Association of Accounting Technicians of Sri Lanka

January 2017 Examination - AA1 Level

Questions and Suggested Answers
(AA 12)

QUANTITATIVE METHODS FOR BUSINESS (QMB)

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THE ASSOCIATION OF ACCOUNTING TECHNICIANS OF SRI LANKA

EDUCATION AND TRAINING DIVISION

AA1 Examination - January 2017
(AA 12) Quantitative Methods for Business

SUGGESTED ANSWERS

SECTION – A

Fifteen (15) compulsory questions

(Total 40 marks)

Suggested Answers to Question One:

1.1 G : B

4 : 5

8 000

Total = $\frac{8\,000 \times 9}{4}$

= **18 000** **Answer (2)**

1.2 This Question have a mistake

We can't find the present value of the annuity at the of 4 years (Because it is future value)

We assume this is 4 year period annuity,

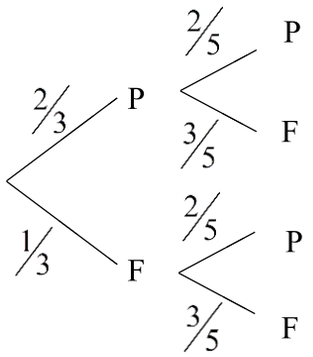
$A_{n\urcorner r} = \frac{X\{1 - \wedge 1 + r\ \&\ ^{-n}\}}{r}$ x=12 000, r= 0.08, n=4

$A_{n\urcorner r} = \frac{12\,000\{1 - 1.08^{-4}\}}{0.08}$

= **39 745.52**

Answer (3)

1.3



(F, F) $\frac{1}{3} \times \frac{3}{5} = \frac{1}{5}$

Probability of both are fail = $\mathbf{\frac{1}{5}}$

Answer (2)

1.4

x	P(x)	X. P(x)
2500	0.30	750
3500	0.45	1575
4500	0.20	900
5500	0.05	275
E(X)		3500

$E(X) = \sum X.P(x)$

= **3500**

Answer (2)

1.5 $A = P(1 + r)^n$ p = 4 000 000 r = 0.08 n = 4

= 4 000 000X 1.08^4

=5 441 955.84

Interest = 5 441 955.84 - 4 000 000

= 1 441 955.84

I = Prt p = 4 000 000 r = 0.08 t = 4

= 4 000 000 X 0.08 X 4

= 1 280 000

Difference between two interest =**161 955.84**

Answer (3)

1.6 **Answer (2)**

1.7

a = 2
a + 3d = 20
2 + 3d = 18
3d = 18
d = **6** **Answers (3)**

1.8 BEP = $\frac{61\,000}{(69-29)}$
= **1525** **Answer (4)**

1.9 Y = T × S Y = 1800 S = 75%
1 800 = T × 0.75
T = **2 400** **Answer (2)**

1.10 S = **- 40%** **Answer (1)**

1.11 Total Income of the month = Rs $\frac{240\,000 \times 125}{25}$
= Rs. 1 200 000
Selling price per unite = Rs. $\frac{1\,200\,000}{200}$
= **Rs.6 000**

1.12 $P_{\%} = \frac{300}{200} \times 100$
= **150**

1.13
1 Index numbers by their nature give only general indications of changes over a period of time.
2 So many methods are used to calculate the index numbers and different methods give different results.
3 Index numbers can be manipulated by taking a freak period as the base period so that the desired conclusions could be obtained but can mislead the viewers.
4 Weighting factors can become out of date
5 Generally, samples are used to obtain data for index number calculations and therefore information obtained might be biased, incomplete or false.
6 Index numbers can be misinterpreted by the uniformed laymen.

1.14 (10 / 25) = 0.4 = **40%**

1.15 (10 / 20) = 0.5 = **50%**

End of Section A

SECTION –B

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

Suggested Answers to Question Two:

02. (a) i) **Total Cost Function** = Variable Cost + Fixed Cost

= **8,000 x + 1,000 x^2 + 900,000**

Total Revenue Function = Demand Function x x

= (120,000 - 1,000 x) x x

= **120,000 x - 1,000 x^2**

ii) **Method I**

Profit Function (P) = Revenue - Cost

= (120,000 x - 1,000 x^2) - (8,000 x + 1,000 x^2 + 900,000)

= 112,000 x - 2,000 x^2 - 900,000

dp / dx = 112,000 - 4,000 x - 0 = 0

=> 4,000 x

= 112,000

x = **28**

(d^2p / dx^2) = 0 - 4,000 < 0

∴ The maximum quantity = x = **28**

Method II

Marginal Cost (MC) = (dc / dx)

= 8,000 + 2,000 x

Marginal Revenue (MR) = (dR / dx)

= 120,000 - 2,000 x

At the profit maximum point:

