

# Lahore Board-2024

Roll No \_\_\_\_\_ ( To be filled in by the candidate)

(Academic Sessions 2020 – 2022 to 2022-2024 )



**STATISTICS**                      224-1<sup>st</sup> Annual-(INTER PART – II)  
**(COMMERCE GROUP)**

Time Allowed : 15 Minutes  
Maximum Marks : 10

**Q.PAPER ( Objective Type )      PAPER CODE = 8642**

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1	Battery life time is --- variable. (A) Qualitative      (B) Discrete      (C) Comparable      (D) Continuous
2	Graph of class boundaries and frequency is (A) Histogram      (B) Ogive      (C) Histogram      (D) Bar chart
3	One dimensional diagram is (A) Rectangular diagram      (B) Square diagram (C) Simple bar chart      (D) Pie diagram
4	Single value which represent a set of data : (A) Symmetric      (B) Central tendency      (C) Skew-symmetric      (D) Quartile

5	If $\Sigma x = 150$ , $\bar{X} = 10$ then $n = \dots$ : (A) 10      (B) 50      (C) 5      (D) 15
6	Mode of 2, 7, 10, 15 is : (A) Zero      (B) No mode      (C) 2      (D) 15
7	The year of which index number is 100 known as : (A) Current year      (B) Previous year      (C) Chain year      (D) Base year
8	Consumer price index number is also called ---- index number : (A) Value      (B) Volume      (C) Cost of living index      (D) Wholesale price
9	Probability of getting red card when a card is drawn from 52 : (A) $\frac{1}{26}$ (B) $\frac{1}{52}$ (C) $\frac{26}{2}$ (D) $\frac{1}{2}$
10	If $P(A \cap B) = P(A) \cdot P(B)$ then A and B are : (A) Independent      (B) Dependent      (C) Mutually exclusive      (D) Exhaustive

206-224-(Objective Type)-5375 (8642)

**SECTION – I**

**2. Write any SIX (6) short answers of the following questions :**

**12**

- (i) Define parameter by giving an example. (ii) Explain the concept of primary data.  
 (iii) Differentiate ungrouped and grouped data. (iv) Define statistics in plural sense.  
 (v) Distinguish between histogram and historiogram. (vi) What is an array?  
 (vii) Explain the term “Equally Likely Events”.  
 (viii) Write down sample space when three coins are tossed.  
 (ix) A die is rolled. What is the probability that it shows odd numbers?



**3. Write any SIX (6) short answers of the following questions :**

**12**

- (i) Given  $D = X - 2075$ ,  $\sum fD = -10750$ ,  $\sum f = 500$ , find arithmetic mean.  
 (ii) Describe four desirable qualities of a good average.  
 (iii) Write down any two properties of arithmetic mean.  
 (iv) If mode = 15 and median = 12, find mean.  
 (v) Find the median of 0, -1, -4, 3, 5, 10, -3, -7, 10, 3  
 (vi) Describe four advantages of mode.  
 (vii) Contrast between simple and composite index numbers.  
 (viii) Given  $\sum p_1q_0 = 7052$ ,  $\sum p_0q_0 = 6095$ ,  $\sum p_0q_1 = 6980$ ,  $\sum p_1q_1 = 8061$ , find Fisher Ideal Index.  
 (ix) Define consumer price index number.

**SECTION – II**

**Note : Attempt any TWO questions.**

4. (a) Following data represents the reported sales for 26 companies in the shoe industry :

32, 36, 54, 38, 17, 41, 22, 33, 22, 31, 21, 18, 46, 36, 11, 31, 29, 12,  
 23, 51, 12, 13, 37, 33, 27, 26

Construct a frequency distribution. Using classes with a width of 10 i.e. 10-20, 20-30 etc.

(b) Draw a frequency polygon from the following data :

C.I	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 34	35 – 39
f	5	11	18	22	15	9	4

5. (a) For the following data, find arithmetic mean by coding method :

Marks	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79
f	8	87	190	86	20

(b) If  $D = X - 112$ , calculate median of ‘X’ for the following data :

D	-2	-1	0	1	2	3
f	24	30	45	65	72	68

6. (a) Given the prices of four commodities. Construct price index numbers by simple aggregate method taking (i) 2016 as base (ii) average of all year aggregate as base :

Years	Commodities			
	A	B	C	D
2016	81	77	119	55
2017	62	54	128	52
2018	104	87	111	100
2019	93	75	154	96

- (b) A fair die is tossed twice. Find the probabilities that the sum of numbers appearing is :  
 (i) At most 5 (ii) At least 10



Roll No                      **Lahore Board-2023** (To be filled in by the candidate)

(Academic Sessions 2019 – 2021 to 2021 – 2023 )

**STATISTICS**

223-1<sup>st</sup> Annual-(INTER PART – II)

