

THE PUBLIC ACCOUNTANTS EXAMINATIONS BOARD

A Committee of the Council of ICPAU

ATC(U) EXAMINATIONS

LEVEL ONE

BUSINESS MATHEMATICS & STATISTICS - PAPER 3

WEDNESDAY, 17 DECEMBER 2003.

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 1½ 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 $5p^{-3} = 8 \times 5^{-2}$, find the value of p .
- $\frac{8}{125}$.
 - $\frac{2}{5}$.
 - $\frac{8}{5}$.
 - $\frac{5}{2}$.
- (ii) The mean of three numbers is 9, and their mode is 11. Determine the lowest of the three numbers.
- 3.
 - 8.
 - 5.
 - 11.
- (iii) If a revenue function is given by $R = 300Q - \frac{1}{3}Q^2$ then $dR^2/dQ^2 = -2/3$. Which of the following tests will yield a maximum?
- $dR/dQ = 0$.
 - $dR^2/dQ^2 = 0$.
 - $dR^2/dQ^2 < 0$.
 - $dR^2/dQ^2 > 0$.
- (iv) Mr. Y. Zayidi bought 50 boxes of pencils at 12,000 per box. He was offered a trade discount of 5% and cash discount of 2.5%. How much did he pay?
- Shs. 600,000.
 - Shs 555,750.
 - Shs 570,000.
 - Shs 585,000.
- (v) If $A = \{\text{letters in the word APPEAR}\}$ and $B = \{\text{letters in the word DISAPPEAR}\}$. Find $n(A \cup B)$.
- 7.
 - 15
 - 9.
 - 6.
- (vi) The donation to a charity fund in $(n + 1)^{\text{th}}$ week is given by the equation $A = \$D(1 + x/100)^n$, where D and x are constants. Calculate the donation for the second week to the nearest \$10.
- 121.
 - 110.
 - 120
 - 100.

- (vii) Solve the equation $4x^2 = 12x - 9$.
- $x = \{2, 3\}$.
 - $x = \{3/2\}$.
 - $x = \{0, 9/4\}$.
 - $x = \{3, 3/4\}$.
- (viii) During the June 2002 ATC(U) Examinations one quarter of the candidates passed Business Mathematics and Statistics paper. At the next sitting in December 2002 there were 84 more candidates and 8 more candidates passed Business Mathematics and Statistics paper. On this occasion one fifth of the candidates passed. Find the number of candidates who sat the June 2002 examinations.
- 136.
 - 176.
 - 196.
 - 92.
- (ix) At Park Hotel;
- 1 food ticket costs Shs. 1,250;
 - 5 food tickets cost Shs. 6,000;
 - 10 food tickets cost Shs. 11,500 and
 - 15 food tickets cost Shs. 16,500.
- How much do 25 food tickets cost at this hotel?
- 31,250.
 - 25,000.
 - 21,000.
 - 25,500.
- (x) A salesgirl is paid a commission of 8% on the value of goods she sells. If her commission is Shs 60,000, what is the value of goods that she has sold?
- Shs 420,000.
 - Shs 480,000.
 - Shs 690, 000.
 - Shs 750,000.
- (xi) Find the median of the numbers 60, 50, 80, 110, 70, 60, 13.
- 60.
 - 65.
 - 70.
 - 80.

- (xii) Raffle tickets are numbered from 1 to 50. What is the probability that the winning ticket is a multiple of 7 or includes a digit 7?
- (a) $\frac{4}{50}$.
 - (b) $\frac{7}{50}$.
 - (c) $\frac{12}{50}$.
 - (d) $\frac{11}{50}$.
- (xiii) A shortbread recipe uses flour, butter, sugar and nuts in the ratio of 9:6:3:2 by weight. How much butter is used in making 1 Kg of the mixture?
- (a) 30g.
 - (b) 100g.
 - (c) 450g.
 - (d) 300g.
- (xiv) Which point does not lie on the line $3y = 7 - x$?
- (a) (-5, 4).
 - (b) $(0, 2\frac{2}{3})$.
 - (c) (1, 2).
 - (d) (4,1).
- (xv) The proportion defective in the manufacture of T-shirts at Ponix Factory may be taken as 2%. If a sample of 100 T-shirts is drawn at random and assuming a binomial distribution, the standard deviation of the distribution is:
- (a) 2
 - (b) 1.96
 - (c) 1.4
 - (d) 0.02
- (xvi) In a school contest examination, a contestant is awarded 3 marks for each right answer and loses 2 marks for each wrong answer. If one does 24 questions and obtains 37 marks. How many were right?
- (a) 37.
 - (b) 24.
 - (c) 63.
 - (d) 48.
- (xvii) 40 % of the population of a country are male, 25% of the male population and 30% of the female population are under 18 years. What percentage of the total population is under 18 years?
- (a) 10.
 - (b) 18.
 - (c) 28.

