

EXAMINATION NO. _____



2015 EXAMINATIONS

ACCOUNTING TECHNICIAN PROGRAMME

PAPER TC 3: BUSINESS MATHEMATICS & STATISTICS

WEDNESDAY 3 JUNE 2015

TIME ALLOWED : 3 HOURS
9.00AM - 12.00 NOON

INSTRUCTIONS

1. You are allowed **15 minutes** reading time **before the examination begins** during which you should read the question paper and, if you wish, make annotations on the question paper. However, you are **not** allowed, **under any circumstances**, to open the answer book and start writing or use your calculator during this reading time.
2. Number of questions on paper - 9.
3. The paper is divided into **Sections A** and **B**. **ALL** questions to be answered in **Section A** and **ANY TWO** from **Section B**.
4. The maximum number of marks for each answer is indicated against each question.
5. Formulae Sheets and Graph Paper are provided.
6. Use of non-programmable calculators is allowed.
7. Show all your workings in order to gain full marks. Method marks will be awarded throughout.
8. Final answers must be given correct to 2 decimal places, unless otherwise stated.
9. Begin **each** answer on a fresh page.
10. **DO NOT OPEN THIS PAPER UNTIL YOU ARE INSTRUCTED BY THE INVIGILATOR.**

This question paper contains 6 pages

This question paper must **not** be removed from the examination hall.

SECTION A**ANSWER ALL QUESTIONS IN THIS SECTION**

1. (a) Simplify the following:

$$\frac{-3^2 \times (1-4)^2}{(5-8)^2 \times 3} + 3$$

3 Marks

- (b) Calculate the value of M from the formula below

$$M = \frac{2A(B-4)(10-C)}{3B-4C+2D},$$

where $A = 20$, $B = 6$, $C = 4$ and $D = 5$.**3 Marks****(TOTAL : 6 MARKS)**

2. In order to monitor the efficiency of her department, the Head of the finance section of Kabwerebwere Holdings spot-checks the number of invoices left unprocessed at the end of each day. At the end of the first period of the spot-check (26 working days), she has collected the following data:

1	5	3	3	2	3
0	4	1	4	3	3
2	1	2	1	1	0
3	6	5	0	3	4
2	3				

Required:

- (a) Construct an ungrouped frequency distribution of the data.

3 Marks

- (b) Use the frequency distribution to find the following:

(i) the mean of the invoices left unprocessed;

3 Marks

(ii) the standard deviation of invoices left unprocessed.

4 Marks**(TOTAL : 10 MARKS)****Continued/.....**

3. (a) The cost (in K'00) of producing x shirts in a factory is given by the function $C(x) = 5x^2 - 30x + 100$.

Required:

- (i) Calculate the cost of producing 8 shirts. **2 Marks**
- (ii) Find the production level at which the cost is at the minimum. **4 Marks**
- (b) A car hire centre keeps free pamphlets for information listing the various categories of cars under its management. They currently have 500 pamphlets divided as follows:

Pamphlet	Quantity
Category A vehicles	55
Category B vehicles	265
Category C vehicles	150
Category D vehicles	30

Required:

If a person randomly selects a pamphlet:

- (i) What is the probability that the person will not select a category D vehicle pamphlet? **2 Marks**
- (ii) What is the probability that a Category B vehicle or a Category C vehicle pamphlet will be selected? **3 Marks**
- (TOTAL : 11 MARKS)**

4. (a) (i) Using an example, describe the concept of depreciation. **2 Marks**
- (ii) Assume you have a machine that is valued at K500,000 and depreciates at 6% per annum on a reducing balance.

Required:

Calculate the number of years it will take for its value to reduce to K150,000. **5 Marks**

- (b) Use Cramer's Rule to solve the following simultaneous equations:

$$12x + 4y = 60$$

$$4x + 8y = 40$$

5 Marks
(TOTAL : 12 MARKS)

5. (a) State the difference between continuous data and discrete data. **2 Marks**
- (b) The following table summarises Amaona Kuchedwa's family budget for a typical month in 2014.

Item	Budgeted amount (K)
Food	55,000
Utilities	15,000
Transport	25,000
School fees	40,000
Entertainment	20,000

Required:

- (i) Construct a fully labeled bar chart, using percentages to the nearest whole number. **5 Marks**
- (ii) If the family is expected to pay VAT of 16.5% on non-food items, how much will the family pay? **3 Marks**
- (TOTAL : 10 MARKS)**

6. (a) A Mchengautuwa carpenter makes small tables. He has to pay K4,000 a month for rent, K2,500 a month for insurance and K18,500 to his staff each month. The material for each table costs him K750, while the market price for each table is K1950.

