Association of Accounting Technicians of Sri Lanka

Level I Examination - July 2024

Suggested Answers

(102) BUSINESS MATHEMATICS AND STATISTICS (BMS)

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THE ASSOCIATION OF ACCOUNTING TECHNICIANS OF SRI LANKA

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(102) BUSINESS MATHEMATICS AND STATISTICS

SUGGESTED ANSWERS

(Total 40 Marks) **SECTION - A**

Suggested Answers to Question One:

1.1 (3)

(Chapter 01)

$7x2 + 12x + 5 = (7x+5)(x+1)$

(03 marks)

1.2 (2)

(Chapter 02)

$S = X(1 + r)^n$ x= 500 000, n = 4, r = 0.12,

$S = 500\,000 \times 1.12^4$

S = 786 759.68

Interest = 786760 – 500 000 = Rs. 286 760//

(03 marks)

1.3 (3)

(Chapter 02)

$$PV = \frac{X(1-(1+r)^{-n})}{r}$$

X= 60 000, n = 5, r = 0.05

$$PV = \frac{60000 \times (1-1.05^{-5})}{0.05}$$

$PV = 259\,768.60 \approx 259\,769$

OR

Using Annuity table

$PV = X \times \text{CDF}$

$PV = 60\,000 \times 4.329 = 259\,740$

(03 marks)

1.4 (3)

(Chapter 07)

$P = \frac{p1}{p0} \times 100$

$Q = \frac{240}{160} \times 100 = 150\%$

(03 marks)

1.5 (1)

(Chapter 05)

$$r = \frac{n\sum XY - \sum X . \sum Y}{\sqrt{(n\sum X2 - (\sum X)2)\,(n\sum Y2 - (\sum Y)2)}}$$

$$r = \frac{1992 - 1612}{\sqrt{(832 - 676)\,(4832 - 3844)}}$$

$$= \frac{380}{\sqrt{156\,X\,988}}$$

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(03 marks)

1.6 (2)

(Chapter 06)

$\frac{6}{10} X \frac{5}{9} = \frac{1}{3}$

(03 marks)

1.7 (2)

(Chapter 02)

Pr(X < 1) =0.1 + 0.25 + 0.15 =0.50

(03 marks)

1.8 (3)

(Chapter 04)

L_1 = 19.5, $\Delta_1 = 19 - 10 = 9$ **C = 10**

$\Delta_2 = 19 - 12 = 7$

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

$$M_o = 19.5 + \left[\frac{9}{9+7}\right] \times 10$$

$$\boldsymbol{M_o = 25.125 \cong 25//}$$

(03 marks)

1.9 (2)

(Chapter 02)

$S = X(1 + r/N)^{n \times N}$ X= 200,000 r = 0.12, n = 3 ,N=4

$S = 200{,}000\ (1 + 0.12/4)^{3 \times 4}$

S = 200,000 X 1.426

S = 285,000

(03 marks)

1.10 (3)

(Chapter 07)

$$T = 1\,160 + 182.86X$$

$$T = 1\,160 + 182.86 \times 7 = 2440$$

(03 marks)

1.11 ***(Chapter 06 & 07)***

A ⟶ 3
B ⟶ 4
C ⟶ 2
D ⟶ 1

(01 mark each, 04 marks)

1.12 ***(Chapter 04 & 05)***

The amount to spend for the hotels = 36000 X $\left[\frac{126}{360}\right]$ = **Rs.** 12 600

(02 marks)

1.13 ***(Chapter 01)***

$T_n = ar^{n-1}$

$T_n = 5 \times 2^8$

$T_n = 1280$ //

(02 marks)

1.14 ***(Chapter 05)***

False

(01 mark)

1.15 ***(Chapter 07)***

True

(01 mark)

(Total 40 marks)

End of Section A

Suggested Answers to Question Two:

Chapter 01

(a)

No of student tickets sold = X

No of adult tickets sold = Y

X + Y = 830

30X + 50Y = 31 040

By using calculator, X = 523

Y = 307

No of student tickets sold = 523

No of adult tickets sold = 307

(04 marks)

(b) Material and labor costs of a clay pot = Rs. 1500 – 300

= Rs. 1200

Material cost of a clay pot $= 1200 \times \frac{3}{5}$ = Rs 720.00

Labor cost of a clay pot $= 1200 \times \frac{2}{5}$ = Rs 480.00

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(03 marks)

