

**2023**

**COMMERCE**

**Paper : COMHG3036**

**( Business Statistics )**

Full Marks : 80

Pass Marks : 32

**Time : 3 hours**

*The figures in the margin indicate full marks  
for the questions*

- 1. Choose the correct alternative from the following (any six) :** **1×6=6**

(a) The manufacturer of a shoe company is preferred to use which of the following averages?

(i) Arithmetic mean

(ii) Geometric mean

(iii) Median

(iv) Mode

(b) If  $P(A) = 0$ , then the event  $A$  is said to be

(i) sure event

(ii) uncertain event

(iii) impossible event

(iv) independent event

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- (c) Cost of living index number is known as
- (i) consumer price index
  - (ii) wholesale price index
  - (iii) quantity index
  - (iv) ideal index
- (d) The sales of wool and umbrella are associated with which the component of the time series?
- (i) Secular trend
  - (ii) Seasonal variation
  - (iii) Irregular variation
  - (iv) All of the above
- (e) If  $X$  and  $Y$  are the two variables, then there can be at most
- (i) one regression line
  - (ii) two regression lines
  - (iii) three regression lines
  - (iv) an infinite number of regression line
- (f) Which of the following percentiles ( $P_i$ ) is first quartile?
- (i)  $P_{25}$
  - (ii)  $P_{10}$
  - (iii)  $P_{50}$
  - (iv)  $P_{75}$

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- (g) If the regression coefficient  $b_{yx} > 1$ , then regression coefficient  $b_{xy}$  is
- (i) less than or equal to 1
  - (ii) greater than 1
  - (iii) equal to 1
  - (iv) less than 1 such that  $b_{yx} \times b_{xy} \leq 1$
- (h) An index number is a
- (i) special type of average
  - (ii) measure of relative change
  - (iii) percentage relative
  - (iv) All of the above
- (i) The terms 'prosperity', 'recession', 'depression' and 'recovery' are in particular attached to
- (i) secular trend
  - (ii) seasonal fluctuations
  - (iii) cyclical movements
  - (iv) irregular variations
- (j) If  $P(A) = P(B)$ , then the two events  $A$  and  $B$  are said to be
- (i) independent
  - (ii) dependent
  - (iii) equally likely
  - (iv) Both (i) and (iii)

2. Answer any five of the following questions :  
 $2 \times 5 = 10$

- (a) Find the harmonic mean of 2 and 3.  
 (b) Write the formulae for Laspeyres' and Paasche's index numbers.  
 (c) Write two properties of correlation.  
 (d) Write down the objectives of analysis of time series.

(e) If  $P(A) = \frac{1}{4}$ ,  $P(B) = \frac{2}{5}$ ,  $P(A \cap B) = \frac{20}{3}$  then find  $P(A \cup B)$ .

- (f) Write two uses of index numbers.  
 (g) Mention four characteristics of good average.

3. Answer any six of the following questions :  
 $5 \times 6 = 30$   
 (a) In trying to calculate the effectiveness in its advertising campaign, a firm compiled the following information :

| Year | Advertising expenditure ('000 ₹) | Sales (in lakhs ₹) |
|------|----------------------------------|--------------------|
| 1990 | 12                               | 36                 |
| 1991 | 23                               | 42                 |
| 1992 | 37                               | 57                 |
| 1993 | 46                               | 64                 |
| 1994 | 57                               | 68                 |
| 1995 | 76                               | 82                 |

Calculate the regression equation of sales on advertising expenditure. Estimate the probable sales when advertising expenditure is ₹ 60,000.

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- (b) Show that the Fisher's ideal index number satisfies both time reversal test and factor reversal test.

- (c) Write a note on skewness.

- (d) Calculate the overall cost of living index number from the following data and interpret the result :

| Group of items | Group index | Group weight |
|----------------|-------------|--------------|
| Food items     | 250         | 45           |
| Clothing       | 320         | 20           |
| Fuel           | 190         | 5            |
| House rent     | 150         | 15           |
| Others         | 300         | 15           |

- (e) Discuss the different components of time series analysis with examples.

