



UNIVERSITY OF THE PUNJAB

B.A. / B.Sc. Part - II
Supplementary Examination - 2018

Roll No.

Subject: Statistics-II
PAPER: A

TIME ALLOWED: 3 Hrs.
MAX. MARKS: 75

Note: Attempt FIVE questions in all, at least TWO questions from each section.

SECTION-1

- Q.1 a) Explain sampling and non-sampling errors. (6 + 9)
What methods would you suggest to control each type of error?
- b) The heights of a large number of shrubs of the same kind produced for sale by a horticultural nursery are normally distributed with mean 1.14m and standard deviation 0.25m. Fifty samples, each consisting of n=100 shrubs, are selected. In how many of these samples would you expect to find the mean sample being to be i) greater than 1.16m ii) between 1.13 and 1.18m?
- Q.2 a) State the central limit theorem. (3 + 7 + 5)
- b) A population proportion is 0.40. A simple random sample of size 200 will be taken and the sample proportion will be used to estimate the population proportion, what is the probability that the sample proportion will be within ± 0.03 of the population proportion?
- c) At a small private college the students are classified as follows:

Classification	B.Sc	B.A	F.Sc	F.A
No of Students	100	120	160	220

If we wish to select a stratified random sample of size n = 30 by proportional allocation, how large a sample must we take from each stratum?

- Q.3 a) Explain unbiasedness and consistency for good point estimators. (4 + 6 + 5)
- b) Let x_1, x_2 be a random sample of size 2 from a population with mean μ and variance σ^2 . Consider the following two estimators of the mean μ .
 $T_1 = \frac{x_1 + x_2}{2}$ (sample mean), $T_2 = \frac{x_1 + 2x_2}{3}$ (weighted mean).
 i) Are they unbiased? ii) what is the efficiency of T_2 relative to T_1 .
- c) A random sample of 100 values was taken from a normal population with mean μ and the following results were obtained: $\sum X = 3978.7$ and $\sum X^2 = 1583098.3$.
 find 98% confidence interval for μ .

- Q.4 a) Explain the difference between one-sided and two sided tests. When should each be used? (5 + 10)
- b) Twelve hogs were fed on diet A, 15 on diet B. The gains in weights for the individual hogs (in pounds) were as shown:

A	25	30	28	34	24	25	13	32	24	30	31	35		
B	44	34	22	8	47	31	40	30	32	35	18	21	35	29

What conclusions may be drawn from this experiment? Is $H_0: \mu_A = \mu_B$ (Use the $\alpha = 0.05$)

- Q.5 a) State any two properties of Chi-square distribution and write down the tests based on Chi-square?. (5 + 5 + 5)
- b) The earnings per share for 10 companies in the software industry with standard deviation was $S_1 = 4.27$ and the earnings per share for 7 companies in the telecom industry with standard deviation was $S_2 = 2.27$. Conduct a test for equal variance at $\alpha = 0.05$
- c) A sample is selected from approximately normal population with 10 observations has (unbiased variance) $S^2 = 0.2576$. Compute 95% confidence interval for standard deviation.

(P.T.O.)

SECTION-II

Q.6 a) The grades in a statistics course were as follows

(6+9)

Grade	A	B	C	D	E
<i>f</i>	14	18	32	20	16

Test the hypothesis, at the 0.50 level of significance, that the distribution of grades are uniform.

b) Given the data

<i>x</i>	0	1	2	3	4	5
<i>f</i>	40	32	18	8	2	0

Fit a poisson distribution and test the goodness-of-fit. Use $\alpha = 0.05$

Q.7. Find the linear Regression equation of the form $\hat{y} = a + bx$ for the following data (3+8+4) with Assuming normality, (If β is population regression coefficient)

X	1	1	2	3	4	4	5	6	6	7
Y	2.1	2.5	3.1	3.0	3.8	3.2	4.3	3.9	4.4	4.8

- i) Test the null hypothesis $H_0: \beta \leq 0$ against $H_1: \beta > 0$ Use ($\alpha = 0.05$)
- ii) Find the 95% confidence limits for β

Q.8. a) Define the Partial correlation co-efficient. (2+13)

b) Let b_{ij} is the coefficient of linear regression X_i on X_j . We are given $n = 6$ and $b_{21} = -0.714$, $b_{12} = -1.111$, $b_{23} = 5.143$, $b_{32} = 0.1796$, $b_{13} = -6.4667$, $b_{31} = -0.1452$

Calculate Partial correlation co-efficient ($\gamma_{12.3}$) and Multiple correlation co-efficient ($R_{1.23}$) and test the significance of $\gamma_{12.3}$, $R_{1.23}$ at $\alpha = 0.05$.

