Association of Accounting Technicians of Sri Lanka

AA1 Examination - January 2018

Questions and Suggested Answers
Subject No : AA12

QUANTITATIVE METHODS FOR BUSINESS (QMB)

Association of Accounting Technicians of Sri Lanka
No. 540, Ven. Muruththettuve Ananda Nahimi Mawatha,
Narahenpita, Colombo 05.

Tel : 011-2-559 669

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THE ASSOCIATION OF ACCOUNTING TECHNICIANS OF SRI LANKA

EDUCATION AND TRAINING DIVISION

AA1 Examination - January 2018
(AA12) Quantitative Methods for Business

SUGGESTED ANSWERS

SECTION – A

Objective Test Questions (OTQs)
Fifteen (15) compulsory questions
(Total 40 marks)

Suggested Answers to Question One:

1.1 $2+3y = y + 14$
$2y = 12$
$\mathbf{y = 6}$
Answer (2)

1.2 $A = P(1 + r)^n$
$P = 500\,000 \quad r = 0.12 \quad n = 2$
$A = 500\,000 X 1.12^{\,2}$
$\mathbf{A = 627\,200}$ **Answer (3)**

1.3 $TC = 6x^2 - 4x + 500$
Answer (1)

1.4 **Answer (2)**

1.5 **Answer (3)**

1.6 $TR = TC$
$30x = 10x + 2400$
$20x = 2400$
$\mathbf{x = 120}$
Answer (2)

1.7 Simple aggregate price index for 2016 $= \frac{(180+72+200) \quad X \ 100}{(150+60+125)}$

$= \frac{452}{335} X \ 100$

$= \mathbf{134.93}$

Answer (2)

1.8 $A = \frac{x[1 - (1+r)^{-n}]}{r}$

$A = \frac{1000[1 - 1.12^{-3}]}{0.12}$

A = Rs. 2 402

x = 1000, n = 3, r = 0.12

OR

Year	Amount	DF	DV
1	1,000	0.893	893
2	1,000	0.797	797
3	1,000	0.712	712
			2,402

Answer (3)

1.9 Mean $(\overline{X}) = \frac{11 + 12 + 16}{3} = 39 / 3$

$= \mathbf{13}$

Answer (2)

1.10 Standard Deviation (S.D) $= \sqrt{\left\{ \frac{521}{3} - 13^2 \right\}}$

$= \mathbf{2.16}$

Answer (4)

1.11 The probability that he / she is a junior manager. = **0.2778 or $\frac{50}{180}$**

1.12 The probability that he / she is a management assistant. = **0.5 or $\frac{90}{180}$**

1.13 The probability that he / she works out of Colombo.= **0.5556 or $\frac{100}{180}$**

1.14 probability that he / she works in Colombo given that he / she is a Senior manager. = **0.6250 or $\frac{25}{40}$**

1.15 the probability that he / she is married = (40 / 180) x 0.8 + (50 / 180) x 0.6 + (90 / 180) x 0.5

= **0.5944 or 107 / 180**

(Total 40 marks)

End of Section A

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

Suggested Answers to Question Two:

(a) $R(x) = p \times q$
$R(x) = (66 - X)\ (X)$
$R(x) = 66x - x^2$

(03 marks)

(b) Profit function

$P(x) = R(x) - C(x)$
$P(x) = (-x^2 + 66x) - (2x^2 + 18x + 500)$
$P(x) = 66x - x^2 - 2x^2 - 18x - 500$
$P(x) = -3x^2 + 48x - 500$

(03 marks)

(c)

$R(x) = -x^2 + 66x$

$MR = \frac{dR}{dx}$

$MR = -2x + 66$

$C(x) = 2X^2+18X+500$
$MC = 4X + 18$

At maximum profit
$MR = MC$
$-2x + 66 = 4X + 18$
$6X = 48$
$X = 8$
No. of units 8 (for the maximum profit)

(04 marks)
(Total 10 marks)

Alternative Answer

Using profit function $= \frac{dp}{dx} = 0$

$0 = \frac{d(-3x^2 + 48x - 500)}{dx}$

$0 = -6x + 48 - 0$
$6x = 48$
$x = 8$

Suggested Answers to Question Three:

p_0q_0	p_1q_0	p_1q_1	p_0q_1
105X40=4200	85X40=3400	85X70=5950	105X70=7350
140X65=9100	160X65=10400	160X35=5600	140X35=4900
250X20=5000	200X20=4000	200X45=9000	250X45=11250
70X50=3500	60X50=3000	60X75=4500	70X75=5250
21800	**20800**	**25050**	**28750**

(a)

Laspeyre's Price Index ($LP_{1/0}$) $= \frac{\sum(p_1 \times q_0)}{\sum(p_0 \times q_0)} \times 100$

$= \frac{20{,}800}{21{,}800} \times 100$

$= \underline{\mathbf{95.41\%}}$

(05 marks)

b)

Paasche's Price Index ($PP_{1/0}$) $= \frac{\sum(p_1 \times q_1)}{\sum(p_0 \times q_1)} \times 100$

