



Association of Accounting Technicians of Sri Lanka

AA1 Examination - January 2020

**Suggested Answers
Subject No : AA12**

**QUANTITATIVE METHODS FOR BUSINESS
(QMB)**

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THE ASSOCIATION OF ACCOUNTING TECHNICIANS OF SRI LANKA
EDUCATION AND TRAINING DIVISION

AA1 Examination - January 2020
(AA12) Quantitative Methods for Business

SUGGESTED ANSWERS

SECTION – A

Fifteen (15) compulsory questions
(Total 40 marks)

Suggested Answers to Question One:

1.1 **Answer 02**

$$3x + 3 = 2(x + 2)$$

$$3x + 3 = 2x + 4$$

$$x = 1$$

(03 marks)

1.2 **Answer 01**

$$I = prt \quad P = 25\,000 \quad r = 8.0\% = 0.08 \quad t = 5$$

$$I = 25\,000 \times 0.08 \times 5$$

$$I = 10,000$$

(03 marks)

1.3 **Answer 04**

$$TR = 33q - 4q^2$$

$$MR = 33 - 8q$$

(03 marks)

1.4 **Answer 03**

$$Q = (9,500 / 6,000) \times 100$$

$$= (q_1 / q_0) \times 100$$

$$= 158\%$$

(03 marks)

1.5 **Answer 02**

NPV = Present value of cash inflow - Present value of cash outflow

$$PV = \frac{X}{(1+r)^n} \quad r = 0.1 \quad PV = \frac{X}{1.1^n}$$

$$NPV = \frac{2,500,000}{1.1^1} + \frac{2,500,000}{1.1^2} + \frac{2,500,000}{1.1^3} - 5,000,000$$

$$NPV = 6,217,130 - 5,000,000 \\ = \underline{\underline{1,217,130}} \approx \underline{\underline{1,215,000}}$$

(03 marks)

1.6 **Answer 01**

$$\Sigma P = \frac{\Sigma P_1}{\Sigma P_0} \times 100$$

$$\Sigma P = \frac{1370}{1240} \times 100$$

$$\Sigma P = \underline{\underline{110\%}}$$

(03 marks)

1.7 **Answer 03**

$$T = 210 + 3x$$

X value for year 2019 is 7

$$T = 210 + 3 \times 7$$

$$= 231$$

(03 marks)

1.8 **Answer 04**

$$P(\text{MUY}) = 0.11 + 0.12 + 0.33 \\ = 0.56$$

(03 marks)

1.9 **Answer 02**

$$E(X) = \Sigma X \times P \\ = 1000 \times 0.15 + 1100 \times 0.20 + 1250 \times 0.30 + 1320 \times 0.25 + 1400 \times 0.10 \\ = \text{Rs.1,215}$$

(03 marks)

1.10 **Answer 03**

$$S = \sum_{n=1}^n X(1+r)^{n-1}$$

$$S = 200,000 \times (1 + 0.12)^3$$

$$S = 280,985.60$$

$$\approx \underline{\underline{280,986}}$$

(03 marks)

1.11 Purchase Price = $(100/125) \times 145,000 = \text{Rs. 116,000/-}$

(02 marks)

1.12 **Method 1**

We assumed

Rs. X invested at 6% and

Rs. Y invested at 8%.

Then, $X + Y = 500\,000 \longrightarrow 1$

$$\frac{6}{100} \times X + \frac{8}{100} \times Y = 38,000 \longrightarrow 2$$

The student can get the answer using calculator which will be as below.

$$X = 100,000$$

$$Y = 400,000$$

Answer, Rs. 100,000 invested at 6%, and

Rs. 400,000 invested at 8%.

Method 2

We assumed,

Rs. X invested at 6%, and

Rs.(500 000 – X) invested at 8%.

$$\left(X \times 1 \times \frac{6}{100} \right) + \left((500\,000 - X) \times 1 \times \frac{8}{100} \right) = 38,000$$

$$0.06X + 0.08(500\,000 - X) = 38,000$$

$$0.02X + 30,000 - 0.06X = 38,000$$

$$0.02X = 8,000$$

$$\underline{X = 400,000}$$

Therefore answer is, Rs. 100,000 invested at 6%, and

Rs. 400,000 invested at 8%

(02 marks)

1.13 **Reasons for sampling**

1. Population will be very large.
2. Population will be reliable.
3. Sampling is usually less expensive than considering population.
4. By sampling you get results quicker than considering population(Less time consuming)

(02 marks)

1.14 False

(02 marks)

1.15 True

(02 marks)

(Total 40 marks)

End of Section A

Four (04) compulsory questions.
(Total 40 marks)