Time Allowed : 20 Minutes

Q. PAPER – II ( Objective Type )

**PAPER CODE = 8185**

Maximum Marks : 17

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1	Simple linear regression model contains : (A) One variable (B) Two variables (C) Three variables (D) More than three variables
2	The difference between statistic and parameter is called : (A) Random error (B) Sampling error (C) Standard error (D) Non sampling error
3	The value of $\chi^2$ is always : (A) -1 to +1 (B) Zero (C) Positive (D) Negative
4	The normal distribution is : (A) Continuous (B) Discrete (C) Positively skewed (D) Negatively skewed
5	A set of instructions that run the computer is : (A) Hardware (B) Printers (C) Software (D) Monitors
6	A formula or function used to estimate a parameter is called : (A) Estimate (B) Bias (C) Estimator (D) Estimation
7	A part of population is called : (A) Parameter (B) Statistic (C) Sample (D) Sampling
8	The range of normal distribution is : (A) 0 to $\infty$ (B) $-\infty$ to 0 (C) $-\infty$ to $\infty$ (D) 0 to $-\infty$
9	In the least squares regression line $y = a + bx$ , the slope is : (A) b (B) zero (C) X (D) a
10	Decomposition of time series is called : (A) Analysis of time series (B) Histogram (C) Historigram (D) Detrending
11	Which of the following can be alternative hypothesis $H_1$ : (A) $\theta \leq \theta_0$ (B) $\theta \geq \theta_0$ (C) $\theta = \theta_0$ (D) $\theta \neq \theta_0$
12	In sampling with replacement, a sampling unit can be selected : (A) Only once (B) Only twice (C) Less than once (D) More than once
13	A sudden decrease in supplies due to floods is an example of : (A) Secular trend (B) Seasonal variations (C) Cyclical variations (D) Irregular variations
14	The point estimate of $\mu$ is : (A) $\bar{X}$ (B) $\sigma$ (C) $\mu$ (D) $\sigma^2$
15	In case of symmetrical distribution : (A) $\mu_1 = \mu_2$ (B) $\mu_3 = \mu_4$ (C) $\beta_1 = \beta_2$ (D) Mean = Median = Mode
16	Co-efficient of correlation (r) lies between : (A) 0 and 1 (B) -1 and 0 (C) $-\infty$ to $+\infty$ (D) -1 and +1
17	A $4 \times 5$ contingency table consists of : (A) 9 cells (B) 20 cells (C) 12 cells (D) 18 cells

172-223-(Objective Type)- 2500 (8185)

Please visit for more data at: [www.pakcity.org](http://www.pakcity.org)

**SECTION – I Lahore Board-2023**

**2. Write short answers to any EIGHT (8) questions :**

16

- (i) Give any two area relations in normal distribution.
- (ii) What is relation between M.D and S.d of normal distribution?
- (iii) Show that in standard normal distribution  $Q.D = Q_3$
- (iv) For  $Z \sim N(0, 1)$ , calculate  $P(-1.96 < Z < 1.96)$ .
- (v) What are the parameters of normal distribution?
- (vi) Define interval estimation.
- (vii) Given  $n = 64$ ,  $\bar{X} = 42.7$ ,  $\sigma = 8$  and  $Z_{\alpha/2} = 1.645$ , find C.I for  $\mu$ .
- (viii) Which test is powerful test?
- (ix) Differentiate between null and alternative hypothesis.
- (x) What is meant by critical values?
- (xi) Define input and output devices.
- (xii) What is software?



**3. Write short answers to any EIGHT (8) questions :**

16

- (i) Define finite population.
- (ii) What is sampling frame?
- (iii) What is simple random sampling?
- (iv) Explain the term sampling units.
- (v) Define cluster sampling.
- (vi) Write two objectives of sampling.
- (vii) What is meant by regression?
- (viii) Define slope of the straight line.
- (ix) If  $a = 130$ ,  $b = 3.956$  then estimate  $y$  for  $x = 12$
- (x) Define scatter diagram.
- (xi) What is negative correlation?
- (xii) If  $\hat{y} = 30 - 2x$  and  $\hat{x} = 20 - 0.01y$ , find " $r$ "

**4. Write short answers to any SIX (6) questions :**

12

- (i) How are association and correlation different from each other?
- (ii) Define association. Give two real life examples of association.
- (iii) Calculate the value of rank correlation coefficient if  $6\sum d^2 = n(n^2 - 1)$ . Comment it.
- (iv) Define time series. Give any one real life example of a time series.
- (v) What sort of variation was related to corona? Also name the four types of variations in a time series.
- (vi) Find trend using method of semi-average for a time series  $y = 4, 4, 4, 4, 4$  for the year 2000 to 2004.
- (vii) Write one advantage and one disadvantage of moving-average method.
- (viii) Linear trend for the year 2015 -2019 is  $\hat{y} = 3 + 5x$ . Find trend value for the year 2020. Origin was 2017.
- (ix) Interpret  $a$  and  $b$  in a linear trend  $\hat{y} = a + bx$  for the year 2016-2020.

