

**INSTITUTE OF BANKERS IN MALAWI**

**DIPLOMA IN BANKING EXAMINATION**

**SUBJECT: INTRODUCTION TO BUSINESS STATISTICS (IOBM – D212)**

**Date: Wednesday, 6th November 2015**

**Time Allocated: 3 hours (08:00 – 11:00 am)**

**INSTRUCTIONS TO CANDIDATES**

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

2 Section A consists of 4 questions, each question carries 15 marks.

Answer **ALL** questions.

3 Section B consists of 4 questions, each question carries 20 marks. Answer **ANY TWO** questions.

4 You will be allowed **10 minutes** to go through the paper before the start of the examination, 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. 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 (60 MARKS)**

Answer **ALL** questions from this section

**QUESTION 1**

1. (i) What is a time series? Illustrate your answer with an example. (*2 marks)*
2. Which time series component (trend, seasonal or irregular) would you associate with the following:
3. Increase in reservations due to an uncommon hot summer,
4. Increase in reservations in the run up to Christmas and New Year festivities. *(2 marks)*

b) A financial analyst has projected that, in 2015, a bank may make profits of K20 million or K12million, or incur a loss of K5m, with probabilities 0.3, 0.5 and 0.2, respectively. Find the expected profit. *(3 marks)*

c) (i) State any **three** conditions under which the Binomial probability distribution occurs. *(3 marks)*

(ii) A bank orders an electronic component that is used in its ATMs and it is known that 10% of the components are defective. The components are sold in boxes of 12. If a box is chosen at random, what is the probability that it has at least 4 defects? *(5 marks)*

**(Total 15 marks)**

**QUESTION 2**

a) Cite **two** uses of the normal distribution. *(2 marks)*

1. A large bank has a number of ATMs in various location of the country. The bank’s records over a long period of time (during which the ATMs utilisation may be assumed to have remained constant) show that the average number of ATMs requiring service per day is 3. Estimate the probability that on a given day
2. No ATM will have to be serviced. *(3 marks)*
3. At the most 3 ATMs will be serviced. *(4 marks)*

(c) Approximately 1 in 10 customers of a bank prefers the savings account. After a promotional campaign in Blantyre, 200 customers were interviewed to determine the effectiveness of the campaign. The result of this sample survey showed that a total of 26 people expressed preference for the savings account.

**Required**

Find the 98% confidence interval for the true population proportion of customers that prefer the savings account. *(6 marks)*

**(Total 15 marks)**

**QUESTION 3**

a) (i) What is the difference between independent events and mutually exclusive events? (*2 marks)*

(ii) If two events, A and B, were mutually exclusive, how would you find the probability that any one of them occurs? *(2 marks)*

b) A bank Manager decided to check the accuracy of data posting in its system. Posting is done by three members of staff: Bamuswe, Katete and Tivine. A sample of 10,000 transactions was selected. 3,000 were posted by Bamuswe, 2,500 by Katete and 4,500 by Tivine. The error rates for Bamuswe, Katete and Tivine are estimated to be 1%, 1.2% and 2% respectively. From the sample of 10,000 transactions, the bank manager selected randomly one transaction.

1. What is the probability that the selected entry has posting errors? (*7 marks)*
2. If the selected entry is found to have posting errors, what is the probability it was entered by Katete? *(4 marks)*

**(Total 15 marks)**

**QUESTION 4**

(a) (i) What is the difference between compound interest and simple interest?

*(2 marks)*

(ii) Kopani borrows *K15*0*,* 000 from Madalo Bank for 72 months at simple interest rate to start a small business. If he must repay *K*180*,* 500 at the end of the 72 month loan period, what rate of simple interest per annum was being charged by the bank? *(4 marks)*

(b) The number of customers using a particular ATM in a week follows a normal distribution with a mean of 6,000 and a standard deviation of 450.

