

# THE PUBLIC ACCOUNTANTS EXAMINATIONS BOARD

*A Committee of the Council of ICPAU*

## ATC(U) EXAMINATIONS

### LEVEL 1

#### BUSINESS MATHEMATICS & STATISTICS - PAPER 3

FRIDAY, 14 DECEMBER 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.

**© 2001 Public Accountants Examinations Board**

## SECTION A

### Question 1

- (i) Define an independent variable.
- (a) A variable whose value depends on another.
  - (b) A variable whose value is constant.
  - (c) A variable whose value changes arbitrarily.
  - (d) A variable whose value is constant for sometime and then changes arbitrarily.
- (ii) In a factory, there are 5 workers whose ages are 20, 15, 19, 21, 17 years. Find the median age.
- (a) 19 years
  - (b) 21 years
  - (c) 17 years
  - (d) 20 years,
- (iii) An example of a vector matrix is
- (a) 
$$\begin{bmatrix} 4 & 7 \\ 1 & 2 \\ 5 & 10 \end{bmatrix}$$
  - (b) 
$$\begin{bmatrix} 4 & 5 & 9 \\ 3 & 10 & 10 \\ 0 & 2 & 7 \end{bmatrix}$$
  - (c) 
$$\begin{bmatrix} 5 & 2 \\ 8 & 3 \end{bmatrix}$$
  - (d)  $[5 \ 6 \ 7]$
- (iv) Find the derivative of  $y = 1 / \sqrt{x}$
- (a)  $1/2x \sqrt{x}$
  - (b)  $1/2 x^1$
  - (c)  $-1/2 x \sqrt{x}$
  - (d)  $-1/x \sqrt{x}$

(v) Divide  $\frac{5}{8}$  by  $\frac{3}{7}$

- (a)  $\frac{11}{24}$
- (b)  $1\frac{11}{24}$
- (c)  $\frac{15}{56}$
- (d)  $\frac{56}{15}$

(vi) If Shs 100,000 is lent at 20% simple interest per annum, after how many years will it earn interest of Shs 50,000

- (a) 2.5 years
- (b) 2.0 years.
- (c) 1.5 years.
- (d) 3.0 years

(vii) The following are criteria or qualities of a good estimator except.

- (a) preciseness
- (b) unbiasedness.
- (c) efficiency.
- (d) consistency.

(viii) A computer which cost Shs. 2,200,000 is depreciated at 25% per annum using the straight line method of depreciation. What will its net book value be at the end of the first year?

- (a) Shs 55000,000
- (b) Shs.1,650,000
- (c) Shs.1,100,000.
- (d) Shs. 2,200,000

(ix) If  $A = \{m, n, o, p\}$  and  $B = \{n, q, r, s, p\}$ . What is  $A \cup B$ ?

- (a)  $\{m, n, o,$
- (b)  $p, n, q, r, s, p\}$
- (c)  $\{n, p\}$
- (d)  $\{m, n, o, p, q, r, s\}$
- (e)  $\{m, o, q, r, s\}$

(x) In how many ways can we choose 4 people from 7?

- (a) 16 ways
- (b) 35 ways
- (c) 28 ways
- (d) 6 ways

(xi) Calculate the mean of 43, 50, 75, 51, 51, 47, 50, 47, 40, 48,

- (a)  $\left( \begin{array}{c} 50 \\ 10 \\ 50.2 \\ 502 \end{array} \right)$
- (b)
- (c)
- (d)

(xii) What is the perimeter of a wall that is 45m long and 25m wide.

- (a) 70m
- (b) 50m
- (c) 100m
- (d) 140m

(xiii) Solve the equation  $2(4x - 2) = 3(x + 2)$

- (a)  $\left( \begin{array}{c} 2 \\ 2/5 \\ 1/5 \\ 10/11 \end{array} \right)$
- (b)
- (c)
- (d)

(xiv) Abdullah produces his goods at Shs x100,000. He then sells them with a mark up of 20%. What is his sales price.

- (a) Shs. 50,000
- (b) Shs. 20,000
- (c) Shs 120,000
- (d) Shs 80,000

- (xv) If a revenue function is given by  $R = 10Q - Q^2$ , then  $\frac{dR}{dQ} = 10 - 2Q$ . At what point can we get a turning point ?
- (a) Where  $\frac{d^2 R}{d Q^2} = 0$
- (b) Where  $\frac{d^2 R}{d Q^2} > 0$
- (c) Where  $\frac{d R}{d Q} = 0$
- (d) Where  $\frac{d^2 R}{d Q^2} < 0$
- (xvi) What is  $\frac{5}{7} + \frac{6}{11} - \frac{3}{7}$
- (a)  $\frac{254}{385}$ .
- (b)  $\frac{440}{55}$ .
- (c)  $\frac{250}{385}$ .
- (d) None of the above.
- (xvii) Under what circumstances can a normal distribution be used to approximate the binomial distribution.
- (a) When n is small and p is large.
- (b) When n is large and p is small.
- (c) When both n and p are large.
- (d) When both n and p are small.
- (xviii) If  $\sum f x^2 = 21,705$   $\sum f = 80$   $\sum f x = 1,225$ . What is the standard deviation?
- (a) 4.2
- (b) 5.5
- (c) 36.8.
- (d) 6.1.

