



**Association of Accounting Technicians of Sri Lanka**

**July 2019 Examination – AA1 Level**

**Suggested Answers  
(AA12)**

**QUANTITATIVE METHODS FOR BUSINESS  
(QMB)**

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**THE ASSOCIATION OF ACCOUNTING TECHNICIANS OF SRI LANKA**  
**AA1 Examination – July 2019**  
**(AA12) Quantitative Methods for Business**  
**SUGGESTED ANSWERS**

Fifteen (15) compulsory questions  
(40 Marks)

**SECTION - A**

*Suggested Answers to Question 01:*

1.1

**Answer (3)**

$$8y + 6 = 3y + 21$$

$$5y = 15$$

$$y = \underline{15/5}$$

1.2

**Answer (2)**

$$I = prt \quad P = 12\,000, r = 12.0\% = 0.12, t = 3$$

$$I = 12\,000 \times 0.12 \times 3$$

$$I = \underline{4\,320}$$

1.3

**Answer (3)**

$$TC = 3,000x - 4x^2 + 10\,000$$

$$MC = \underline{30000 - 8x}$$

1.4

**Answer (4)**

$$2x + y = 14$$

$$3x + 2y = 24$$

Answer (using calculator)

$$\underline{X=4, y=6}$$

1.5

**Answer (1)**

$$\Sigma x = 30, \Sigma y = 180, n = 6$$

$$y = a + 2x.$$

$$a = \bar{y} - b \bar{x}$$

$$a = (180/6) - (2 \times 30/6)$$

$$\underline{a = 20}$$

1.6

**Answer (2)**

$$\begin{aligned} \text{Weighted average relative price index} &= \frac{\sum Xw}{\sum w} \\ &= \frac{(115 \times 7 + 110 \times 8 + 118 \times 10)}{7 + 8 + 10} \\ &= 114.6 \\ &= \underline{115} \end{aligned}$$

1.7

**Answer (3)**

$$T = 483x + 6,636$$

X value for year 2017 is 7

$$\begin{aligned} \therefore T &= 483 \times 7 + 6,636 \\ &= \underline{10,017} \end{aligned}$$

1.8

**Answer (3)**

A & B are two mutually exclusive events

$$\begin{aligned} \therefore P(A \cup B) &= P(A) + P(B) \\ &= 0.57 + 0.28 \\ &= \underline{0.85} \end{aligned}$$

1.9

**Answer (2)**

$$\begin{aligned} E(X) &= \sum X \times P \\ &= (-6,000 \times 0.3) + (8,000 \times 0.35) + (11,000 \times 0.15) + (15,000 \times 0.20) \\ &= \underline{\underline{5,650}} \end{aligned}$$

1.10

**Answer (1)**

arithmetic sequence : 22, 27, 32, 37, .....

$$a = 22, d = 5$$

$$T_n = a + (n - 1)d$$

$$T_{20} = 22 + (19 \times 5)$$

$$= \underline{\underline{117}}$$

1.11

Highest positive Net Present Value (NPV) is Rs.14,060  
Therefore the best investment option is “ D “

Highest Internal Rate of Return is 22%  
According to IRR method the best project is “ A “

1.12

**Method 1**

$$\begin{aligned} \text{Effective Annual Rate} &= 1(1 + r)^n - 1 \quad r = 0.16/4 = 0.04, n = 4 \\ &= 1(1 + 0.04)^4 - 1 \\ &= 0.1699 \\ &= \underline{\underline{16.98\%}} \end{aligned}$$

**Method 2**

$$\begin{aligned} A &= x(1 + r)^n \quad r = 0.16/4 = 0.04, n = 4 \quad A = 100 \\ &= 100(1 + 0.04)^4 \\ &= 116.99 \\ \text{Effective Annual Rate} &= 116.99 - 100 \\ &= \underline{\underline{16.98\%}} \end{aligned}$$