- (f) In an examination, 10 students secured the following marks in Business Statistics and Accountancy :

| Marks in Business Statistics | Marks in Accountancy |
|------------------------------|----------------------|
| 50                           | 57                   |
| 53                           | 57                   |
| 63                           | 82                   |
| 77                           | 85                   |
| 71                           | 52                   |
| Marks in Business Statistics | Marks in Accountancy |
| 83                           | 87                   |
| 86                           | 86                   |
| 89                           | 89                   |
| 92                           | 92                   |
| Marks in Business Statistics | Marks in Accountancy |
| 68                           | 91                   |
| 91                           | 77                   |
| 83                           | 83                   |
| 86                           | 86                   |

Find the correlation coefficient between the marks in Business Statistics and Accountancy.

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- (g) Fit a linear trend by the method of least square to the following time series data :

|                     |      |      |      |      |      |      |
|---------------------|------|------|------|------|------|------|
| Year                | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Sales (₹ in crores) | 7    | 10   | 12   | 14   | 17   | 24   |

- (h) If two dice are thrown, what is the probability of getting a sum of 7 points or 11 points?

- (i) Write down the properties of binomial probability distribution.

- (j) Find the missing frequency ( $f_3$ ) of the following frequency distribution when AM is 15.38 :

|           |    |    |       |    |    |    |
|-----------|----|----|-------|----|----|----|
| $x$       | 10 | 12 | 14    | 16 | 18 | 20 |
| Frequency | 2  | 7  | $f_3$ | 20 | 8  | 5  |

4. Answer any two of the following questions :

- (a) What is index number? Discuss the main steps in the construction of index numbers.

$$10 \times 2 = 20$$

- (b) Determine median and mode of the following distribution. Also, find the mean by using empirical relation between mean, median and mode :

$$2 + 8 = 10$$

$$4 + 4 + 2 = 10$$

|                    |      |       |       |       |       |
|--------------------|------|-------|-------|-------|-------|
| Expenditure (in ₹) | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 |
| No. of families    | 14   | 23    | 27    | 21    | 15    |

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- (c) Define dependent events, independent events and conditional probability. Bag-I contains 3 red and 4 black balls while another Bag-II contains 5 red and 6 black balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that it was drawn from Bag-II.  $1+1+2+6=10$

- (d) (i) What are the differences between correlation and regression? 5

- (ii) A bag contains 8 articles, 4 of which are defective. If 2 articles are drawn at random, what is the probability that none of them are defective? 5

5. Answer any one of the following questions : 14

- (a) What do you mean by dispersion? Mention the various types of dispersion. Find the mean, standard deviation and coefficient of variation from the following distribution :  $1+4+3+4+2=14$

|                |       |       |       |       |       |       |
|----------------|-------|-------|-------|-------|-------|-------|
| Age (year)     | 20-25 | 25-30 | 30-35 | 35-40 | 40-45 | 45-50 |
| No. of persons | 170   | 110   | 80    | 45    | 40    | 35    |

- (b) Define univariate and bivariate distribution. Discuss the concept of correlation and regression between two variables. What do you mean by positive, negative and zero correlation? Also, discuss why there are two lines of regression.  $2+4+4+4=14$

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- (c) (i) Discuss about the uses of index number. 7
- (ii) Calculate trend values from the following data using 4-yearly moving average method : 7

|       |        |      |      |      |      |
|-------|--------|------|------|------|------|
| Year  | : 2010 | 2011 | 2012 | 2013 | 2014 |
| Sales | : 36   | 43   | 45   | 32   | 44   |

|       |        |      |      |      |
|-------|--------|------|------|------|
| Year  | : 2015 | 2016 | 2017 | 2018 |
| Sales | : 52   | 34   | 24   | 14   |

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