(Turn Over)



# Lahore Board-2023

(2)

## SECTION – II

**Note :** Attempt any **THREE** questions.

5. (a) In a normal distribution 33% of the values are under 48 and 12.3% are over 60, find mean and standard deviation of the distribution. 4

- (b) The 90<sup>th</sup> percentile of a normal distribution is 50, while the 15<sup>th</sup> percentile is 25, find  $\mu$  and  $\sigma$  4

6. (a) Draw all possible samples of two letters each without replacement from the letters of the word "PUNJAB". Find proportion of the letter 'A' in each sample. Make a sampling distribution of sample proportion and verify  $\mu_{\hat{p}} = \pi$  4

- (b) A population consists of values 2, 4, 6, 8. Draw all possible samples of size 2 without replacement from this population and show that :

$$\sigma_{\bar{x}}^2 = \frac{\sigma^2}{n} \cdot \frac{N-n}{N-1}$$

4

7. (a) A random sample of 250 from the 5000 students in Govt. College, Gujranwala contained 30 left-handed students. Give an approximate 95% confidence interval for the proportion of left-handed students in the college. 4

- (b) A sample of 400 male students is found to have a mean height of 67.47 inches. Can it be regarded as a simple random sample from a large population with mean height 67.39 with standard deviation of 1.3 inches? 4

8. (a) A random sample of 5 pairs of observations  $(x_i, y_i)$  is given below : 4

$x_i$	3	2	5	1	4
$y_i$	13	9	27	8	18

Determine the least square linear regression  $\hat{y}_i = a + bx_i$  and estimate  $y$  for  $x = 6$

- (b) For a set of 22 pairs of observations, we have  $\sum x_i = 983$ ,  $\sum y_i = 409$ ,  $\sum x_i^2 = 61339$ ,  $\sum y_i^2 = 8475$ ,  $\sum x_i y_i = 15811$ . Find product moment correlation co-efficient for the data. 4

9. (a) Test the association between the subject and results from the following data : 4

Subjects	Pass	Fail
Maths	60	40
Stats	100	80
Eco	120	100

- (b) Find the trend values by using 3-days moving average of following data : 4

Days	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Sun
Values	120	140	135	118	129	130	150	140



172-223-(Essay Type)-10000

**STATISTICS**

222-(INTER PART – II)

Time Allowed : 20 Minutes

Q. PAPER – II ( Objective Type )

PAPER CODE = 8185

Maximum Marks : 17

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1	The independent variable is also called : (A) Regressor (B) Predictor (C) Explanatory variable (D) All of these
2	A value calculated from the sample is called : (A) Parameter (B) Mean (C) Statistic (D) Proportion
3	If the attributes A and B are completely positively associated, then the co-efficient of association is equal to : (A) 1 (B) 0 (C) -1 (D) < 1
4	The limits of the normal distribution are : (A) 0 to $\infty$ (B) $-\infty$ to $+\infty$ (C) $-\infty$ to 0 (D) 0 to 1
5	A decimal number system has base : (A) 10 (B) 8 (C) 2 (D) 16
6	Statistical inference is divided into --- approaches : (A) 2 (B) 3 (C) 4 (D) 5
7	A sample is a part of the : (A) Population (B) Sampling (C) Unit (D) Error
8	For a normal distribution with $\mu = 55$ and $\sigma = 10$ , how much area will be found under the curve to the right of $X = 55$ : (A) 1.0 (B) 0.68 (C) 0.5 (D) 0.32
9	In the regression equation : $\hat{y} = a + bx$ , the constant 'a' is called : (A) X-intercept (B) Y-intercept (C) Dependent (D) Independent
10	Fire in a factory is an example of : (A) Secular trend (B) Irregular variations (C) Cyclical variations (D) Seasonal variations
11	A deserving player is not selected in the team, it is an example of : (A) Type-II error (B) Correct decision (C) Type-I error (D) None of these
12	If $\sigma^2 = 5$ and $n = 2$ , then $\sigma_{\bar{x}}^2$ is : (A) 2 (B) 2.5 (C) 3 (D) 5
13	A trend is the better fitted trend for which the sum of squares of residuals is : (A) Maximum (B) Zero (C) Minimum (D) None of these
14	Confidence co-efficient is denoted by : (A) $1 - \beta$ (B) $\alpha$ (C) $\beta$ (D) $1 - \alpha$
15	In a normal distribution $N(\mu, \sigma^2)$ , $Q_1$ is equal to : (A) $\mu + 0.6745\sigma$ (B) $\mu - 0.7979\sigma$ (C) $\mu - 0.75\sigma$ (D) $\mu - 0.6745\sigma$
16	The correlation co-efficient is independent of : (A) Origin only (B) Scale of measurement (C) Both origin and scale of measurement (D) None of these
17	A characteristic which varies in quality from one individual to another is called : (A) Attribute (B) Regression (C) Statistic (D) Variable



**SECTION – I**

**2. Write short answers to any EIGHT (8) questions :**

**Lahore Board-2022**

**16**



- (i) What is the range of normal distribution?
- (ii) In a normal distribution if  $\mu_2 = 16$ , then find the value of  $\mu_4$ .
- (iii) If M.D. of a normal distribution is 16, find the value of  $\sigma$ .
- (iv) Write down the importance of normal distribution.
- (v) The mean of a normal distribution is 10, what will be the values of its median and mode?
- (vi) What is meant by statistical inference?
- (vii) Given  $n = 40$ ,  $\bar{X} = 32$ ,  $\sigma = 7$  and  $Z_{\frac{\alpha}{2}} = 1.96$ , find C.I. for  $\mu$ .
- (viii) Define hypothesis.
- (ix) Define type – I error with example.
- (x) Given  $n = 100$ ,  $\bar{x} = 5.9$ ,  $\mu = 6$  and  $\sigma = 0.2$ , find  $z$ .
- (xi) What is data processing?
- (xii) Define hybrid computer.

