

DATA ANALYSIS AND QUANTITATIVE TECHNIQUES

Duration: 3 Hours

Total Marks: 60

Instructions:

- i. All questions are compulsory
- ii. Standard calculators allowed

Q.1 Attempt the following

- A. Write a short note on components of time series (6)
- B. Fit a linear trend for the following series. And estimate the number of production units for 2007 (6)

Year	2000	2001	2002	2003	2004	2005	2006
No. of production units	120	125	128	140	125	135	124

OR

- I. Compute moving average values using four yearly cycles for the number of students studying in a business school as given below. Also plot the original data and trend values on the same graph. (6)

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
No. of students	320	305	332	380	390	395	390	417	418	428

- II. Estimate the trend values using the data given below by taking a five yearly moving average. Also plot the original data and trend values on the same graph. (6)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Value	25	25.3	27	28.7	29.3	30.8	30.4	28.4	32	36	32

Q. 2 Attempt the following

- A. Using four yearly moving average determine the trend values and plot the original data and trend values on the same graph (6)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Production in 1000 units	120	125	120	126	122	125	123	120	127	124

- B. For the data given below (6)

x	17	8	11	23	26	5
y	5	2	3	7	8	1

Find

- i. \bar{x}, \bar{y}
- ii. $V(x), V(y)$
- iii. σ_x, σ_y
- iv. $cov(x, y)$
- v. r
- vi. b_{xy}, b_{yx}
- vii. the equations of both the lines of Regression

OR

- I. Fit a linear trend for the following series by using least square method. Estimate the number of production units for 2002 (6)

Year	1999	2000	2001	2002	2003	2004	2005
No. of production units	120	130	140	135	125	140	135

- II. Use Spearman's method to find coefficient of correlation for the following (3)

Marks I	40	45	50	55	35
Marks II	60	65	70	40	55

- III. Find r if $\sum xy = 16$, $\sum x^2 = 19$, $\sum y^2 = 19$, $\bar{x} = -0.5$, $\bar{y} = 0.5$ and $n = 6$ (3)

OR

Q. 3 Attempt the following

- A. Draw scatter diagram for the following data and state the type of correlation if any between the variables (3)

x	3	1	0	4	5	-1	-4	2	3
y	6	-5	-2	8	5	0	1	-1	4

- B. Find r if $\sum(x - \bar{x})^2 = 120$, $\sum(y - \bar{y})^2 = 235$, $\sum(x - \bar{x})(y - \bar{y}) = -139$ (3)

- C. Use least square method to find the equations of lines of regression for the following data (x on y and y on x) (6)

x	-1	-2	-3	-0	-5	4	3	2	1	5
y	-10	-15	-20	-5	-30	15	10	5	0	20

OR

- I. Find Karl Pearson's coefficient of correlation for the following (4)

x	1	2	3	5	4	3
y	2	4	5	5	3	1

- II. Find Spearman's coefficient of correlation for the following (4)

Marks	40	10	60	20	40	50
Grades	B ⁺	A	C ⁺	A ⁺	C ⁺	B

- III. Prove that $\frac{\sum(x - \bar{x})(y - \bar{y})}{n} = \frac{\sum xy}{n} - \bar{x}\bar{y}$ (4)

Q. 4. Attempt the following

- A. Find the Laspeyre's, Paasche's and Fisher's Index Numbers for each of the following (6)

Commodity	Base year		Current year	
	Price	Quantity	Price	Quantity
	p_0	q_0	p_1	q_1
A	40	4	50	9
B	50	3	70	3
C	60	2	90	2
D	80	4	100	1

- B. Taking the base year as 1998, find Index Number for the year 2004 from the following data. (3)

Group	1995		2000
	p_0	q_0	p_1
Food	45	3	50
Clothes	30	5	45
Fuel and lighting	50	2	60
House rent	60	3	75
Miscellaneous	20	4	30

- C. The price relatives I , for the current year and the weights w , for the base year are given below. Find the cost of living Index Number. (3)

Group	I	W
Food	150	4
Clothes	140	3
Fuel and lighting	100	3
House rent	120	4
Miscellaneous	200	6

OR

- I. For the following data find the Index Numbers using (6)
- The Weighted Aggregative Method
 - The Weighted Average of Relatives Method, taking 1999 as the base year

commodities	Price for the years		
	1999	2005	Weight
A	33	11	3
B	40	30	8
C	24	12	2
D	10	4	5
E	6	7	6

- II. Taking small year as the base, find the Simple Index Numbers for the following date using (6)
- Simple Aggregative Method and
 - Simple Average of Relatives Method

Commodities	Price in years	
	1995	2000
I	13	65
II	16	48
III	18	36
IV	20	60
V	25	50

Q.5. Attempt the following

- A. State addition theorem on probability.
 There are 4 Indians, 4 Australians and 3 Russians are in a group. If two persons are to be selected at random, find the probability that,
- Both are Russians
 - None is an Russians
 - At least one is an Indian
 - At most one is an Indian
 - Both are from different nationalities

B. State multiplication theorem on probability

A four digit number is formed using the digits 0,1,2,3,4,5,6,7,8,9. Find the probability that, the number so formed

- a. Is even
- b. Is odd
- c. Ends with 3
- d. Has all distinct digits
- e. Has all distinct digits and ends with 3

(6)

OR

I. Write a short note on Normal Distribution

(6)

II. There are 35 lottery tickets, numbered from 1 to 35. One of them is drawn at random. What is the probability that the number on it is a multiple of

- i. 2
- ii. 3
- iii. 2 and 3
- iv. 2 or 3
- v. 5 and 6
- vi. 5 or 6

(6)