MC = MR

8,000 + 2,000 x = 120,000 - 2,000 x

4,000 x = 112,000

x = **28 Units**

Method III

At the break-even points, TC = TR

$8{,}000\,x + 1{,}000\,x^2 + 900{,}000 = 120{,}000\,x - 1{,}000\,x^2$

$2{,}000\,x^2 - 112{,}000\,x + 900{,}000 = 0$

$x^2 - 56\,x + 450 = 0$

$$x = \frac{56 \pm \sqrt{(56 \times 56) - 4 \times 1 \times 450}}{2}$$

$$x = \frac{56 \pm \sqrt{3{,}136 - 1{,}800}}{2}$$

$$x = \frac{56 \pm \sqrt{1{,}336}}{2}$$

$x = (56 \pm 36.5) / 2$

$x = (56 + 36.5) / 2$ or $(56 - 36.5) / 2$

$x = 46.25$ or $x = 9.75$

Profit Maximum Point Quantity $= (46.25 + 9.75) / 2$

$x =$ **28 Units**

(06 marks)

(b) **Method I**

$$A = \frac{SR^n (R - 1)}{(R^n - 1)} \qquad R = 1 + r\%$$

$$= \frac{150{,}000 \times (1.06)^5 (1.06 - 1)}{(1.06^5 - 1)}$$

= **35,610** (approx.)

Method II

Year	Amount borrowed	Amount settled	D.C.F.	PV	
				Loan	Repayment
0	150,000	-	1.000	150,000	-
1		A			
2		A			
3		A	4.212	-	4.212A
4		A			
5		A			
				150,000	**4.212A**

$4.212A = 150{,}000$

A = 35,612 (approx.)

Method III

A = 150,000 / 4.212 ***(04 marks)***

= **35,612** ***(Total 10 marks)***

Suggested Answers to Question Three:

(a) Laspeyre's Price Index ($LP_{1/0}$) $= \frac{\sum(P_1 \times q_0)}{\sum(P_0 \times q_0)} \times 100$

$= \frac{2060000}{1865000} \times 100$

$=$ **110.45%**

$P_1 \times q_0$	$P_0 \times q_0$
1150 × 1100 = 1265000	850 × 1100= 935000
610 × 500 = 305000	600 × 500 = 300000
350 × 1400 = 490000	450 × 1400 = 630000
2060000	1865000

(04 marks)

(b)

Month	Power Generation (Units)
January	750 000 X 20% = 150 000
February	150 000 + 13 500 = 163 500
March	163 500 - 15 000 = 148 500
April	135 500
May	90 000
June	63 000
	750 000

	No Of Units	%	Degrees
For January	150,000.00	20.00	72^0
For February	163,500.00	21.80	78.48^0
For March	148,500.00	19.80	71.28^0
For April	135,000.00	18.00	64.8^0
For May	90,000.00	12.00	43.2^0
For June	63,000.00	8.40	30.24^0
	750,000.00	100.00	360^0

(06 marks)
(Total 10 marks)

Suggested Answers to Question Four:

(a) **Method I**

(a) (i) Mean $= \frac{\sum fX}{\sum f}$

$= \frac{410}{100}$

$= \mathbf{4.1}$

(ii)

Standard Deviation $= \sqrt{\frac{\sum fX^2}{\sum f} - \left(\frac{\sum fX}{\sum f}\right)^2}$

Standard Deviation $= \sqrt{\frac{2230}{100} - \left(\frac{410}{100}\right)^2}$

$= \sqrt{5.49}$

$= \mathbf{2.34}$

04 Marks

(a) **Method II** A = 5

Height	X	f	d	fx	fx^2
1-3	2	50	-3	-150	450
4-6	5	30	0	0	0
7-9	8	20	3	60	180
		100		**-90**	**630**

