STRICTLY CONFIDENTIAL

THE INSTITUTE OF CHARTERED ACCOUNTANTS IN MALAWI

JUNE 2016 EXAMINATIONS

ACCOUNTING TECHNICIAN PROGRAMME

PAPER TC3: BUSINESS MATHEMATICS & STATISTICS

EXAMINER'S REPORT

GENERAL COMMENTS

The examination paper for this subject was fair and of the appropriate diploma level. This report is summary of the candidates' performance in general, but also, on the performance of the individual questions and recommendations/ suggestions for future examinations.

The paper covered the syllabus adequately and was the appropriate level. However, the candidates' performance was below expectation. Many candidates had problems in the following areas of the syllabus: inequalities and equations, probability, integration, graph sketching, correlation and financial mathematics.

COMMENTS ON INDIVIDUAL QUESTIONS

The paper had two sections, A and B. Section A, which had six questions and was compulsory, while Section B had three questions and candidates were required to answer any two. Below are the questions asked and how the candidates generally performed.

Question 1

Question 1 involved simplifying an expression and solving an inequality. In part a), some candidates instead of directly expanding and simplifying the expression $(2-t)^2-(t-3)^2$ took it as a difference of two squares and erroneously expanded as follows: $(2-t)^2-(t-3)^2 = (2-t)(2+t)-(t-3)(t+3)$.

In part b), while some candidates were able to find the common denominator of 20 for the denominators 4 and 5 and then solved the inequality as it was supposed to be, others replaced the inequality with the equal sign and solved the equation $\frac{x-3}{4}-\frac{x+4}{5}=6$. Solving an equation instead of the inequality made the candidates lose marks.

Question 2

This was on integration and finding the geometric mean. Most candidates were able to find the geometric mean as the question had demanded, although some calculated the arithmetic mean, hence, got it wrong.

Part (a) was on integration. While a fair attempt was made by most candidates in integrating the integrand $f(x)=3x^2-2x+1$, a few had problems applying the Fundamental Theorem of Calculus to evaluate the definite integral as follows: $\int_0^1 (3x^2-2x+1)dx=\left[\frac{3x^3}{3}-\frac{2x^2}{2}+x\right]_0^1$.

Other candidates were able to integrate $3x^2$ and $-2x$, but failed to integrate the $+1$.

Question 3

This question was fairly well handled by the candidates. It involved constructing a fully labelled ogive, then use it to answer some questions based on the ogive constructed. Some, however, did not obtain cumulative frequencies, hence, constructed something that looked like a normal distribution graph. In addition, candidates failed to produce very smooth ogives. They need to improve in the quality of graphs and diagrams that they produce.

Question 4

Part (a) involved sketching the graph of the profit function $TP=-x^2+9x-14$. The candidates were expected to come up with a table of values for use in sketching the graph. The challenge that the majority of the candidates faced was getting the values of total profit using mere substitution. Most of them had difficulties dealing with $-x^2$. In addition, even those that had sketched the correct graph had difficulties to find the range of number of units that the company needs to produce to make a profit. This was supposed to have been read from the graph by looking at the values for which total profit was positive.

Most candidates did very well in part (b) by solving it using Arithmetic instead of formulating simultaneous equations to calculate the number of estates for macadamia nuts and coffee.

Question 5

This question was on logarithmic equation and distinguishing between simple and compound interest. On the distinction between simple and compound interest, the

expectation was that candidates would base their answers on how each interest type is found rather than the formulae used in their calculation.

The logarithmic equation proved difficult for many candidates, since they failed to apply the formulae of logarithms when two numbers are multiplied. i.e. $\log_b M + \log_b N = \log_b (MN)$. Others just dropped off the logs to erroneously simplify the equation as follows: $\log_{10}(x-3)+\log_{10}(x-2)=\log_{10}(2x+24)$ to $(x-3)+(x-2)=2x+24$. Thus $\log_{10}(x-3)+\log_{10}(x-2)=\log_{10}(2x+24)$ should have been reduced to $\log_{10}(x-3)(x-2)=\log_{10}(2x+24)$ and eventually $(x-3)(x-2)=2x+24$, which is solved as a quadratic equation.