Suggested Answers to Question Two:

(a)

Chapter 02-Part I-Quantitative Finance-Interest

i) $X = 750,000$, $r = 12\% = 0.12$, $t = 2$, $n=4$

$$S = X(1 + r)^n$$

$$S = X\left(1 + \frac{r}{n}\right)^{nt}$$

$$S = 750,000\left(1 + \frac{0.12}{4}\right)^{2 \times 4}$$

$$S = 750,000 \times (1.03)^8$$

$$S = 750,000 \times 1.267$$

$$\underline{\underline{S = 950,250/-}}$$

Total amount in his account at the end of 3 years is Rs. 950,250/-

(04 marks)

ii) Total Interest = Rs. 950,250 – 750,000
= Rs. 200,250/-

(02 marks)

$$\begin{aligned} \text{(b) } A &= \frac{SR^n \times (R - 1)}{R^n - 1} \\ &= \frac{500,000 * (1 + 0.14)^5 * (1 + 0.14 - 1)}{(1 + 0.14)^5 - 1} \\ &= \frac{500,000 (1.14)^5 * 0.14}{(1.14)^5 - 1} \\ &= \frac{500,000 * 1.925 * 0.14}{1.925 - 1} \\ &= \frac{134,750}{0.925} \\ &= \text{Rs. 145,675.67} \leq \text{Installment} \end{aligned}$$

(04 marks)

(Total 10 marks)

Suggested Answers to Question Three:

(a)

Chapter 03-Financial Operative Measures

Method I

$$\begin{aligned}\text{Profit Function} &= \text{TR} - \text{TC} \\ P &= 74x + 2x^2 - (3x^2 - 86x - 250) \\ &= 74x + 2x^2 - 3x^2 + 86x - 250 \\ &= -x^2 + 160x - 250\end{aligned}$$

$$\text{If profit is maximized} = \frac{d^2p}{Dx^2} < 0$$

$$\begin{aligned}\text{So, } dp &= \frac{-2x + 160}{Dx} \\ 2x &= 160 \\ x &= \mathbf{80}\end{aligned}$$

So \Rightarrow Number of unit at which the profit is maximized,
 $\Rightarrow x = \mathbf{80}$ units

Method II

$$\begin{aligned}\text{MR} &= 74 + 4x \\ \text{MC} &= 6x - 86 \\ 74 + 4x &= 6x - 86 \\ 160 &= 2x \\ \mathbf{80} &= x\end{aligned}$$

(04 marks)

(b) (i) Total Cost (TC) = Variable Cost + Fixed Cost
 $= \mathbf{75x + 250,125}$

$$\begin{aligned}\text{Profit Function} &= \text{TR} - \text{TC} \\ &= 650x - (75x + 250,125) \\ &= 650x - 75x - 250,125 \\ &= \mathbf{575x - 250,125}\end{aligned}$$

(03 marks)

(ii) **Method I**

At the break –even point Profit Function

$$\begin{aligned}575x - 250,125 &= 0 \\ 575x &= 250,125 \\ x &= \mathbf{435}\end{aligned}$$

Method II

$$\begin{aligned}\text{TR} &= \text{TC} \\ 650x &= 75x + 250,125 \\ 575x &= 250,125 \\ x &= \mathbf{435}\end{aligned}$$

(03 marks)

(Total 10 marks)

Suggested Answers to Question Four:

(a)

Chapter 04-Numerical Descriptive Measures

Method I

Monthly Salary (Rs.'000)	Mid-Point(x)	No of employees(f)	f (x)	f(x) ²
10 - 19	14.5	6	87	1,261.50
20 - 29	24.5	20	490	12,005.00
30 - 39	34.5	8	276	9,522.00
40 - 49	44.5	6	267	11,881.50
50 - 59	54.5	6	327	17,821.50
60 - 69	64.5	4	258	16,641.00
		∑f=50	∑f x=1,705	∑f x²=69,132.50

(a)

$$\begin{aligned} \text{Mean} &= \frac{\sum fx}{\sum f} \\ &= \frac{1,705}{50} \\ &= \underline{\underline{34.1}} \end{aligned}$$

(03 marks)

(b)

$$\begin{aligned} \text{Standard Deviation} &= \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2} \\ &= \sqrt{\frac{69,132.5}{50} - (34.1)^2} \\ &= \sqrt{1,382.65 - 1,162.81} \\ &= \sqrt{219.84} \\ &= \underline{\underline{14.83}} \end{aligned}$$

(04 marks)

