



INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS OF RWANDA
Driving Sustainable Performance

Associate of



CERTIFIED ACCOUNTING TECHNICIAN

LEVEL 1 EXAMINATION

L 1.4 : BUSINESS MATHEMATICS

WEDNESDAY: 11 JUNE 2014

INSTRUCTIONS:

1. **Time Allowed : 3 hours 15 minutes** (15 minutes reading and 3 hours writing).
2. This examination has **seven** questions and only **five** questions are to be attempted.
3. Marks allocated to each question are shown at the end of the question.
4. Show all your workings, where applicable.

QUESTION ONE

(a) (i) A week before kicking-off of the Kigali Peace Marathon held in May 2014, at Stade Amahoro, an athletics trial was conducted. The performance of the athletes who took part on a certain day is summarized in the following table, capturing the time in minutes that the athletes registered.

| Time (minutes) | Number of athletes |
|----------------|--------------------|
| 120-124 | 5 |
| 125-129 | 14 |
| 130-134 | 17 |
| 135-139 | 32 |
| 140-144 | 15 |
| 144-149 | 10 |

Required :

- (i) Construct a histogram to represent the above data and use it to estimate the modal time, in minutes, registered by athletes. **(5 Marks)**
- (ii) The mean time achieved by the athletes on this day. **(4 Marks)**
- (iii) Pearson’s measure of skewness of time achieved by athletes on this day. **(5 Marks)**

(b) Beamer Limited in Gasabo manufactures and sell motorcycles. The selling price of motor cycles is Frw 1,200,000 per motorcycle and estimated demand and variable costs with their associated probabilities are as follows:

| Estimated demand | |
|------------------|-------------|
| Demand (units) | Probability |
| 5000 | 0.3 |
| 6000 | 0.6 |
| 8000 | 0.1 |

| Estimated variable costs | |
|--------------------------|-------------|
| Variable cost per unit | Probability |
| 60,000 | 0.1 |
| 70,000 | 0.3 |
| 40,000 | 0.5 |
| 45,000 | 0.1 |

Variable cost is independent of volume of sales and fixed costs amount to Frw 10,000,000

Required : Calculated the expected profit of the company **(6 Marks)**

(Total 20 Marks)

QUESTION TWO

a) Manasha Limited manufactures three products namely X, Y and Z .The Company has three outlets, A, B and C. The data below shows the number of units produced of X, Y and Z for the months of June 2014 and July 2014.

| Outlets | JUNE 2014 | | | JULY 2014 | | |
|---------|-----------|-----------|-----------|-----------|-----------|-----------|
| | Product X | Product Y | Product Z | Product X | Product Y | Product Z |
| A | 520 | 900 | 500 | 450 | 800 | 500 |
| B | 350 | 250 | 120 | 420 | 380 | 200 |
| C | 0 | 660 | 200 | 400 | 560 | 250 |

The selling price of product X, Y, and Z in each of the three outlets Frw 40,000, Frw 25,000, and 50,000 respectively

Required : Using matrix algebra, determine the total sales revenue of Manasha Limited for June and July 2014. **(6 Marks)**

b) Mr. Eugene Manishimana purchased a grinding machine at a cost of Frw 1,630,000. The estimated useful life of machine is 10 years with estimated salvage value of Frw 100,000

Required :

(i) The annual rate of depreciation using the reducing balance method **(3 Marks)**

(ii) The net book value of machine after 6th year. **(3 Marks)**

c) Miss Nice Murerwa bought a motor cycle on hire purchase terms. The cash price of a motor cycle is Frw 1,200,000. The hire purchase terms comprise a deposit of 30 percent and 12 monthly installments of the balance and interest payable. Simple interest is charged on principal balance at rate of 15 percent per annum.

Required :

(i) The amount of each monthly installment **(3 Marks)**

(ii) The amount of savings (if any) that Miss Nice Murerwa would have made if she paid a deposit of 50% of cash price and was charged simple interest of 12 percent. **(5 Marks)**

(Total 20 Marks)**QUESTION THREE**

(a) Differentiate between overlapping sets and equal sets as used in set theory **(2 Marks)**

(b) Explain the following terms as used in probability

(i) Probability space **(2 Marks)**

(ii) Random experiment **(2 Marks)**

(iii) Mutually exclusive **(2 Marks)**

(iv) Collectively exhaustive **(2 Marks)**

(c) The Bourne Valley Ice Cream Company conducted a market survey to investigate customers' loyalty to the company three flavours of ice cream namely; **vanilla, strawberry and cocktail.**

The following results were obtained from survey :

| Percentage of customers | Customers' loyalty |
|-------------------------|--|
| 22 % | Loyal to the vanilla ice cream flavour |
| 18 % | Loyal to the straw berry ice cream flavour |
| 16% | Loyal to the cocktail ice cream flavour |
| 10 % | Loyal to both the vanilla and strawberry ice creams flavours |
| 7 % | Loyal to both the vanilla and cocktail flavour. |
| 6 % | Loyal to both the strawberry and cocktail flavours |
| 4 % | Loyal to all the three flavours of ice cream |

Required : The percentage of customers who were loyal to at least one of the three flavours of ice cream.

