

THE ASSOCIATION OF ACCOUNTING TECHNICIANS OF SRI LANKA
INTERMEDIATE EXAMINATION - JULY 2012
(51) BUSINESS MATHEMATICS AND STATISTICS
Time: 03 hours

 29-07-2012
 Morning
 [9.00 – 12.00]

• Instructions to candidates:

- (1) *This paper consists of three (03) Sections A, B & C.*
- (2) **Five (05) questions should be answered as follows:**
- **Question No.01 of Section A**
 - **Both questions of Section B**
 - **Any two (02) questions from Section C**
- (3) *Submit all workings and calculations. State clearly assumptions made by you, if any.*
- (4) *Use of calculators is permitted.*
- (5) *Answers should be in one language, in the medium applied for, in the booklets provided.*
- (6) *Graph papers will be provided.*
- (7) *100 Marks.*

 No. of Pages : 08
 No. of Questions : 06

SECTION - A

Multiple Choice Questions

Answer all questions of this Section.

30 marks

01. Select from (1), (2), (3) and (4) the **most correct** answer to each of the following questions. Write the number of the selected answer in your answer booklet with the English letter assigned to the question.

- (A) There were some eggs in a bag. When the eggs were grouped into four, five and six, two eggs were always in excess.

How many eggs were there in the bag?

- (1) 58 (2) 60 (3) 62 (4) 120

(B) $\frac{a-1}{a-2} - \frac{a+1}{a+2} + \frac{2a}{a^2-4}$

When the above algebraic expression is simplified, the answer is:

- (1) $\frac{4a}{a^2-4}$ (2) $\frac{4a}{4-a^2}$ (3) $\frac{4}{a^2-4}$ (4) $\frac{4}{4-a}$

(C) Find the transformation (A^{-1}) of matrix A:

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 0 & -6 & 0 \end{pmatrix}$$

- (1) $\begin{pmatrix} 1 & 0 \\ 2 & -6 \\ 3 & 0 \end{pmatrix}$ (2) $\begin{pmatrix} 0 & -6 & 0 \\ 1 & 2 & 3 \end{pmatrix}$ (3) $\begin{pmatrix} 0 & 1 \\ -6 & 2 \\ 0 & 3 \end{pmatrix}$ (4) $\begin{pmatrix} 0 & -1 \\ 6 & -2 \\ 0 & -3 \end{pmatrix}$

(I) Identify which one of the following is **not** a method of collection of secondary data:

- (1) Published reports. (2) Government statistics.
 (3) Company's financial statements. (4) Questionnaires.

(J) The prices of a kilogram of sugar for 5 years are shown below:

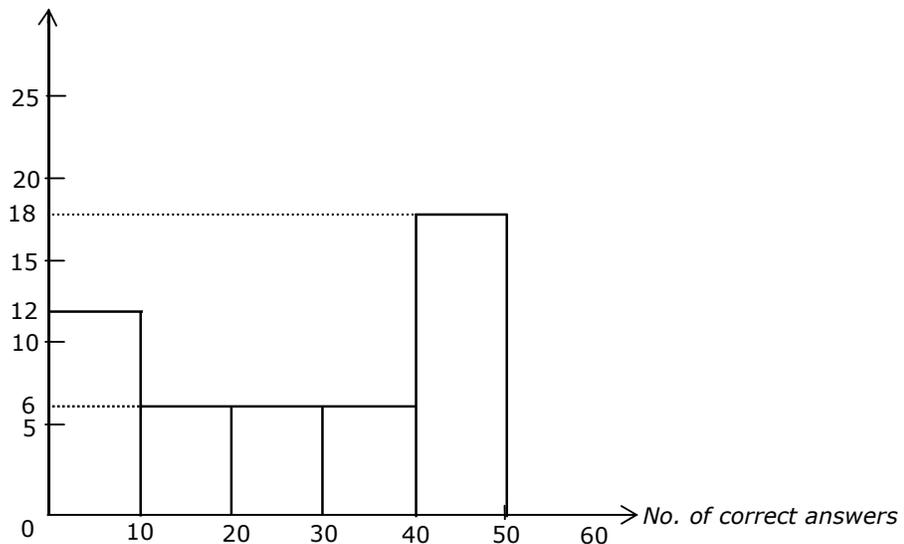
Year	2001	2002	2003	2004	2005
Price (Rs.)	30	50	60	100	110

What is the mean deviation of sugar prices for 5 years?