(c)

$8x - 11 = 2x + 25$

$6x = 36$

$x = 6$

(03 marks)

(Total 10 marks)

Suggested Answers to Question Three:

Chapter 03

(a)

(i)

$TR = p \times q$ p = -3q + 1 660

$TR = (-3q + 1\,660) \times q$

$\underline{TR = -3q^2 + 1\,660q}$

$TC = FC + VC$

$\underline{TC = 6\,000 + q^2 + 1\,220q}$

$\underline{TC = q^2 + 1\,220q + 6\,000}$

(03 marks)

(ii)

$TR = -3q^2 + 1\,660q$

$\boldsymbol{MR} = \frac{dTR}{dq}$

$\boldsymbol{MR} = -6q + 1\,660$

$TC = 6\,000 + q^2 + 1\,220q$

$\boldsymbol{MC} = \frac{dTC}{dq}$

$\boldsymbol{MC} = 2q + 1\,220$

When profit is maximized

$\boldsymbol{MR} = \boldsymbol{MC}$

$-6q + 1\,660 = 2q + 1\,220$

$8q = 440$

$\underline{q = 55}$

The profit maximizing number of units are 55.

(04 marks)

(b)

TC = 12$q2$ – 24q + 480,000

$\frac{dTC}{dq} = 24q - 24$

When the cost is minimum,

$\frac{dTC}{dq} = 0$

$24q - 24 = 0$

$\underline{q = 1}$

The cost minimizing production level is 1000 units.

(03 marks)

(Total 10 marks)

Suggested Answers to Question Four:

Chapter 05

(a)

(b)

X	Y	XY	X^2
80	**8**	**640**	**6,400**
50	**5**	**250**	**2,500**
30	**3**	**90**	**900**
60	**6**	**360**	**3,600**
40	**4**	**160**	**1,600**
45	**5**	**225**	**2,025**
20	**2**	**40**	**400**
70	**7**	**490**	**4,900**
$\sum x = 395$	$\sum y = 40$	$\sum xy$ $= 2{,}255$	$\sum x2$ $= 22{,}325$

$\sum X = 395$ $\sum Y = 40$, $\sum XY = 2\ 255$, $\sum X^2 = 22\ 325$, $n = 8$

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

$$b = \frac{8 \text{ X } 2{,}255 - 395 \text{ X } 40}{(8 \text{ X } 22{,}325 - 395^2)}$$

$$b = \frac{18{,}040 - 15{,}800}{(178{,}600 - 156{,}025)}$$

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

$$a = \frac{40}{8} - 0.099 \times \frac{395}{8}$$

a = 0.11

Least square regression line Y = 0.099x - 0.11

(07 marks)

(c) Substitute x = 90

Y = 0.099 - 0.11x

Y = 0.099 - 0.11×90,000

Y = 8,910.11

Expected profit is Rs.8,910

(03 marks)
(Total 10 marks)

Suggested Answers to Question Five:

Chapter 04

(a)

Class Interval	f	(x)	fx	Fx^2
0 -9	7	4.5	31.5	141.75
10 – 19	9	14.5	130.5	1,892.25
20 – 29	14	24.5	343	8,403.50
30 – 39	8	34.5	276	9,522
40 – 49	7	44.5	311.50	13,861.75
50 - 59	5	54.5	272.50	14,851.25
	50		**1,365**	**48,672.50**

$\sum f X =$ 1 365 $\sum f X^2 = 48\ 672.5$ $\sum f = 50$

Mean $= \frac{\sum fX}{\sum f}$

$= \frac{1\ 365}{50}$

= 27.3

(03 marks)

(b)

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

Standard Deviation = $\sqrt{\frac{48\ 672.5}{50} - \left[\frac{1365}{50}\right]^2}$

= 15.10

(04 marks)

(c)

Coefficient of Variation = $\frac{s}{\bar{X}} \times 100$

$= \frac{15.10}{27.3} \times 100$

= 55.3%

(03 marks)
(Total 10 marks)

End of Section B

(Total 20 Marks)

SECTION - C

Suggested Answers to Question Six:

(A)