**3. Write short answers to any EIGHT (8) questions :**

**16**

- (i) Define target population
- (ii) Differentiate between sampling error and non-sampling error.
- (iii) What do you mean by Bias?
- (iv) Give any two advantages of sampling.
- (v) Given  $n = 36$ ,  $\sigma_{\bar{x}} = 2$  then find  $\sigma^2$
- (vi) If  $\mu_1 = 10$ ,  $\mu_2 = 8$ ; then find  $\mu_{\bar{x}_1 - \bar{x}_2}$
- (vii) What is meant by curve fitting?
- (viii) Discuss principle of least squares.
- (ix) If  $\bar{x} = 50$ ,  $\bar{y} = 110$ ,  $a = 10$ , then find  $b$
- (x) Give two properties of correlation coefficient.
- (xi) What is perfect positive correlation?
- (xii) If  $S_x^2 = 9.102$ ;  $S_y^2 = 2.204$ ;  $S_{xy} = 1.694$  then find  $r$  ( correlation coefficient )

**4. Write short answers to any SIX (6) questions :**

**12**

- (i) Define association of attributes.
- (ii) If  $(A) = 20$ ,  $(B) = 10$ ,  $n = 40$ , find  $(AB)$  if 'A' and 'B' are independent.
- (iii) Differentiate between class and class frequency.
- (iv) Given  $(AB) = 95$ ,  $(A\bar{B}) = 55$ ,  $(\bar{A}B) = 85$ ,  $(\bar{A}\bar{B}) = 45$ , find the co-efficient of association.
- (v) Give the formulae of 'a' and 'b' while computing the trend by semi-average method.
- (vi) Differentiate between signal and noise.
- (vii) If  $\hat{y} = 10 - 2x$ , find the trend values for  $x = 0, 1, 2, 3, 4, 6$
- (viii) Name any three methods of obtaining secular trend.
- (ix) Enlist the components of time series.

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(2)

## SECTION – II

**Note :** Attempt any THREE questions.

5. (a) Given that the heights of college boys normally distributed with mean  $5' - 2''$  and standard deviation  $4''$  and that minimum height required for joining N.C.C. is  $5' - 4''$ . Find percentage of boys who would be rejected on account of their height. 4

- (b) If  $X \sim N(0, 4)$ , find (i)  $P[X > 0]$  (ii)  $P[0.2 < X < 1.8]$  4

6. (a) Given  $\mu_{\bar{x}_1 - \bar{x}_2} = 4, \mu_2 = 6, \sigma_1 = 2.25, N_1 = 30, N_2 = 25, n_1 = 4, n_2 = 4, \sigma_{\bar{x}_1 - \bar{x}_2} = 6.25$ . Find  $\mu_1$  and  $\sigma_2$  when sampling is done without replacement. 4

- (b) A population consists of three numbers 4, 6, 8. Take all possible samples of size two with replacement from this population. Find mean and unbiased variance of each sample. Also find sampling distribution of variances. 4

7. (a) Find a 95% confidence interval for the mean of a population if a sample of 25 values gave a mean of 83. Here  $\sigma = 7$ . 4

- (b) A sample of size 100 is taken from a population whose variance is 25. If sample mean is 50. Test 4

$$H_0: \mu = 60$$

$$H_1: \mu \neq 60$$

$$\text{at } \alpha = 0.01$$

8. (a) Fit the regression line taking Y as independent variable : 4

X	8	9	11	11	12	14	15
Y	20	40	50	70	75	80	82

and show that  $\Sigma(X - \bar{X}) = 0$

- (b) For a set of 8 pairs of observations  $\Sigma X = 144, \Sigma Y = 160, S_x = S_y = 5, \Sigma(X - \bar{X})(Y - \bar{Y}) = 180$ , find correlation coefficient. 4

9. (a) Calculate the value of Chi-square for the following data : 4

	Vaccinated	Not vaccinated
Attacked	27	77
Not attacked	88	74

- (b) Calculate 3 year moving averages and 2 year centred moving averages for the following data : 4

Year	1920	1921	1922	1923	1924
Y	80	74	73	83	72



172-222-(Essay Type)-10000



Roll No \_\_\_\_\_ **Lahore Board-2021** (To be filled in by the candidate)

(Academic Sessions 2017 – 2019 to 2019 – 2021 )

**STATISTICS**

221-(INTER PART – II)