$= \frac{25{,}050}{28{,}750} \times 100$

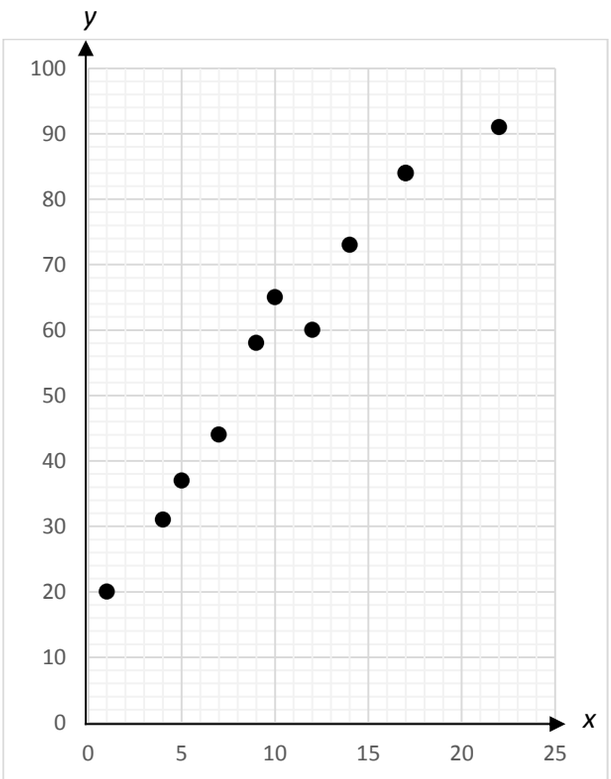
$= \underline{\mathbf{87.13\%}}$

(05 marks)

(Total 10 marks)

Suggested Answers to Question Four:

(a)



(04 marks)

(b)

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

$$r = \frac{10 \text{ X } 6{,}981 - 101 \text{ X } 563}{\sqrt{(10 \text{ X } 1385 - 101^2)(10 \text{ X } 36521 - 563^2)}}$$

$$= \frac{69{,}810 - 56{,}863}{\sqrt{(13{,}850 - 10{,}201)(365{,}210 - 316{,}969)}}$$

$$= \frac{12{,}947}{\sqrt{3{,}649 \text{ x } 48{,}241}}$$

$$= \underline{\mathbf{0.9758}}$$

(04 marks)

(c) These two variables have **Strong positive linear relationship**

(02 marks)

(Total 10 marks)

Suggested Answers to Question Five:

(a)

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

$$b = \frac{10 \text{ X } 4{,}185 - 55 \text{ X } 685}{(10 \text{ X } 385 - 55^2)}$$

$$b = \frac{41{,}850 - 37{,}675}{3{,}850 - 3{,}025}$$

$$b = \frac{4{,}175}{825}$$

b = 5.0606

$\bar{x} = \Sigma x / n$

$= 55 / 10$

$= \mathbf{5.5}$

$\bar{y} = \Sigma y / n$

$= 685 / 10$

$= \mathbf{68.5}$

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

$a = 68.5 - 5.0606 \text{ X } 5.5$

$a = 68.5 - 27.83$

a = 40.6667

Regression line $y = a + bx$

y = 40.67 + 5.06x ***(06 marks)***

(b)

Year	Cash inflow	D.F. (10%)	PV
0	(200,000)	1	(200,000)
1	65,000	0.909	59,085
2	65,000	0.826	53,690
3	65,000	0.751	48,815
4	65,000	0.683	44,395
		NPV =	**+ 5,985**

(04 marks)
(Total 10 marks)

End of Section B

SECTION –C

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

Suggested Answers to Question Six:

(A)

Day	Save(Rs.)
1	30
2	60
3	120
4	240
5	480
Total	**930**

Total save amount Rs. 930.00

OR

a = 30, r = 2, n = 5

$$Sn = \frac{a(r^n - 1)}{(r - 1)}$$

$$Sn = \frac{30(2^5 - 1)}{(2 - 1)}$$

$$Sn = \frac{30(32 - 1)}{1}$$

$$= 30 \times 31$$

Sn = 930

Total save amount Rs. 930.00

(04 marks)

(B) $2x + 8y = 72$ ——— ①

$4x + 4y = 96$ ——— ②

①×2 $4x + 16y = 144$ ——— ③

③-② $12y = 48$

$y = 4$

Substituting y = 4,in ①"

$2x + 32 = 72$

$2x = 40$

$x = 20$

$$\left\{\begin{matrix} \mathbf{x = 20} \\ \mathbf{y = 4} \end{matrix}\right\}$$

(05 marks)

(C) (a)

S = 750,000

r = 0.12 / 4 = **0.03**

n = 4 x 5 = 20

$$S = \frac{P\,[(1 + r)^n - 1]}{r}$$

$$750{,}000 = \frac{P\,[(1 + 0.03)^{20} - 1]}{0.03}$$

$$P = \frac{750{,}000 \times 0.03}{(1.03)^{20} - 1}$$

$$P = \frac{22{,}500}{0.806}$$

$$= \underline{\mathbf{27{,}916}}$$

Quarterly deposit = Rs. 27,916/-

(06 marks)

Alternative Answer

$$S = \frac{AR(R^n - 1)}{(R - 1)} \quad \text{Where } R = r + 1$$

$$S = AR\frac{(R^n - 1)}{(R - 1)}$$

$$750{,}000 = A\frac{(1.03)[(1.03)20 - 1]}{0.03}$$

$$A = \frac{750{,}000 \times 0.03}{(1.03)(0.8061)}$$

$$= 22{,}500 / 0.8302$$

$$= \mathbf{27{,}101.9}$$

Quarterly deposit = Rs. 27,101.90

(C) (b)

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

$$500{,}000 = x\left(1 + \frac{0.132}{12}\right)^{12}$$

$$500{,}000 = x(1.011)^{12}$$

$$\frac{500{,}000}{1.1403} = x$$

x = 438,481.10 <= Original Investment

So, Interest = 500,000 – 438,481.10

= **61,518.90**

(05 marks)

(Total 20 marks)

End of Section C

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