Association of Accounting Technicians of Sri Lanka

July 2015 Examination - AA1 Level

Questions and Suggested Answers
Subject No : 12

QUANTITATIVE METHODS FOR BUSINESS (QMB)

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THE ASSOCIATION OF ACCOUNTING TECHNICIANS OF SRI LANKA

EDUCATION AND TRAINING DIVISION

AA1 Examination - July 2015
(12) Quantitative Methods for Business

SUGGESTED ANSWERS

Section - A

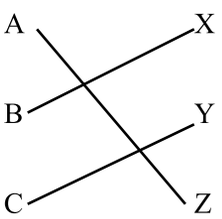
Answers to ALL questions are expected.

Suggested Answers to Question One:

1.1 The bill value of the customer A after deducting the discount = 2125 x (95/100) = Rs. 2018.75
The bill value of the customer B after deducting the discount = 5050 x (90/100) = Rs. 4545.00
The total bill value of the two customers = 2018.75 + 4545.00
= Rs. 6563.75

Correct answer is (3)

1.2



Correct answer is (1)

1.3 **Correct answer is (2)**

1.4 (6 + 6) / 46 x 360 = 93.9 $\simeq 94^0$

Correct answer is (3)

1.5 Present value (PV) = 400 x 0.926 + 450 x 0.857 + 480 x 0.794 + 500 x 0.735 + (510 + 1600) x 0.681
= Rs. 2941.58
= Rs. 2942 millions (to the nearest million)

**** In the paper this is rounded as 2941.***

Correct answer is (3)

1.6

Revenue values	Probabilities
5,000	0.1
150,000	0.005
0	0.895

Expected profit = Expected revenue - cost

= 1300 - (5000 x 0.1 + 150000 x 0.005 + 0 x 0.895)

= 1300 - 1250

= Rs. 50

Correct answer is (4)

1.7 **Correct answer is (1)**

1.8 Any three (03) of the following;

1. Investment cost
2. Cash inflows
3. Risk
4. The availability of required capital
5. The need for borrowing it
6. Uncertainity of estimated cash flows
7. Non-financial benefits of an investment
8. Expected return from the investment

1.9 False

1.10 True (directly from the graph)

Alternative method;

The cost function, C = 200000 + 15x

The revenue function, R = 50x (50 = 100000 / 2000)

For break-even points 50x = 200000 + 15x

35x = 200000

x = 5714.29

∴ The given statement is **True.**

1.11 Profit = Revenue - cost

500,000 - 350,000

= Rs. 150,000

∴ **True**

1.12 False

1.13 False

1.14 $P_n q_o$

1.15 Laspereyre's quantity index $= \frac{\Sigma q_n P_o}{q_o P_o} \times 100$

$$0.9625 = \frac{(90 + 225 + 224)}{(12 \times 10 + X \times 25 + 15 \times 16)}$$

$$= \frac{539}{(120 + 25X + 240)}$$

$$= \frac{539}{(360 + 25X)}$$

$$0.9625 (360 + 25X) = 539$$

$$346.5 + 24.0625X = 539$$

$$24.0625X = 192.5$$

$$X = 8$$

1.16 Laspereyre's Price Index (LP) $= \frac{\Sigma q_n P_o}{q_o P_o} \times 100$

Item	Base Year		Current Year			
	P_0	q_0	P_n	q_n	$P_o q_o$	$P_n q_o$
A	10	12	14	9	120	168
B	25	**8**	27	9	200	216
C	16	15	19	14	240	285
					560	669

Laspereyre's Price Index LP = (669 / 560) x 100

= 119.46%

End of Section A

Section - B

Answers to ALL questions are expected.
(Total 32 marks)

Suggested Answers to Question Two:

(a) Let monthly profit values be a, ar, ar^2... respectively is Rs. million.