Time Allowed : 20 Minutes

Q. PAPER – II ( Objective Type )

PAPER CODE = 8183

Maximum Marks : 17

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1	In sampling with replacement, the sampling units can be selected : (A) Only once (B) More than once (C) Less than once (D) None
2	Which of the following “CAN NOT” be $H_0$ : (A) $\theta \leq \theta_0$ (B) $\theta \geq \theta_0$ (C) $\theta \neq \theta_0$ (D) $\theta = \theta_0$
3	For $2 \times 2$ contingency table, d.f. = ---- : (A) $(r-1)(c-1)$ (B) $(r-1)+(c-1)$ (C) $(r-1)-(c-1)$ (D) $rc-1$
4	The sequence which follows irregular or random pattern of variations is called : (A) Signal (B) Model (C) Noise (D) Trend
5	Normal distribution has maximum ordinate at $X = \text{---}$ : (A) $\mu$ (B) $\sigma$ (C) 1 (D) 0
6	When two variables are uncorrelated, then the value of “r” will be : (A) Zero (B) +1 (C) -1 (D) 0.5
7	In standard normal distribution, mean and variance respectively are : (A) 0 and 3 (B) 0 and 1 (C) 0 and 5 (D) 0 and 2
8	If $\hat{y} = 2 + 0.6X$ , then the value of slope is : (A) 2 (B) 0.30 (C) 1.2 (D) 0.6
9	Graph of time series is called : (A) Histogram (B) Histogram (C) Scatter diagram (D) Ogive
10	If level of significance is 0.05, then level of confidence will be : (A) 0.95 (B) 0.90 (C) 0.99 (D) 0.095
11	In normal distribution $P(-\infty < X < +\infty)$ is equal to : (A) -1 (B) 0 (C) 1 (D) 0.5
12	The formula or function used to estimate a parameter is called : (A) Estimate (B) Estimation (C) Predictor (D) Estimator
13	$\sum \bar{x} p(\bar{x})$ is equal to : (A) $\bar{x}$ (B) $\mu_{\bar{x}}$ (C) $\mu^2$ (D) N
14	Accepting $H_0$ , when $H_0$ is false, is : (A) No error (B) Type I error (C) Type II error (D) $\alpha$
15	A population about which some information is desired is called : (A) Sampled population (B) Hypothetical population (C) Target population (D) Infinite population
16	In regression, $\Sigma \hat{y}$ is equal to : (A) 0 (B) $\Sigma y$ (C) a (D) $b_{yx}$
17	The limit of rank correlation coefficient is : (A) -1 and 0 (B) 0 and +1 (C) -1 and +1 (D) $-\infty$ and $+\infty$

172-221-(Objective Type)- 2500 (8183)

**SECTION – I**

**Lahore Board-2021**

**2. Write short answers to any EIGHT (8) questions :**

**16**

- (i) What is standard normal distribution?
- (ii) Write any two properties of normal distribution.
- (iii) In a normal distribution, if  $\mu = 20$  and  $\sigma = 5$ , find Q.D.
- (iv) Why  $\beta_1$  is zero in normal distribution?
- (v) Define points of inflection in normal distribution.
- (vi) In a normal distribution,  $\mu_2 = 9$ , find  $\mu_3$  and  $\mu_4$ .
- (vii) Define unbiased estimator.
- (viii) What is best estimator?
- (ix) Define interval estimate.
- (x) Define statistical hypothesis.
- (xi) Define power of a test.
- (xii) Define level of significance.



**3. Write short answers to any EIGHT (8) questions :**

**16**

- (i) Define sampling.
- (ii) Define non-probability sampling.
- (iii) If  $\sigma = 5$ ,  $N = 3$ ,  $n = 8$ , find  $\sigma_{\bar{x}}^2$  if sampling is done with replacement.
- (iv) Define sampling frame.
- (v) Write down any two advantages of sampling.
- (vi) A population consists of 2, 4, 6, 8, 9. How many possible samples of size 3 can be drawn without replacement?
- (vii) Define scatter diagram.
- (viii) What are the parameters of simple linear regression model?
- (ix) Given  $\hat{y} = 0.72 + 1.33x$ ,  $\Sigma y = 16.9$  and  $x = 0, 1, 2, 3, 4$  then show that  $\Sigma y = \Sigma \hat{y}$ .
- (x) What is the range of correlation coefficient?
- (xi) What is the relationship between regression coefficients and correlation coefficient?
- (xii) If  $r = 0.48$ ,  $S_{xy} = 36$  and  $S_x^2 = 16$ , find the value of  $S_x$ .

**4. Write short answers to any SIX (6) questions :**

**12**

- (i) Define attributes.
- (ii) Define class and class frequency.
- (iii) What is ultimate class frequency?
- (iv) If  $n = 600$ ,  $(A) = 240$ ;  $(B) = 270$ , find  $(AB)$
- (v) What is time series?
- (vi) Describe the seasonal variation.
- (vii) Discuss historigram.
- (viii) Explain the term secular trend.
- (ix) Discuss term noise.



