

THE PUBLIC ACCOUNTANTS EXAMINATIONS BOARD

A Committee of the Council of ICPAU

BUSINESS MATHEMATICS & STATISTICS - PAPER 3

ATC(U) EXAMINATIONS

JUNE 2001

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.

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SECTION A

Question 1

- (i) Make C the subject of the formula $y = mx + \frac{1}{2}cb$:-
- (a) $2b(y-mx)$
 - (b) $2\frac{(mx-y)}{b}$
 - (c) $2\frac{(y-mx)}{b}$
 - (d) $b\frac{(mx-y)}{b}$
- (ii) Otto, a Salesman, receives a salary of Shs.40,000 a month and a commission of $2\frac{1}{2}\%$ on all sales over Shs.50,000. If his sales last month were Shs.400,000, what was his commission?
- (a) Shs.10,750.
 - (b) Shs.11,750.
 - (c) Shs. 7,750.
 - (d) Shs. 8,750.
- (iii) Given that $K = (a,b,c,d,e,f,g,h)$
 $M = (a,e,i,o,u)$
- Find $n(K \cap M)$.
- (a) 2.
 - (b) 3.
 - (c) 0.
 - (d) 5.
- (iv) If $X = 5$ and $y = 3$, find the value of $3x - (y+2x)$.
- (a) 3
 - (b) 2
 - (c) 1
 - (d) 28

- (v) A shirt priced at Shs.38,000 is subject to a discount of 5% for cash. Find the price.
- (a) Shs.1,900.
 - (b) Shs.38,000.
 - (c) Shs.36,000.
 - (d) Shs.36,100.
- (vi) What is the present value of Shs.100,000 received in year 3 when $r = 7\%$.
- (a) Shs.81,629.
 - (b) Shs.100,000.
 - (c) Shs.90,000.
 - (d) Shs.7,000.
- (vii) Differentiate $S = 3t^3 + 4t^2 - 2t + 5$.
- (a) $9t^2 - 4t - 2$.
 - (b) $9t + 8t^2 - 2$.
 - (c) $9t^2 + 8t - 2$.
 - (d) $9t^2 + 4t + 5$.
- (viii) What would be the total value of Shs.50,000 invested now after 3 years if the interest rate is 20% p.a?
- (a) Shs.86,400.
 - (b) Shs.50,000.
 - (c) Shs.86,000.
 - (d) Shs.10,000.
- (ix) Find the geometric mean of $8 \times 9 \times 15$.
- (a) 360.
 - (b) 9
 - (c) 10.26.
 - (d) 10.67.

- (x) In how many ways can three men be accommodated each in a room if there are ten rooms at their disposal?
- (a) 720.
(b) 72.
(c) 270.
(d) 200.
- (xi) The probability of an event happening is $\frac{1}{3}$, and of another mutually exclusive event $\frac{3}{8}$. What is the probability of either event happening?
- (a) $\frac{1}{24}$.
(b) $\frac{17}{24}$.
(c) $\frac{3}{8}$.
(d) $\frac{1}{3}$.
- (xii) Set A of data has a mean of 120 and a standard deviation of 50. Calculate its coefficient of variation.
- (a) 0.0147.
(b) 2.400.
(c) 0.718.
(d) 0.417.
- (xiii) Solve for x in the equation $x^2 + 3x - 4 = 0$.
- (a) $x = -1$ or 4.
(b) $x = 1$ or -4.
(c) $x = 3$ or -1.
(d) $x = 1$ or 4.
- (xiv) Find the inverse of the matrix $\begin{pmatrix} 2 & 3 \\ 1 & 5 \end{pmatrix}$
- (a) $\frac{1}{13} \begin{pmatrix} 5 & -3 \\ 1 & 2 \end{pmatrix}$
(b) $\begin{pmatrix} 5 & -3 \\ 1 & 2 \end{pmatrix}$
(c) $\frac{1}{13} \begin{pmatrix} 2 & 3 \\ 1 & 5 \end{pmatrix}$

(d) $\begin{pmatrix} 2 & 3 \\ -1 & 5 \end{pmatrix}$

- (xv) If 4 men can do a piece of work in 15 hours, how long would 10 men take?
- (a) 6 hours.
 - (b) 10 hours.
 - (c) 15 hours.
 - (d) 4 hours.
- (xvi) The perimeter of a triangular is 475m and the ratio of the sides is 5:6:8. Find the length of the sides.
- (a) 125m, 170m, 200m.
 - (b) 125m, 180m, 200m.
 - (c) 125m, 170m, 150m.
 - (d) 125m, 150m, 200m.
- (xvii) The index number of an item is 1998 in 152 taking 1997 as a base calculate the 1997 index number taking 1998 as a base (to the nearest whole number).
- (a) 69.
 - (b) 66.
 - (c) 60.
 - (d) 65.
- (xviii) Calculate the mean deviation of the set of data: 3,6,9,12,5.
- (a) 2.
 - (b) 5.
 - (c) 2.8.
 - (d) 2.5.
- (xix) The following are components of a frequency distribution table except:-
- (a) Classmark.
 - (b) Class boundary.
 - (c) Class limit.
 - (d) Line of concentration.