Then;

$a + ar = 36 \rightarrow a(1 + r) = 36$ ——— (1)

$a \times ar^2 = 9(ar)$

$a^2r^2 = 9ar$

Since $a \neq 0$ and $r \neq 0$

$ar = 9$ $\quad a = 9/r$ ——— (2)

by sub. the value of a in (2), in (1)

$9 / r(1 + r) = 36$

$9 + 9r = 36r$

$27r = 9 \rightarrow r = 1/3$

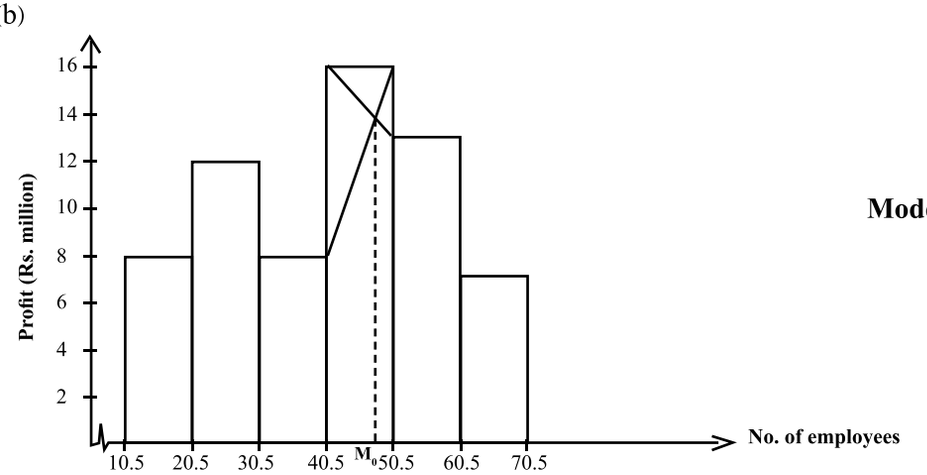
by sub. in (2) : $a = 9 / (1/3) = 27$

Now sub. $a = 27$; $r = 1/3$ and $n = 8$ in $S_n = \dfrac{a(1 - r)^n}{1 - r}$

The total profit of first eight months $= \dfrac{27[1 - (1/3)^8]}{1 - (1/3)} = 40\dfrac{40}{81}$

$=$ Rs. 40.4938 millions (to 4 d.p.)

(b)



Mode = 47.5

Suggested Answers to Question Three:

(a) The cost function,

$C = 1/3P^3 - 5P^2 + 16P + 100$

$dC/dP = 1/3 \times 3P^2 - 5(2P) + 16(1) + 0$

$= P^2 - 10P + 16$

For turning points, let $dC/dP = 0$

$P^2 - 10P + 16 = 0$

$(P - 2)(P - 8) = 0$

$P = 2$ or $P = 8$

$d^2C/dP^2 = 2P - 10$

At $P = 2$, $d^2C/dP^2 = 2(2) - 10 = -6 < 0 \rightarrow P = 2$, is the maximum.

At $P = 8$, $d^2C/dP^2 = 2(8) - 10 = 6 > 0 \rightarrow P = 8$, is the minimum.

$\therefore$ The number of units which minimise the production cost = 8

(b)

No. of motor Cars	No. of Accidents (f)	Mid point (x)	$U = \frac{(x - A)}{C}$	fU	fU^2
41-45	1	43	-3	-3	9
46-50	2	48	-2	-4	8
51-55	3	53	-1	-3	3
56-60	6	58 A	0	0	0
61-65	8	63	1	8	8
66-70	3	68	2	6	12
71-75	2	73	3	6	18
				$\Sigma fU = 10$	$\Sigma fU^2 = 58$

Mean, $\overline{X} = A + \left(\frac{\Sigma fU}{\Sigma f}\right) \times C$

$\overline{X} = 58 + (10 / 25) \times 5 = 60$

Standard deviation, $\sigma = C \times \sqrt{\frac{\Sigma fU^2}{\Sigma f} - \left(\frac{\Sigma fU}{\Sigma f}\right)^2}$

