

EXAMINER'S REPORT**AA1 EXAMINATION - JANUARY 2020****(AA12) QUANTITATIVE METHODS FOR BUSINESS**

Part - A**Question No. 01**

Question in this section consisted of Objective Test Questions (OTQ), namely 10 multiple choice questions, 3 marks per question and 5 short questions 2 marks per question for 40 marks covering the overall syllabus. Most of the candidates had obtained more than half of the marks out of allocated marks. On the whole candidates had read question carefully, understood and answered satisfactorily to this section. Even though it was expected to write correct choice in front of relevant question number for the question No. 1.1 to 1.10 (10 OTQs.). Some candidates had proceeded to write explanatory answers to questions. Some candidates had written several choice to the same 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 from this question and majority of candidates had submitted correct answers.

1.2. This was a question set out to test the understanding of calculation of simple interest.

It was expected to substitute to $I = \frac{ptr}{100}$ formula and majority of candidates had submitted correct answers.

1.3. In this problem it was tested the Marginal Revenue (MR) function related to a revenue giving the Total Revenue (TR) function for a given company. Most of the candidates had provided the correct answer. Some candidates did not have a clear understanding that marginal revenue function could be arrived at using the calculus method based on total revenue function. Further it was noted that a few candidates lack the knowledge on use of calculus method.

1.4. Although this question expected to calculate the quantity relative substituting the $\frac{q_1}{q_0} \times 100$ correctly by this question, only considerable number of candidates had obtained correct answer.

- 1.5.** This question expected to find the value for NPV for a given project. Majority of the candidates had not given correct answer. It was seen that the inadequate knowledge of the candidates to do the calculations correctly using the correct formula.

Even though it was expected to get Rs.1,215,000/- as nearest value to NPV, majority of candidates failed to get that amount.

- 1.6.** In this question individual price indices of 3 items with their relative weights had been given and it was required to calculate the relative price index. It is expected to obtain average relative price index using the price index formula $= \frac{\sum p_1}{\sum p_0} \times 100$.

Considerable number of candidates had selected correct answer. Therefore it seems that majority of candidates had understanding on price index formula.

- 1.7.** The trend equation relevant to energy consumption of a country within 6 years had been given in this question and it was required to estimate the energy consumption for the year 2019. Only a few candidates had selected the correct answer.

Majority of candidates failed to obtain the average consumption of 231 by substitution of $x = 7$ to the trend equation $T = 210 + 3x$.

- 1.8.** This was expected to find the probability of P(MUY) by the given Venn diagram. Some candidates had not obtained correct answer due to the lack of knowledge on that. The P(MUY) is arrived by adding the probability of relevant 3 areas in a Venn diagram. But due to the lack of understanding correct answer was not taken. Some candidates had not considered $M \cap Y = 0.12$

- 1.9.** The answer was to be expected through the probability distribution related to expected value of a given sales of a company and substituting to formula $E(x) = \sum_{i=1}^n xp(x)$.

Few candidates had submitted wrong answer due to lack of knowledge on basic principles. Majority of the candidates has submitted correct answer.

- 1.10.** This question tested the knowledge on compound interest. It was expected to substitute $S = X(1 + r)^n$. But few candidates had not been able to compute $(1 + r)^n$. There were majority of candidates who had obtained correct answer using calculations.

- 1.11.** This question tested the knowledge on calculation of profit / loss. It was expected to calculate the purchase price giving the sales price and profit margin. Adequate number of candidates had submitted the correct answer.

- 1.12.** This question is on calculation of simple interest. It needs to be find the invested amount building the equation and solving it use of statement related to simple interest. Here, majority of candidates had not read the question properly. Majority of candidates had failed to build the equation $x \times \frac{8}{100} + (500,000 - x) \frac{6}{100} = 38,000$ considering the investment made at 8% as x .

- 1.13.** This question tested the theoretical knowledge on sampling. Here, it was requested to write reasons for use of sampling and majority of candidates had not answered successfully. Majority of candidates had written answers which were not related to the question.
- 1.14.** It was asked to write true / false for a given statements for question number **1.14** and **1.15**. In 1.14, it was tested the knowledge on how to be -1 for correlation coefficient between a pair of variables. Majority of candidates had identified that there is a strong minus relationship.
- 1.15.** It was tested the theoretical knowledge on, total revenue is equal to total cost at breakeven point. Almost all the candidates had submitted correct answer.

Part - B

The following matters were observed in the evaluation of answers of this section which consisted of 4 compulsory questions.

Question No. 02

This was a problem set to test the knowledge on compound interest, total amount in the account at the end of second year, total interest earned and value of annual installment. On the whole, majority of candidates had written satisfactory to **part (a) (i)** and a considerable number of candidates had written satisfactory answers to **part (a) (ii)** as well. Answers to **part (b)** were at minimum and out of that only a few had written successful answer.

Some candidates had attempted to calculate compound interest, year by year for the total amount to be available at the end of second year, while using the compound interest formula $S = X(1 + r)^2$ 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 formula.

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 given product, variable cost for a production unit and Total Revenue (TR) function were given.

