



**Association of Accounting Technicians of Sri Lanka**

**Level I Examination - July 2021**

**Suggested Answers**

**(102) BUSINESS MATHEMATICS AND STATISTICS (BMS)**

**Association of Accounting Technicians of Sri Lanka**

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**THE ASSOCIATION OF ACCOUNTING TECHNICIANS OF SRI LANKA**  
**Level I Examination - July 2021**  
**(102) BUSINESS MATHEMATICS AND STATISTICS**  
**SUGGESTED ANSWERS**

(Total 40 Marks)

**SECTION - A**

*Suggested Answers to Question One:*

1.1 (2)

$$9x + 4 = 3x + 34$$

$$6x = 30$$

$$x = 30/6$$

$$\underline{x = 5}$$

(03 marks)

1.2 (3)

Time taken by pipe A = 180 min.

Time taken by pipe B =  $180 \times \frac{1}{6}$  min. = 30 min.

(03 marks)

1.3 (1)

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

$$X = 50\,000, r = 6\% = 0.06, n = 10$$

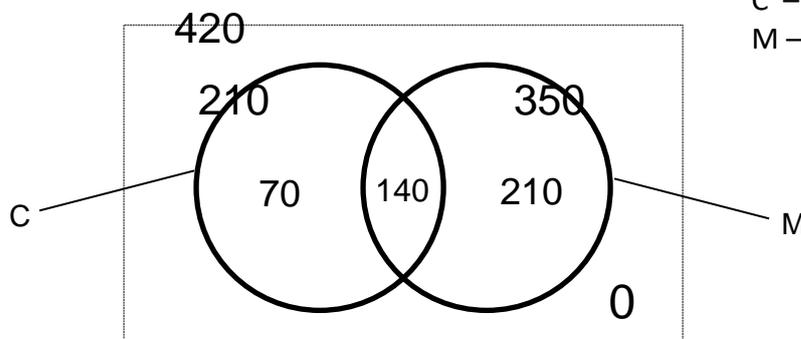
$$S = 50\,000 \times (1.06)^{10}$$

$$\underline{S = 89,542}$$

Total amount in her account is Rs. 89,542

(03 marks)

1.4 (1)



If a student having a mobile phone was selected randomly from this group, the probability that the student also has a computer at home is  $\frac{140}{350} = \frac{2}{5}$

(03 marks)

1.5 (2)

1, 4, 5, 8, 10, 16, 18, 18, 19, 19, 19, 25

$$\text{Median} = \frac{n+1}{2} \text{th term}$$

$$\text{Median} = \frac{12+1}{2} \text{th term}$$

$$\text{Median} = 6.5 \text{th term}$$

$$\text{Median} = \frac{16+18}{2} \text{th term}$$

$$\underline{\text{Median} = 17}$$

(03 marks)

1.6 (3)

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

$$P = \frac{10}{12} \times 100 = \underline{83\%}$$

(03 marks)

1.7 (4)

$$P(A \cap B) = P(A) + P(B) - P(A \cup B)$$

$$P(A \cap B) = 0.30 + 0.50 - 0.70$$

$$P(A \cap B) = 0.10$$

$$P(A \cap B)' = 1 - P(A \cap B)$$

$$P(A \cap B)' = 1 - 0.1$$

$$\underline{P(A \cap B)' = 0.9}$$

(03 marks)

1.8 (3)

$$X = 6000, r = 0.075, n = 8$$

$$FV = \frac{x(1+r)^n - 1}{r}$$

$$FV = \frac{6000 \times 1.075 \times [1.075^8 - 1]}{0.075}$$

$$FV = 67,379 \quad \text{This is the most correct value}$$

$$\underline{FV \approx 67,381}$$

(03 marks)

1.9 (1)

Season	Seasonal Index	Trend	Forecasted Sales
Q1	1.4	12,500	17,500
Q2	1.2	12,000	14,400
Q3	0.6	10,750	6,450
Q4	0.8	9,600	7,680

(03 marks)

