

(D) Based on the individual performance, the yearend performance bonus was distributed in the ratio of 2 : 3 between two employees A & B. If B received Rs.8,000/- more than A, what is the amount of performance bonus received by A:

- (1) Rs. 40,000/- (2) Rs. 24,000/- (3) Rs. 8,000/- (4) Rs. 16,000/-

(E) Find the adjoint of the matrix A.

Where $A = \begin{pmatrix} 1 & -6 \\ 3 & -7 \end{pmatrix}$

- (1) $\begin{pmatrix} 1 & -6 \\ 1 & -6 \end{pmatrix}$ (2) $\begin{pmatrix} 1 & 1 \\ 3 & 2 \end{pmatrix}$ (3) $\begin{pmatrix} 1 & -6 \\ -3 & 7 \end{pmatrix}$ (4) $\begin{pmatrix} -7 & 6 \\ -3 & 1 \end{pmatrix}$

(F) A graduate joined a company as a Management Trainee for an initial annual salary of Rs.216,000/- with an annual increment of Rs.4,800/- in every year. What is the total amount of the salary he would earn during the first 5 years?

- (1) Rs.235,200/- (2) Rs.240,000/-
(3) Rs.1,104,000/- (4) Rs.1,128,000/-

(G) A company purchased an asset for Rs.150,000/-. Asset is depreciated at the rate of 25% per annum on reducing balance method. Find the book value of the asset after 4 years:

- (1) Rs. 47,460.94 (2) Rs. 585.00
(3) 0 (4) Rs. 35,595.70

(H) **Kamal** bought 3 chocolates and 2 toffees for Rs.28/- and **Nimal** bought a chocolate and 4 toffees for Rs.26/-. The price of a chocolate and a toffee respectively is:

- (1) Rs.5/- and Rs.6/- (2) Rs.6/- and Rs.5/-
(3) Rs.6/- and Rs.6/- (4) Rs.5/- and Rs.5/-

- (I) The total cost function $C(x)$ of a company which manufacturers soft toys is given by,

$$C(x) = 2,500 + 10x - 0.01x^2 + 0.0002x^3$$

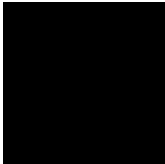
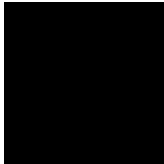
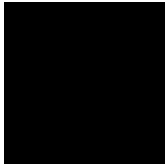
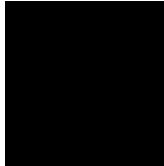
Find the marginal cost function of $C^1(x)$ for the above total cost function:

- (1) $C^1(x) = 10x - 0.02x + 0.0006x^2$
 (2) $C^1(x) = 10 - 0.04x + 0.0006x^2$
 (3) $C^1(x) = 10 - 0.02x + 0.0006x^2$
 (4) $C^1(x) = 2,500x + 5x^2 - \left(\frac{0.01}{3}\right)x^3 + \left(\frac{0.0002}{4}\right)x^4 + k$

- (J) The following table shows number of students in G.C.E. (A/L) classes of a school.

Stream	Number of students
Commerce (C)	60
Science (S)	45
Arts (A)	75

Which one of the following pie charts correctly represents the above data:

- (1)  (2)  (3)  (4) 

- (K) Which of the following methods are / is examples of **non probabilistic** sampling methods?

- I. Cluster sampling
 II. Quota sampling
 III. Judgment sampling
 IV. Stratified sampling

- (1) I only. (2) II only. (3) II & III only. (4) III & IV only.

- (L) The national consumer magazine reported the following behavior of correlation coefficient between two variables:
- The correlation coefficient between car weight & fuel consumption is - 0.9,
 - The correlation coefficient between car weight & annual maintenance cost is 0.8,

Which of the following statements is / are true?

- I. Higher weight cars tend to be less fuel consuming.
 II. Higher weight cars tend to be costly for maintenance.

- (1) I only. (2) II only.
 (3) I & II. (4) None of the above.

- (M) The probability that 'A' passes the examination is $\frac{2}{3}$ and the probability of 'B' passes the examination is $\frac{2}{5}$.

What is the probability that both of them will **fail** the examination?

- (1) $\frac{4}{15}$ (2) $\frac{4}{5}$ (3) $\frac{1}{5}$ (4) $\frac{1}{2}$

- (N) 7, 1, 2, 5, 7, 10, 8, 9, 14, 7, 7

The mean, median and mode of the above data are respectively:

- (1) 7, 7, 7 (2) 5, 7, 7 (3) 7, 10, 7 (4) 9, 5, 5

- (O) For a given set of data, the following values are calculated:

$\sum p_n q_o = 2,070$	$\sum p_o q_o = 1,660$	$\sum q_n p_o = 1,070$	$\sum p_n q_n = 1,340$
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Using the knowledge of index numbers, the Paasche's Quantity Index is:

- (1) 124.7% (2) 125.2% (3) 64.5% (4) 64.7%

(02 marks each, Total 30 marks)

SECTION - B

Compulsory Questions

Answer both questions of this Section

50 marks

02. (a) Two simultaneous equations are expressed in the following matrix form:

$$\begin{pmatrix} 3 & 2 \\ 4 & 5 \end{pmatrix} \begin{pmatrix} \mathbf{a} \\ \mathbf{b} \end{pmatrix} = \begin{pmatrix} 12 \\ 23 \end{pmatrix}$$

- (i) Write down the two simultaneous equations.
- (ii) Solve the two simultaneous equation and find the values of **a** and **b**.
- (iii) Calculate the value of the determinant of matrix $A = \begin{pmatrix} 3 & 2 \\ 4 & 5 \end{pmatrix}$ (06 marks)

- (b) A Building Maintenance Company (BMC) signed a contract of 10 years with **ABC Ltd.** to provide building maintenance service for the next 10 years. As per the contract agreement the annual maintenance fee is Rs.50,000/-in the first year and agreed to increase thereafter by 10% of the previous year's amount in every year.

