Examiner's Report

AA1 EXAMINATION - JULY 2019

(AA12) QUANTITATIVE METHODS FOR BUSINESS

PART A

Question No. 01

Questions in this section consisted of Objective Test Questions, namely 10 multiple choice questions and 5 short questions for 40 marks covering the overall syllabus. Most of the covering the overall syllabus. Most of the candidates had obtained more than half of the marks. Only a few had obtained full marks. On the whole candidates had read the questions carefully, understood and answered satisfactorily to this section. Even though the number assigned to the correct choice of the answer was expected, some candidates had proceeded to write explanatory answers to questions. Some candidates had written several choices to the same question. Some candidates had written Roman figures instead of the optional numbers given in the question. There were instances where the number of the selected answer was not clearly written.

Common weaknesses noted from the answers to sub-sections of Question No. 01 and comments are set out below:

1.1 Arriving at the solution of a simple equation was expected in this part. This was a simple problem and most candidates had submitted correct answers.

1.2 This was a question set out to test the understanding of calculation of simple interest, and calculation of the amount of interest on a loan obtained for 3 years was required. A considerable number of candidates had given the correct answer. Some candidates however, had calculated interest only for 2 years. Candidates did not have a clear understanding of simple interest and compound interest. This was one of the 10 Objective Test Questions for which candidates had provided correct answers.

1.3 In this problem it was tested the marginal cost function giving the total cost function for a given product. Most of the candidates had provided the correct answer. Some candidates did not have a clear understanding that Marginal Cost Function could be arrived at using the calculus method on the Total Cost Function. Further it was noted that a few candidates lacked the knowledge on use of calculus method.

1.4 This problem relates to solving simultaneous equations with two (02) variables. majority of the candidates had supplied correct answers. This happened to be one of the few Objective Test Questions answered correctly by the most number of candidates. The candidates who made mistakes in this question were found to be lacking the knowledge in simplification.

1.5 In this question the linear regression line of a set of data and summary statistics ∑y, ∑x and n had been given and the value of the absolute 'a' was to be arrived at by candidates. A few candidates had substituted the value of ∑y instead of y of the regression line, and the value of ∑x instead of $\bar{x}$ and given the answers as 120.

1.6 In this question individual prize indices of 3 items with their relative weights had been given and it was required to calculate the relative price index.

It was expected to obtain the average relative price index by using the prize

index formula = $\frac{\sum[w \times I_p]}{\sum w}$ X 100.

A considerable number of candidates had selected correct answer. It was observed that most candidates did not have correct understanding of calculation of this index.

1.7 The trend equation relevant to annual sales figures of a company had been given in this question and it was required to estimate the average sales for the year 2017. Only a few candidates had selected the correct answer.

Majority of the candidates failed to obtain the average sales value of 10,017 by substitution of x = 7 to the trend equation T = 483 x + 6,636.

1.8 This was a question set to test the knowledge of candidates on probability.

Candidates should understand that when P(A) = 0.57 , P(B) = 0.28 with A and B as two mutually exclusive events P (A∪B) = P (A) + P (B). Some candidates had not identified the probability of happening of events A and B as P (A∪B). It was clear that majority of candidates had not correctly understood the concepts of probability concerning mutually exclusiveness and joint events. It also appeared that most candidates lacked basic knowledge about profitability.

1.9 The monthly expected profit of a newspaper agent to be obtained through the profitability distribution of his monthly profit / loss given was expected in this question. It was noticed that the knowledge of candidates on profitability distribution was very low.

1.10 A question included to test the knowledge of candidates on arithmetic progression. A few terms at the beginning of the progression had been given expecting calculation of the 20^{th} term.

It was possible to arrive at the 20^{th} term easily by identifying the 1^{st} term as 22 and common differences d = 5 in the formula $T_n = a + (n-1)\, d$. But candidates had not been able to arrive at the correct answer having not selected the correct formula and using incorrect methods.