**1.10 (2)**

$$\begin{aligned}
 PV &= \frac{X(1 - (1 + r)^{-n})}{r} \\
 PV = 500,000, \quad n = 3, \quad r = 0.075 \\
 500,000 &= \frac{X(1 - 1.08^{-3})}{0.08} \\
 \frac{500,000 \times 0.08}{(1 - 1.08^{-4})} &= \frac{0.08}{x} \\
 x &= 194,017 \quad \text{This is the most correct value} \\
 x &\approx \underline{\underline{194,024}}
 \end{aligned}$$

**(03 marks)**

**1.11**

- A → (2)
- B → (4)
- C → (1)
- D → (3)

**(01 mark each, 04 marks)**

**1.12**

$$\frac{1,170}{130} \times 100 = \underline{\underline{\text{Rs.900/-}}}$$

**(02 marks)**

**1.13**

$$\begin{aligned}
 T_n &= ar^{n-1} \\
 T_8 &= 1 \times 3^7 \\
 T_8 &= \underline{\underline{2,187}}
 \end{aligned}$$

$a = 1, \quad r = 3, \quad n = 8$

**(02 marks)**

**1.14**

Statement is True

**(01 mark)**

**1.15**

Statement is False

**(01 mark)**

**(Total 40 marks)**

**End of Section A**

**Suggested Answers to Question Two:****Chapter 01 - Fundamental Concepts of Mathematics**

(a)

Method 01

$$\begin{aligned} 3 - 5x &\leq -12 \\ 3 + 12 &\leq 5x \\ 15 &\leq 5x \\ 3 &\leq x \text{ or } x \geq 3 \end{aligned}$$

Method 02

$$\begin{aligned} 3 - 5x &\leq -12 \\ -5x &\leq -12 - 3 \\ \frac{-5x}{-5} &\geq \frac{-15}{-5} \\ x &\geq 3 \end{aligned}$$

(02 marks)

**Chapter 01 - Fundamental Concepts of Mathematics**

(b)

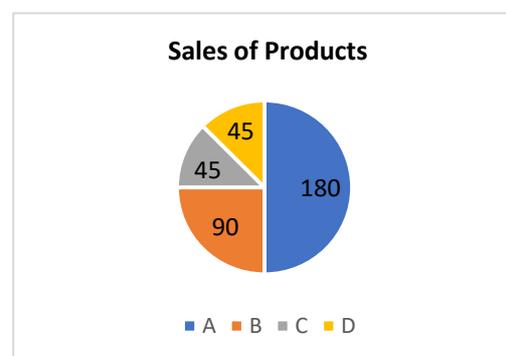
$$\begin{aligned} 2a + 5b &= 13 \text{ --- ①} \\ 3a - 2b &= 10 \text{ --- ②} \\ \text{①} \times 2 &\rightarrow 4a + 10b = 26 \text{ --- ③} \\ \text{②} \times 5 &\rightarrow 15a - 10b = 50 \text{ --- ④} \\ \text{④} - \text{③} &\rightarrow 19a = 50 + 26 \\ & a = 4 \\ \text{①} &\rightarrow 8 + 5b = 13 \\ & 5b = 5 \\ & b = 1 \end{aligned}$$

(04 marks)

**Chapter 04 - Data Presentation and Descriptive Measures**

(c)

Product	No. Of Units	Angle
A	180	$\frac{180}{360} \times 360 = 180^\circ$
B	90	$\frac{90}{360} \times 360 = 90^\circ$
C	45	$\frac{45}{360} \times 360 = 45^\circ$
D	45	$\frac{45}{360} \times 360 = 45^\circ$
Total	360	$360^\circ$

(04 marks)  
(Total 10 marks)

**Suggested Answers to Question Three:**

**Chapter 03 – Financial Operative Measures for Business**

(a)

NOTE; in this question variable cost is negative. It is a mistake.

$$\begin{aligned} TC &= FC + VC \\ \underline{TC} &= \underline{200 - 60q - q^2} \end{aligned}$$

$$\begin{aligned} TR &= p \times q & p &= 40 - q \\ TR &= (40 - q) \times q \end{aligned}$$

$$\underline{TR = 40q - q^2}$$

(04 marks)

(b)

$$\begin{aligned} TP &= TR - TC \\ TP &= 40q - q^2 - (200 - 60q - q^2) \\ \underline{TP} &= \underline{100q - 200} \end{aligned}$$

(02 marks)

(c)