**1.13 Profit Function=Revenue Function-Cost Function**

$$TR = 22x$$

$$TC = 15x + 12,600$$

$$TP = TR - TC$$

$$TP = 22x - (15x + 12,600)$$

$$\underline{\underline{TP = 7x - 12,600}}$$

**1.14** Statement is **True**

**1.15** Statements is **False**

*(02 marks each, Total 40 marks)*

*End of Section A*

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

**SECTION - B**

*Suggested Answers to Question 02:*

(a) **Chapter 02-Part I -Quantitative Finance-Interest**

$$A = P(1 + r)^n \quad X = 500\,000, \quad r = 9\% = 0.09, \quad t = 3$$

$$S = 500\,000 \times (1.09)^3$$

$$S = \underline{\underline{\text{Rs.647,514.50}}}$$

Total amount in her account at the end of 3 years is **Rs.647,514.50**

(03 marks)

(b) **Chapter 02-Part II -Quantitative Finance-Discounting**

(i)

**Method I**

$$A = \frac{S \times R^n \times (R-1)}{R^n - 1} \quad A = 75\,000, \quad n = 3, \quad r = 0.08$$

$$75\,000 = \frac{X(1 + 1.08)^3 \times 0.08}{(1+0.08)^3 - 1}$$

$$x = \frac{75\,000 \times 1.08^3 \times 0.08}{(1+1.08)^3 - 1}$$

$$= \frac{7,558.272}{0.259712}$$

$$x = \underline{\underline{\text{Rs.29,102.51}}}$$

Annual Installment is **Rs.29,102.51**

(03 marks)

(ii)

**Method II**

Year	Loan	Payment	DCF (8%)	Repayment
0	75,000	-	-	-
1	-	A	-	-
2	-	A	2.577	2.577A
3	-	A	-	-

$$\Rightarrow 2.577A = 75,000$$

$$A = \frac{75,000}{2.577}$$

$$= \underline{\underline{\text{Rs. 29,103.60}}}$$

(b)

(ii)

**Amortization Schedule**

Year	Amount Outstanding at the beginning	Interest Payable	Installment	Final Balance
0	75,000	-	-	-
1	75,000	6,000	29,103	51,897
2	51,897	4,151	29,103	26,944
3	26,946	2,156	29,103	-

(04 marks)  
(Total 10 marks)

***Suggested Answers to Question 03:***

(c) **Chapter 03-Financial Operative Measures**

Profit Function=TR-TC

$$= 20x + 3X^2 - (4X^2 - 500x + 1500)$$

$$= 20x + 3X^2 - 4X^2 - 500x + 1500$$

$$= 520X - X^2 - 1,500$$

$$\text{Maximum Profit} = \frac{dp}{dx} = 520 - 2x$$

$$2x = 520$$

$$X = \underline{\underline{260 \text{ Units}}}$$

**Alternative Answer**

$$MR = 20 + 6x$$

$$MC = 8x - 500$$

$$MR = MC$$

$$20 + 6x = 8x - 500$$

$$2X = 520$$

$$\underline{\underline{X = 260 \text{ Units}}}$$

(05 marks)

(b)

$$\begin{aligned} \text{(i) } TC &= FC + VC \\ TC &= \underline{\underline{2q^2 + 5q + 400\,000}} \end{aligned}$$

(02 marks)

(ii) **At the Break Even Point**

$$TR = TC$$

$$2q^2 + 9q + 250\,000 = 2q^2 + 5q + 400\,000$$

$$4q = 400,000 - 250,000$$

$$4q = 150,000$$

$$\underline{\underline{q = 37,500}}$$

**Break-even quantity = 37,500 Units**

(03 marks)  
(Total 10 marks)