Chapter 02

1st Method (Using calculator)

$$\boldsymbol{PV = \frac{X(1-(1+r)^{-n})}{r}}$$

$$X = \frac{PV \times r}{(1-(1+r)^{-n})}$$

PV = 500,000, n = 5, r = 0.13

$$X = \frac{500{,}000 \times 0.13}{(1-1.13^{-5})}$$

$$X = 142{,}157.27$$

Annual installment = Rs. 142, 157. 27

2nd Method (Using CDF table)

$\boldsymbol{PV = x \times CDF}$ PV= 500,000, n= 5 , r = 0.13, CDF= 3.517

$$\boldsymbol{X = \frac{PV}{CDF}}$$

$$\boldsymbol{X = \frac{500{,}000}{3.517}}$$

$$\boldsymbol{X = 142{,}166.62}$$

Annual installment = Rs. 142, 166. 62

(03 marks)

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(B)

Chapter 02

(a)

Using Discounting Factors

Year	Cash Flow		D.F. (12%)	Present Value (X)	Present Value (Y)
	A	B			
0	(500,000.00)	(500,000.00)	1	(500,000.00)	(500,000.00)
1	150,000.00	190,000.00	0.893	133,950.00	169,670.00
2	220,000.00	210,000.00	0.797	175,340.00	167370.00
3	260,000.00	300,000.00	0.712	185,120.00	213,600.00
NPV				**(5,590.00)**	**50,640.00**

Using Formula

	Year	0	1	2	3
Project X	Cash flow	(500 000)	150 000	220 000	260 000
Project Y	Cash flow	(500 000)	190 000	210 000	300 000

NPV = Present value of cash inflow - Present value of cash outflow

$PV = \frac{X}{(1+r)^n}$ r =0.12 $PV = \frac{X}{1.12^n}$

Project X

$$NPV = \frac{150\,000}{1.12^1} + \frac{220\,000}{1.12^2} + \frac{260\,000}{1.12^3} - 500\,000$$

$NPV = 494\,374.09 - 500\,000$

$= -5\,625.91$//

Project Y

$$NPV = \frac{190\,000}{1.12^1} + \frac{210\,000}{1.12^2} + \frac{300\,000}{1.12^3} - 500\,000$$

$NPV = 550\,587.65 - 500\,000$

$= 50\,587.65$//

(06 marks)

(b)

Net Present Value of project Y is positive. Project X have negative NPV.

Therefor Project Y is the best investment.

(02 marks)

(C)

Chapter 06

Type	Supplier X	Supplier Y	Total
Faulty	2	4	6
Good	43	51	94
Total	45	55	100

(a)

Probability that a randomly selected circuit is faulty = $\frac{6}{100}$ = 0.06 //

(02 marks)

(b)

Pr (Circuit is faulty/circuit is from company X) = $\frac{2}{45}$ = 0.04 //

(03 marks)

(D)

Chapter 06

X : Weight of the packages(g)

μ= 540 σ = 48

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

$$Z = \frac{X - 540}{48}$$

Pr(X < 465)

$$\Pr\left(\frac{X - 540}{48} < \frac{465 - 540}{48}\right)$$

Pr(Z < -1.56) = 0.5 – 0.4406

= 0.0594

= 5.9%

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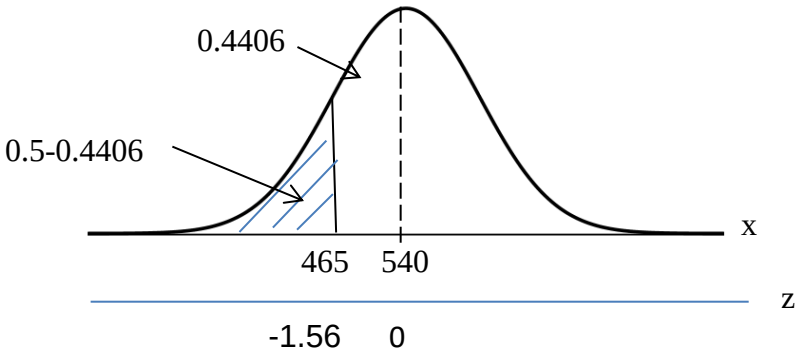

(04 marks)

(Total 20 marks)

End of Section C

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