## SECTION – II

Lahore Board-2021

**Note : Attempt any THREE questions.**

5. (a) In a normal distribution the mean is 20 and S.D = 5, find : 4  
 (i)  $P(X \geq 8)$  (ii)  $P(X < 24)$
- (b) In normal distribution mean = 16 and variance = 25, find : 4  
 (i)  $P(11 < X < 21)$  (ii)  $P(X > 26)$
6. (a) A population consists of values 3, 6 and 9. Take all possible samples of size 3 with replacement. Form sampling distribution of mean. Verify the results : 4  
 (i)  $\mu_{\bar{X}} = \mu$  (ii)  $\sigma_{\bar{X}}^2 = \frac{\sigma^2}{n}$
- (b) A finite population consists of three values 2, 4, 6. Take all possible sample of size 2 with replacement. Form the sampling distribution of sample variance and verify that : 4  

$$\mu_{S^2} = \frac{n-1}{n} \sigma^2$$

$$S^2 = \frac{\sum (X - \bar{X})^2}{n}$$
7. (a) Find a 90% confidence interval for the mean of a normal distribution if  $\sigma = 2$  and a sample of size 8 gave the values 9, 14, 10, 12, 7, 13, 11, 12 4
- (b) Let  $X \sim N(\mu, 100)$  and  $\bar{X}$  be the mean of a random sample of 64 observations of  $X$ , given that  $\bar{X} = 15$  test  $H_0: \mu = 12$  against  $H_1: \mu > 12$  use  $\alpha = .05$  4
8. (a) For the following data : 4
- |   |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|
| X | 6   | 8   | 10  | 12  | 14  |
| Y | 102 | 106 | 110 | 113 | 120 |
- Find the mean values  $\bar{X}$  and  $\bar{Y}$  and using these values find the equation of the regression line  $Y$  on  $X$  in the form  $Y - \bar{Y} = b(X - \bar{X})$
- (b) Compute the coefficient of correlation for a sample of 20 pairs of observations 4  
 Given that :  $\bar{X} = 2$ ,  $\bar{Y} = 8$ ,  $\sum X^2 = 180$ ,  $\sum Y^2 = 1424$  and  $\sum XY = 404$
9. (a) Find the association between injection against typhoid and exemption from attack from the following contingency table : 4
- | Attribute      | Attacked | Not attacked |
|----------------|----------|--------------|
| Inoculated     | 528      | 25           |
| Not inoculated | 790      | 175          |
- (b) Calculate 7 days moving average for the following records of attendance : 4

Days	Weeks	
	I	II
Sun	24	27
Mon	55	52
Tue	29	32
Wed	48	43
Thur	52	53
Fri	55	53
Sat	61	65

**STATISTICS**

218-(INTER PART – II)

Time Allowed : 20 Minutes

Q. PAPER – II ( Objective Type )

PAPER CODE = 8185

Maximum Marks : 17

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1	In simple linear regression the number of unknowns are : (A) One (B) Two (C) Three (D) Four
2	The standard deviation of sampling distribution is : (A) Dispersion (B) Difference (C) Average (D) Standard error
3	A qualitative characteristic is : (A) Constant (B) Quantitative variable (C) Attribute (D) None
4	In normal distribution the value of constant $\pi$ is : (A) $\frac{23}{6}$ (B) $\frac{22}{7}$ (C) $\frac{30}{9}$ (D) $\frac{42}{8}$
5	One byte equals to : (A) 8 bits (B) 4 bits (C) 7 bits (D) 13 bits
6	P ( type – I error ) is equal to : (A) $\alpha$ (B) $\beta$ (C) $\theta$ (D) $1 - \beta$
7	The probability distribution of a statistic is : (A) Sampling (B) Parameter (C) Data (D) Sampling distribution
8	In normal distribution the value of constant $e$ is : (A) 2.7183 (B) 2.8173 (C) 2.1792 (D) 1.2345
9	The value of correlation co-efficient lies between : (A) 0 and 1 (B) -1 and 0 (C) -1 and +1 (D) 0 and 2
10	The additive model of time series is : (A) $Y = T + C + S + I$ (B) $Y = TCSI$ (C) $T - C - S - I$ (D) $T + C - S - I$
11	The number of degrees of freedom for paired t-test based on $n$ pairs of observation is : (A) $2n - 1$ (B) $n - 2$ (C) $2(n - 1)$ (D) $n - 1$
12	The sample is subset of : (A) Data (B) Population (C) Parameter (D) Distribution
13	In semi average method if number of values is odd then we drop from initial two halves : (A) First value (B) Last value (C) Middle value (D) $2^{nd}$ value
14	Estimate and estimator are : (A) Same (B) Different (C) Both A and B (D) Neither A nor B
15	If $X$ is $N(100, 64)$ then S.D is : (A) 18 (B) 100 (C) 8 (D) 91
16	The signs of regression co-efficients and correlation co-efficient are always : (A) Different (B) Same (C) Zero (D) One
17	In converting the score 18, 24, 12, 22, 33 to ranks ( assigning rank 1 to highest score ) the rank of score 12 is : (A) 4 (B) 5 (C) 1 (D) 3