*Suggested Answers to Question 04:*

**Chapter 04-Numerical Descriptive Measures**

Life Time	Mid-Point-(x)	No of batteries(f)	F(x)	F(x) <sup>2</sup>
50 - 54	52	2	104	5,408
55 - 59	57	29	1,653	94,221
60 - 64	62	37	2,294	142,228
65 - 69	67	16	1,072	71,824
70 - 74	72	14	1,008	72,576
75 - 79	77	2	154	11,858
		$\sum f = 100$	$\sum fX = 6,285$	$\sum fX^2 = 398,115$

$$(a)(i) \text{Mean} = \frac{\sum f(x)}{\sum f} = \frac{6285}{100} = \underline{\underline{62.85}}$$

**(03 marks)**

$$\begin{aligned}
 (ii) \text{Standard Deviation} &= \sqrt{\frac{\sum fX^2}{\sum f} - \left[\frac{\sum fX}{\sum f}\right]^2} \\
 &= \sqrt{\frac{398,115}{100} - \left[\frac{6285}{100}\right]^2} \\
 &= \sqrt{3,981.15 - 3,950.12} \\
 &= \sqrt{31.03} \\
 &= \underline{\underline{5.5702}}
 \end{aligned}$$

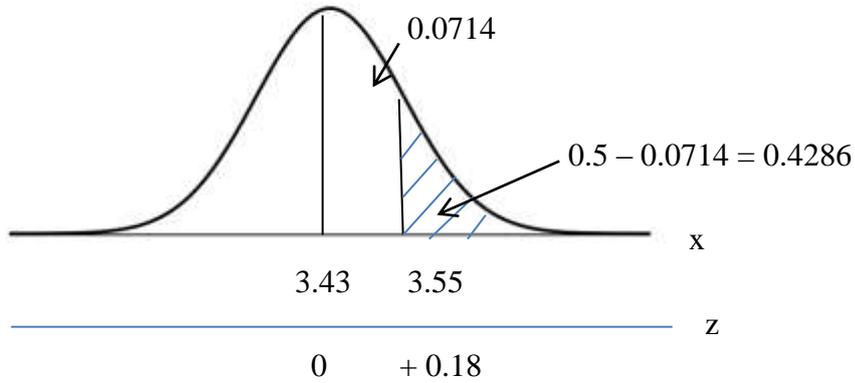
**(04 marks)**

(b) **Chapter 07-Probability and its applications II**

X : weight of a newborn baby(kg)

$$\mu=3.43 \quad \sigma=0.65$$

$$Z = \frac{X - \mu}{\sigma}$$



$$Z = \frac{x - M}{\sigma} = 0.18$$

$$Z = \frac{3.55 - 3.43}{0.65} = 0.18$$

$$P(Z > 0.18) = 0.0714$$

$$P(X > 3.55) = 0.5 - 0.0714$$

$$\underline{\underline{P(X > 3.55) = 0.4286}}$$

(03 marks)  
(Total 10 marks)

*Suggested Answers to Question 05:*

**Chapter 05-Comparing two quantitative variables**

$$\sum X = 2,702, \quad \sum Y = 3,864, \quad \sum XY = 1,490,621, \quad \sum X^2 = 1,044,554, \quad \sum Y^2 = 2,134,110, \quad n = 7$$

$$(a) \quad b = \frac{n \sum XY - \sum X \cdot \sum Y}{n \sum X^2 - (\sum X)^2}$$

$$b = \frac{7 \times 1,490,621 - 2,702 \times 3,864}{(7 \times 1,044,554) - (2,702)^2}$$

$$b = \frac{10,434,347 - 10,440,528}{7,311,878 - 7,300,804}$$

$$b = \frac{-6,181}{11,074}$$

$$b = \underline{\underline{-0.55815}}$$

$$\begin{aligned} \bar{Y} &= \frac{\sum Y}{N} \\ &= \frac{3,864}{7} \\ &= \underline{\underline{552}} \end{aligned}$$

$$\begin{aligned} \bar{X} &= \frac{\sum X}{n} \\ &= \frac{3,864}{7} \\ &= \underline{\underline{386}} \end{aligned}$$

$$a = \bar{y} + bx$$

$$= 552 - (-0.558) \times 386$$

$$= 552 + 215.388$$

$$= \underline{\underline{767.388}}$$

(07 marks)