(c)

$$\begin{aligned} \text{Coefficient of Variation (V)} &= \frac{\text{Standard Deviation} * 100\%}{\text{Mean}} \\ &= \frac{S}{\bar{x}} \times 100 \\ &= \frac{14.83}{34.1} \times 100 \\ &= \underline{\underline{43.49\%}} \end{aligned}$$

Method II

Monthly Salary (Rs.'000)	Mid-Point(x)	No of employees(f)	f (x)	f(x)2
10 - 19	15	06	90	1,350
20 - 29	25	20	500	12,500
30 - 39	35	08	280	9,800
40 - 49	45	06	270	12,150
50 - 59	55	06	330	18,150
60 - 69	65	04	260	16,900
		$\Sigma f = 50$	$\Sigma f x = 1,730$	$\Sigma f x^2 = 70,850$

(a) **Mean** = $\frac{\Sigma fX}{\Sigma f}$
= $\frac{1,730}{50}$
= 34.6

(03 marks)

(b) **Standard Deviation** = $\sqrt{\frac{\Sigma fx^2}{\Sigma f} - \bar{x}^2}$
= $\sqrt{\frac{70,850}{50} - (34.6)^2}$
14.82

(04 marks)

(c) **Coefficient of Variation (V)** = $\frac{\text{Standard Deviation}}{\text{Mean}} * 100\%$

$$= \frac{S}{\bar{x}} \times 100$$

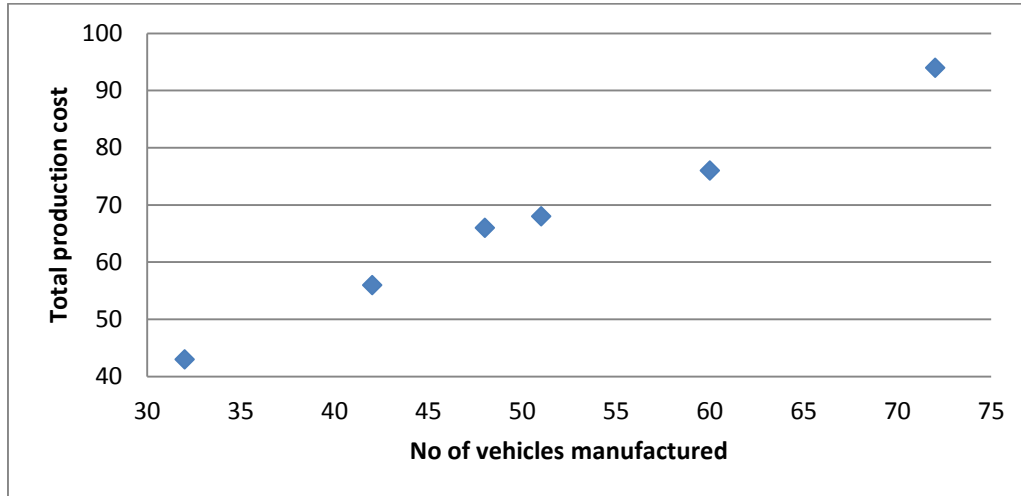
$$= \frac{14.82}{34.6} \times 100$$

$$= \underline{42.83\%}$$

(03 marks)
(Total 10 marks)

Suggested Answers to Question Five:

(a) Chapter 5-Comparing Two Quantitative Variables



$\Sigma X = 305, \Sigma Y = 403, \Sigma XY = 21,692, \Sigma X^2 = 16,477, n = 6$

(03 marks)

(b)

x	y	xy	X ²
42	56	2,352	1,764
51	68	3,468	2,601
32	43	1,376	1,024
60	76	4,560	3,600
48	66	3,168	2,304
72	94	6,768	5,184
305	403	21,692	16,477

$$b = \frac{n \Sigma XY - \Sigma X \Sigma Y}{n \Sigma X^2 - (\Sigma X)^2}$$

$$b = \frac{(6 \times 21,692) - (305 \times 403)}{(6 \times 16,477) - (305)^2}$$

$$b = \frac{130,152 - 122,915}{98,862 - 93,025}$$

$$b = \frac{7,237}{5,837}$$

$$\underline{\underline{b = 1.24}}$$

$$a = \bar{Y} - b\bar{X}$$
$$a = \frac{403}{6} - (1.24 \times \frac{305}{6})$$
$$a = 67.2 - (1.24 * 50.83)$$

$$\underline{\underline{a = 4.17}}$$

Regression line

$$Y = a + bx$$

$$\underline{\underline{Y = 4.17 + 1.24x}}$$

(05 marks)

(c) Substitute $x = 55$

$$Y = 4.17 + 1.24x$$

$$Y = 4.17 + 1.24 \times 55$$

$$Y = 72.37$$

Expected Production cost = Rs.72.37 million.