(4 Marks)

d) The table below shows the weights and index numbers of business in certain economy

| Business activity | Weight | Index |
|-----------------------|--------|-------|
| Industrial production | 40 | 240 |
| Mineral production | 9 | 140 |
| Internal trade | X | 200 |
| Financial markets | 20 | 135 |
| Exports and imports | 10 | Y |
| Shipping | 6 | 300 |

The weighted index number of the business activities is 100 and 215.2 respectively

Required : The values of X and Y

(6 Marks)**(Total 20 Marks)**

QUESTION FOUR

- (a) Distinguish between additive and multiplicative decomposition in the context of time-series analysis. (3 Marks)
- (b) Under what circumstances is time-series analysis inappropriate? (2 Marks)
- c) The following table presents quarterly sales data for sun tan lotion over a three-year period :

| Year | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|------|---------------|---------------|---------------|---------------|
| | Frw “million” | Frw “million” | Frw “million” | Frw “million” |
| 2011 | 55.0 | 76.5 | 61.2 | 77.8 |
| 2012 | 54.4 | 65.9 | 52.7 | 81.4 |
| 2013 | 59.3 | 83.2 | 78.5 | 93.0 |

Required:

- a) Use an appropriate method to calculate the trend and seasonal factors. (10 Marks)
- b) Forecast the level of sales in the four quarters of the year 2015. (5 Marks)

(Total 20 Marks)

QUESTION FIVE

- a) Outline three uses of function in business. (2 Marks)
- b) Aston products limited deals in production of a product named “Amata”

The average revenue and average cost function of “Amata” are given by:

$$AR = 40 - 10X$$

$$AC = 16 - 2x + x^2 + 10/x$$

Where AR = average revenue function (Frw millions)

AC = average cost of functions (Frw millions)

X = Number of units “Amata”

Required :

- (i) The total profit of function (2 Marks)
- (ii) The Maximum profit (6 Marks)

c) Jane Kayitesi sells Bananas, Oranges and Mangoes at her boutique in Kimoronko market. On Monday last week she sold 55 Bananas, 100 Oranges 95 Mangoes making a total sale of Frw 16,250. On Tuesday she sold 60 Bananas, 120 Oranges and 80 Mangoes making a total sale of Frw 15,800. On Wednesday, She sold 75 Bananas, 150 Oranges and 120 Mangoes making total sale of Frw 21,750. She buys these items from a wholesaler at Frw 300, Frw 200 and Frw 600 for a Banana, Orange and Mango respectively.

Required:

- (i) Calculate three simultaneous equation connecting the number of units sold and total sales (4 Marks)
- (ii) Determine the selling price for each item (4 Marks)
- (iii) Average profit for Miss Jane Kayitesi over the three days (2 Marks)

(Total 20 Marks)

QUESTION SIX

- a) Define “Learning Curve Index” and deduce its arithmetic elements. (3 Marks)
- b) List five applications of Learning Curve in a business environment. (6 Marks)
- c) State the use and importance of Spreadsheets in an office. (5 Marks)

d) Briefly elaborate procedures of computation of summation and average using the Excel Worksheet. (6 Marks)

(Total 20 Marks)

QUESTION SEVEN

- (a) An investment worth Frw 750 million earns interest at a rate of 12% per year.

The investor has 2 mutually exclusive options which depend on the frequency of compounding the interest and the time spans:

- Option 1 compounding 4 times a year for 20 years
- Option 2 compounding continuously for 16 years

Required:

- (i) Advise the investor which is best option **(8 Marks)**
- (ii) For option 2, how long will it take for the investment to double **(5 Marks)**

b) A project has an initial cost of Frw 2,000,000 and promises Frw 100,000 cash flow each year for a life span of 10 years. The cost of capital is 12%.

Required:

- (i) Calculate the net present value for the project. **(7 Marks)**

(Total 20 Marks)

End of question paper