Question 6

The candidates performed well in this question. It was on advantages and disadvantages of some data collection methods and matrices. However, almost all the candidates failed to give a disadvantage of observation – which is observer bias.

Candidates handled part b) on matrices fairly well. It was pleasing to note that some of them had realized that in some cases matrix multiplication was not compatible and said so e.g. $\begin{pmatrix}40\\75\\25\end{pmatrix}\begin{pmatrix}10 & 5 & 50\\20 & 8 & 80\end{pmatrix}$. They were awarded full marks accordingly.

Question 7

Many candidates avoided this question in Section B especially part (a) which was on arithmetic progression. Candidates were expected to form simultaneous equations using the information provided. Most of them seemed not to notice that what they were given were sums, therefore, should have used the formula $S_n = \frac{n}{2}[\,2a+(n-1)d\,]$ instead of the nth term $a+(n-1)d$.

In part (b), the candidates had difficulties finding the standard deviation, hence got it wrong, because they did not use the standard deviation formula. Since these were samples, candidates were supposed to use $\sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$ instead of $\sqrt{\frac{\sum(x-\bar{x})^2}{n}}$ to find the standard deviation.

Question 8

This question was on sampling, financial mathematics and construction of a Lorenz curve. Many candidates seemed not to know the difference between a sample and a sampling frame, but also, why a sample is preferred to the whole population.

Part (b) was on compounding. While candidates were able to apply the compounding formula $A = P(1+r)^n$, some had problems applying the formula when compounding semi annually. Candidates were expected to consider the number of periods in order to come up with $5\left(1+\frac{14}{100}\div 2\right)^{3\times 2}$.

In the construction of the Lorenz curve, the problem was obtaining cumulative frequencies of households and income. Most candidates failed to do so.

Question 9

The last question was on probability and correlation. It was clear that candidates had confused mutually exclusive events with independent events. Mutually exclusive events were mostly interpreted as those that are independent of each other such as 'rainfall' and 'going to school'. Candidates were supposed to give a definition of mutually exclusive events as 'events that cannot happen at the same time' such as getting 'a head' and 'a tail' when a fair coin is tossed.

Part (a) (ii) was on probability and no candidate got full marks. Candidates failed to come up with the tree diagram, hence, had difficulty finding the required probability. Candidates seemed not to have taken time to read and analyse the information in order to identify which comes first between sitting for medical profession examinations and attending classes.

Part (b) was on correlation. In the first part, the candidates were asked to distinguish between product moment correlation coefficient and rank correlation coefficient. A few candidates were able to explain the difference between the two.

In part (ii), on the other hand, many candidates failed to rank the data correctly, hence, attempted to find the product moment correlation coefficient instead. It was pleasing, however, to note that some candidates were able to come up with adjusted ranks in case of a tie in the ranks.

CONCLUSION

In summary, the question paper was a fair combination of questions that required candidates to exhibit the knowledge of various concepts and also perform calculations. The question paper made a thorough coverage of the syllabus.

As has been the case in previous examination diets, candidates appeared not to have been fully prepared for the examination. This is evident from their failure to tackle questions, such as, simplifying expressions, applying formulae, solving equations, probability, progressions and calculus problems. Extra effort should be made by candidates to understand topics in Calculus and Probability in particular.

Recommendation/Suggestions

The following recommendations are made to help candidates do better in future examinations:

(i) Candidates should cover the whole syllabus adequately.

Most candidates appeared not to have been fully prepared for the examination. This was clearly shown in the way they tackled the questions, while others opted to avoid some questions.

(i) Candidates must make an effort to understand concepts in non-traditional areas of Mathematics such as Calculus, Linear Programming and Probability. Candidates must learn and understand the various concepts that are part of the syllabus.

(ii) Candidates need to follow instructions that are given on the question paper.

(iii) Candidates must also use graph paper for questions where they are asked to construct charts/graphs and label them accordingly.

(iv) Candidates must be encouraged to show their working clearly and to be neat and orderly.