(i) Mean $= A + \frac{\sum fd}{\sum f}$

$= 5 + \frac{-90}{100}$

$= \mathbf{4.1}$

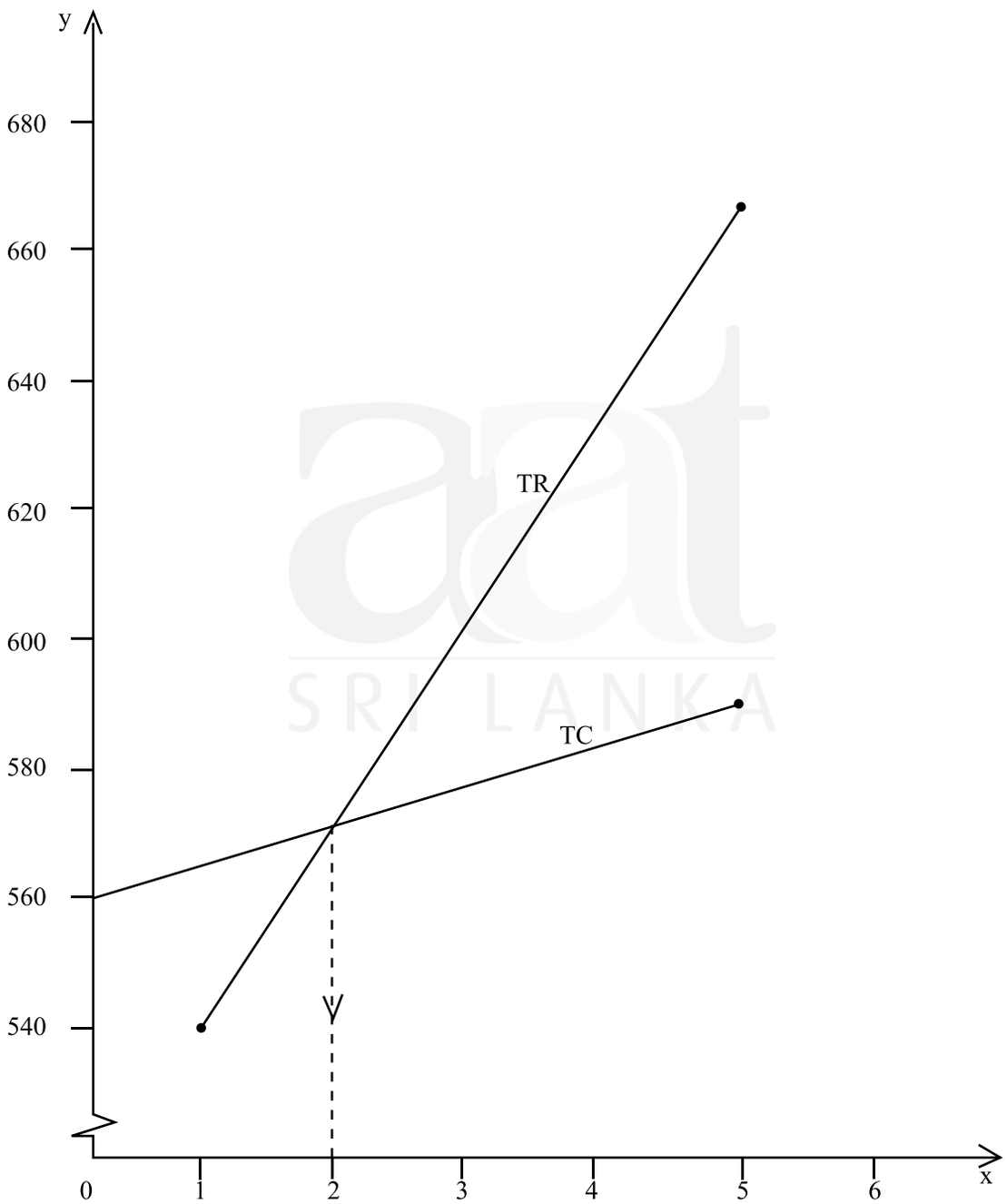
(ii) Standard Deviation $= \sqrt{\frac{\sum fd^2}{\sum f} - \left(\frac{\sum fd}{\sum f}\right)^2}$

Standard Deviation $= \sqrt{\frac{630}{100} - \left(\frac{-90}{100}\right)^2}$

$= \mathbf{2.34}$

(b) i

	TC	= 6x + 560	TR	=	31x + 510
	x	TC	x		TR
	1	566	1		541
			5		665
R/C	5	590			



(ii) Number of breakeven units **= 2**

(06 marks)
(Total 10 marks)

Suggested Answers to Question Five:

(a)

M1

Years	Cash Flow (Rs.' 000)	Discount Factors		Present value (Rs.'000)	Present value (Rs.'000)
0	-60	$1/1.09^0$ or	1	-60	-60
1	20	$1/1.09^1$ or	0.9174	18.3486	18.348
2	20	$1/1.09^2$ or	0.8417	16.8336	16.834
3	20	$1/1.09^3$ or	0.7722	15.4437	15.444
4	26	$1/1.09^4$ or	0.7084	18.4191	18.4184
				9.0450	**9.0444**

NPV = Rs. 9.0450 or 9.0444

M2

Years	Cash Flow (Rs.' 000)	Discount Factors		Present value (Rs.'000)	Present value (Rs.'000)
0	-50	$1/1.09^0$ or	1	-50	-50
1	15	$1/1.09^1$ or	0.9174	13.7615	13.761
2	15	$1/1.09^2$ or	0.8417	12.6252	12.6255
3	10	$1/1.09^3$ or	0.7722	7.7218	7.722
4	15	$1/1.09^4$ or	0.7084	10.6264	10.626
				(5.2651)	**-5.2655**

NPV =Rs. (5.2651)or (5.2655)

(b) Highest positive NPV value given by machine **M1**

Therefore machine M1 should be purchase.