- (i) Compute the maintenance service fee charged by BMC for the 10th year.
- (ii) The total cost function of providing the service under this contract is given by,

$$C_n = 0.6 P_1 (1.08)^n + 10,000$$

Where, C_n is the n^{th} year total service cost

P_1 is the maintenance fee for the first year of agreement

n is the n^{th} year of the contract ($n \leq 10$)

Calculate the 10th year total cost of providing the service to **ABC Ltd.** and the net profit for the year 10 of the BMC. (06 marks)

- (c) A seven year fixed deposit of Rs.12,000/- is made in a bank at an annual compound interest rate of 9%.

- (i) Find the maturity value of the fixed deposit at the end of the seven years.
- (ii) Assume that the deposit earns a 9% annual compound rate of interest, compounded quarterly. How much would be in the fixed deposit at the end of seven years. (06 marks)

(d) The pattern of Pascal's Triangle is given below:

			1					
			1		1			
		1		2		1		
	1		3		3		1	
1		4		6		4		1

(i) Study the pattern and write down the next row of numbers in the Pascal Triangle.

(ii) Write down the expansion of $(1 - x)^5$ by using the binomial theorem. (06 marks)

(e) **Super Bright PLC** is a company which manufactures CFL bulbs. The variable cost of a CFL bulb manufactured by the company is Rs.100/- and is sold to agents at a price of Rs.250/- per bulb. Net profit of the company for the last year was Rs.900,000/- after deducting Rs.225,000/- as the fixed cost. (Assume that all bulbs manufactured are sold to agents).

(i) Find the revenue function and total cost function of **Super Bright PLC**.

(ii) Draw the graphs of total revenue and total cost functions in a graph paper and indicate the break-even sales volume in the graph. (06 marks)

(Total 30 marks)

03. (a) The following table shows the marks obtained by 103 students who sat for the Business Mathematics and Statistics subject at the last term test of a school.

Marks	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80 - 89	90 - 99
No. of students	10	18	22	24	11	9	6	3

(i) Draw the histogram on a graph paper to illustrate the above information.

(ii) Determine the mode value of marks using the histogram. (05 marks)

(b) Given below is data relates to the number of vehicles imported by a vehicle vendor during last 9 months.

Month	No. of vehicles imported
April	17
May	18
June	16
July	35
August	32
September	45
October	18
November	25
December	28

- (i) What is the range of the number of vehicles imported during the 9 months?
- (ii) Calculate the mean deviation of the number of cars imported during the 9 months. (05 marks)
- (c) In order to identify the relationship between price and demand, the Sales Director of **ABC Company** expects to analyze the prices and sales data in the past. The following data are provided for your analysis:

Price (Rs.)	Sales volume (Units)
4	30
8	22
12	14
24	8
28	4
32	3
108	81

Using the above data,

- (i) Calculate the correlation coefficient between the two variables.
- (ii) Comment on the relationship between price and demand.

of **ABC Company**.

(10 marks)

(Total 20 marks)

SECTION - C

Answer **any** two (02) questions from this Section

20 marks

04. (a) When the selling price of a product is Rs.3.50, the demand will be 250 units per day. When the price is increased to Rs.5.50 per unit, the demand will be reduced to 50 units per day.

Assuming a linear relationship between number of units in demand per day & selling price per unit.

- (i) Write down the demand function.
- (ii) Write down the revenue function.
- (iii) Find the quantity of which maximize the total revenue. (05 marks)

- (b) A and B are bottle sealing machines, which are used to seal the soft drink bottles in a production line. On a particular day, the Machine A sealed 70% and Machine B sealed 30% respectively of the total production of that day. It was found that 5% of the bottles sealed by A and 3% of the bottles sealed by B were rejected due to sealing defects.

If we select a sealed bottle randomly, what is the probability which has a defect?

(05 marks)

(Total 10 marks)

05. (a) A company has purchased a machine today for its production department at a cost of Rs.65,000/-. The expected life time of this machine is 5 years and scrap value would be Rs.5,000/- at the end of life time. It is estimated that this machine has to be replaced after 5 years and the purchase price of new machine will increase by 25% after 5 years time. The management wishes to create a fund by depositing a fixed sum monthly basis at a rate of 9% per annum compounded monthly.

How much the company should deposit in the bank account monthly in order to collect funds to buy a new machine after 5 years time? (05 marks)

- (b) The following table shows the details of sales of three items for the years 2004 and 2008.

Item	Year 2004		Year 2008	
	Unit Price	Quantity	Unit Price	Quantity
	P_o	Q_o	P_n	Q_n
A	315	12	420	18
B	150	25	175	20
C	400	8	510	7

Considering 2004 as the base year,
Calculate:

- (i) Laspeyre's Price Index,
(ii) Laspeyre's Quantity Index,

for the year 2008.

(05 marks)
(Total 10 marks)

06. (a) In an analysis of 100 investors of stock market, the following information was found regarding the share investments in companies A, B and C.

40 investors have shares of company A.

42 investors have shares of company B.

39 investors have shares of company C.

18 investors have shares of both companies A and B.

25 investors have shares of both companies B and C.

12 investors have shares of all three companies.

20 investors have shares of company A only.

You are required to, answer the following questions. You may use Venn diagram or any other suitable method:

- (i) Out of the investors who do not have shares of company B, how many investors have shares of company C.
(ii) How many investors have shares of exactly two of the above three companies. (06 marks)

- (b) Find the number of permutations that can be made by using all the letters in the word "A N U R A D H A P U R A". (04 marks)

(Total 10 marks)