1.11 Identifying the best option for investment under the techniques NPV and IRR was required in this question. Although it was expected to work out the best investment separately under each of the techniques, candidates had not understood it correctly and had selected one investment under both techniques.

1.12 This question was based on effective annual interest rate. Most candidates had found it difficult to use correct formula,

$$\left(1 + \frac{r}{n}\right)^{n} - 1$$

The answer of most candidates was that the effective annual interest rates was 4%. But correct answer was 16.98%.

1.13 Although this was a very easy problem of identifying the profit function of a company with the Total Revenue (TR) function and Total Cost (TC) function given, majority of the candidates had been unsuccessful due to errors in simplification. They had incorrectly simplified TR - TC = 22 x - 15 x + 12,600. They had not understood that when deducting an item with more than two terms brackets should be used and when bracket is removed all the terms should be multiplied by the value in front of the bracelet.

1.14 In this question the definition of an annuity had been given and whether it is true or false had been tested. Most candidates had answered very successfully.

1.15 Correlation coefficient between a pair of variables had tested. Here candidates should be aware that the value of correlation coefficient can be plus, minus or zero. However, most candidates had answered satisfactorily.

PART B

The following matters were observed in the evaluation of answers of this section which consisted of 04 compulsory questions.

Question No. 02

This was a problem set to test the knowledge on compound interest, value of annual installment and preparation of loan amortization schedule covering under the financial mathematics section. On the whole, majority of the candidates had written satisfactory answers to **part (a)** and a considerable number of candidates had written satisfactory answers to **part (b) (i)** as well. Answers to part (b) (ii) were at minimum and out of that only a few had been successful.

Some candidates had attempted to calculate compound interest, year by year, using the compound interest formula $A = P (1 + r)^n$ and they had to face more simplification errors because of use of long methods.

In order to arrive at the installment, they had used incorrect methods without using the formula, $A = \frac{S \times R^n \times (R - 1)}{R^n - 1}$ or DCF X A = 75,000.

Question No. 03

This question consisted of 2 parts **(a)** and **(b)**. **Part (a)** tested the calculation of number of units to which maximize the profit when the Total Revenue (TR) function and Total Cost (TC) function were given. **Part (b)** expected identifying total cost function and breakeven quantity when fixed cost for a month, Total Variable Cost (VC) for a month and Total Revenue (TR) function were given.

(a) A considerable number of candidates had understood correctly and provided correct answers that the Profit (P) function should be arrived at by subtracting Total Cost (TC) function from the Total Revenue (TR) function. Some candidates had made mistakes in simplifying TR - TC. A considerable number of candidates had no correct idea about calculus. A few candidates had attempted to solve the problem treating TP = TC - TR.

Majority of candidates who recorded the profit function correctly, equating it to "0" using calculus had correctly calculated the number of units that maximized profit. A few candidates had provided incorrect answers taking the profit function as (P) = 0. Some candidates had correctly calculated the number of units maximizing profit by equating Marginal Revenue (MR) to Marginal Cost (MC). A considerable number of candidates had attempted to solve the problem treating TR = TC instead of MR = MC.

Question No. 04

This question consisted of 2 parts **(a)** and **(b)**. Calculation of mean and standard deviation using the data given was expected through **(a)** while knowledge on normal distribution was tested through **(b)**.

(a) It was necessary to calculate the mean and standard deviation of the lifetime of a battery using the given data.

(i) Majority of the candidates had correctly calculated the mean lifetime of a battery. Due to non-calculation correctly of the mid value of class intervals, mixing up values of ' f ' and ' x ' of data and not taking correctly total of $\sum fx$ a few candidates had not been able to calculate the mean correctly.

(ii) A considerable number of candidates had calculated the standard deviation of the life of a battery correctly. Some candidates had not been able to arrive at the correct answer due to not using the correct formula, not copying the formula correctly, not identifying the difference between $(\sum x)^2$ and $\sum x^2$ correctly, not calculating the required terms, not substituting correctly as fx x fx and fx x f in working at fx^2 and not taking $\sqrt{}$.