$= 5 \times \sqrt{(58/25) - (10/25)^2}$

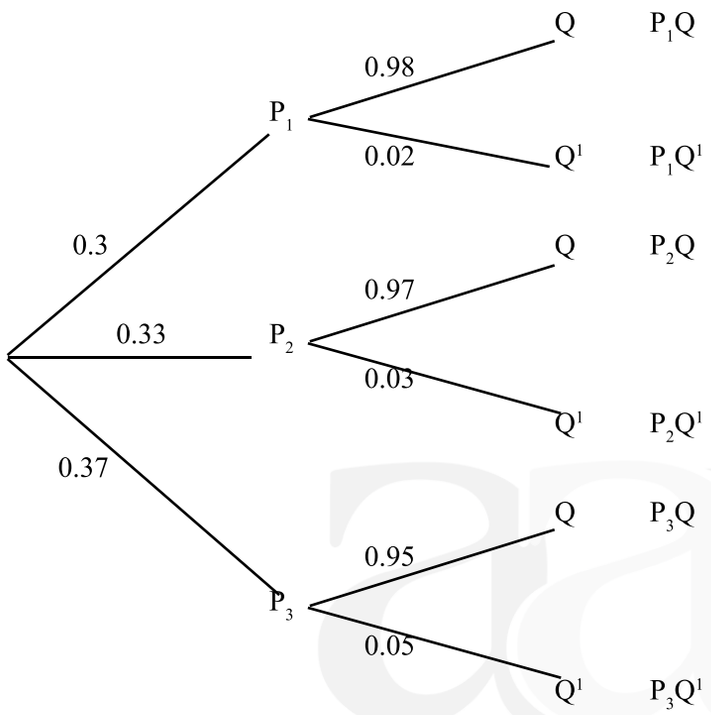
$= 5 \times \sqrt{2.32 - 0.16}$

$= 5 \times \sqrt{2.16}$

$= 7.348$ (to 3 d.p.)

Suggested Answers to Question Four:

(a) Let Q be the event at which the products are packed properly and Q^1 be the event at which the products are not packed properly.



The probability of a packed product chosen at random not packed properly is : $= P(Q^1)$

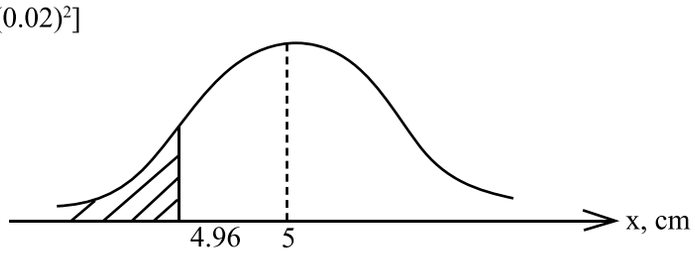
$= P(P_1 \cap Q^1) + P(P_2 \cap Q^1) + P(P_3 \cap Q^1)$

$= (0.3 \times 0.02) + (0.33 \times 0.03) + (0.37 \times 0.05)$

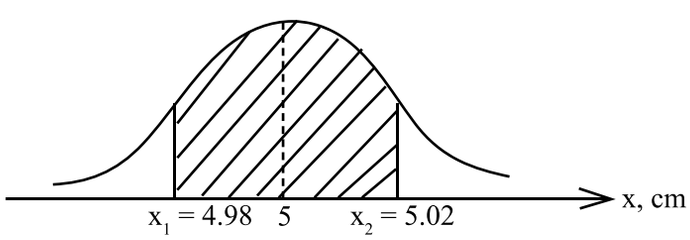
$= \underline{\underline{\mathbf{0.0344}}}$

(b) Let the length of the given type of steel cables produced be X.

Then, $x \sim N[5, (0.02)^2]$

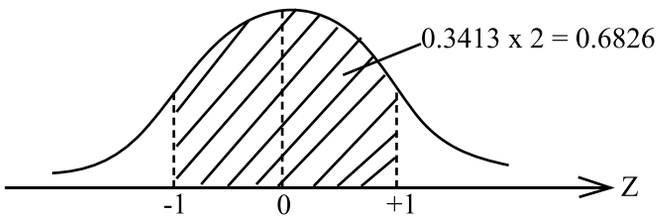


(i)



