

THE PUBLIC ACCOUNTANTS EXAMINATIONS BOARD

A Committee of the Council of ICPAU

ATC(U) EXAMINATIONS

LEVEL ONE

BUSINESS MATHEMATICS & STATISTICS - PAPER 3

WEDNESDAY, 23 JUNE 2004.

INSTRUCTIONS TO CANDIDATES:

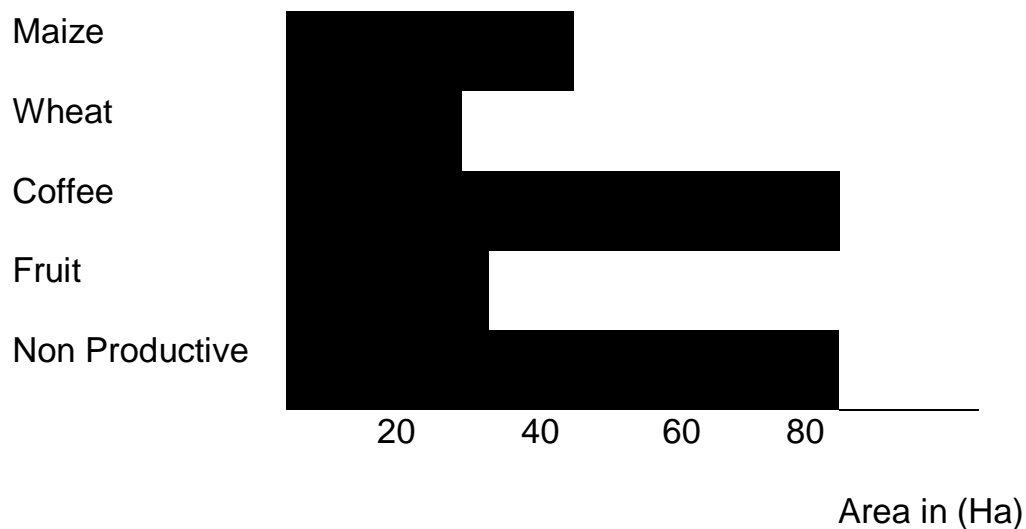
1. Time allowed: **3 hours**
2. Attempt **all** questions in Section A, any **two** questions in Section B and any **two** questions in Section C.
3. Section A has **twenty** compulsory multiple-choice questions, each carrying $1\frac{1}{2}$ marks.
4. Section B has **three** questions and only **two** are to be attempted. Each question carries 20 marks.
5. Section C has **three** questions and only **two** are to be attempted. Each question carries 15 marks.
6. Please read further instructions on the answer booklet.

SECTION A

Question 1.

- (i) If $a = \frac{2+x}{x}$ $b = \frac{a+2}{2}$ and $p = \frac{a+b}{b}$
and $x = -2$. Find the value of p .
- (a) 1
(b) 2
(c) -1
(d) 1.5
- (ii) Three sets of numbers are: $P = \{1, 2, 3, 4, 5\}$, $Q = \{4,5,6,7,8\}$ and $R = \{1, 3, 5, 7, 9\}$. Find the Set $R \cap \{P \cup Q\}$
- (a) $\{4,5\}$
(b) $\{1, 3, 5, 7\}$
(c) $\{3, 5, 7\}$
(d) $\{1, 2, 3, 4, 5, 6, 7\}$
- (iii) A good approximation for the value of:
 $\left(\frac{0.04 \times 2.45}{0.4} \right)^{\frac{1}{2}}$ is
- (a) 15.
(b) 2.25.
(c) 5.
(d) 8.
- (iv) If $P(x,y)$ is a point such that $3x - 2y > 6$ and $x + 2y < 5$, then P could be the point:
- (a) (2, 3)
(b) (2, -1)
(c) (1, 3)
(d) (3, 1)
- (v) A sum of money was divided into 2 parts in the ratio 5:4. The smaller part was then divided in the ratio of 3:5. If the smaller of these two is Shs 180,000. What was the original sum of money?
- (a) Shs 840,000.
(b) Shs 37,500.
(c) Shs 108,000.
(d) Shs 240,000.

- (vi) If Y varies jointly as X and Z; and $Y = 48$, when $X = 4$, $Z = 2$. Find Y when $X = 3$ and $Z = 5$.
- (a) 8
(b) 90
(c) 15
(d) 120
- (vii) Given that $\begin{pmatrix} 3 & 0 \\ 2 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 6 \\ 1 \end{pmatrix}$
Find the value of $x + y$.
- (a) 5
(b) -1
(c) 7
(d) 3.
- (viii) In an archery competition the following times were recorded: 10, 20, 30, 40, 50 (time in seconds). Later it was found out that the score 40 should have been recorded as 50. State a measure of central tendency which would not be affected by the change.
- (a) Median.
(b) Mode
(c) Mean
(d) Range.
- (ix) The chart below shows how land area is put to use in Kapchorwa Area:



What is the best approximate percentage of the land which is non productive?