(xix) In 1999 a video recorder was sold at £438. In 2001 the same recorder is sold at £ 462. What is the price relative for 2001 using 1999 as the base year?

- (a) 94.8
- (b) 105.5
- (c) 1.055
- (d) 0.948

(xx) What is the integration of  $Zy^m dx$ ?

- (a)  $\frac{m}{a} y^{z+1} dx + C$
- (b)  $\frac{Z}{m+1} y^{m+1} dx + C$
- (c)  $\frac{Z}{M+1} y^{m+1} + C$
- (d)  $\frac{Z}{m+1} y^{m+1}$

**SECTION B: BUSINESS MATHEMATICS**

**Question 2**

IOM manufactures two products A and B. The cost of making 15 units of A and 10 units of B is Shs 600. The cost of making 5 units of A and 8 units of B is Shs 340. He makes a profit of 10% and 15% on each unit of products A and B respectively

Required:

- (a) Express the cost of making one unit of products A and B in form of simultaneous equations  
(2 marks)
- (b) Calculate the cost of making one unit of product A and one unit of product B.  
(12 marks)
- (c) Calculate the selling price of one unit of A and one unit of B  
(6 marks)
- (Total 20 marks)**

**Question 3**

- (a) Find the ratio of 1000m to 50km?  
(3 marks)
- (b) If 90 kgs of millet flour cost Shs 150,000, what will be the cost of 150kg?  
(5 marks)
- (c) A farmer estimates that he needs 18 tractors to plough a piece of land in 30 days.
- (i) If there is a delay of 10 days due to heavy rains, calculate the number of tractors required to complete the work on time.  
(5 marks)
- (ii) If the original number of tractors is reduced by a third, how long would it take to complete the work?  
(7 marks)
- (Total 20 marks)**

**Question 4**

(a) If  $M = \begin{pmatrix} 2 & 3 \\ -1 & 4 \\ 8 & 1 \end{pmatrix}$  and  $N = \begin{pmatrix} 2 & 8 & 2 \\ 1 & 2 & -2 \\ 3 & 4 & -6 \end{pmatrix}$

Identify the following elements:

- (i)  $m_{3,2}$  (2 marks)
- (ii)  $m_{1,2}$  (2 marks)
- (iii)  $n_{2,2}$  (2 marks)
- (iv)  $n_{2,3}$  (2 marks)

(a) If  $A = \begin{pmatrix} 1 & 1 & 2 \\ 2 & 4 & 1 \end{pmatrix}$  and  $B = \begin{pmatrix} 1 & 2 & -1 \\ 4 & 2 & -1 \end{pmatrix}$

What is matrix C if  $C = 3A - 2B$  (5 marks)

(c) If  $D = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}$

What is  $D^{-1}$ ?

(2 marks)

(d) Solve for x and y using matrices

$$\begin{aligned} 4x + 2y &= 8 \\ 3x + y &= 5 \end{aligned}$$

(5 marks)

(Total 20 marks)

## SECTION C - STATISTICS

### Question 5

- (a) Explain any four merits and any four demerits of the arithmetic mean. (4 marks)
- (b) Write short notes on each of the following:
- (i) Ogive (2 marks)
  - (ii) Harmonic mean (2 marks)
- (c) The following table shows the weights (kg) of 100 accountancy students of Trinity Business College in June 2001:

Weights (kg)	No. of students
44 - 44	16
45 - 49	25
50 - 54	21
55 - 59	14
60 - 64	10
65 - 69	8
70 - 74	6

Required:

- (i) Construct a histogram for the above data. (5 marks)
- (ii) Use the histogram in (i) above to estimate the modal weight (in kg). (2 marks)
- (Total 15 marks)**

### Question 6

- (a) Define the following terms.
- (i) Mutually exclusive events (2 marks)
  - (ii) Independent events (2 marks)
  - (iii) Dependent events (2 marks)
  - (iv) Complementary events (2 marks)
- (b) Ian and Rhona appear in an interview for two vacancies in the same post. The probability of Ian's selection is  $\frac{1}{7}$  and that of Rhona's selection is  $\frac{1}{5}$ . What is the probability that

- (i) both of them will be selected? **(2 marks)**
- (ii) only one of them will be selected? **(2 marks)**
- (iii) none of them will be selected? **(3 marks)**

**(Total 15 marks).**

**Question 7**

- (a) (i) What is random sampling? **(2 marks)**
  - (ii) Give two types of random sampling **(2 marks)**
  - (b) What is the difference between homogeneous and heterogeneous populations. **(4 marks).**
  - (d) List the main methods of collecting primary data. **(3 marks).**
  - (d) What are the most important considerations in the design of questionnaires? **(4 marks).**
- (Total 15 marks)**