Q.9. a) Describe the LSD test in analysis of variance.

(3+12)

b) The following data represent the scores of 5 students in 4 courses

Student <i>i</i>	Course <i>j</i>			
	Eng	Stat	Math	Phy
1	88	51	73	87
2	79	85	82	80
3	67	74	91	77
4	35	76	43	55
5	99	84	95	83

Use a 0.05 level of significance to test the hypothesis that

- i) The course are of equal difficulty. ii) The Student have equal ability.
- ii) Apply *L.S.D* test to determine which mean scores of students are significantly different.

Q.10. a) Explain the basic principles Replication and local Control of Experimental Design. (5+10)

b) Carry out the Analysis of Variance for the following Latin Square Design and give your conclusions. Using 0.05 level of significance for each test.

		COLUMNS			
		1	2	3	4
ROWS	1	B (10)	A (8)	C (9)	D (13)
	2	C (8)	D (13)	B (13)	A (10)
	3	D (15)	C (9)	A (8)	B (9)
	4	A (6)	B (10)	D (14)	C (7)



UNIVERSITY OF THE PUNJAB

B.A. / B.Sc. Part – II
Supplementary Examination - 2018

Roll No.

TIME ALLOWED: 3 Hrs.
MAX. MARKS: 100

Subject: Statistics
PAPER: Optional

Note: Attempt any FOUR (4) questions. All questions carry equal marks.

1. (a) Explain the difference between the descriptive and inferential statistics: (6)
(b) Draw a histogram for the following data: (19)

Age nearest birthday:	20-29	30-39	40-49	50-59	60-69	70-79	80-89
No. of men:	1	2	25	22	19	15	4

2. (a) What is statistical average? Name the important types of averages. (6)
(b) The following distribution shows Kilowatt-Hours of electricity used in one month by residential consumers in a certain locality of Lahore. (19)

Consumption	5-24	25-44	45-64	65-84	85-104	105-124	125-144	145-164
No. of Consumer	5	9	15	14	13	10	7	3

Calculate mean, median and mode.

3. (a) Define range, variance and coefficient of variation. (6)
(b) Calculate mean, variance and coefficient of variation for the following frequency distribution. (19)

Marks	25-50	50-75	75-100	100-125	125-150	150-175
Frequency	10	12	16	17	20	18

4. (a) Define quartile deviation and standard deviation? (6)
(b) Calculate Pearson's Coefficient of Skewness for the data below. (19)

Marks	10-14	15-19	20-24	25-29	30-34	35-39	40-44
f	1	4	6	8	13	4	2

5. (a) State the properties of regression line. (6)
(b) Compute the least squares regression equation of Y on X for the following data: (19)

X	5	6	8	10	12	13	15	16	17
Y	7	19	23	28	36	41	44	45	48

6. (a) Define Correlation and write its types. (6)
(b) Find the Correlation Coefficient for the following data. (19)

X	1	3	5	6
Y	1	2	5	5
X	6	7	9	9
Y	6	7	7	8

7. (a) Explain the following terms Variable and Attribute. (6)
(b) Given the following contingency table for hair colour and eye colour., (19)
Test the null hypothesis of independence of the two classification at the 0.01 level of significance.

Eye Colour	Hair Colour		
	Fair	Grey	Brown
Blue	80	47	25
Black	81	56	28
Dark blue	69	35	30

8. (a) Define Sampling. What are the advantages of sampling. (6)
(b) A population consists of values 2,6,8,10,12 and 14. Take all possible samples of size 2 without replacement from this population and find the mean for each sample. Make sampling distribution of sample mean and verify that: (19)

$$\mu_x = \mu \text{ and } \sigma_x = \frac{\sigma}{\sqrt{n}} \sqrt{\frac{N-n}{N-1}}$$