- (a) 80%
- (b) 95%
- (c) 25%
- (d) $33\frac{1}{3}\%$

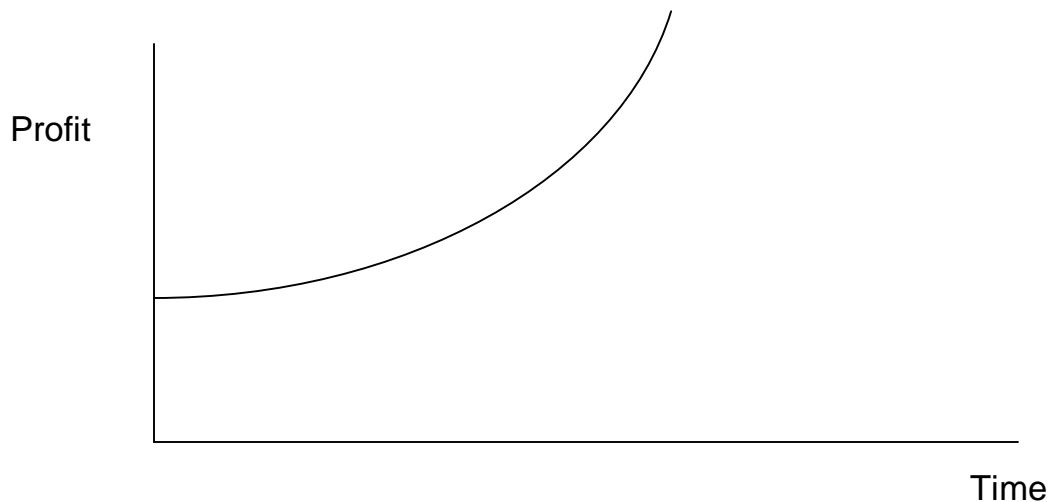
Use the following data to answer questions (x) – (xi):

The tyre pressure of 25 cars using Delight Petrol Station were taken in Newtons per cm^2 . The results were distributed for individual tyres as follows:

Pressure N/cm^2	10	12	14	16	18	20	22	24
No. of tyres	1	10	12	25	28	14	8	2

- (x) What is the range of values that give the interquartile range of the distribution?
- (a) 0 – 16
 - (b) 14 – 20
 - (c) 12 – 14
 - (d) 16 – 18
- (xi) Find the mode.
- (a) 28
 - (b) 18
 - (c) 24
 - (d) 17
- (xii) A farmer has enough feeds for 36 cattle for three weeks. The farmer then calculates that the same amount of feeds would be enough for 27 cattle for n weeks. What is the value of n ?
- (a) 12.
 - (b) 4
 - (c) $2\frac{1}{4}$
 - (d) 9.
- (xiii) An Accounts Assistant earns Shs. 750,000 in a reputable company, and gets a pay rise of 6%. The following year gets a pay rise of 4%. What does he/she earn then?
- (a) Shs 795,000
 - (b) Shs 825,000
 - (c) Shs 826,800
 - (d) Shs 1,062,500

- (xiv) What price should a dealer charge for an article which costs Shs. 153,000 so that he/she can offer 15% discount and still make a profit of 10% on the selling price?
- (a) Shs 153,000.
 - (b) Shs 168,300.
 - (c) Shs 200,000.
 - (d) Shs 179,010.
- (xv) In how many years (correct to the nearest whole year) will Shs. 15,000,000 amount to Shs 20,000,000 if the interest rate is at 4% compounded quarterly?
- (a) 2 years.
 - (b) 8 years.
 - (c) 4 years.
 - (d) 7 years.
- (xvi) A machine bought for £ 2,400 depreciates in value at a compound rate of 8% per annum. Find the value of the machine after 8 years.
- (a) £ 1,232.
 - (b) £ 4,442.
 - (c) £ 2,592.
 - (d) £ 1,920.
- (xvii) Which statement best describes this graph showing profits of a firm over several months?



- (a) The profits of a firm show a steady increase.
- (b) The firm's profits are increasing at increasing rate.
- (c) Although the profits are increasing, the rate of increase is slowing down.
- (d) After an initial decrease in profits they then increased.

- (xviii) Under what circumstances can a sample be a true representative of a population?
- When a sample is a subset of a population.
 - When a sample is very small.
 - When a sampling frame is defined.
 - When random numbers are used.
- (xix) The statistical survey variables which describe some attribute or quality are called:
- Stochastic Data.
 - Quantitative Data.
 - Parametric Data.
 - Qualitative Data.
- (xx) If $P = 3Q^2 - 4Q + 5$, find $\frac{dp}{dq}$.
- $3Q - 4$.
 - $6Q - 5$.
 - $6Q^2 - 4$.
 - $6Q - 4$.