At the breakeven point,  $TR = TC$

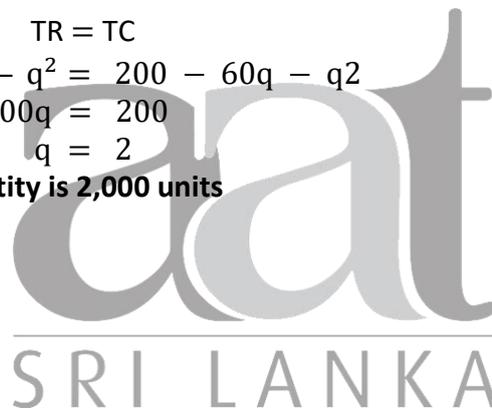
$$\begin{aligned} 40q - q^2 &= 200 - 60q - q^2 \\ 100q &= 200 \\ q &= 2 \end{aligned}$$

Monthly break-even quantity is 2,000 units

OR

At zero profit

$$\begin{aligned} 0 &= 100q - 200 \\ 100q &= 200 \\ \underline{q} &= \underline{2} \end{aligned}$$



(04 marks)

(Total 10 marks)

**Suggested Answers to Question Four:**

**Chapter 05 – Comparing Two Quantitative Variables**

(a)

$$\sum X = 64, \sum Y = 59, \sum XY = 552, \sum X^2 = 580, n = 8$$

x	y	X <sup>2</sup>	xy
3	3	9	9
6	2	12	36
8	5	40	64
5	7	35	25
9	6	54	81
10	9	90	100
11	12	132	121
12	15	180	144
<b>64</b>	<b>59</b>	<b>552</b>	<b>580</b>

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

$$b = \frac{(8 \times 552) - (64 \times 59)}{(8 \times 580) - (64^2)}$$

$$b = \frac{4,416 - 3,776}{4,640 - 4,096}$$

$$b = \frac{640}{544}$$

$$\underline{\underline{b = 1.1765}}$$

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

$$a = \frac{59}{8} - \left[1.1765 \times \frac{64}{8}\right]$$

$$a = 7.375 - 1.176 \times 8$$

$$\underline{\underline{a = -2.033}}$$

Therefore least square regression line is,

$$Y = a + bx$$

$$\underline{\underline{Y = -2.033 + 1.176x}}$$

(07 marks)

(b)

$$Y = -2.033 + 1.176x$$

$$8 = -2.033 + 1.176x$$

$$1.176x = 8 + 2.033$$

$$1.176x = 10.033$$

$$\underline{\underline{X = 8.53}} \text{ or } \underline{\underline{x = 9}}$$

(03 marks)

(Total 10 marks)

**Suggested Answers to Question Five:**

**Chapter 04 – Data Presentation and Descriptive Measures**

Time	<i>f</i>	<i>x</i>	<i>x</i> <sup>2</sup>	<b>F<i>x</i><sup>2</sup></b>	<i>fx</i>
10 – 19	25	14.5	210.25	5,256.25	362.50
20 – 29	18	24.5	600.25	10,804.50	441
30 - 39	30	34.5	1,190.25	35,707.50	1,035
40 – 49	17	44.5	1,980.25	33,664.25	756.50
50 – 59	6	54.5	2,970.25	17,821.50	327
60 - 69	4	64.5	4,160.25	16,641.50	258
	<b>100</b>		<b>11,111.50</b>	<b>119,895</b>	<b>3,180</b>

**(a) Mode**

Mode class is 30-39

$$L_1 = 29.5, \quad \Delta_1 = 30 - 18 = 12 \quad C = 10$$

$$\Delta_2 = 30 - 17 = 13$$

$$M_o = L_i + \left[ \frac{\Delta_1}{\Delta_1 + \Delta_2} \right] \times C$$

$$M_o = 29.5 + \left[ \frac{12}{12 + 13} \right] \times 10$$

$$M_o = 29.5 + 4.8$$

$$M_o = \underline{\underline{34.3}}$$

(03 marks)

**(b)**

$$\sum fX = 3180$$

$$\frac{\sum fX^2 = 119\,895}{\sum f = 100}$$

$$\begin{aligned} \text{Mean} &= \frac{\sum fX}{\sum f} \\ &= \frac{3180}{100} \\ &= \underline{\underline{31.80}} \end{aligned}$$

(03 marks)