- (1) Rs.0/- (2) Rs.70/- (3) Rs.26/- (4) Rs.28/-

(K) In order to select some staff members for a foreign training, a company conducted a Multiple Choice Questions (MCQ) test which comprised of 50 MCQs. The results of the MCQ test is represented in the histogram shown below:

No. of Candidates



If the best 50% of the Candidates who sat for the test are being selected for the foreign training, what is the minimum mark that a Candidate should get to be eligible for the foreign training?

- (1) 20 (2) 25 (3) 40 (4) 30

(L) Which of the following sampling methods are **probabilistic** sampling method/s?

- (a) Simple Random Sampling.
- (b) Stratified Random Sampling.
- (c) Quota Sampling.

- (1) (a) and (c) only. (2) (a) and (b) only.
(3) All (a), (b) and (c). (4) None of the above.

(M) There are 5 numbers in a data series. First number of the data series is 14 and mean, median and mode are 10, 9 and 6 respectively. Find the 5 numbers:

- (1) 14, 6, 9, 6, 15 (2) 14, 9, 9, 9, 9
(3) 14, 9, 10, 8, 9 (4) 14, 9, 9, 6, 12

(N) There are red balls and blue balls of the same size in a bag. The probability of getting a red ball from a bag is $\frac{2}{3}$.

If there are seven blue balls in the bag, how many red balls are there in the bag?

- (1) 28 (2) 21 (3) 14 (4) 7

(O) The linear relationship between the sales (in Rs.'000) and advertising expenditure (in Rs.'000) is given by,

$$Y = 0.9x + 6$$

- (a) The two variables have a correlation coefficient of 0.9.
- (b) When the advertising expenditure is 0, the company could achieve a sales of Rs.6,000/-.

Which of the above statement/s is/are correct?

- (1) (a) only. (2) (b) only.
(3) (a) and (b). (4) None of the above.

(02 marks each, Total 30 marks)

SECTION - B

Compulsory Questions

Answer both questions of this Section

50 marks

- 02.** (a) Three main cost elements of a plantation company are buying plants, fertilizer and cost of labour. The ratio of estimated expenditure for buying plants and fertilizer for the next year is 3 : 2 and the ratio of estimated expenditure for fertilizer and labour is 4 : 5.

If Rs.750,000/- has been allocated as total expenditure for next year, find the allocation for each of the above cost elements for the next year. (05 marks)

- (b) A person has invested a total of Rs.30,000/- in two bank accounts on the same day. Part of his money has been invested in a fixed deposit account which pays an interest of 8% per annum and the balance was invested in a Savings Account which pays an interest of 5% per annum.

If the total interest he earned at the end of one year is Rs.2,100/-, find the amount invested in the fixed deposit. (05 marks)

- (c) A company is evaluating a new investment on introducing a new product line. The new product line requires an initial investment of Rs.100,000/- and operational cost of Rs.5,000/- annually from year 1 - 6. The new product line generates an income of Rs.30,000/- per year from year 1 - 6.

Assume that all cash inflows and operational costs occur at the end of each year and no cash flows are expected after 6 years. The required rate of return is 10%.

- (i) Calculate the Net Present Value (NPV) of the investment.
(ii) Comment on the viability of the investment. (06 marks)

You may use the following discounting factors at 10%.

Year	1	2	3	4	5	6
Discounting Factor @ 10%	0.909	0.826	0.751	0.683	0.621	0.564

- (d) A customer walks into a showroom to buy a refrigerator. Listed price of the selected refrigerator is Rs.112,000/-. However the merchant has offered the following three payment options to the customer.

Option 1 : Outright cash purchase

A discount of 15% on the listed price is offered for outright cash purchases.

Option 2 : Credit card payment

A discount of 16% on the listed price is offered for payment by credit cards. However the customer has to pay a bank charge of 1% of the amount charged on the credit card when he settles the credit card payment to the bank.

Option 3 : Easy payment scheme

A discount of 6% on the listed price is offered by the merchant and the customer will be offered on easy payment. There is no interest, and customer will pay by 12 installments to the bank under a easy payment scheme. Under the promotion, the bank will undertake to bear the cost of the last installment (effectively customer has to pay only 11 installments). Also a bank charge of 1% is charged from the customer on value of the installment, when each installment is settled.

