

THE ASSOCIATION OF ACCOUNTING TECHNICIANS OF SRI LANKA
INTERMEDIATE EXAMINATION - JULY 2013
(51) BUSINESS MATHEMATICS AND STATISTICS
Time: 03 hours

 28-07-2013
 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) $(x + 1)(x + 5)(x - 3)$:

After removing the brackets of the above algebraic expression, the answer is:

- | | |
|-----------------------------|-----------------------------|
| (1) $3x^3 + 2x^2 - 13x$ | (2) $x^3 + 3x^2 - 13x - 15$ |
| (3) $x^3 - 3x^2 + 13x - 15$ | (4) $x^3 - 3x^2 + 13x - 9$ |

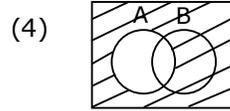
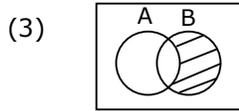
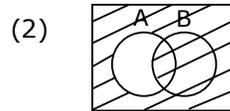
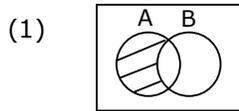
- (B) **CT PLC** is an industrial glove manufacturer which owned two factories in Kaduwela & Kandy, and the Fixed Cost (FC) of production per month, and Variable Cost (VC) per pair of gloves, are as follows:

	Kaduwela Rs.	Kandy Rs.
FC per month	35,220	36,600
VC per pair of gloves	40	30

CT PLC receives orders to manufacture 4,000 pairs of gloves for the next month. If the company's policy is to maintain total production cost of both factories equal, the number of pairs of gloves that Kandy factory should manufacture for the next month would be:

- (1) 2,000. (2) 1,734. (3) 2,266. (4) 4,000.

(C) Complement of set "A" is shown by:



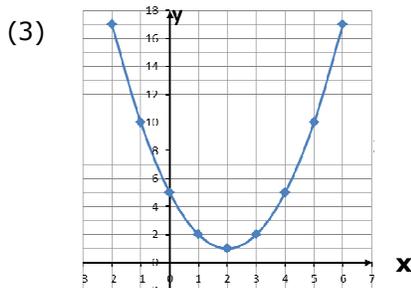
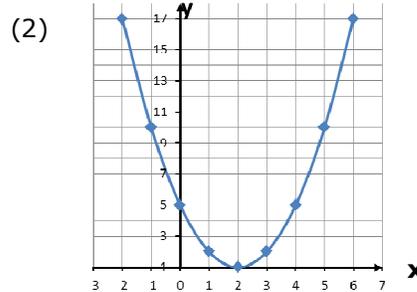
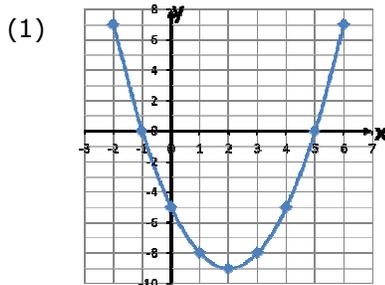
(D) A company purchases raw material required for its manufacturing process from several suppliers. The current year raw material purchase price is Rs.10/- per kilogram and it is increasing at a rate of 4% per year in the next 5 years. If the company enters into an agreement with a supplier to supply 15 million kilograms of raw material per year, the total amount that the company has to pay to the supplier for the next 5 year period (to the nearest integer) would be:

- (1) Rs.845 million. (2) Rs.150 million.
 (3) Rs.780 million. (4) Rs.750 million.

(E) A person has opened a fixed deposit of Rs.20,000/- in a bank at an annual interest rate of 12% compounded quarterly. The maturity value of the fixed deposit after 3 years period is: *(Answer given to the nearest hundred)*

- (1) Rs.27,200/-. (2) Rs.28,500/-. (3) Rs.27,700/-. (4) Rs.22,400/-.

(F) The graph which represents the function of $y = x^2 - 4x - 5$, within the range of $-3 < x < 7$ is:



(4) None of (1), (2) or (3).

