of the three quizzes constitutes 20% of the final grade and the final examination constitutes 40%.

**Required:**

Find the weighted mean of the student's performance.

**(5 marks)**

- (c) The managers of a company are given bonuses every end of year. The selection uses the performance appraisal results during the year. To qualify for a bonus, a manager should score a minimum of 60% in the appraisal. Ndau, Mani and Tukei are some of the managers in the company, whose probabilities of winning bonuses are  $\frac{3}{5}$ ,  $\frac{2}{3}$  and  $\frac{3}{4}$  respectively.

**Required:**

Find the probability that all the three will:

- (i) qualify for the bonuses.

**(2 marks)**

- (ii) not qualify the bonuses.

**(2 marks)**

**(Total 15 marks)**

**Question 6**

- (a) After buying a house, a man spent 15% of the purchase price on renovations. A year later, he sold the house for Shs 57.96 million, making a profit of 12% on his total outlay.

**Required:**

Calculate the price that the man had paid for the house.

**(3 marks)**

- (b) Five companies made the following tax returns to the revenue authorities; Shs 2 million, Shs 2.5 million, Shs 1 million, Shs 3 million and Shs 0.5 million.

**Required:**

Calculate their harmonic mean.

**(3 marks)**

- (c) A firm producing juice has its total cost equation given by  $TC = 1000q + 20,000$ . The firm's demand equation for its juice is given by  $P = -10q + 5,000$ . All the values are in shillings and quantities in litres.

**Required:**

Determine the:

- (i) quantity that maximizes revenue.
- (ii) price that maximizes profits.
- (iii) maximum profit.

**(4 marks)**

**(2 marks)**

**(3 marks)**

**(Total 15 marks)**

**Question 7**

- (a) Identify any **four** ways of presenting data that has been collected.

**(4 marks)**

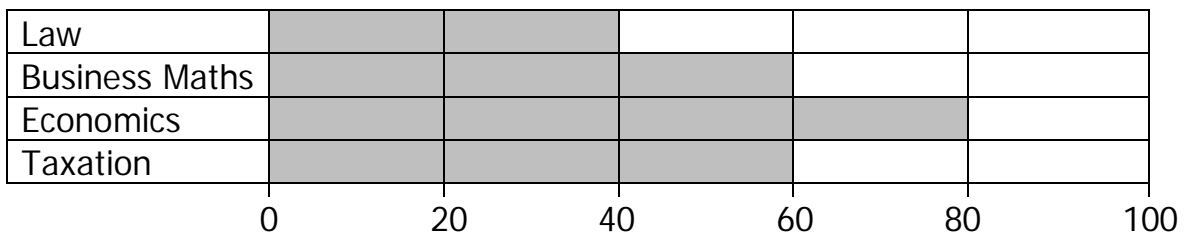
- (b) Michael is competing in a weekly sales contest at a car dealership where he works. He receives 5 points for each deluxe model he sells and 3 points for each standard model he sales. In a certain week, Michael received 38 points from the sale of 10 cars.

**Required:**

Find the number of each model that Michael sold.

**(6 marks)**

- (c) The graph below shows the marks obtained by a candidate in four different papers in an examination.



**Required:**

For the marks obtained, calculate the:

- (i) range.
- (ii) mode.
- (iii) mean.

**(2 marks)**

**(1 mark)**

**(2 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. Geometric mean (GM)  $= \sqrt[n]{x_1 \times x_2 \times x_3 \times x_4 \dots \times x_n}$
6. Harmonic mean (HM)  $= \frac{n}{\sum \frac{1}{x}}$
7. Sample standard deviation,  $\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$
8. Pearson coefficient of skewness (Sk)  $= 3 \frac{(\bar{x} - \text{median})}{\sigma}$
9. Value after n years  $= p \left[ 1 \pm \frac{r}{100} \right]^n$
10. Combinations  ${}_nC_r = \frac{n!}{(n-r)!r!}$
11. 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) Laspeyre's price index  $= \frac{\sum (p_1 \times q_0)}{\sum (p_0 \times q_0)} \times 100$
  - (d) Paasche's price index  $= \frac{\sum (p_1 \times q_1)}{\sum (p_0 \times q_1)} \times 100$
12. Binomial distribution,  $b(x; n, p) = \binom{n}{x} p^x q^{n-x}$