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## **CERTIFIED PUBLIC ACCOUNTANT**

### **FOUNDATION 1 EXAMINATION**

#### **F1.1: BUSINESS MATHEMATICS AND QUANTITATIVE METHODS**

**WEDNESDAY: 12 JUNE 2013**

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#### **INSTRUCTIONS:**

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

Attempt any five questions.

### QUESTION ONE

- (a) (i) What is a Lorenz curve? **(3 marks)**  
(ii) State two areas where Lorenz curves can be used. **(2 marks)**
- (b) Manukato Ltd is a producer of cosmetic product and produces the product at its three plants  $P_1$ ,  $P_2$  and  $P_3$ . The available annual production at the various plants were 100 units at plant 1, 200 at plant 2 and 100 at plant 3. The demand at the three markets  $M_1$ ,  $M_2$  and  $M_3$  were 90 units at market 1, 80 units at 2 and 90 units at 3. A unit costs Frw 3, Frw 4 and Frw 1 to produce at plants 1, 2 and 3 respectively. The unit transportation cost from  $P_1$  to market 1, 2 and 3 is Frw 11, Frw 12 and Frw 16 respectively while from  $P_2$  to market 1, 2 and 3 is Frw 10, Frw 11 and Frw 15 respectively and from  $P_3$  to markets 1, 2 and 3 is Frw 12, Frw 10 and 16 respectively.

#### Required:

Using vogal approximation method, determine the optimum production and distribution schedule **(15 marks)**

**(Total 20 marks)**

### QUESTION TWO

Your recent training in Business Mathematics and Quantitative Methods introduced you to data processing which you want to apply to the collected data so as to come up with a rational decision.

The Department of Labour has over a period observed the staff turnover (number of staff leaving the organization per year) due to a number of factors. They are considering formulating a policy to address this turnover problem. However, before they formulate the policy, they need to establish the trends. You have been assigned to establish the trends using baseline statistics. Below is the staff turnover of 80 organizations:

39	41	27	10	24	11	24	24
53	23	44	47	20	23	16	45
30	28	13	31	21	10	31	22
15	44	32	42	34	27	21	29
27	17	36	22	23	59	21	25
49	43	23	48	29	34	21	52
22	23	37	21	14	33	38	28
17	45	16	29	23	27	19	23
25	13	33	15	38	22	24	22
12	37	24	19	24	12	30	35

#### Required:

- a) Construct a frequency distribution table showing the staff turnover using classes from 10-19. **(4 marks)**
- b) Using the table constructed in (a) above, compute the following:
- (i) Mean turnover **(3 marks)**  
(ii) Median turnover. **(3 marks)**  
(iii) Modal turnover. **(3 marks)**
- c) Comment on the organization whose staff turnover is 25. **(3 marks)**
- d) Calculate the standard deviation. **(4 marks)**

**(Total 20 marks)**

### QUESTION THREE

- a) What is the role of index numbers in business? (7 marks)
- b) The table below shows the prices (Frw ) and quantities of five different commodities for the years 2010 and 2011:

Commodity	Base Year 2010		Year 2011	
	Price ( $P_0$ )	Quantity( $q_0$ )	Price ( $P_n$ )	Quantity( $q_n$ )
Food	4	10	5	8
Medical Care	6	8	9	7
Clothes	14	5	7	12
Fuel	3	12	6	8
Communication	5	7	8	5

Using the above data for the year 2010 with 2011 as base year:

- i) Compute the simple price index for each commodity. (5 marks)
- ii) Determine Laspeyre's and Paasche's price index numbers for the year 2010 given 2011 is the base year. (5 marks)
- iii) Comment on the limitations of index numbers. (3 marks)
- (Total 20 marks)**

### QUESTION FOUR

- a) Explain the purpose of venn diagram. (3 marks)
- b) A market researcher investigating consumers' preference for three brands of beverages namely: coffee, tea and cocoa, in Cyangu town gathered the following information:

From a sample of 800 consumers, 230 took coffee, 245 took tea and 325 took cocoa, 30 took all the three beverages, 70 took coffee and cocoa, 110 took coffee only, 185 took cocoa only.

#### Required:

- (i) Present the above information in a venn diagram. (4 marks)
- (ii) Compute the number of customers who took tea only. (2 marks)
- (iii) Find the number of customers who took coffee and tea only. (2 marks)
- (iv) Determine the number of customers who took tea and cocoa only. (2 marks)
- (v) Calculate the number of customers who took none of the beverages. (2 marks)
- (vi) Explain the importance of set theory in business. (5marks)

**(Total 20 marks)**

### QUESTION FIVE

- a) What are the limitations of critical path analysis? (3 marks)
- b) The following activities comprise a project to make a film:

Activity	Preceded by	Duration in weeks
<b>J:</b> Negotiate Distribution	-	6
<b>K:</b> Arrange Publicity	J	5
<b>L:</b> Write Screen Play	-	3
<b>M:</b> Hire Cast and Crew	L	5
<b>N:</b> Shoot and Edit	M,Q	4
<b>P:</b> Design Sets	L	2
<b>Q:</b> Build Sets	P	1

**Required:**

- i) Draw a network diagram for the above mentioned project (7 marks)
- ii) Determine the critical path and its duration? (2 marks)
- iii) From your findings in (i) & (ii) above, what do you advise management to do? (5 marks)
- iv) Draw its Gantt chart and comment on its uses. (3 marks)

(Total 20 marks)

**QUESTION SIX**

a) Write short notes on the following tests

- i) Normal test (2marks)
- ii) T-test (2marks)
- iii) Variance ratio test or f test (2marks)
- iv) Chi squared test (2marks)

b) An observation was made about reading abilities of males and females. The observation leads to a conclusion that females are faster readers than males. The observation was based on the times taken by both females and males when reading out a list of names during graduation ceremonies at iCPAR grounds.

In order to investigate into the observation and the consequent conclusion a sample of 200 men were given lists to read. On average each man took 63 seconds with a standard deviation of 4 seconds

A sample of 250 women were also taken and asked to read the same list of names. It was found that they on average took 62 seconds with a standard deviation of 1 second.

**Required**

By conducting a statistical hypothesis testing at 1% level of significance establish whether the sample data obtained does support earlier observation or not. (6marks)

Nevea industrial manufacturers have produced a Deodorant known as “Nivea For Men.” In order to test its popularity in the market, the manufacturer carried a random survey in Kigali city where 10,000 consumers were interviewed after which 7,200 showed preferences. The manufacturer also moved to Gisenyi area where he interviewed 12,000 consumers out of which 10,000 showed preference for the product.

**Required**

Design a statistical test and hence use it to advise the manufacturer regarding the differences in the proportion, at 5% level of significance. (6marks)

(Total 20marks)

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**End of question paper**