- (G) **AB (Pvt) Ltd.** was formed for the purpose of setting up a new manufacturing plant. The total project cost of setting up the plant is given below:

Items	Rs. (million)
Machinery	549
Air conditioners	240
Electrical equipment	373
Total Project Cost	1,162

The electrical equipment is depreciated at 15% per annum & the remaining assets are depreciated at 5% per annum. If depreciation is calculated on the straight-line basis, annual depreciation charge of **AB (Pvt) Ltd.** is:

- (1) Rs. 95.4 million. (2) Rs. 65.6 million.
 (3) Rs. 82.9 million. (4) Rs. 30 million.

- (H) A certain amount of money is distributed among A, B and C in the ratio of 2:5:3 and another amount of money among B, D and E is also distributed in the same ratio. If the amount distributed among A, B and C is $\frac{2}{5}$ of the amount distributed among B, D and E, the ratio in which the money is distributed among A, C and E is:

- (1) 2:5:3 (2) 4:10:25 (3) 10:6:25 (4) 4:6:15

(I)
$$A = \begin{pmatrix} 3 & 2 \\ 4 & 1 \end{pmatrix} \text{ and } B = \begin{pmatrix} 2 & 0 & 1 \\ 3 & 2 & 0 \end{pmatrix}$$

A x B of the above matrices is:

- (1) $\begin{pmatrix} 0 & -4 & 3 \\ 5 & -2 & 4 \end{pmatrix}$ (2) $\begin{pmatrix} 12 & 4 & 3 \\ 11 & 2 & 4 \end{pmatrix}$ (3) $\begin{pmatrix} 0 & 4 & 3 \\ 5 & 2 & 4 \end{pmatrix}$ (4) $\begin{pmatrix} 12 & -4 & 3 \\ 11 & -2 & 4 \end{pmatrix}$

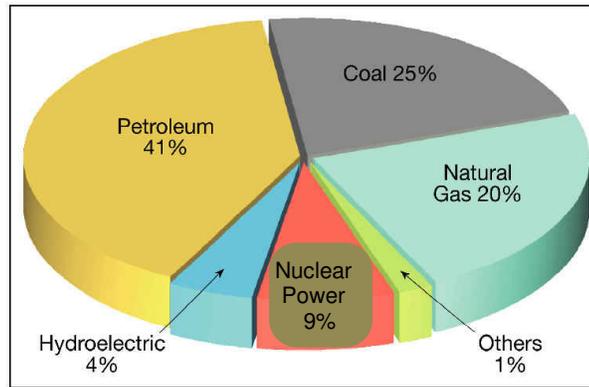
- (J) The management of a shoe manufacturing company is discussing to conduct a survey for identification of the customers' satisfaction. The Financial Manager of the company makes the following statements during the discussion:

- (a) To get accurate results in random sampling, the sample size should be larger.
 (b) Convenient sampling is a probabilistic sampling method.
 (c) In judgement sampling, the sampling is done according to the desire of the surveyor.

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

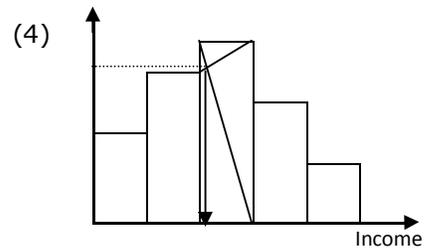
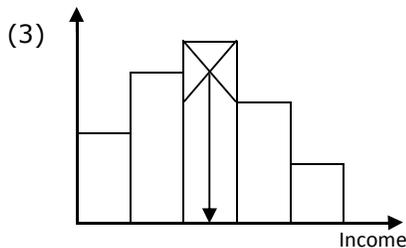
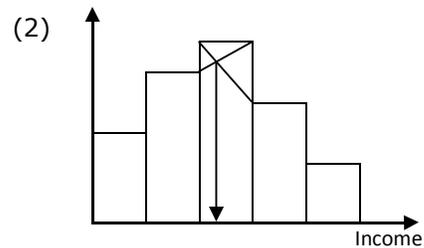
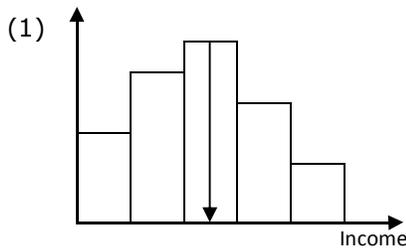
- (1) (a) and (c) only. (2) (b) and (c) only.
 (3) (a) only. (4) (c) only.

- (K) The following pie-chart shows the percentage distribution of the different energy sources consumed by residents in XYZ city. These energy sources are used to generate electricity.