(xx) In a negative skewness, the following is true:-

- (a) The mode will be lower than the mean.
- (b) The mean will have a higher value than the median.
- (c) The mode will be higher than the median.
- (d) The mean, mode, median will coincide.

SECTION B – BUSINESS MATHEMATICS

Question 2:

- (a) Find the turning point of the equation $x^2 - 4x + 3 = y$. **(4 marks)**
- (b) State the two rules of testing maximum and minimum points. **(2 marks)**
- (c) Steers Ltd. believes that demand for its product can be represented by
 $P = 10 - 0.003Q$, where P is the unit price and Q is the quantity of sales. The total cost function is $1,000 + 3Q + 0.004Q^2$

Required:

- (i) Calculate the level of output and the unit price at which profit will be maximised. **(11 marks)**

Calculate the amount of profit at this level.

(3 marks)
(Total 20 marks)

Question 3:

- (a) Solve the equation for x and y using matrices:

$$\begin{aligned}y &= 2x + 3. \\y &= 3x - 4.\end{aligned}$$

(7 marks)

- (b) Simplify the following:

- (i) $4^5 \times 4^{-2}$.

(2 marks)

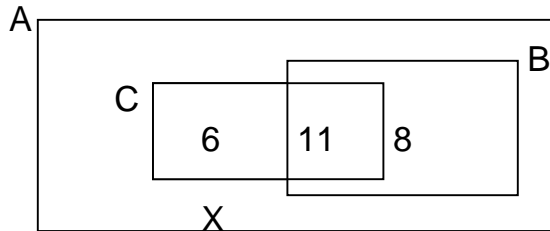
- (ii) $3^{-5} \div 3^{-2}$

(2 marks)

- (iii) $(14.2)^4 \times (14.2)^{\frac{1}{4}}$

(3 marks)

- (c) The diagram below represents a class of 32 students.



$B = \{\text{All students who like Business Mathematics}\}.$

$C = \{\text{All students who like Statistics}\}.$

- (i) How many students like only one subject? **(2 marks)**
- (ii) If x represents the number of students who don't like either of the two subjects, find x . **(2 marks)**
- (iii) If a student is picked at random from that class, what is the probability of selecting a student who likes only Business Mathematics? **(2 marks)**

(Total 20 marks)

Question 4:

- (a) (i) What is an annuity? **(3 marks)**
 - (ii) Mbuga Co. Ltd. plans to invest Shs.1,000,000 at the end of the year for each of the next five years at an interest rate of 5% p.a. How much will have accumulated at the end of the fifth year? **(4 marks)**
- (b) (i) If Shs.80,000 is invested now, to earn 10% interest for 3 years and 8% thereafter, what would be the size of the total investment at the end of 5 years?
 - (ii) Calculate the effective rate of interest of 1.5% per month, compounded. **(4 marks)**
- (c) On 1.1.97, a business purchased a laser printer costing Shs.1,800,000. The printer has an estimated life of 4 years, after which it will have no residual value. **(5 marks)**

Required:

Calculate the annual depreciation charges for 1997, 1998, 1999 and 2000 on the printer using the diminishing balance method at 60% p.a.

(Total 20 marks)

SECTION C - STATISTICS

Question 5:

(a) Write short notes on each of the following as used in statistics.

- (i) Random sampling. **(2 marks)**
- (ii) Systematic sampling. **(2 marks)**
- (iii) Questionnaire. **(2 marks)**
- (iv) Primary data. **(2 marks)**

(b) Briefly distinguish between a histogram and pie chart. **(4 marks)**

(c) Outline the procedure of constructing a Lorenz Curve. **(3 marks)**

(Total 15 marks)

Question 6:

In 1999, Mukwano Soap Factory produced “Nyota” brand cartons of soap (in thousands). The following table relates to the production:-

Cartons of Soap ('000s)	Frequency
66-68	2
69-71	7
72-74	12
75-77	6
78-80	20
81-83	3

From the table above, calculate:-

- (a) The mean. **(6 marks)**
- (b) The standard deviation. **(5 marks)**
- (c) The median. **(2 marks)**
- (d) The pearson's measure of skewness **(2 marks)**

(Total 15 marks)

Question 7:

- (a) A frequency distribution is normal, with a mean of 100 and a standard deviation of 10.

Required:

Calculate the preparation of the total frequencies which will be:-

- (i) 80-110. **(3 marks)**
(ii) Above 100. **(2 marks)**
(iii) Below 85. **(2 marks)**
- (b) The prices of quantities of the principle raw materials purchased by Nile Breweries Ltd. for the years 1999 and 2000 are as follows:-

Material	Quantity (in tons)		Price per ton (in 000's)	
	1999	2000	1999	2000
A	140	150	100	150
B	55	80	200	150
C	90	100	250	200

Required:

Taking 1999 = 100, Calculate:-

- (i) Laspeyres price index. **(4 marks)**
(ii) Paasche's price index. **(4 marks)**
(Total 15 marks)