(b) Knowledge on normal distribution was absolutely necessary to write answers to this point. Only a few candidates had attempted to answer this part. Candidates who did so had obtained only the answer z = 0.1846. It had been difficult for most candidates to calculate the probability using the normal distribution table.

Question No. 05

This is a question relating to regression. The amount of money received by a shop-keeper, x and y from the sale of books and sweets, with the relevant data table and values $\sum x$, $\sum y$, $\sum x^2$, $\sum y^2$, $\sum xy$ have been given.

(a) The question required identification of the least squqre regression line given by $y = a + bx$. Only a few candidates had correctly identified the regression line. Although a considerable number of candidates had arrived of the value of 'b' correctly using the correct equation, they failed to get the correct answer to 'a' by substitution to the formula due to lack of adequate knowledge of basic mathematic concepts. Also some candidates had unnecessarily drawn the relevant graph instead of the equation of the regression line.

(b) Majority of the candidates who identified the regression line correctly had provided correct answers to this part also. Due to errors in simplification and not understanding the question correctly others had failed to submit correct answers. Also some of the candidates had used unnecessary incorrect methods instead of calculating the sales income by substitution of x = 350 to the equation.

PART C

Question No. 06

This question comprised of 3 parts **A, B** and **C**. **Part A** presented a problem about index numbers, **Part B** about time series and **Part C** about profitability.

(A) This was a question on index numbers. The base weighted aggregate price index (Laspeyre's Price Index) for 2018 had to be calculated considering 2015 as the base year using the given data of quantities and prices of the three items A, B, C for 2015 to 2018. Most of the candidates had provided correct answers. The reason why some candidates failed to answer this question are, mixing up columns necessary to calculate p_1q_0 and p_0q_0 , not calculating $\sum p_1q_0$ and $\sum p_0q_0$, finding $\sum p$ and $\sum q$ separately and multiplying, inability to select the correct price index for solving the problem from the Formulae sheets, not copying correctly to the answer booklet the quantities and prices given in the question, Errors of multiplication and divisions and considering base year as 2018 instead of 2015.

(B) This was a question on time series related to sales of a company. In a table showing quarterly sales, 4 quarter moving average and centered moving average where part of the information is given. The blanks had to be filled by the candidates and provided the 4 quarter moving averages for blanks marked as (a) and (b) and centered moving averages for blanks marked as (c) and (d). But there were shortcomings in calculating the values of blanks marked (e) and (f) in Y/T.

(C) This was a problem about probability. Most of the candidates did not have the ability to correctly draw the tree diagram to answer this problem. The probabilities given had not been correctly recorded in naming the branches of the Tree Diagram. Also they had not known that the probabilities of the branches had to be multiplied while going up the branches. It was noted that the fact that the total of probabilities is 01 was not known and the knowledge of candidates in converting percentages to decimals was low.

Some candidates had considered 16/100 * 4/100 = 64/200 and 4/100 * 16/100 = 64/100 in arriving at in probability. It appered that the basic mathematical knowledge of candidates was low. In here some candidates had done the calculation paying no attention to machine B.

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General matters for which attention should be drawn to improve the performance level of candidates:

(1) Study the full contents of the new syllabus completely paying more attention to newly introduced subject matters.

(2) Workings should be clearly shown along with answers wherever applicable.

(3) Care should be exercised in copying formulae and in substitution. Use the most convenient formula when several formulae could be applied to answer for certain questions.

(4) Handwriting should be legible and the numbers of questions should be correctly written.

(5) Follow the instructions given in the question paper.

(6) Perusal of past question papers and suggested answers would help sharpening of knowledge and experience.

(7) Proper management of time is important.

(8) Re-check the question numbers before handing over the answer scripts.

(9) Appearing for the examination with a firm determination of passing the examination with due preparation.

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