(10 marks)

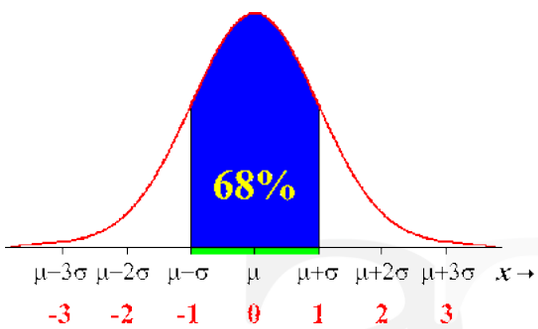
End of Section B

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

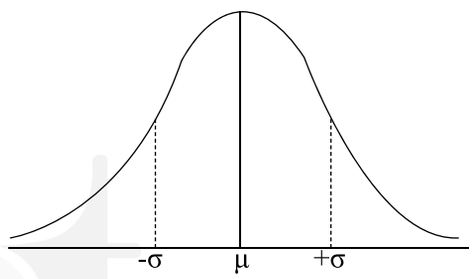
Suggested Answers to Question Six:

(A)

(a)



OR



68% or 68.26%

(02 marks)

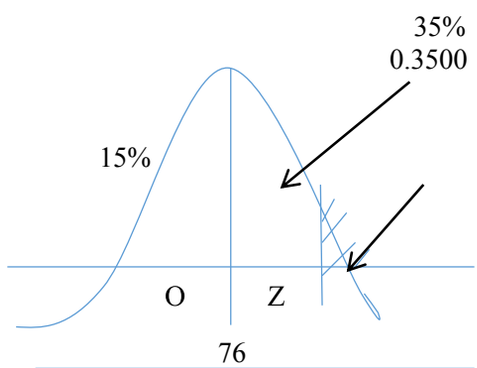
(b)

X : Exam marks

μ =76 σ=15

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

$Z = \frac{X - 76}{15}$



$1.04 = \frac{X - 76}{15}$

X = 91.6

X = 92

Minimum Marks 92

(05 marks)

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

= $\frac{5 \text{ X } 26660 - 367 \text{ x } 361}{5 \text{ x } 27859 - (367)^2}$

= **0.1765**

a = $\overline{Y} - b\overline{X}$

a = $\frac{361}{5} - 0.1765 \text{ x } \frac{367}{5}$

a = 59.24

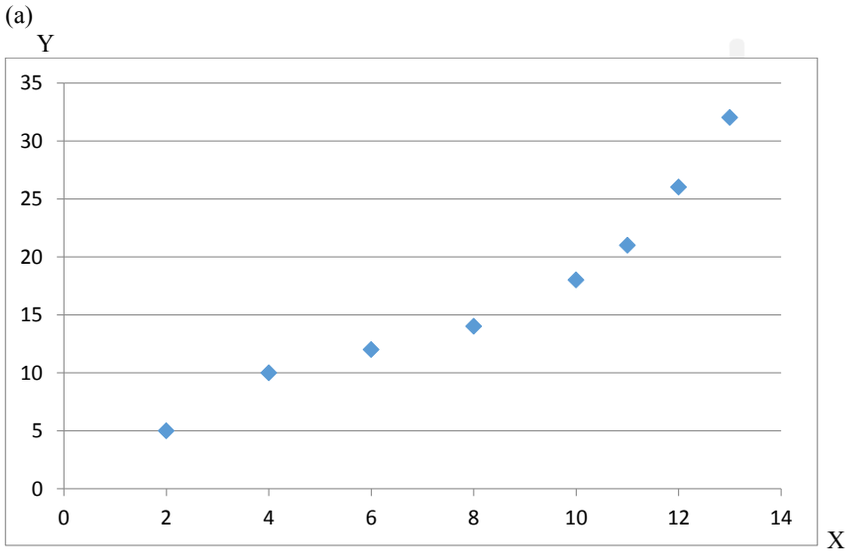
Regression line Y = a + bx

Y = 59.24 + 0.1765X

(06 marks)

(C)

(a)



(b) Between X & Y have **positive linear correlation**

(C) r = $\frac{n \sum XY - \sum X . \sum Y}{\sqrt{(n \sum X^2 - (\sum X)^2)(n \sum Y^2 - (\sum Y)^2)}}$

r = $\frac{8 \text{ X } 1373 - 66 \text{ X } 138}{\sqrt{(8 \text{ X } 654 - 66^2)(8 \text{ X } 2930 - 138^2)}}$

= 0.9560

(07 marks)

(Total 20 marks)

End of Section C

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