Recommend the best payment option to the customer. (07 marks)

- (e) It is found that the demand function of a product is $P = q^2 - 20q + 300$ and the supply function is $P = 5q + 450$, where P is the price and q is the quantity.
- (i) Draw the demand function and supply function on a graph sheet and hence find the equilibrium price and quantity.
- (ii) If the supply function is changed to $P = 5q + 350$, find the new equilibrium price and quantity using the graph. (07 marks)
- (Total 30 marks)

03. (a) A survey on affordability of school fees for children was done by interviewing 500 parents. The results are summarized in the probability table given below:

	School fees - Too Much	School fees - Just Right	School fees - Too Low
Parents having a child presently in a school	0.30	0.13	0.01
Parents having a child presently not in a school	0.20	0.25	0.11

- (i) What percentage of parents say that the cost of sending a child to a school is **Too Low**?
- (ii) Suppose a parent is chosen at random given that the person has a child presently in a school, what is the probability that the parent chosen is a person who believes the cost of attending a school is **Too Much**?
- (iii) How many parents have said that the school fee is **Just Right**? (06 marks)
- (b) A person maintains a personal record of the daily income from his shop for the last 30 days. The details in his record are tabulated below:

Income (Rs.)	No. of days
Less than 10,000	2
$10,000 \leq \text{Income} < 20,000$	4
$20,000 \leq \text{Income} < 30,000$	5
$30,000 \leq \text{Income} < 40,000$	8
$40,000 \leq \text{Income} < 50,000$	6
$50,000 \leq \text{Income} < 60,000$	3
$60,000 \leq \text{Income} < 70,000$	2

- (i) Draw the cumulative frequency curve (less than) for the above data.
- (ii) Indicate the median of the distribution on the graph and find the median income per day for last 30 days. (06 marks)

- (c) The following table shows the details of sales of three items for base year and current year:

Item	Base year		Current year	
	Price	Qty.	Price	Qty.
A	200	6	300	4
B	300	5	500	6
C	500	4	600	7

Using the above data,

- (i) Calculate the price relative for each item.
 - (ii) Calculate the Laspeyzer's Price Index and Paasche's Price Index for the current year.
 - (iii) Give an advantage of using Laspeyzer's Index compared to Paasche's Index. (08 marks)
- (Total 20 marks)

SECTION - C

Answer **any** two (02) questions only from this Section
20 marks

- 04.** (a) A string, 400 cm long is cut into a number of pieces so that the lengths of the pieces are in an arithmetical progression. The lengths of the shortest and the longest pieces are 5 cm and 45 cm respectively. Find the number of pieces. (04 marks)
- (b) The data presented in the table shows the test results of lifetimes of CFL bulbs obtained by using 50 bulbs:

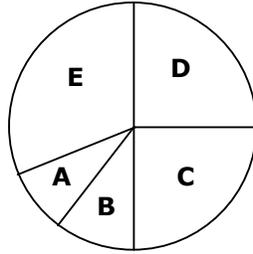
Lifetime (x) in number of years	No. of CFL Bulbs
$0 < x \leq 2$	6
$2 < x \leq 4$	15
$4 < x \leq 6$	12
$6 < x \leq 8$	8
$8 < x \leq 10$	5
$10 < x \leq 12$	4

Using the data in the table,

- Calculate: (i) Mean
(ii) Standard Deviation
of the lifetime of CFL bulbs. (06 marks)
- (Total 10 marks)

- 05.** (a) Solve,
 $\log(x + 6) - 2 \log x = \log 12$ (03 marks)
- (b) Using Binomial theorem, write down the expansion of,
 $(2x - 3)^4$ (03 marks)

- (c) The following pie chart represents the last year total profit of **ABC PLC**, generated from its five(05) products **A, B, C, D** and **E**.



The profit from product **C** is twice as the profit from product **A** and the profit from product **D** is three times as the profit from product **A**.

Profit from product **B** is 50% of the profit that comes from product **D**.

The ratio of profit between products **B** and **E** is 1 : 3.

If the last year total profit of **ABC PLC** is Rs.72 million, find the profit share that comes from product **E**.

(04 marks)

(Total 10 marks)

- 06.** (a) On 01st April 2011, a company purchased a brand new car for Rs. 7,200,000/-. The value of the vehicle was depreciated on the reducing balance basis for a period of 4 years, and at the end of 4 years its book value was Rs.3,758,445/-.

- (i) Calculate the rate at which the value of the vehicle was depreciated.
- (ii) If the company uses the straight-line method of depreciation at the same rate as that obtained in (i) above, what is the book value of the vehicle at the end of 4 years? (05 marks)

- (b) The following table shows the ranks based on the performance of 8 Candidates for the Written Test and the Interview:

Candidate	A	B	C	D	E	F	G	H
Rank for the Written Test	6	2	7	4	1	5	3	8
Rank for the Interview	1	4	2	3	6	5	8	7

Using the information given above,

- (i) Calculate the rank correlation Coefficient.
- (ii) Comment on the value of the rank correlation coefficient obtained in (i) above.

You may use the following formula,

$$r' = 1 - \frac{6 \sum d^2}{n(n^2 - 1)}$$

(05 marks)

(Total 10 marks)