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. What is time series? Explain the components of time series   (6)

B. Fit a linear trend for the following series by using least square method. And estimate the number of production units for 2002   (6)

Year	1995	1996	1997	1998	1999	2000	2001
No. of production units	125	128	133	135	140	141	143

OR

I. Compute moving average values using five 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	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
No. of students	330	315	352	390	400	405	400	427	428	438

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

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Value	25.2	27.3	28.4	29.7	30.4	32.8	33.4	30.5	30.7	32	36

Q. 2 Attempt the following

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

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Production in 1000 units	121	120	123	125	124	122	125	126	125	126

B. For the data given below   (6)

x	2	3	4	5	6	7
y	3	5	7	9	11	13

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	1995	1996	1997	1998	1999	2000	2001
No. of production units	125	128	133	135	140	141	143

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

A	40	50	20	30	45
B	20	45	30	35	47

III. Find n if $\sum xy = 16$, $\sum x^2 = 19$, $\sum y^2 = 19$, $\bar{x} = -0.5$, $\bar{y} = 0.5$ and $r = 1$ (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	4	5	8	7	9	6	2	1
y	6	3	4	7	9	8	6	1	2

B. Find r if $\sum(x - \bar{x})^2 = 412$, $\sum(y - \bar{y})^2 = 53$ $\sum(x - \bar{x})(y - \bar{y}) = 47$ (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	24	8	26	12	10	16	20	22	18	14
y	11	3	12	5	4	7	9	10	8	6

OR

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

x	-3	-2	-1	0	1	2
y	-2	-1	0	1	2	3

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

Marks	30	35	80	60	35	75
Grades	A^+	C	B	A	B	B^+

III. Write the formulae for $cov(x,y)$, r, b_{xy} and b_{yx} (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 p_0	Quantity q_0	Price p_1	Quantity q_1
I	30	3	40	3
II	60	4	50	1
III	50	9	50	4
IV	70	2	60	2

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B. Taking the base year as 1995, find Index Number for the year 2000 from the following data. (3)

Group	1995		2000
	p_0	q_0	p_1
Food	23	4	25
Clothes	15	5	20
Fuel and lighting	5	9	8
House rent	12	5	18
Miscellaneous	8	6	13

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	320	20
Clothes	140	15
Fuel and lighting	270	18
House rent	160	22
Miscellaneous	210	25

OR

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

commodities	Price for the years		Weight (w)
	1999 (p_0)	2001 (p_1)	
A	20	30	4
B	12	24	5
C	26	13	6
D	50	150	3

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

Commodities	Price in years	
	2000	2003
I	800	830
II	176	200
III	100	127
IV	44	43

Q.5. Attempt the following

A. State addition theorem on probability.
   There are 5 Indians, 4 Australians and 3 Russians in a group. If two persons are to be selected at random, find the probability that,
   a. Both are Indians
   b. None is an Indian
   c. At least one is an Indian
   d. At most one is an Indian
   e. Both are from different nationalities (6)

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B. State multiplication theorem on probability

A four digit number is formed using the digits 1, 2, 3, 4, 5. 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.   5
   ii.   7
   iii.   5 and 7
   iv.   5 or 7
   v.   5 and 6
   vi.   5 or 6

(6)

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