- (a) A considerable number of candidates had understood correctly and provided correct answer that the profit (P) function should be arrived at 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 did not have 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 following the alternative method of equating Marginal Revenue (MR) to Marginal Cost (MC). A considerable number of candidates had attempted to solve the problem treating $TR = TC$ instead of $MR = MC$.

- (b) (i) This part expected to find profit function through the total cost function. Some candidates had calculated $TC - TR$ instead of $TR - TC$. Majority of candidates had not multiplied by minus (-) when solve $TR - TC = 74x + 2x^2 - (3x^2 - 86x + 250)$.
- (ii) It was required to find x solving $TR - TC$ to calculate the breakeven quantity. If not so, it was required to find x equating the profit function to 0. Considerable number of candidates had submitted correct answer.

Question No. 04

This question consisted of 3 parts (a), (b) and (c). It was tested the knowledge on calculation of mean through part (a), standard deviation through part (b) and coefficient of variation through part (c).

It was necessary to calculate the mean, standard deviation and coefficient of variation of the monthly salary of 50 employees using the given data.

- (a) Majority of the candidates had correctly calculated mean using the formula $\bar{x} = \frac{\sum_{i=1}^n fix_i}{\sum_{i=1}^n fi}$.

Due to not calculating correctly the mid value of class intervals, mixing up values of "f" and "x" of data and not taking correctly the total of $\sum fx$, few candidates had not been able to calculate the mean correctly.

- (b) A considerable number of candidates had calculated the standard deviation of the employees' salaries correctly. Some candidates had not been able to arrive at the correct answer due to not using the correct formula $\sqrt{\frac{\sum fx^2 - x^2}{\sum f}}$ 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 $fx \times fx$ and incorrectly substituting as $fx \times f$ in arriving at fx^2 .
- (c) Majority of candidates had not been able to obtain correct answer due to not applying the correct formula for coefficient of variation $\frac{\text{Standard Diviation}}{\text{Mean}} \times 100$ and not obtain correct answer for **part (a) and (b)**.

Question No. 05

This is a question relating to regression. The details of the vehicles sold within 6 months by a vehicle manufacturing company (x) and total manufacturing cost in (y) had been given by the table.

- (a) Majority of the candidates had obtained higher marks presenting the data in a scatter diagram drawn in a graph paper.
- (b) The question required to identification of least square regression line given by $y = a + bx$.

It was not correctly submitted when a and b calculated as follows:

$$b = \frac{n \sum xy - \sum x \sum y}{n \sum x^2 - \sum x^2} \quad \text{and} \quad a = \bar{y} - b\bar{x} .$$

- (c) Majority of the candidates who identified the regression line correctly had provided correct answers to this part. Due to errors in simplification and not understanding the question correctly, others had failed to submit correct answers. Some of the candidates had done unnecessary calculations instead of calculating the expected production cost by substituting of $x = 55$ to the equation.

Part - C

Question No. 06

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

- (A)** This part tested the finding of values for x and y solving the simultaneous equation. Majority of the candidates had submitted answers successfully. Few candidates had not done calculations correctly when solving the simultaneous equations.

- (B)** This was a question on time series related to sale of a product. It was required to fill the blanks. In a table showing quarterly sales, 4 quarter moving average and centered moving average where part of the information is given. Most of the candidates had correctly calculated the values for (a) and (b) for 4 quarter moving averages and (d) and (e) for centered moving averages. But there were shortcomings in finding the value of Y/T .

- (C)** This was a problem about probability. **Part (a)** required to read the problem well and draw the tree diagram. However, majority of candidates failed to name the branches of the tree diagram. In **part (b)** when obtaining the probabilities through tree diagram, some candidates had added probabilities instead of multiplying the probabilities. It was noted that some candidates did not know the fact that the total of probabilities is 01 and the knowledge of candidates in converting percentages to decimals was low. Considerable number of candidates had failed to correctly understand the meaning of word at least and identify the all ways related to **(b) (ii)** and **(iii)**.

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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 syllabus completely paying more attention to newly introduced subject matters.
- (2) Workings should be clearly shown along with answers where applicable.
- (3) It is required to correctly apply the basic mathematical rules and simplifications in copying formula and in substitution. Use the most convenient formula when several formula could be applied to answer for certain question. Further when formulas are copying, it should be considered without changing “+” and “-” marks.
- (4) Some candidates have obtained final answer using calculators. However, it is appropriate to present the final answer following the steps of correctly writing the formula and substituting the values to it. In doing so, there is a possibility of score the marks for steps when final answer is not correct.
- (5) It should be exercised to correctly apply the mathematical principles in solving equations and calculus of functions.
- (6) Handwriting should be legible and the numbers of questions should be correctly written.
- (7) Follow the instructions given in the question paper.
- (8) Perusal of past question papers and suggested answers would help sharpening knowledge and experience.
- (9) Proper management of time is important.
- (10) Re-check the question numbers before handing over the answer scripts.
- (11) There were instances that new questions had been started in a small space at the end of previous question without starting the new question in a new page. Each question should be started in new page at all times for easy reference.
- (12) Appearing for the examination with a firm determination of passing the examination with due preparation.

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