$$Z_1 = \frac{x_1 - \mu}{\sigma} = \frac{4.98 - 5}{0.02} = -1$$

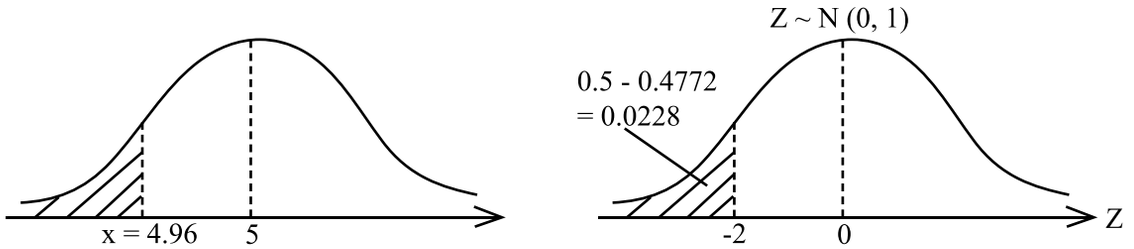
$$Z_2 = \frac{x_2 - \mu}{\sigma} = \frac{5.02 - 5}{0.02} = 1$$



Probability that the length of steel cable is between 4.98cm and 5.02cm.

$\therefore$ P (4.98 < x < 5.02) = 0.6826

(ii)



$$Z_1 = \frac{x - \mu}{\sigma} = \frac{4.96 - 5}{0.02} = -2$$

$\therefore$ The percentage of rejected steel cables = 0.0228 x 100 = 2.28%

Suggested Answers to Question Five:

Life span of a machine (x)	Output per hour (y)	A xy	B x^2	C y^2
2	50	100	4	2500
4	60	240	16	3600
6	55	330	36	3025
12	45	540	144	2025
14	40	560	196	1600
16	35	560	256	1225
$\Sigma x = 54$	$\Sigma y = 285$	$\Sigma xy = 2330$	$\mathbf{\Sigma x^2 = 652}$	$\mathbf{\Sigma y^2 = 13975}$

Correlation Coefficient, (r) = $\frac{n\Sigma xy - (\Sigma x)(\Sigma y)}{\sqrt{[n\Sigma x^2 - (\Sigma x)^2][n\Sigma y^2 - (\Sigma y)^2]}}$

$$r = \frac{6(2330) - (54)(285)}{\sqrt{[6(652) - (54)^2][6(13975) - (285)^2]}}$$

$$r = \frac{-1410}{\sqrt{996 \times 2625}}$$

= **- 0.872** (to 3 d.p.)

End of Section B

Answers to ALL questions are expected.

(Total = 28 marks)

Suggested Answers to Question Six:

(a) Components of variation in time series :

Trend component

Seasonal component

Cyclical component

Irregular component

(b) Computations :

Year	Quarter		Share price (Y) (Rs.)	(i) Moving total values	(ii) centered moving total values	(iii) & (iv) Quarterly centered moving averages and Trend (T) values
2012	1	1	88			
	2	2	69	337		
	3	3	75		631	78.875
	4	4	105	294	594	74.25
2013	1	5	45	300		73.75
	2	6	75	290	590	71.625
	3	7	65	283	573	72.125
	4	8	98	294	577	75.5
2014	1	9	56	310	604	77.625
	2	10	91	311	621	77.875
	3	11	66	312	623	80.375
	4	12	99	331	643	83.375
2015	1	13	75	336	667	85.5
	2	14	96	348	684	88.375
	3	15	78	359	707	
	4	16	110			

Suggested Answers to Question Seven:

(a) Computation of NPV ;

Net present value of the machine referred to in the first proposal = NPV_1

NPV_1 = (20 x 0.926 + 30 x 0.857 + 35 x 0.794 + 35 x 0.735 + 30 x 0.681) - 100

= 118.175 - 100

NPV_1 = Rs. 18.175 million (> 0)

Net present value of the machine referred to in the second proposal = NPV_2

NPV_2 = (10 x 0.926 + 15 x 0.857 + 20 x 0.794 + 25 x 0.735 + 25 x 0.681 + 25 x 0.630 + (20 + 20) x 0.583) - 115

= 112.465 - 115

NPV_2 = Rs. (2.535) million (< 0)

(b) Since the net present value (NPV) of the first proposal is positive, the company should go ahead with the first proposal because it is profitable.

(c) $NPV_2 < 0$ i.e. negative

$\therefore$ The company should not go ahead with the second proposal as it is not profitable.

End of Section C