

- N.B.** 1. All questions are compulsory.
 2. Figures to the right indicate full marks.
 3. Use of simple calculator is allowed.
 4. Graph papers will be supplied on request.

Q.1 a. The demand function is given by $p = 30 + 6D - D^2$ where p is the price and D is the demand. Find the total revenue, the average revenue and the marginal revenue when the demand is 4 units. (5)

b. Find dy/dx if

i. $y = x^4 + 4^x - 4 \cdot \log x + e^4$ (2)

ii. $y = x^7 \log x - 3x^5 \cdot e^x$ (3)

OR

Q.1 p. A firm produces an output of a certain product at a total cost given by $c = x^3 - 4x^2 + 7x$. Find at what output average cost is minimum and what is the minimum average cost. (5)

q. i. Find $\frac{dy}{dx}$ if (2)

$$y = \frac{25 \log x + \sqrt{x}}{x^3 + 3^x}$$

ii. Find $\frac{d^2y}{dx^2}$ if (3)

$$y = 2e^x - \log x + 4^x$$

Q.2 a. Find the accumulated value after 4 years and the present value of an immediate annuity of Rs. 10,000/- p.a. at 8% p.a. to be paid for 4 years. (5)

b. On what sum of money will the difference between the compound interest and the simple interest for 2 years at 4% p.a. be Rs. 56? (5)

OR

Q.2 p. A loan of Rs. 1,00,000 is to be returned in 4 equal monthly instalments at 12% p.a. Calculate the EMI using reducing balance method. Calculate for each month the break-up of the EMI into interest payment and principal repayment. (5)

q. A person has to pay a company Rs. 8000 at the end of 1 year and Rs. 12,000 at the end of 2 years. The person settles the payments now at the present value calculated taking 10% p.a. compound interest. What amount does he have to pay? (5)

Q.3 a. Calculate rank correlation coefficient for the following data giving distribution of marks obtained by 9 students in a certain test. (5)

Marks in Economics	45	25	28	42	43	40	39	37	41
Marks in Mathematics	70	68	80	85	70	75	65	59	64

- b. Obtain the two regression equations for the data given below -
 $\bar{x} = 25$ $\bar{y} = 20$ $\sigma_x^2 = 16$ $\sigma_y^2 = 9$ $r = 0.7$

Find the most likely value of y when $x = 24$ (5)

OR

- Q.3 p. Find Karl Pearson's coefficient of correlation for the following data. (5)

x : 82 72 62 58 54 45
 y : 38 45 50 64 72 75

- q. The regression of y on x for certain bivariate data was found to be $10y = 3x + 155$ and that of x on y was $10x = 7y + 10$. Find \bar{x} , \bar{y} and r. (5)

- Q.4 a. Find the trend values using method of least squares for the following data. (5)

Year : 1998 1999 2000 2001 2002 2003 2004
 Production : 52 53 42 60 65 67 69

Also estimate the production for year 2006.

- b. Calculate price index number using- (5)
 i. Laspeyre's
 ii. Paache's
 iii. Fisher's formula

Commodity	Base year		Current year	
	Price	Quantity	Price	Quantity
A	8	6	12	4
B	10	8	12	8
C	14	4	18	4
D	4	6	2	10
E	10	10	14	8

OR

- Q.4 p. The price in Rs. per quintal of a certain commodity during 1995 to 1998 were as follows :- (5)

Year	Quarter			
	I	II	III	IV
1995	321	348	348	348
1996	327	351	354	348
1997	342	359	381	345
1998	364	390	401	385

Compute the seasonal indices by the method of simple averages

- q. Compute cost of living index number from the following data. (5)

Group	Weight	Price (in Rs.)	
		Base year	Current year
Food	60	120	160
Clothing	30	40	60
Fuel and light	30	80	110
House rent	40	30	45
Miscellaneous	25	50	70

- Q.5 a. Explain in brief :- (5)

- Decision making under uncertainty
- Decision making under risk.

- b. A pizza shopkeeper promises its customers to deliver within thirty minutes. Daily demand for pizzas as follows :-

Pizzas	90	100	110	120
Probability	0.1	0.2	0.4	0.3

The cost of each pizza is Rs. 100 and sells them for Rs. 150. All unsold pizzas are thrown away. How many pizzas should the shopkeeper make to maximize his profit? What is the optimum expected profit? (5)

OR

- Q.5 p. Given following pay off table suggest best action using - (6)
- maximin
 - Minimax regret
 - Laplace criterion

States of Nature	Pay off table			
	Profit in lacs of Rs.			
	A ₁	A ₂	A ₃	A ₄
S ₁	100	150	300	150
S ₂	50	200	+200	200
S ₃	125	+50	100	300
S ₄	140	100	150	100
S ₅	135	+100	0	50

- q. Represent the following decision making problem by a decision tree :-

Acts	States of Nature		
	E ₁	E ₂	E ₃
A ₁	10	12	25
A ₂	30	16	24
A ₃	18	24	10
A ₄	25	30	20
Probability	0.2	0.5	0.3