- (d) 30.
- (xviii) A graph that extends over a single year and incorporates individual monthly data, monthly cumulative data for the year and moving annual totals of the data is called:
- (a) Lorenz curve.
 - (b) Z - chart.
 - (c) Band – chart
 - (d) Gantt – chart.
- (xix) Evaluate $\frac{{}^{10}C_3 \times {}^{12}C_3}{{}^{22}C_6}$
- (a) 0.354
 - (b) 0.018
 - (c) 294
 - (d) 40,000
- (xx) A firm needs to provide £ 5,000 in six years time and can invest at 5% per annum. How much should be set aside at the end of each year in order to achieve the required amount?
- (a) £ 735.
 - (b) £ 250.
 - (c) £ 5,250.
 - (d) £ 4,750.

SECTION B**Question 2**

(a) If $P = \begin{pmatrix} 2X & 1 \\ 0 & 2 \end{pmatrix} + \begin{pmatrix} 3 & 2 \\ 2 & 3 \end{pmatrix} = \begin{pmatrix} 9 & 3 \\ 2 & 5 \end{pmatrix}$ and $Q = \begin{pmatrix} 1 & -3 \\ -2 & 6 \end{pmatrix}$

Find:

(i) the value of X. (2 marks)

(ii) the value of PQ. (2 marks)

(b) Solve the simultaneous equations: $7x + 5y = -2$
 $4x + 3y = 1$

(4 marks)

- (c) A trade union, on behalf of its members, negotiated a 5% pay rise of the weekly wage or Shs 6,000 per week depending on what is greater. On computation, one of the employees, Hope Kasande, found out that there was no difference between a rise of 5% and a rise of Shs 6,000 per week.

Required:

Calculate Hope Kasande's weekly wage before the pay rise.

(3 marks)

- (d) The Uganda Theatre Institute has a theatre hall with 30 rows of 15 seats each. The tickets for the first five rows cost Shs 30,000 per ten seats. All other seats cost Shs 20,000 per ten seats.

Required:

(i) What is the seating capacity of the theatre hall?

(2 marks)

(ii) Calculate the income from the sale of the tickets for ten performances if all the seats are sold out.

(7 marks)

(Total 20 marks)**Question 3**

- (a) When Peter joined MK Ltd, his starting salary was Shs 1,000,000 per annum. Each year he is entitled to an increment of 10% of the previous year's salary.

Required:How much will Peter earn during the 7th year?

(3 marks)

- (b) An advertisement on one of the MTN shops in Kampala runs as follows:

What do you want for XMAS?

Cheaper phone? Cost: Nokia Shs 320,000.

Terms:

- Cash: 15% discount.

- Hire purchase: deposit 15% of marked price and pay either Shs 82,000 on a monthly basis for four months or Shs 25,000 per week for 12 weeks.

Required:

Calculate:

- (i) A saving the customer would make by buying a Nokia phone on cash terms rather than monthly hire purchase. (7 marks)
- (ii) The saving a customer would make by buying a Nokia phone on weekly hire purchase rather than monthly hire purchase. (3 marks)
- (iii) The percentage of profit the MTN shop would make if it bought the Nokia phone at 20% mark down and sold it on a monthly hire purchase. (7 marks)

(Total 20 marks)

Question 4

- (a) Define the terms marginal cost and marginal profit. (4 marks)
- (b) A manufacturer of lighting fittings has a daily production cost equation $C = 800 - 10x + \frac{1}{4}x^2$, where C is in millions of shillings.

Required:

How many fittings **x** should be produced each day to minimize costs?

(8 marks)

- (c) A firm has just bought a machine for Shs 8,000,000. It will be kept in use for four years, and then will be disposed off for an estimated amount of Shs 500,000.