**SECTION – I**

**Lahore Board-2018**

**2. Write short answers to any EIGHT (8) questions :**

**16**

- (i) In a normal distribution  $Q_1 = 8$  ,  $Q_3 = 17$  . Find the value of mean and mode.
- (ii) Write the probability density function of standard normal distribution.
- (iii) If  $Z \sim N(0, 1)$  , then find  $P[|z| < 1.64]$
- (iv) Write four properties of standard normal distribution.
- (v) Find the ordinate of the standard normal curve at  $z = -0.84$
- (vi) Define interval estimation.
- (vii) Differentiate between estimator and estimate.
- (viii) What are the assumptions of student's t-Statistic?
- (ix) Define level of significance.
- (x) Given  $\bar{X} = 28$  ,  $\mu_0 = 28$  . Find the value of z-score.
- (xi) What is computer software?
- (xii) What is a compiler?



**3. Write short answers to any EIGHT (8) questions :**

**16**

- (i) What is population?
- (ii) What is non-sampling error?
- (iii) What is standard error?
- (iv) Explain the properties of the sampling distribution of a mean.
- (v) Given  $N_1 = 3$  ,  $n_1 = 2$  and  $N_2 = 4$  ,  $n_2 = 2$  . If  $\sigma_1^2 = \frac{8}{3}$  and  $\sigma_2^2 = \frac{5}{4}$  find  $\text{var}(\bar{X}_1 - \bar{X}_2)$  when sampling is done without replacement?
- (vi) Distinguish between finite and infinite population.
- (vii) Sketch scatter diagram indicating negative correlation.
- (viii) Explain the term regression coefficient.
- (ix) Given  $x = 2, 4, 6$  and  $y = 4, 4, 4$  , find simple correlation coefficient.
- (x) Write the relationship between regression coefficient and correlation coefficient.
- (xi) What is curve fitting?
- (xii) If  $\Sigma(X - \bar{X})(Y - \bar{Y}) = 8400$  and  $\Sigma(X - \bar{X})^2 = 2800$  , find  $b_{yx} = ?$

**4. Write short answers to any SIX (6) questions :**

**12**

- (i) Define the term Dichotomy for attributes.
- (ii) What is positive and negative association?
- (iii) What is contrary classes?
- (iv) Define independence of attributes.
- (v) What is contingency table?
- (vi) If  $\hat{y} = 10 + 3x$  , find the trend values for  $x = 1, 2, 3, 4$ ?
- (vii) Define principle of least square.
- (viii) Write down two properties of least square line.
- (ix) Enlist the different methods of measuring secular trend.

## SECTION – II

**Note :** Attempt any **THREE** questions.



5. (a) In a normal distribution  $\mu = 47.6$  and  $\sigma = 16.2$ , find :  
 (i)  $P_{90}$  (ii) Two points such that any value has 95% probability of falling between them. 4
- (b) If  $X \sim N(60, 100)$ , where  $X$  indicate marks obtained by student, find probability that a student selected at random obtains marks : (i) less than 56 (ii) more than 50 4
6. (a) Draw all possible samples of size 2 with replacement from a population 2, 4, 6 make sampling distribution of sample mean. Also find (i)  $\mu_{\bar{x}}$  (ii)  $\sigma_{\bar{x}}$  4
- (b) If  $n_1 = 10, n_2 = 15$   
 $\mu_1 = 30, \mu_2 = 10$   
 $\sigma_1^2 = 5, \sigma_2^2 = 6$   
 find (i)  $\mu_{\bar{x}_1 - \bar{x}_2}$  (ii)  $\sigma_{\bar{x}_1 - \bar{x}_2}$   
 if sampling is done with replacement 4
7. (a) Given the following summary statistics : 4
- |            |                   |                 |
|------------|-------------------|-----------------|
| $n_1 = 40$ | $\bar{x}_1 = 90$  | $\sigma_1 = 15$ |
| $n_2 = 50$ | $\bar{x}_2 = 100$ | $\sigma_2 = 20$ |
- Construct 95% confidence interval for  $\mu_2 - \mu_1$
- (b) Test the null hypothesis  $H_0 : \mu_1 = \mu_2$  against alternative hypothesis  $H_1 : \mu_1 \neq \mu_2$  at  $\alpha = 0.05$  using the data given in part (a). 4
8. (a) Fit the regression line of  $Y$  on  $X$  to given data and show that  $\Sigma(Y - \hat{Y}) = 0$  4
- |     |   |   |   |   |   |
|-----|---|---|---|---|---|
| $X$ | 1 | 2 | 3 | 4 | 5 |
| $Y$ | 1 | 1 | 2 | 2 | 4 |
- (b) Compute and interpret the co-efficient of correlation between the values of  $X$  and  $Y$  from the data given below : 4
- |     |    |    |    |    |    |
|-----|----|----|----|----|----|
| $X$ | 5  | 10 | 15 | 20 | 25 |
| $Y$ | 12 | 14 | 20 | 18 | 16 |
9. (a) Find co-efficient of association from the following data : 4
- | Height of son | Height of father |       |
|---------------|------------------|-------|
|               | Tall             | Short |
| Tall          | 500              | 100   |
| Short         | 100              | 400   |
- (b) Compute the trend values by method of semi-average for the following data : 4
- |        |      |      |      |      |      |
|--------|------|------|------|------|------|
| Year   | 1921 | 1922 | 1923 | 1924 | 1925 |
| Values | 15   | 18   | 17   | 42   | 38   |



**(Academic Sessions 2015 – 2017 and 2016-2018 )**

STATISTICS

218-(INTER PART – II)

Time Allowed : 15 Minutes

(COMMERCE GROUP)

GROUP – II

Maximum Marks : 10

Q.PAPER ( Objective Type ) PAPER CODE = 8648

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.



