

**Instructions :**

- 1) All questions are compulsory.
- 2) Figures given right indicate full marks.
- 3) Simple Calculator is allowed.

Q.1 a) A medical Journal claimed that the average weight of a male in Mumbai is 52.3 kg. A student checked the weight of 36 Persons randomly to find that the average weight was 50.1 kg with a S. D. of 1.8 kg. Test the Journal's claim at 5% level of significance. [5]

b) Solve Graphically :

$$\begin{aligned} \text{Max } z &= 20x + 25y \\ \text{Subject to : } &5x + 2y \leq 50 \\ &x + y \leq 12 \\ &x, y \geq 0 \end{aligned}$$

c) i) If  $A = \begin{bmatrix} 4 & 1 & 2 \\ 1 & 3 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & 1 & 8 \\ -2 & 1 & -6 \end{bmatrix}$   
verify that  $(A + B)^T = A^T + B^T$  [2]

ii) Find the inverse, it exists of the matrix [2]

$$A = \begin{bmatrix} 5 & 6 \\ 3 & 4 \end{bmatrix}$$

iii) Find det A, if  $A = \begin{vmatrix} 1 & 3 & 5 \\ 2 & 1 & 4 \\ 6 & 2 & 3 \end{vmatrix}$  [1]

**OR**

a) A company producer two chemical products  $C_1$  and  $C_2$ . Its factory has two departments X and y, both running for at most 8 hrs a day.  $C_1$  requires 2 hrs in department X and 3 hrs in department Y per ton. The same figures for  $C_2$  are 1.5 and 1 hrs. The average profit per ton for  $C_1$  and  $C_2$  is Rs. 10 Lakh and Rs. 8 lakh respectively. Formulate the L.P.P. to maximize the profit. [5]

b) Solve the equations using the method of adjoint A. [5]

$$\begin{aligned} 2x - 3y + z + 3 &= 24 \\ 3x + y - 2z &= 10 \\ x - 2y - 3z &= 5 \end{aligned}$$

c) Write Short Note on null and alternate hypothesis. [5]

Q.2. a) The marks of Babita and Bharat are in the ratio 7 : 3. the difference between their marks is 56. What are their marks. [5]

**P.T.O.**

b) The simple interest on Rs. 4000 for 4.25 yrs at 9% p.a. is Rs. 720 less than the simple interest on Rs. 6000 for 3.75 years at a certain rate of interest find the rate. [5]

c) Compare project P and Q, verifying their acceptability. Use 16% p.a. interest rate and use the NPV method. [5]

Yr	0	1	2	3	4	5
Cashflow for Project P	-80,000	25,000	30,000	35,000	40,000	45,000
Cashflow for Project Q	-80,000	21,000	28,000	35,000	42,000	47,000

OR

a) A loan of Rs. 80,000 is to be returned in 3 monthly instalments at the rate of 12% p.a. compounded monthly. Find EMI using the reducing balance method. Also find Amortization table. [8]

b) Write Short Note on :

i) Sinking fund

ii) Ordinary Annuity [2]

c) Mr. Rahul earned a profit at 15% on Cost by Selling an article for Rs. 4140. What would have been his percentage gain or loss if he had sold the articles for Rs. 3,240. [5]

Q. 3. a) The sales turnover and profit during the two periods were as follows.

Period I - Sales Rs. 20 lakhs - Profit Rs. 2 lakhs

Period II - Sales Rs. 30 lakhs - Profit Rs. 4 lakhs

Calculate :

i) P/V Ratio

ii) Sales required to earn a profit of 5 lakhs

iii) Profit when sales are Rs. 10 lakhs [6]

b) Write Short Note on Annual Budget and indicators of Deficit. [4]

c) Calculate Beta ( $\beta$ ) in case of share of Nelco Ltd, whose returns and market Port folio returns are given below.

Year	Nelco Ltd	Market Port folio Returns
1	20	14
2	24	18
3	10	9
4	15	14
5	(-) 10	(-) 8
6	12	10
7	18	16

P.T.O.

- 8 28 30  
9 33 35  
10 40 42 [5]

OR

a) Write Short Note on :		Project A		Possible event
i) GDP	Cash inflows (Rs.)	Probability	Cash inflows (Rs.)	
ii) GNP	12,000	0.10	4,000	P
iii) NDP	10,000	0.20	5,000	Q
iv) NNP	8,000	0.40	6,000	R

- b) A factory requires 1500 units of an item per month, each costing Rs. 27. The cost per order is Rs. 150 and the inventory carrying charges work out to 20% the average inventory. Find out the Economic order Quantity and No. of orders per year. [6]

- c) A Company Set aside Rs. 80,000 at the end of every year to Create a Sinking fund. What will be the amount at the end of 4 years at 9% p.a. [5]

- Q. 4. a) Write a note on External economic indicators. [5]

- b) Fit a linear trend equations to the following data and estimate the sales for the year 2005

Year	2000	2001	2002	2003	2004
Sales	100	120	140	160	180

- c) If  $A = \begin{bmatrix} 5 & 0 \\ 0 & 5 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 5 \\ 5 & 1 \end{bmatrix}$  then verify that,  $A \times B = B \times A = 5B$  [4]

OR

- a) i) Find the value of a, b, c if

$$\begin{bmatrix} 4 & 2a + 1 \\ b - c & 2 \\ 1 & 10 - c \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 10 & 3 \\ -8 & -4 \end{bmatrix} = \begin{bmatrix} 6 & 6 \\ 8 & 5 \\ -7 & 0 \end{bmatrix} \quad [3]$$

- ii) If  $A = \begin{bmatrix} 2 & 4 \\ 1 & 1 \end{bmatrix}$  then verify that

$$A^2 - 3A - 2I = 0 \quad [3]$$

- b) The Compound interest and the Simple interest on a sum of money at a certain rate for 2 yrs. is Rs. 8200 and Rs. 8000 respectively. Find the sum and the rate. [5]

c) Calculate only Expected money value for 'H' Ltd., their two project 'A' and 'B' and you are required to give your considered opinion regarding the selection of the project (considering the criterion of Expected money value)

Possible event	Project A		Project B	
	Cash inflows (Rs.)	Probability	Cash inflows (Rs.)	Probability
P	4,000	0.10	12,000	0.10
Q	5,000	0.20	10,000	0.15
R	6,000	0.40	8,000	0.50
S	7,000	0.20	6,000	0.15
T	8,000	0.10	4,000	0.10

[4]



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Year	2000	2001	2002	2003	2004
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c)  $HA = \begin{bmatrix} 5 & 0 \\ 0 & 5 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$  then verify that  $A \times B = B \times A = 5B$

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a) i) Find the value of a, b, c if

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