

INSTRUCTIONS:

- I. Figures to the right indicate maximum marks
- II. Start each answer on a fresh page.
- III. All questions are compulsory
- IV. Non scientific, non programmable calculator allowed.
- V. Graph paper will be provided on request

1. Attempt the following**[6x2=12 marks]**

- A. Fit a linear trend for the following series. Estimate the number of production units in 2012

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|-------------------------|------|------|------|------|------|------|------|
| No. Of production units | 125 | 128 | 133 | 135 | 140 | 141 | 143 |

- B. Find the Laspyere's, Paasche's and Fisher's Index number for the following

| Commodities | Base year | | Current year | |
|-------------|-----------|----------|--------------|----------|
| | Price | Quantity | Price | Quantity |
| I | 90 | 10 | 70 | 10 |
| II | 80 | 4 | 30 | 25 |
| III | 70 | 40 | 60 | 90 |
| IV | 60 | 30 | 40 | 30 |

OR

- X. Obtain the trend values of the following time series by taking the period of moving average as 4 years. Also plot the original data and the trend values on the same graph

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|----------|------|------|------|------|------|------|------|------|------|------|
| Producti | 2412 | 2440 | 2486 | 2424 | 2420 | 2405 | 2486 | 2502 | 2510 | 2500 |

- Y. The average annual earnings of BMC officers were Rs 1,40,000 in 2016 and Rs 2,00,000 in 2017. If the cost of living price index increased from 210 in 2016 to 340 in 2017, find

- i. The real wages of the BMC officers in above years
- ii. The increase/ decrease in the real wages during these two years
- iii. The percentage increase/ decrease in the wages during this period.

2. Attempt the following

[6x2=12 marks]

- A. The following table gives the number of hours a set of 6 students have studied and their marks out of 5 in a unit test. Find Karl Pearson's coefficient of correlation and comment

| | | | | | | |
|----------------------|---|---|---|---|---|---|
| Studied in hours (X) | 5 | 4 | 2 | 5 | 3 | 6 |
| Marks(Y) | 5 | 4 | 1 | 3 | 4 | 5 |

- B. There are 15 tickets bearing numbers from 1 to 15 in a bag. One ticket is drawn from bag at random. Find the probability that the ticket bears a number which is even or a multiple of 3.

OR

- X. Use Spearman's formula to find correlation coefficient for the following

| | | | | | | | | |
|----------------|---|---|---|---|---|---|---|---|
| R ₁ | 1 | 3 | 5 | 8 | 7 | 3 | 6 | 2 |
| R ₂ | 2 | 7 | 4 | 5 | 8 | 1 | 2 | 5 |

- Y. A problem is given to three students A, B, C whose chances of solving it are $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$ respectively. Find the probability that the problem is solved.

3. Attempt the following

[6x2=12 marks]

- A. Taking smaller year as the base year, find Index number for the following using

- Simple Aggregative method
- Simple average of price relative method

| Edible oil | Price per litre | |
|------------|-----------------|------|
| | 2010 | 2015 |
| Sunflower | 64 | 120 |
| Palm | 72 | 140 |
| Coconut | 80 | 160 |
| Groundnut | 100 | 200 |
| Til | 52 | 100 |

- B. The following is the data set of new car registration in town A. Using 5 yearly moving averages find the trend for the data. Also plot the original data and trend values on the same graph.

| | | | | | | | | | | |
|---------------------|------|------|------|------|------|------|------|------|------|------|
| Year | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
| No. of registration | 1011 | 1193 | 1125 | 1068 | 1119 | 1112 | 990 | 1099 | 1304 | 1676 |

OR

- X. For the following data, find the weighted index number using

- Weighted Aggregative index number
- Weighted average of price relative index number

| commodities | Prices per kg | | Weightage w |
|-------------|---------------|------|-------------|
| | 2016 | 2017 | |
| Onion | 18 | 27 | 3 |
| Potato | 16 | 24 | 4 |
| Cauliflower | 26 | 52 | 2 |
| Cabbage | 13 | 39 | 1 |
| Green peas | 40 | 60 | 3 |

Y. Using three yearly moving averages determine the trend. Plot the original data and trend values on the same graph

| Year | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|-------|------|------|------|------|------|------|------|------|------|------|
| Value | 121 | 120 | 123 | 125 | 124 | 122 | 125 | 126 | 125 | 126 |

4. Attempt the following

[6x2=12 marks]

A. Define the following terms

- Independent events
- Mutually exclusive events
- Exhaustive events
- Equally likely events
- Impossible and certain events
- Complementary events

B. For the following data find,

- The coefficient of regression
- The coefficient of correlation
- The equations of lines of regression

| | | | | | |
|---|---|---|---|----|----|
| X | 4 | 6 | 8 | 10 | 12 |
| Y | 7 | 3 | 1 | 5 | 9 |

OR

X. The probability that a person will react to a drug is 0.001. out of 2000 individuals checked, find the probability that

- Exactly 3
 - More than 2 individuals get a reaction
- Take $e^{-2}=0.135$

Y. Two regression lines are given below:

- Identify the regression lines and state coefficient of regression
- Find the coefficient of correlation

$$6x+5y=50 \quad \text{and} \quad 10x+3y=62$$

5. Attempt the following

[6x2=12 marks]

- A. What is scatter diagram? Explain types of correlation using scatter diagram.
Define regression.
- B. In a certain city there 1000 electric bulbs were used for street lighting. The average life of bulbs is 1000 hours with standard deviation of 200 hours. Find the number of bulbs expected to fail
- In first 800 hours
 - Between 800 to 1200 hours

| | | | |
|---|--------|--------|--------|
| Z | 1 | 2 | 3 |
| P | 0.3413 | 0.4772 | 0.4987 |

OR

- X. For the following bivariate data with given values of mean variance and covariance, find
- b_{yx} , b_{xy} and r
 - the equations of lines of regression
 - the value of y when $x=2$ and
 - value of x when $y=0.5$

| | | |
|----------|---|------|
| | x | Y |
| Mean | 3 | 5.5 |
| variance | 1 | 1.25 |

Covariance= -1

- Y. A card is drawn from a well shuffled pack of 52 cards. Find the probability that the card drawn is
- a diamond
 - a red card
 - a king
 - an ace or a queen
 - a face card
 - a card bearing a number between and including 2 and 6
