Association of Accounting Technicians of Sri Lanka

Level I Examination - January 2024

Suggested Answers

(102) BUSINESS MATHEMATICS AND STATISTICS (BMS)

Association of Accounting Technicians of Sri Lanka

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A publication of the Education and Training Division

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

Suggested Answers to Question One:

1.1 **(4)**

$9x^2 - 25 = (3x-5)(3x+5)$

(03 marks)

1.2 **(1)**

$S = X(1+r)^n$ x = 400 000,   n = 4,   r = 0.08,

$S = 400\,000 \times 1.08^4$

S = 544195.58

Interest   = 544196 − 400 000 = Rs. 144 196//

(03 marks)

1.3 **(2)**

$P(X \cap Y) = P(X) + P(Y) - P(X \cup Y)$

$P(X \cap Y) = 0.40 + 0.55 - 0.85$

$P(X \cap Y) = 0.10$

(03 marks)

1.4 **(4)**

$Q = \frac{q1}{q0} \times 100$

$Q = \frac{50}{40} \times 100 = 125\%$

(03 marks)

1.5   (3)

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

$$r = \frac{5 \times 2863 - 293 \times 60}{\sqrt{(5 \times 20575 - 293^2)(5 \times 928 - 60^2)}}$$

$$= \underline{-0.7759}$$

(03 marks)

1.6   (4)

$$Md = L + \frac{(\frac{n}{2} - Fc)}{fm} \times c.$$

$$Md = 29.5 + \frac{(50 - 20)}{35} \times 10$$

$$Md = 34$$

(03 marks)

1.7   (3) a = 1- 0.75 = 0.25

(03 marks)

1.8   (1)

AER = (1 + r/N)^N - 1   r=0.16, N=4

AER = (1 + 0.16/4)^4 - 1

AER = 0.16986

AER = 16.98%

(03 marks)

1.9   (2)

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

PV= 2000 000, n = 5, r = 0.12

$$2000000 = \frac{x(1-1.12^{-5})}{0.12}$$

$$x = \frac{2000000 \times 0.12}{(1-1.12^{-4})}$$

$$\underline{x = Rs.554,785}$$

(03 marks)

1.10 **(2)**

$$\hat{Y} = \hat{T} \times \hat{S}$$

$$\hat{Y} = 1265 \times 1.05$$

$$\hat{Y} = 1328$$

(03 marks)

1.11

A ⟶ 3
B ⟶ 1
C ⟶ 4
D ⟶ 2

(01 mark each, 04 marks)

1.12

Total number of minutes the student watched TV on Tuesday and Thursday = 60 + 10

= <u>70 minutes</u>

(02 marks)

1.13

$$T_n = a + (n-1)d$$

$$T_n = 0 + 9 \times \frac{1}{4}$$

$$T_n = \frac{9}{4}$$

$$T_n = 2\frac{1}{4} \text{ or } 2.25$$

(02 marks)

1.14 False

(01 marks)

1.15 True

(01 marks)

(Total 40 marks)

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End of Section A

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Suggested Answers to Question Two:

Chapter 01 - Fundamental Concepts of Mathematics

(a)

$T_n = ar^{n-1}$ a = 500,000, r = 1.15, n = 4

$T_6 = 500,000 \times 1.15^3$

$T_6 = 760,437.50$

Profit in fourth year = Rs. 760,437.50

(03 marks)

(b)

Cost per share of company A = Rs, X

Cost per share of company B = Rs, Y

⇨ $61x + 80y = 7,042$ ——— (1)
⇨ $61x + 14y = 3,346$ ——— (2)
(1) − (2) $66y = 3,696$
        $y = \underline{56}$

(1) => $61x + 80 \times 56 = 7,042$

        $61x = 2,562$

        $x = \underline{42}$

Cost per share of company A = Rs. 42

Cost per share of company B = Rs. 56

(04 marks)

(c)

Total amount payable by Nuwan $= 840 \times \frac{115}{100}$

= **Rs. 966**

(03 marks)
(Total 10 marks)

Suggested Answers to Question Three:

Chapter 03 - Financial Operative Measures for Business

(a)

$$TR = p \times q \qquad\qquad p = 13q - 20$$

$$TR = (13q - 20) \times q$$

$$\underline{TR = 13q^2 - 20q}$$

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

$$\underline{MC = 26q + 5}$$

(04 marks)

(b) Let q = 50

$$MC = 26 \times 50 + 5$$

$$MC = Rs.\ 1305$$

(02 marks)

(c)

At the Break Even Point

TR = TC

$$13q^2 - 20q = 13q^2 + 5q - 1000$$

$$25q = 1000$$

$$q = 40$$

Break-even quantity = 40 units

(04 marks)
(Total 10 marks)

Suggested Answers to Question Four:

Chapter 05 - Comparing Two Quantitative Variables

(a)

x	y	xy	x^2
15	10	150	225
18	8	144	324
22	6	132	484
23	6	138	529
24	7	168	576
20	8	160	400
17	9	153	289
16	10	160	256
$\sum x = 155$	$\sum y = 64$	$\sum xy = 1,205$	$\sum x2 = 3,083$

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

$$b = \frac{8 \times 1,205 - 155 \times 64}{(8 \times 3,083 - 155^2)}$$

b = - 0.438

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

$a = \frac{64}{8} - (-0.4382) \times \frac{155}{8}$

a = 16.486

Least square regression line

<u>**Y = 16.486 - 0.438x**</u>

(08 marks)

(a)

Substitute x = 19

Y = 16.486 - 0.438x

Y = 16.486 - 0.438×19

Y = 8.164

expected rating of customer satisfaction is 8.