Required:

- (i) Write an equation to represent his profit. **4 Marks**
- (ii) How many tables must he sell in a month to make a profit of K11,000? **3 Marks**
- (b) A company has been in operation for 5 years and the following is the distribution of profits that it has been making.

Year	2009	2010	2011	2012	2013
Profit (K million)	12	15.1	18.5	19.8	16.2

Required:

Express the profit figures as index numbers using 2011 as the base year.

4 Marks
(TOTAL : 11 MARKS)

Continued/.....

SECTION B**ANSWER TWO QUESTIONS ONLY FROM THIS SECTION**

7. (a) (i) Briefly describe the difference between systematic sampling and judgmental sampling. **4 Marks**
- (ii) Give **one** advantage and **one** disadvantage of each of the sampling techniques specified in part (i). **4 Marks**

- (b) A company is building a model in order to forecast total costs based on the level of output. The analysis of data collected for the past 12 months revealed the following:

$$\sum x = 240, \sum y = 2,920, \sum x^2 = 5,110, \sum y^2 = 745,200, \sum xy = 61,500$$

where the output is denoted by x and costs by y .

Required:

- (i) Using the given information, calculate the correlation coefficient and comment on the relationship between total costs and level of output. **5 Marks**
- (ii) Find a simple linear regression model using the given information. **5 Marks**
- (iii) Find the cost when 15 items are produced. **2 Marks**

(TOTAL : 20 MARKS)

Continued/.....

8. (a) (i) Briefly describe any **two** components that make up a time series. **2 Marks**
- (ii) The following table gives the quarterly sales for Wayichukucha Enterprises over the last 3 years.

Year	Sales (K'000)			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
2012	42	41	52	39
2013	45	48	61	46
2014	52	51	60	46

Required:

- I) Plot a fully labelled scatter diagram of the data. **4 Marks**
- II) Using the method of moving averages, find the trend values. **6 Marks**
- (b) An investor is considering three options, only one of which she can afford. All three have the same initial outlay, but there are different income patterns available from each.

Investment A pays K20,000 at the end of each year for the next 5 years.

Investment B pays K10,000 at the end of the first year, K15,000 at the end of the second year, and so on until the final payment of K30,000 at the end of the fifth year.

Investment C pays K40,000 at the end of the first year, K30,000 at the end of the second year, and K20,000 at the end of the third year.

The investor estimates a constant rate of interest of 15 per cent throughout the next 5 years.

Required:

Which investment should she choose?

8 Marks
(TOTAL : 20 MARKS)

Continued/.....

9. (a) An analyst is studying the monthly incomes of two densely populated townships, Ujeni and Njani. The following are percentage distributions of monthly household income in the two townships:

Income Level	Ujeni	Njani
Low	25	15
Lower middle	30	29
Upper middle	32	38
Lower upper	10	9
High upper	3	9

Required:

- (i) State any reason why you would use a multiple bar chart to present the distribution such as this one. **2 Marks**
- (ii) Construct a fully labelled multiple bar chart for the data with income on the horizontal axis. **5 Marks**
- (b) Ung'onoung'ono Ltd manufactures two models of television sets, a portable colour set called Ndixia and a standard colour set called Zude. Each Ndixia model costs K7,500 to produce and sells for K12,500 while the Zude model costs K24,000 to produce and sells for K31,000.

Each set requires time for assembly and testing. A total of 2,000 hours are available during the month for assembly and 600 hours for testing. Each Ndixia model requires 8 hours for assembly and 2 hours for testing. For the Zude model, 10 hours are needed for assembly and 5 hours for testing.

One of the major suppliers of cathode ray tubes has just been affected by a strike and this has restricted the number of tubes available. Supplies in the next month will not exceed 100 tubes for the Zude model.

The aim of Ung'onoung'ono Ltd is to maximize profit.

Required:

- (i) Construct a linear programming model for the monthly production. **4 Marks**
- (ii) Using the graphical method, determine the number of television sets of each model that should be manufactured monthly to maximize profit. **9 Marks**

(TOTAL : 20 MARKS)

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