

BREGMA

TIME : 2 hrs.

MARK : 50

- Instruction :** 1) All questions are compulsory
 2) Figures to the right indicate marks.
 3) Graph papers will be provided on request.

Section - I

- Q.1 a) The total cost and total revenue functions of a firm are given by
 $C = \frac{x^3}{3} - 3x^2 + 9x + 16$ and $R = 21x - x^2$
 What output will maximise the total profit? 05
- b) Find $\frac{dy}{dx}$ for the following
- i) $y = \frac{4e^x + \log x}{10^x + \sqrt{x}}$ 03
- ii) $y = 7^x - 2x^{7/2} + 3 \log x - x + \sqrt{x}$ 02

OR

- Q.1 a) The demand function is given by
 $P = 100 + 2D - D^2 + D^3$, Where P = Price and
 D = demand. Find the total revenue, the average revenue and marginal revenue when the demand
 is 10. 05
- b) i) Find $\frac{dy}{dx}$ if $y = x^3 \log x - 10xe^x$ 02
- ii) Find $\frac{d^2y}{dx^2}$ if $y = -2x^3 + 10x^2 - 5x + 2$ 03
- Q.2 a) The simple and compound interest for 2 years, on the same principal at the same rate are Rs.7200
 and Rs.7632 respectively. Find the principal and the rate of interest. 05
- b) Find the present value of an immediate annuity of Rs.20,000 p.a. for 3 years at 14% p.a.
 compounded annually. 03
- c) Find EMI using the flat interest rate method if a loan of Rs.55,000 is to be returned in 3 equal
 monthly instalments. The rate is 12% p.a. 02

OR

- Q.2 a) A person borrowed totally Rs.80,000 from two known people. For one loan, he paid 18% p.a.
 and for the second loan he paid 25% p.a. After a year, he paid Rs.15800/- as simple interest. How
 much money did he borrow at each rate? 05
- b) Find the accumulated value of an annuity of Rs.4000/- paid at the end of each year, for 4 years,
 compounded annually at 10% 05
- Q.3 a) Following data give the age of husband and wife for 8 couples. Find Pearson's coefficient of
 correlation.

Age of husband (in years)	35	38	40	45	48	48	50	53
Age of wife (in years)	30	30	33	35	40	42	45	48

- b) Find the two regression equations from the following data -
 $\bar{x} = 23$ $\bar{y} = 35$
 $\sigma_x = 2$ $\sigma_y = 3$
 $r_{xy} = 0.6$
 Estimate - i) y when x = 20
 ii) x when y = 38 05

- b) Regression equations for certain bivariate data are found to be $45y = 14x + 490$ and $18y = 35x - 2744$. Find \bar{x} , \bar{y} and r . 05

- Q.4 a) Describe 'secular trend' and seasonal variations components of a time series. 05
- b) Calculate index numbers for the following data using -
- 1) Simple aggregative method
 - 2) Weighted average of price relatives method. (taking base year quantities as base)

Commodity	Base year		Current year
	Price	Quantity	Price
X	15	60	17
Y	20	50	25
Z	17	70	20
W	8	80	8
T	30	10	35

05

OR

- Q.4 a) Calculate Laspeyre's, Paasche's and Fisher's index numbers for the year 1998 with the base 1995 from the following data.

Commodity	1995		1998	
	Price	Quantity	Price	Quantity
A	12	25	15	28
B	10	20	15	25
C	4	15	6	12
D	6	20	9	15

05

- b) Fit straight line trend for the following data giving crude oil production. Also estimate production in 1999.

Year	1991	1992	1993	1994	1995	1996	1997
Production (in million tons)	10	16	21	26	29	29	30

05

- Q.5 a) Describe meaning of the following terms -

- i) Act
- ii) State of nature
- iii) pay off
- iv) Regret value or opportunity loss.

04

- b) Modern Bakery must decide how many Cakes of particular type to stock on daily basis. Past data have generated the following pattern of demand.

Units sold (per day)	180	181	182	183	184	185	186
No. of days	4	16	20	80	40	30	10

If cost of cake is Rs.12 per piece and it is sold at Rs.16 per piece and leftover should be disposed off on the next - day, using EMV criterion determine the number of cakes modern bakery should stock each day.

06

OR

- Q.5 a) Give the following pay off matrix with probabilities of states of nature - i) find expected pay-off of each action (ii) find expected opportunity loss of each act.

- b) Given following payoff table suggest best action using (i) maximin (ii) maximax (iii) Laplace criterion.

Pay of Table

States of nature	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

05