(02 marks)
(Total 10 marks)

Suggested Answers to Question Five:

Chapter 04 - Data Presentation and Descriptive Measures

Age	*x*	*f*	*fx*	*Fx²*
50 - 59	54.5	3	163.5	8,910.75
60 - 69	64.5	4	258	16,641
70 - 79	74.5	2	149	11,100.50
80 - 89	84.5	9	760.5	64,262.25
90 - 99	94.5	5	472.5	44,651.25
100 - 109	104.5	7	731.5	76,441.75
		30	**2,535**	**222,007.50**

(a) Mode class is 80-89

$L_1 = 79.5,$ $\Delta_1 = 9 - 2 = 7$ $C = 10$

$\Delta_2 = 9 - 5 = 4$

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

$$M_o = 79.5 + \left[\frac{7}{7+4}\right] \times 10$$

$$\underline{M_o = 85.86}$$

(03 marks)

(b)

Waiting time (minutes)	X	F	fx	fx^2
50 - 59	54.5	3	163.5	8,910.75
60 - 69	64.5	4	258	16,641
70 - 79	74.5	2	149	11,100.5
80 - 89	84.5	9	760.5	64,262.25
90 - 99	94.5	5	472.5	44,651.25
100 - 109	104.5	7	731.5	76,441.75
		30	2,535	222,007.50

$\sum f X = 2,535$ $\sum f X^2 = 222,007.5$ $\sum f = 30$

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

$= \dfrac{2,535}{30}$

$= 84.5$

(03 marks)

(c)

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

Standard Deviation = $\sqrt{\dfrac{222{,}007.5}{30} - 84.5^2}$

=16.12

(04 marks)
(Total 10 marks)

End of Section B

Suggested Answers to Question Six:
(A)

Chapter 02 - Financial Mathematics for Business

(a)

1st Method (Using calculator)

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

X = 65,848, n = 4, r = 0.12

$$PV = \frac{65,848 \times (1-1.12^{-4})}{0.12}$$

$$PV = 200,003.38$$

Amount of the loan = Rs. 200,003.38

2nd Method (Using CDF table)

The CDF table values in the study packs have only three decimal places

$$PV = x \times CDF \qquad \text{X= 65,848, n= 4 , CDF= 3.037}$$

$$PV = 65,848 \times 3.0374$$

$$PV = 200,006.72$$

Amount of the loan = Rs. 200,006.72

If the loan amount is Rs. 200,000

Year	Balance as at Beginning	Interest @ 8%	Repayment	Amount Payable as at end of the year
1	200,000	24,000	65,848	158,155.79
2	158,152	18,978.24	65,848	111,286.48
3	111,282.24	13,353.87	65,849	58,791.86
4	58,788.11	7,050.61	65,850	0

(03 marks)

(B)

Chapter 02 - Financial Mathematics for Business

(a)

Year	Cash Flow		D.F. (10%)	Present Value (Option A)	Present Value (Option B)
	A	**B**			
0	(1,800,000)	(1,400,000)	1	(1,800,000)	(1,400,000)
1	400,000	500,000	0.909	363,600	454,500
2	800,000	600,000	0.826	660,800	495,600
3	1,000,000	800,000	0.751	751,000	600,800
NPV				**(24,600)**	**150,900**

(b)

	Project A	Project B
Investment	**1 800 000**	**1 400 000**
NPV	- 23 892	**151 465**
	or - 24 600	or **150,900.00**

Net Present Value of project B is positive. Project A have negative NPV.

Therefor Project B is the best investment.

(02 marks)

(C)

Chapter 06 - Probability and its Applications

Type	Correctly	Incorrectly	Total
A	12	5	17
B	8	7	15
C	6	12	18
Total	26	24	50

(a)

The probability that the randomly selected bottle is made from plastic A = $\dfrac{17}{50}$

$$= 0.34$$

(02 marks)

(b)

The probability that the randomly selected bottle is
made from plastic B Given that it is deposited incorrectly. = $\dfrac{7}{24}$

$$= 0.29$$

(02 marks)

(D)

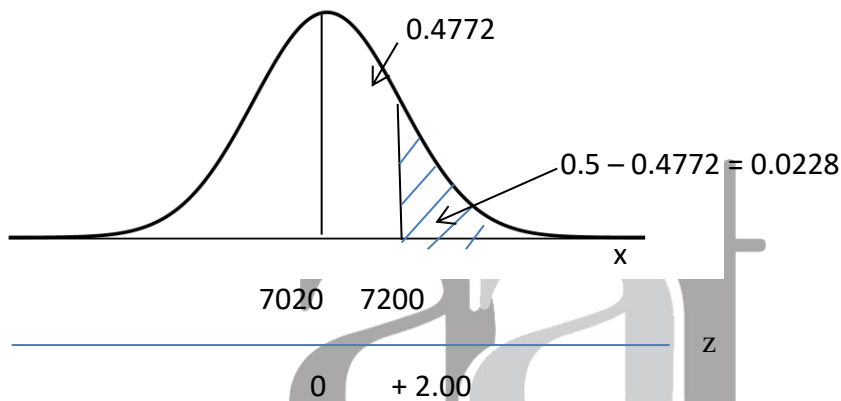## Chapter 06 - Probability and its Applications

X : Weekly overtime payment   (Rs.)

μ= 7020   σ = 90

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

$$Z = \frac{X - 7020}{90}$$

X=7200, $Z = \frac{7200 - 7020}{90} = +2$

0.4772

0.5 − 0.4772 = 0.0228

x

7020   7200

z

0   + 2.00

Pr(X > 7200)   = 0.50 − 0.4772

= .0228

= 2.28%

Number of minor staff whose

Weekly overtime payment is more than Rs. 7,200 = 0.0228X2000

= 46

(03 marks)
(Total 20 marks)

End of Section C