(02 marks)
(Total 10 marks)

End of Section B

One (01) compulsory question.

(Total 20 marks)

Suggested Answers to Question Six:

Chapter 1-Comparing Two Quantitative Variables

$$(A) \quad 3x + 5y = 36 \quad - (1)$$

$$2x + 6y = 32 \quad - (2)$$

$$x = 7, \quad y = 3$$

$$(1) \times 2 \quad \rightarrow \quad 6x + 10y \quad = 72 \quad - (3)$$

$$(2) \times 3 \quad \rightarrow \quad 6x + 18y \quad = 96 \quad - (4)$$

$$(4) - (3)$$

$$8y = 24$$

$$y = 3$$

$$(1) \quad 3x + 5 \times 3 = 36$$

$$3x = 36 - 15$$

$$3x = 21$$

$$x = 7$$

(03 marks)

(B)

Chapter 6-II Time Series

$$a \quad = \frac{225 + 275 + 250 + 350}{4}$$

4

$$= 1,100 / 4$$

$$= 275$$

$$b \quad = \frac{350 + 250 + 300 + 275}{4}$$

4

$$= 1,175 / 4$$

$$= 293.75$$

$$c \quad = \frac{275 + 400 + 275 + 350}{4}$$

4

$$= 1,300 / 4$$

$$= 325$$

$$\begin{aligned}
 d &= (262.5 + 275) / 2 \\
 &= 537.5 / 2 \\
 &= \mathbf{268.75}
 \end{aligned}$$

$$\begin{aligned}
 e &= (293.75 + 306.25) / 2 \\
 &= 300 / 2 \\
 &= \mathbf{300}
 \end{aligned}$$

$$\begin{aligned}
 f &= Y / T \\
 &= 250 / 278.125 \\
 &= \mathbf{0.899}
 \end{aligned}$$

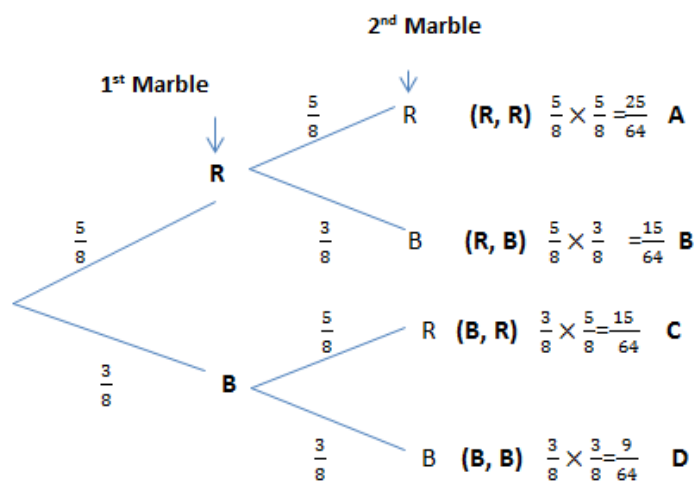
$$\begin{aligned}
 g &= 275 / 328.125 \\
 &= \mathbf{0.838}
 \end{aligned}$$

(07 marks)

(C)

Chapter 7-Part I- Probability and its Applications

a)



R - Draw a red marble

B- Draw a black marble

(05 marks)

b)

- (i) Both marbles are of same colour.

$$P = P(A) + P(D)$$

$$\frac{25}{64} + \frac{9}{64} = \frac{34}{64}$$

(02 marks)

- (ii) At least one red marble .

$$P = 1 - P(D)$$

$$= 1 - \frac{9}{64}$$

$$= \frac{55}{64}$$

(02 marks)

- (iii) At least one black marble

$$P = 1 - P(A)$$

$$= 1 - \frac{25}{64}$$

$$= \frac{39}{64}$$

(02 marks)

(Total 20 marks)

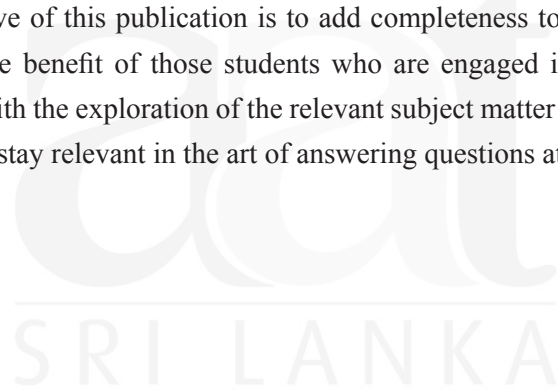
End of Section C

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