If the residents who use Petroleum to generate electricity have to pay Rs.123,000/- as Petroleum cost, costs which have to be paid for Nuclear Power and Natural Gas **respectively** are:

- (1) Rs.30,000/- and Rs.60,000/- (2) Rs.60,000/- and Rs.300,000/-
 (3) Rs.60,000/- and Rs.27,000/- (4) Rs.27,000/- and Rs.60,000/-
- (L) The following histograms try to indicate the mode value of annual income of banking assistants. Which one of the following histograms shows the correct mode value?



- (M) The probability that an Accounts Clerk of a company will work with the same company for another five years time is $\frac{5}{12}$. The probability that the Accountant of the company will work with the same company for another five years is $\frac{3}{7}$. The probability that at least one of them will work with the company for another five years is:

- (1) $\frac{5}{28}$ (2) $\frac{71}{81}$ (3) $\frac{56}{84}$ (4) $\frac{16}{84}$

- (N) The cost of maintenance of machinery together with the frequencies of the maintenance cost for a garment factory are given in the table below:

Cost of Maintenance (Rs. million)	Frequency
00 & more, less than 10	2
10 & more, less than 20	4
20 & more, less than 30	5
30 & more, less than 40	2
40 & more, less than 50	5
50 & more, less than 60	2

The first quartile of the cost of maintenance is:

- (1) 25 (2) 30 (3) 17 (4) 44

- (O) The value of,

$$\sum_{r=1}^4 (r^2 - 2r - 4) \text{ is:}$$

- (1) -30 (2) 30 (3) 6 (4) -6

(02 marks each, Total 30 marks)

SECTION - B

Compulsory Questions

Answer both (02) questions of this Section

50 marks

- 02.** (a) A farmer who harvests 80 kilograms of pepper per day can export his yield at Rs.250/- per kilogram today. If he delays harvesting the crop, the crop yield will be increasing at a rate of 1 kilogram per day, but the price is expected to drop by Rs.2.50 per kilogram per day. When should harvesting of the pepper yield be done to maximize revenue? (06 marks)

- (b) **ABC bank** recently introduced two fixed deposit schemes:

1st Scheme : The bank pays an interest of 16% per annum compounded annually.

2nd Scheme : The bank pays an interest of 14% per annum compounded semi annually.

A recently retired person who received a gratuity payment of Rs.500,000/- intends to open a 3 year fixed deposit with ABC bank.

Recommend the better fixed deposit scheme to deposit his money.

(show your calculations)

(06 marks)

- (c) The production cost of a new type of a mobile phone is Rs.6,000/- and it sells with a 20% profit margin on cost. The company expects that the production cost will increase due to technological advancements in a few months time. The company expects to sell a mobile phone for Rs.7,920/-after the production cost increases to maintain the same profit margin.
- (i) Find the selling price of a mobile phone before the increase in production cost.
- (ii) Calculate the expected new production cost due to technological advancements.
- (iii) What is the percentage increase in production cost? (06 marks)
- (d) The Capital Expenditure (CE) per year and Variable Cost (VC) per year of a bicycle manufacturing factory are given below:

$$CE = 5x^2 - 9$$

$$VC = 7x^2 + 8x - 15$$

["x" is the number of units produced (in thousands) during the year]

As per the historical data, the company's profit is maximized when the Variable Cost is twice the amount of the Capital Expenditure per year. Calculate the number of bicycles the company should manufacture in order to maximize the profit. (05 marks)

- (e) (i) The government wishes to appoint a team of five members comprising of at least one Minister, at least one Deputy Minister and one Secretary of a ministry. In how many different ways this team can be selected from a 12 member team comprising of 5 Ministers, 4 Deputy Ministers and 3 Secretaries of Ministries.
- (ii) Solve,

$$\text{Log}_2 x + \log_2(x-6) = 4$$

(07 marks)

(Total 30 marks)

- 03.** (a) (i) List two(02) measures that can be used to measure dispersion of a data set.
- (ii) The following table shows the monthly salaries of 50 accountants:

Monthly Salary (Rs.'000)	No. of Accountants (<i>f</i>)
$120 \leq x < 130$	2
$130 \leq x < 140$	5
$140 \leq x < 150$	25
$150 \leq x < 160$	10
$160 \leq x < 170$	8

Using the above data, calculate the Mean & Standard Deviation of the salaries of the 50 Accountants. (08 marks)

- (b) (i) What is meant by **mutually exclusive** events?
- (ii) The probability of a student passing a professional examination by attending classes is 0.8, and the probability of the student passing the exam without attending classes is 0.4. It is given that 75% of the students who sit for the examination attend classes.