1-1	The number of important basis of classification is : (A) Two (B) Three (C) Four (D) Five
2	Simple index number involves commodities : (A) More than one (B) One (C) Two (D) Three
3	${}^n p_r = \text{---} :$ (A) $\frac{n!}{r!}$ (B) $\frac{n!}{(n+r)!}$ (C) $\frac{n!}{r!(n-r)!}$ (D) $\frac{n!}{(n-r)!}$
4	The number of chairs in the college is an example of (A) Constant (B) Continuous variable (C) Discrete variable (D) Both A and B
5	$\pi$ is a : (A) Constant (B) Variable (C) Statistic (D) Co-efficient
6	The graph of cumulative frequency distribution is called : (A) Histogram (B) Ogive (C) Frequency polygon (D) Multiple bar chart
7	If three coins are tossed then the possible outcomes are : (A) 3 (B) 9 (C) 4 (D) 8
8	Price relative are equal to : (A) $\frac{P_n}{P_o} \times 100$ (B) $\frac{P_n}{P_{n-1}} \times 100$ (C) $\frac{P_o}{P_n} \times 100$ (D) $\frac{P_{n-1}}{P_n} \times 100$
9	We must arrange the data before calculating : (A) A.M. (B) Median (C) Mode (D) None of these
10	The model letter of the word " STATISTICS" : (A) S (B) T (C) I (D) S and T

**2. Write any SIX (6) short answers of the following questions :**

- |                                    |                                       |
|------------------------------------|---------------------------------------|
| (i) What is quantitative variable? | (ii) What is a parameter?             |
| (iii) What is a population?        | (iv) Define the term class-mark.      |
| (v) Define tabulation.             | (vi) Define class-interval.           |
| (vii) What is an array?            | (viii) Give two advantages of graphs. |
| (ix) Define multiple bar diagram.  |                                       |

**3. Write any SIX (6) short answers of the following questions :**

- |   |                                  |
|---|----------------------------------|
| (i) Write any two reasons of average calculation.         | (ii) Define arithmetic mean.     |
| (iii) Find arithmetic mean when sum of five values is 60. | (iv) Define model class.         |
| (v) Enlist any two uses of index number.                  | (vi) What is price index number? |
| (vii) Define permutation.                                 | (viii) What is probability?      |
| (ix) Define subset.                                       |                                  |

**SECTION – II****Note : Attempt any TWO questions.****4. (a) Make a frequency distribution of the following data taking class size as 1 :**

3	2	10	9	7	6	8	6	5	7
0	9	4	2	8	5	4	3	10	0
6	10	7	8	5	3	2	9	1	2
4	6	7	1	2	10	0	5	2	8

**(Turn Over)**

	(C) Discrete variable	(D) Both A and B		
5	$\pi$ is a :			
	(A) Constant	(B) Variable	(C) Statistic	(D) Co-efficient
6	The graph of cumulative frequency distribution is called :			
	(A) Histogram	(B) Ogive	(C) Frequency polygon	(D) Multiple bar chart
7	If three coins are tossed then the possible outcomes are :			
	(A) 3	(B) 9	(C) 4	(D) 8
8	Price relative are equal to :			
	(A) $\frac{P_n}{P_o} \times 100$	(B) $\frac{P_n}{P_{n-1}} \times 100$	(C) $\frac{P_o}{P_n} \times 100$	(D) $\frac{P_{n-1}}{P_n} \times 100$
9	We must arrange the data before calculating :			
	(A) A.M.	(B) Median	(C) Mode	(D) None of these
10	The model letter of the word " STATISTICS" :			
	(A) S	(B) T	(C) I	(D) S and T



## Lahore Board-2018

(2)

4. (b) The height of college students are given below :

Height	57 – 59	60 – 62	63 – 65	66 – 68	69 – 71
No. of Students	8	15	27	18	9

Draw a histogram.

5. (a) For the following frequency distribution compute mode :

Classes	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79
Frequency	15	18	22	10	05

- (b) Calculate arithmetic mean :

x	5	10	15	20	25	30	35
f	3	7	10	15	10	3	2

6. (a) The price of wheat ( per 40 kg ) is given below. Compute chain indices using 1991 as base year :

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Price	112	124	130	160	160	172	240	240	240	300

- (b) If 3 coins are tossed, construct the sample space and find the probability of 3 heads?

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