(b)

Substitute  $x = 350$

$$Y = 767.388 - 0.558x$$

$$Y = 767.388 - 0.558 \times 350$$

$$Y = 767.388 - 195.3$$

$$Y = 572.088$$

Sales income is Rs.572/-

(03 marks)  
(Total 10 marks)

**End of Section B**

One (01) compulsory question.  
(Total 20 marks)

**SECTION - C**

(A) **Chapter 06-Part I-Index Numbers**

P <sub>1</sub>	P <sub>0</sub>	q <sub>0</sub>	p <sub>1</sub>	p <sub>1</sub> q <sub>0</sub>	p <sub>0</sub> q <sub>0</sub>
155	120	45	155	6,975	5,400
105	80	25	105	2,625	2,000
100	75	60	100	6,000	4,500
				<b>Σ=15,600</b>	<b>Σ=11,900</b>

$$\begin{aligned}\text{Laspeyre's Price Index (LP}_{1/0}\text{)} &= \frac{\sum(p_1 \times q_0)}{\sum(p_0 \times q_0)} \times 100 \\ &= \frac{15600}{11900} \times 100 \\ &= \underline{\underline{131.09}}\end{aligned}$$

(04 marks)

(B) **Chapter 06-Part II-Time Series**

(i)  $a = \frac{260 + 280 + 290 + 300}{4} = 1130/4 = \underline{\underline{282.5}}$

$$b = \frac{280 + 290 + 300 + 320}{4} = 1190/4 = \underline{\underline{297.5}}$$

$$c = \frac{270 + 282.5}{2} = \underline{\underline{276.25}}$$

$$d = \frac{282.5 + 297.5}{2} = \underline{\underline{290}}$$

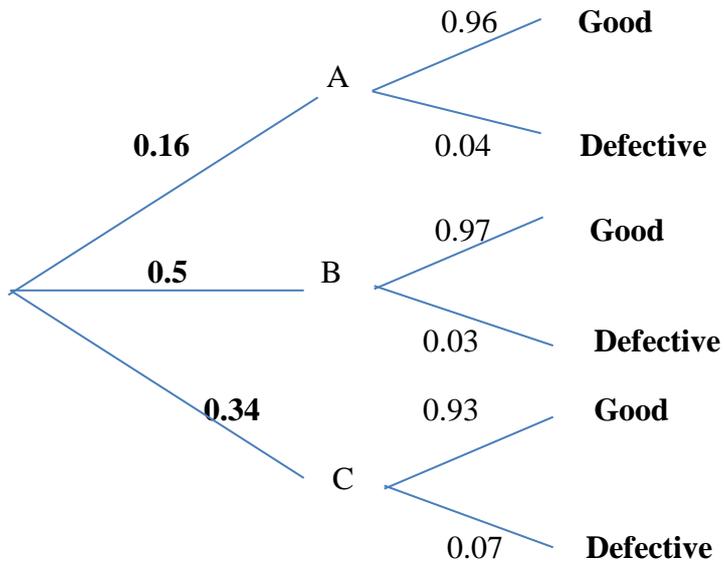
$$e = \frac{260}{263.125} = \underline{\underline{0.99}}$$

$$f = \frac{280}{276.25} = \underline{\underline{1.01}}$$

(06 marks)

(C) **Chapter 07-Probability and its Applications-I**

(a)



*(04 marks)*

(b) (i)

$$\begin{aligned} & (0.16 \times 0.04) + (0.5 \times 0.03) + (0.34 \times 0.07) \\ &= 0.0064 + 0.015 + 0.0238 \\ &= \underline{\underline{0.0452}} \end{aligned}$$

*(03 marks)*

(ii)  $0.5 \times 0.03$

$$= \underline{\underline{0.015}}$$

*(03 marks)*  
*(Total 20 marks)*

**End of Section C**

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