

**INSTITUTE OF BANKERS IN MALAWI**

**CERTIFICATE IN BANKING EXAMINATION**

**SUBJECT: FUNDAMENTALS OF STATISTICS (IOBM – C103)**

**Date: Wednesday, 16th May 2018**

**Time Allocated: 3 hours (13:30 – 16:30 Hours)**

**INSTRUCTIONS TO CANDIDATES**

1 This paper consists of **TWO** Sections, A and B.

2 Section A consists of 20 multiple questions, each question carries 2 marks.

Answer **ALL** questions.

3 Section B consists of 5 questions, each question carries 20 marks. Answer **ANY THREE** questions.

4 You will be allowed **10 minutes** to go through the paper before the start of the examination when you may write on this paper but not in the answer book.

5 Begin each answer on a new page.

6 **Please write your examination number on each answer book used. All answer books without examination number will not be marked.**

7 All persons writing examinations without payment will risk expulsion from the Institute.

8 If you are caught cheating, you will be automatically disqualified in all subjects seated this semester

9 DO NOT open this question paper until instructed to do so.

**SECTION A (40 MARKS)**

Answer **ALL** questions from this section by circling the right answers in the answer sheet provided.

1. A dependent variable in the regression analysis is also known as

A. a predictor.

B. an explanatory variable.

C. a control variable.

D. a response variable.

2. One of the disadvantages of primary data over secondary data is that

A. primary data is relevant to the problem.

B. primary data is time consuming to collect.

C. secondary data already exist.

D. secondary data is less expensive to obtain.

**For questions 3 and 4 choose the best option that correctly fills the blank space.**

3. Two events A and B are said to be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ if the occurrence of event A has no effect on the outcome of event B and vice-versa.

A. exhaustive

B. mutually exclusive

C. equally likely

D. independent

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is good for comparing components both within and across classes in actual terms.

A. Percentage bar chart

B. Loss or gain bar chart

C. Multiple bar chart

D. Component bar chart

5. Half of the difference between lower and upper quartile is referred to as

A. quartile deviation

B. interquartile range

C. mean deviation

D. semi-quartile range

6. A collection of all possible outcomes in a random experiment is called

A. sample space

B. population

C. event

D. likelihood

7. Which of the following is a good example of ordinal variable?

A. Educational qualification (MSCE, diploma, degree)

B. Enterprise size (small, medium, large)

C. Cities (Blantyre, Mzuzu, Lilongwe)

D. Bank accounts (Savings, Current, Investment)

**Use the following information to answer questions 13, 14**

A bank is introducing a new product. The number of product inquires made in the past ten days were recorded as follows;

8 12 6 15 7 19 4 1 11 12

8. What is the modal number of product inquires?

A. 8 B. 12 C. 10 D. 18

9. Find the mean number of product inquires.

A. 9.5 B. 9 C. 18 D. 95

10. Which of the following pairs of diagrams, charts or graphs are used to present interval data?

A. Bar charts and pie chats

B. Histogram and bar graphs

C. Histogram and frequency polygons

D. Pie charts and ogive

11. If 45% of the bank registered customers hold savings accounts, what is the probability that a customer identified at random is not owning a savings account.

A. 0.45 B. 0 C. D. 55

12. Which of the following is a sampling unit for the variable occupancy levels in a city’s lodges in the past few days?

A. Customers

B. Chuma Bank

C. Chuma Bank Managers

D. Chuma Bank employees

13. Which of the following statistical measures can give two or more values from a single distribution?

A. Median

B. Interquartile range

C. Variance

D. Mode

14. Geometric mean is calculated when it is desired to find the average of

A. factors contributing to a product.

B. proportions of parts of a whole.

C. percentages of outcome of interest.

D. multiples of numbers.

**Use the following information to answer question 23 and 24**

A village bank committee is to have two members; a chairperson and a treasurer. There are 6 village bank members all together.

15. What counting technique should be used to find how many different ways can these positions be filled?

A. Multiplicative rule

B. Product rule

C. Permutations

D. Combinations

16. How many different ways can the two positions be filled choosing from the 6 members?

A. 2 B. 6 C. 30 D. 15

17. The value of Pearson’s coefficient of skewness is between

A. -1 and 1

B. 0 and 1

C. 0 and 3

D. -3 and 3

18. In a histogram, the frequency for a class interval is represented by

A. the width of the rectangle.

B. the height of the rectangle.

C. the area of the rectangle.

D. none of the above.

19. Which of the following is **NOT** a type of random sampling technique?

A. Quota sampling

B. Systematic sampling

C. Stratified sampling

D. Multi-stage sampling

20. A bank manageress wants to improve the bank’s yearly earnings. She is interested in understanding how monthly earnings are building up to yearly earnings. If she has data on monthly earnings for previous 5 years, which diagram can she draw?