1. What is the probability that between 5,500 and 7,000 customers use this ATM in a week? *(4 marks)*
2. The bank wishes to be 95% certain that the number of customers using the ATM has exceeded a certain value. Calculate this value (i.e. the number of customers to the nearest whole number). *(5 marks)*

**(Total 15 marks)**

**SECTION B (40 MARKS)**

Answer **ANY TWO** questions from this section

**QUESTION 5**

A bank has been monitoring system breakdown over a four year period. Records show the following distribution of the number of system breakdowns.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | **Number of breakdowns** | | | |
| Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
| 2011 | 20 | 10 | 4 | 11 |
| 2012 | 33 | 17 | 9 | 18 |
| 2013 | 45 | 23 | 11 | 25 |
| 2014 | 60 | 46 | 13 | 29 |

1. Plot a fully labelled scatter diagram of the data. (*4 marks)*
2. Use the method of moving averages to find the trend values.*(6 Marks)*
3. Use the trend values to find the seasonal factors. Assume the addictive model is to be applied. *(5 marks)*
4. Forecast the number of system breakdowns for the first two quarters of 2015.

*(5 marks)*

**(Total 20 marks)**

**QUESTION 6**

1. Briefly explain why interest is paid. *(2 marks)*
2. A bank buys four products with the following features.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Products** | **Number of units bought** | | **Price (K’000) paid per unit** | |
| 2013 | 2015 | 2013 | 2015 |
| A  B  C  D | 20  55  63  28 | 24  51  84  34 | 10  23  17  19 | 11  25  17  20 |

(i) Calculate the Laspeyres quantity index for the products. *(4 marks)*

(ii) Calculate the Paasche price index for the products. *(4 marks)*

1. A firm is considering buying a machine costing K200,000 and the expected net cash flows are as follows

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | 1 | 2 | 3 | 4 | 5 |
| Net cash flow (K) | 50,000 | 55,000 | 65,000 | 75,000 | 75,000 |

**Required**

Assuming the cost of capital is 10%, should the firm buy the machine? Use the Internal Rate of Return (IRR) method. *(10 marks)*

**(Total 20 marks)**

**QUESTION 7**

1. Outline **four** major steps that are followed when conducting a statistical test.

*(4 marks)*

1. Describe any **two** methods of investment appraisal and for each method give **one** advantage and **one** disadvantage. *(8 marks)*
2. A bank plans to finance a local company that produces a scientific calculator and a graphing calculator. Long-term projections indicate an expected demand of at least 100 scientific and  at least 80 graphing calculators each day. Because of limitations on production capacity, no more than 200 scientific and 170 graphing calculators can be made daily. To satisfy a shipping contract, a total of at least 200 calculators much be shipped each day.

If each scientific calculator sold results in a K800 loss, but each graphing calculator produces a K1200 profit, the bank wishes to know how many of each type should be made daily to maximize net profits. (*8 marks)*

**(Total 20 marks)**

**QUESTION 8**

(a) Briefly describe **two** errors that may be made when conducting significance tests.  *(4 marks)*

(b) A bank has established that the average income of account holders of Khumucha Savings Account is K15,000. A sample of 45 sample of Khumucha Savings Account holders revealed that their mean income to be K14,300 with a standard deviation of K2,000. At 5% significance level, test if the sample results are significantly different from what the bank has established. *(6 marks)*

1. A survey is conducted among bank customers to determine if there is any difference in customer opinion about the newly introduced stringent loan conditions depending on their age. The results of the survey are as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Age in years** | **Opinion** | | | |
| **Very unfair** | **Fair** | **Don’t Care** | **No opinion** |
| 20 but less than 30  30 but less than 40  40 and older | 100  300  20 | 200  400  40 | 50  80  15 | 30  70  15 |

1. At the 5% level of significance, test if there is any difference in customer opinion depending on their age.  *(9 marks)*
2. In making this decision, what type of error may you have committed?  *(1 mark)*

**(Total 20 marks)**

**END OF EXAMINATION PAPER**