SECTION B

Question 2

- (a) ICPAU has enough stationery to issue to 600 ATC candidates for 3 days. How long would the stationery last for 300 candidates? (3 marks)
- (b) If $A = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & -4 \\ 0 & 3 \end{pmatrix}$
- Find
- BA
 - $B - 3I$
 - $B^2 - 5B + 6I$.
- Where I is an identity matrix. (10 marks)
- (c) Mr. Nima borrowed Shs. 8,000,000 at 6% compound interest to purchase a piece of land. At the end of each of the first years he repays Shs. 3,000,000. How much must he repay at the end of the third year to clear the debt? (7 marks)

(Total 20 marks)

Question 3

(a) Define the following terms:

- (i) Principal.
- (ii) Interest.
- (iii) Terms
- (iv) Grace period.

(4 marks)

(b) Grace Ltd is considering the following loan scheme:

Principal	:	Shs 25,000,000.
Interest	:	12%
Grace period	:	2 years with capitalised interest.
Loan term	:	15 years.

Calculate the annual loan repayments.

(8 marks)

(c) A machine tool costs Shs. 105,000 and has a scrap value of Shs. 25,000, with a useful life of 4 years.

- (i) Use the sum of digits method to find its depreciation in each of the four years.
- (ii) Find the total depreciation by this method.

(8 marks)

Total 20 marks)

Question 4

(a) A Cinema can accommodate 200 people. When TITANIC was showing, it filled up and the gate collections were Shs 720,000. The first class seats are priced at Shs. 5,000 and the second class seats are priced at Shs. 3,000.

Find the number of seats in the Cinema in each category.

(5 marks)

(b) A Manager of a local restaurant has established the cost function for producing coffee in the restaurant as $C(x) = 500,000 + 4.75x$ shillings, where $C(x)$ is the total cost of producing x cups of coffee.

- Find:
- (i) The total cost for producing 100,000 cups.
 - (ii) The average cost for producing 100,000 cups.
 - (iii) The marginal cost for producing coffee cups.

(7 marks)

(c) The profit equation of a certain company is given by $P = 230,000 + 20S - \frac{1}{2} S^2$. (Where S is the amount of shillings spent on advertising).

What value of advertising would give the maximum profit? What is the maximum profit that would accrue from this value?

(8 marks)

Total 20 marks)**SECTION C****Question 5**

The table below shows the masses of a sample of ATC ladies taking Business Mathematics and Statistics for the first time.

Mass in kg.	40-44	45-49	50-54	55-59	60-64	65-69	70-74
Frequency	3	30	29	33	13	1	1

Required:

- (a) Calculate the mean mass. **(4 marks)**
- (b) Determine the median by calculation. **(3 marks)**
- (c) Draw a cumulative frequency density curve and use it to estimate:
- The number of ladies whose mass exceed the mean mass.
 - The 10 – 90 percentile range.
- (8 marks)**
(Total 15 marks)

Question 6

- (a) In a road test, 20% of the cars fail with faulty steering and 30% fail with faulty brakes. Assuming brakes are not linked to steering, find the probability that a randomly chosen car will pass both tests. **(5 marks)**
- (b) The mean number of success of a binomial distribution $(p + q)^n$ is $16 \frac{2}{3}$ where P is the probability of success. The standard deviation is $1 \frac{2}{3}$. Given that Mean = np and standard deviation = \sqrt{npq} . Calculate the values of n , p and q . **(6 marks)**
- (c) Mr. Mete Waako imported commodities A, B and C from German, Kenya and U.S.A. respectively.

Commodity	Price	
	2000 = 100	2003
A	DM 20,000,000	DM 25,000,000
B	Shs 4,000,000	KShs 4,800,000
C	US \$ 8,000,000	US. \$ 10,000,000

Calculate the simple relative price index for 2003. (Note 2000 = 100 means 2000 is taken as the base year).

(4 marks)
Total 15 marks)

Question 7

A company manufactures and sells product D. The selling price of the product is Shs. 6,000 per unit and estimates of demand and variable cost of sales are as follows:

Demand (Units)	Probability	Probability	Variable cost (per unit)
5000	$\frac{3}{10}$		
6000	$\frac{3}{5}$	$\frac{1}{10}$	Shs. 3,000
8000	$\frac{1}{10}$	$\frac{3}{10}$	Shs. 3,500
		$\frac{1}{2}$	Shs. 4,000
		$\frac{1}{10}$	Shs. 4,500

The unit variable costs do not depend on the volume sales.

Required:

Calculate:

- (a) Expected demand. (5 marks)
 - (b) Expected variable costs. (5 marks)
 - (c) The contribution. (3 marks)
 - (d) Expected profit. (2 marks)
- (Total 15 marks)**