A. Bar chart

B. Lorenz curve

C. Z-chart

D. Ogive

**SECTION B (60 MARKS)**

Answer **ANY THREE** questions from this section

**QUESTION 2**

1. (i) Define the term ‘sampling frame’. *(2 marks)*

(ii) Briefly discuss **three** reasons why sampling is necessary for statistical decision making in business. *(6 marks)*

1. A bank offered each of its employees a choice of three performance bonus options; a cash bonus option, a profit sharing option and a share option. To analyse the employees’ bonus preferences the manager categorized the employees into their work functions; administration and finance, and presented the information in the following two-way pivot table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| WORK PERFORMANCE FUNCTION BONUS | Cash Bonus | Profit Sharing | Share Option | Total |
| Administration | 28 |  | 68 | **140** |
| Finance | 56 | 75 |  | **160** |
| Total | **84** | **119** | **97** | **300** |

**Required:**

(i). Copy and complete the table by filling in the blank cells with appropriate numbers. *(3 marks)*

(ii). Find the probability that an employee selected at random preferred cash bonus. *(2 marks)*

(iii). What is the probability that an employee selected at random is an administrator and preferred cash bonus? *(3 marks)*

(iv). Find the probability that an employee selected at random preferred cash bonus given that he/she is an administrator. *(4 marks)*

**(Total 20 marks)**

**QUESTION 3**

1. (i) Distinguish between ‘cluster sampling’ and ‘quota sampling’. *(4 marks)*

(ii) Write down any **two** approaches used to gather survey data. *(2 marks)*

1. A distribution is given as follows;

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Class | 5 - 9 | 10 - 14 | 15 - 19 | 20 - 24 |
| Frequency | 8 | 6 | 5 | 1 |

**Required:**

(i) How many items were under study? *(2 marks)*

(ii) Calculate the estimate of the mean of the distribution. *(5 marks)*

(iii) Calculate the estimate of the standard deviation of the distribution. *(7 marks)*

**(Total 20 marks)**

**QUESTION 4**

1. Briefly describe the following sections of a questionnaire;

(i) Administrative section.

(ii) Information section. *(4 marks)*

1. Given that a distribution has the following statistics;

|  |  |
| --- | --- |
| Mean | 7.5 |
| Mode | 12 |
| Median | 9 |
| Standard deviation | 4 |

**Required:**

Find the Pearson’s second coefficient of skewness and interpret the results obtained. *(4 marks)*

1. A bank manager at Njawala Bank wishes to send to tellers for a refresher course. He has 3 women and 4 men who qualify for the course.

**Required:**

(i) Using W and M to represent woman and man respectively, draw a probability tree to present the selection of these two tellers showing all probabilities and all possible outcomes. *(9 marks)*

(ii) Find the probability that the manager selects a pair comprised of a man and woman. *(3 marks)*

**(Total 20 marks)**

**QUESTION 5**

1. Explain the difference between ‘data’ and ‘information’. *(2 marks)*
2. The Head of Marketing of a bank wants to determine the effectiveness of their recent advertising strategy. Over the past 4 months they had varied both the number of ads placed per week and the advertising media (press, pamphlets and magazines) used each week. Weekly sales volume data was recorded as well as the number of ads placed per week and the advertising media used each week.

**Required:**

1. Write all the **three** variables in this study. *(3 marks)*

(ii) State which random variable is being predicted. *(2 marks)*

(iii) Which area of statistical analysis is suggested by this scenario? *(3 marks)*

1. The advertisement for a hardware store chain included a coupon for a 20% discount on a wide variety of products. The numbers of coupons that were used the following week in all of the chain’s 20 stores were listed as follows;

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 25 | 31 | 20 | 32 | 13 | 14 | 43 | 2 | 57 | 23 |
| 36 | 32 | 33 | 32 | 44 | 32 | 52 | 44 | 51 | 45 |

**Required:**

(i) Draw a stem-and-leaf display. *(8 marks)*

(ii) Comment on the distribution. *(2 marks)*

**(Total 20 marks)**

**QUESTION 6**

a) Distinguish between ‘simple linear regression’ and ‘multiple linear regression’. *(2 marks)*

b) You are given the following data for *output* at a factory and *cost* of production over the past five months.

|  |  |  |
| --- | --- | --- |
| Months | Output (x)  (‘000 units) | Cost (y)  (MK’000) |
| 1 | 20 | 82 |
| 2 | 16 | 70 |
| 3 | 24 | 90 |
| 4 | 22 | 85 |
| 5 | 18 | 73 |

**Required:**

Given that , , and ;

Calculate and interpret,

(i). the least squares regression equation to determine the expected level of cost for any given volume of output. *(11 marks)*

(ii). The Pearson’s correlation coefficient between output and cost. *(7 marks)*

**(Total 20 marks)**

**END OF THE EXAMINATION PAPER**