If a student is selected at random, find the probability that he passes the examination. (05 marks)

- (c) **TIXN Company (Pvt) Ltd.** imports readymade apparels from Asian countries. These apparels include blouses, skirts and shirts. Company imported its first lot of apparels in the year 2011, and received its second lot of apparels in the year 2012. The table below shows the details of purchases for these two lots of apparels.

Apparel Items	Year 2011		Year 2012	
	Unit price P_o (Rs.)	quantity q_o	Unit price P_n (Rs.)	quantity q_n
Blouses	400	1,000	600	1,200
Skirts	700	1,200	850	900
Shirts	800	900	1,000	1,500

Considering 2011 as the base year, calculate the following index numbers for year 2012 by using the above data:

- (i) Laspeyre's price index.
- (ii) Laspeyre's quantity index. (07 marks)
- (Total 20 marks)

SECTION - C

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

04. (a) **Kahata Tea Estates** commenced its production last year and it produced 8,000 cartons of tea during the first year. According to their forecast, the production will be increased by 50 cartons each year.

Find the year in which it produces 30% more than its first year's production and the total number of cartons produced up to that year. (05 marks)

- (b) Seven technical officers of **ABC Construction Company (Pvt) Ltd.** were ranked based on their technical knowledge and practical performance. The following data was obtained after ranking marks for technical knowledge and practical performance.

Technical officer	A	B	C	D	E	F	G
Rank for technical knowledge (r_1)	1	2	3	4	5	6	7
Rank for practical performance (r_2)	3	4	1	2	7	5	6

Using the above information, calculate the Spearman's rank correlation coefficient for the above data and comment on your result.

You may use the following formula,

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

(05 marks)
(Total 10 marks)

05. (a) **Gamini** is the financial analyst of **FIDA Ltd.** He was asked to do a production analysis of a product manufactured by the company. After collecting past data, he identified the following demand function & supply function of the product:

$$\text{Supply } (Q_s) = 2p + 4p^2$$

$$\text{Demand } (Q_d) = 280 - 35p$$

Where, p is the Price of the commodity (per unit).

- (i) Draw the "Demand Function" and "Supply Function" on a graph paper and identify the equilibrium price and quantity.
- (ii) Using the graph, find the price at which the quantity demand is zero.
(Note: Select the price ranging from 1 to 9) (06 marks)

- (b) Assume that the current share price of **BC PLC** is Rs.50/-. The share price can either increase or decrease over the next period. If the share price increases it will increase by Rs.10/- or if the share price decreases it will decrease by Rs.5/-. The probability of increasing the share price is 0.6. Draw the tree diagram for two successive periods and calculate the probability that the share price becomes Rs.55/- after two successive periods. (04 marks)
(Total 10 marks)

06. (a) **Kayser Garments** is considering a new project & the total project cost is Rs.1,000,000/-. **Kayser Garments** has two options of funding this project and those are; obtaining a term loan from a bank or issuing preference shares.

1st Option : Term Loan Facility of Rs.1,000,000/- for a period of 4 years and re-payable annually. The annual repayments are given below:

Year	1	2	3	4
Repayments (including capital + interest)	(325,000)	(325,000)	(325,000)	(325,000)

2nd Option : Preference Share Issue – For a period of 4 years and re-payable at the end of 4th Year. The amount payable is Rs.1,700,000/-.

Year	0	1	2	3	4
Cash Flow	1,000,000	-	-	-	(1,700,000)

The required rate of return of the company is 10% per annum.

You are required to, identify the most suitable method of funding the project using the Net Present Value (NPV) method.

You may use the following discounting factors at 10%:

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

(05 marks)

- (b) The age distribution of workers in a factory is given below:

Age (years)	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59
No. of workers	4	8	10	25	22	15	9	7

Using the above data, draw a cumulative frequency curve (less than) on a graph paper and find the median age of a worker using the graph. (05 marks)
(Total 10 marks)