Required:

Compute the depreciation of the machine using the:

- (i) Straight – line method per annum. (2 marks)
- (ii) Reducing balance method for each year where the rate of depreciation is given by

$$r = 1 - \sqrt[n]{s/c}$$
 where n = number of years,
 s = net residual value,
 c = cost of asset and
 r = rate of depreciation to be applied. (6 marks)

(Total 20 marks)

SECTION C**Question 5**

The managers of Tami Transport Company are investigating the length of time that customers take to pay their invoices, the normal terms for which are 30 days. They have checked the payment record of 100 customers chosen at random and have compiled the following data:

Payment in	Number of customers
5 to 9 days	4
10 to 14 days	10
15 to 19 days	17
20 to 24 days	20
25 to 29 days	22
30 to 34 days	16
35 to 39 days	8
40 to 44 days	3

Required:

- (a) Find the range of the sample and calculate the arithmetic mean, mean deviation and standard deviation
(12 marks)
- (b) Estimate the proportion of paid invoices that will be below 46.6 days.
(3 marks)
- (Total 15 marks)**

Question 6

- (a) Data given in the table below summarises the expenditure of Moroto City Council during a particular year:

Service	Expenditure (million dollars)
Education	160.2
Highways and Public Transport	35.7
Police	28.9
Social Services	27.9
Other	24.5

The above data are to be represented by a pie chart of radius 5 cm.

Required:

- (i) Calculate to the nearest degree the angle corresponding to each of the five classifications.
(5 marks)
- (ii) What percentage of the total expenditure was spent on police?
(2 marks)
- (iii) The following year the Council spent 305.2 million dollars.

Find the radius of the comparable pie chart that could be used to represent the second data.

(3 marks)

- (b) During data collection a questionnaire may be preferred compared to other methods. Suggest any five important considerations to take into account when designing a questionnaire.

(5 marks)

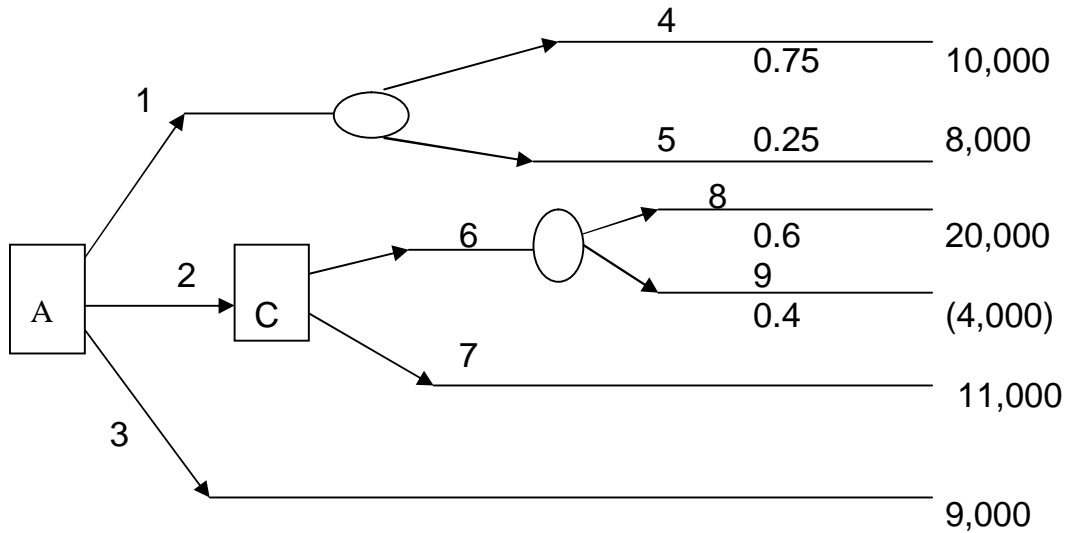
(Total 15 marks)

Question 7

- (a) Given that two events A and B; such that $P(A) = 0.3$ and $P(A \cup B) = 0.6$. Find $P(B)$ when A and B are: mutually exclusive events.

(3 marks)

- (b) The figure below shows a decision tree.



Required:

- What do the rectangles represent? (2 marks)
- What do the circles represent? (2 marks)
- Compute the expected values at points B and D. (4 marks)
- In decision making what do points A and C indicate. (2 marks)
- Using the figure what would be the best option. Give a reason for your choice. (2 marks)

(Total 15 marks)