**(c)**

$$\text{Standard Deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left[ \frac{\sum fx}{\sum f} \right]^2}$$

$$\begin{aligned} \text{Standard Deviation} &= \sqrt{\frac{119\,895}{100} - \left[ \frac{3180}{100} \right]^2} \\ &= \underline{\underline{13.70}} \end{aligned}$$

(04 marks)  
(Total 10 marks)

**End of Section B**

**Suggested Answers to Question Six:****Chapter 02 - Financial Mathematics for Business****(A)****(a)**

$$S = x(1 + ar)^n \quad X = 300,000, \quad r = 8\% = 0.08, \quad t = 3$$

$$S = 300,000 (1 + 3 \times 0.08)$$

$$S = 300,000 + 72,000$$

$$\underline{\underline{S = 372,000}}$$

**(02 marks)****(b)**

$$S = X(1 + r)^n \quad X = 300,000, \quad r = 12/4\% = 0.03, \quad n = 3 \times 4 = 12$$

$$S = 300\,000 \times (1 + 0.03)^{12}$$

$$S = 300,000 \times 1.426$$

$$\underline{\underline{S = 427,800}}$$

**(02 marks)****Chapter 02 - Financial Mathematics for Business****(B)****(a)**

	0	1	2	3
Investment	(500,000)			
Net Cash Flow	-	250,000	375,000	50,000
	(500,000)	250,000	375,000	50,000
10%	1	0.909	0.826	0.751
DCF	(500,000)	227,250	309,750	37,550
<b>NPV = 74,550</b>				

**(04 marks)****(b)**

Project	NPV
A	74,550
B	80,400

Since the NPV of the project B is higher than project A, Project B is the best project to undertake.

**(02 marks)**

**Chapter 06 – Probability and its Applications**

(C)

(a)

x	p	xp
-1	0.32	-0.32
0	0.01	0.00
1	0.02	0.02
2	0.04	0.08
3	0.40	1.20
4	0.21	0.84
		<b>1.82</b>

$$E(X) = \sum X \times P$$

$$= \underline{\underline{1.82}}$$

(03 marks)

(b)

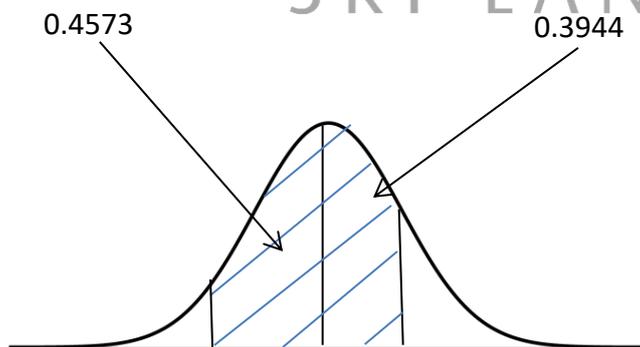
X : time taken by a runner to finish a marathon (min)

$$\mu = 240 \quad \sigma = 40$$

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

$$X = 166, \quad Z = \frac{166 - 177}{6.4} = -1.72$$

$$X = 185, \quad Z = \frac{185 - 177}{6.4} = +1.25$$



X	166	177	185
Z	-1.72	0	+1.25

$$\Pr(166 < X < 185) = 0.4573 + 0.3944$$

$$= \underline{\underline{0.8517 \text{ or } 85.17\%}}$$

The probability that a randomly chosen adult male has a height between 166cm and 185cm is 85.17%.

(03 marks)

**Chapter 07- Index Numbers and Forecasting**

(D)

Item	q <sub>1</sub>	q <sub>1</sub>	q <sub>0</sub>	q <sub>1</sub> P <sub>1</sub>	q <sub>0</sub> P <sub>1</sub>
x	100	15	70	1,500	1,050
y	250	40	280	10,000	11,200
z	130	60	90	7,800	5,400
				<b>19,300</b>	<b>17,650</b>

$$\text{Laspeyre's Quantity Index} = \frac{\sum P_0 q_1}{\sum P_0 q_0} \times 100\%$$

$$= \frac{19,300}{17,650} \times 100\%$$

$$\equiv \underline{\underline{109\%}}$$

(04 marks)

(Total 20 marks)



**End of Section C**

**Notice:**

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