Model Paper

GOVERNMENT COLLEGE UNIVERSITY, FAISALABAD

BA/B.Sc (Part-I) Annual 2017

Subject: Statistics **Paper: (I)** Course Code: STA-301

Course Title: Statistics-I

Time Allowed: 3:00 Hours Maximum Marks: 75 Pass Marks: 33%

Note:- Attempt any five questions in all, at least two questions from each section. Scientific calculators and statistical tables are allowed.

Section-I

Q#1 (a) What are the different meanings of the word statistics? **(05)**

(b) If the arithmetic mean of n numbers $X_1, X_2, X_3, ..., X_n$ is M and A is any arbitrary number, then show that: $\sum(X_i - A)^2 = \sum(X_i - M)^2 + n(M - A)^2$ **(05)**

(c) For a given frequency distribution $\sum f_i X_i = 270$, $\sum f_i (X_i - \bar{x})^2 = 160$, $\bar{x} = 27$

Find the standard deviation and coefficient of variation. **(05)**

Q#2 (a) write a short note on skewness of a frequency distribution. **(05)**

(b) The ages of 100 workers range from 10 years to 54 years. They are grouped into 9 classes with a common class interval of 5 years and the class frequencies from the lowest to the highest class are: 1, 3, 7, 15, 23, 28, 16, 6, and 1. Find the coefficient of skewness by bowley's method. (10)

Q#3 (a) What are the important properties of least squares regression line? **(04)**

(b) Obtain the product moment coefficient of correlation between the following set of values:

x	7.4	9.0	11.0	2.5	4.6	6.5
y	8.5	6.1	2.4	6.7	12.6	3.3

Rank the values and hence find a Spearman's rank correlation coefficient between the two sets. **(11)**

Q#4 (a) Define and explain the consumers price index. **(04)**

(b) Show that marshall's index number do not satisfy the factor reversal test **(04)**

(c) A house hold budget inquiry of the middle class people in Faisalabad gave the following information. **(07)**

Item	Food	Rent	Clothing	Fuel	Misc
Expenditure	35%	15%	20%	10%	20%
Price(2000)	240	80	150	65	120
Price(2001)	250	80	160	75	150

Calculate the index number of retail price for the year 2001 with 2000 as base year

Q#5 (a) Discuss briefly the main components of a time series. **(05)**

(b) From the following time series find the yearly trend values by i) 3-years moving averages and ii) 4-years centered moving averages. **(10)**

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
Values	12	23	37	48	41	37	49	61	70

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Section-II

Q#6 (a) Define and explain the following terms. (05)

i. Random experiment
ii. Sample space
iii. Sure event

(b) The probability that a man will be alive in next 20 years is 0.7 and that his wife will be alive in next 20 years is 0.6, find the probability that (10)

i) both will be alive ii) only the man will be alive iii) neither will be alive

iv) at least 1 will be alive v) only one of them will be alive in next 20 years.

Q#7 (a) Define mutually exclusive events. State and prove the theorem of addition of probabilities concerning mutually exclusive events. (05)

(b) The probability that a driver passes the written test for a driving license is 0.70, what is the probability that a person will fail the test on the 1st try and pass the test on the 2nd try. (05)

(c) In a single throw of 2 fair dice, find the probability that the product of the 2 numbers appearing is divisible by 4. (05)

Q#8 (a) What is meant by a discrete random variable and its probability distribution. (05)

(b) let X_1 and X_2 are two independent random variables having variances k and 2 respectively. If $var(3X_2 - X_1) = 21$, Find k. (05)

(c) A and B throw with one die for a prize of Rs. 1100, which is to be won by the player who 1st throws 6. If A has the 1st throw what are their respective expectations. (05)

Q#9 (a) Prove that the mean of the binominal distribution is np and variance is npq. (08)

(b) Records show that the probability is 0.00005 that a car will have a flat tire while crossing a certain bridge. Use the Poisson approximation to the binomial distribution that among 10000 cars crossing this bridge, (07)

i. Exactly two will have a flat tire.
ii. At most two will have a flat tire.

Model Paper

GOVERNMENT COLLEGE UNIVERSITY, FAISALABAD

BA/B.Sc (Part-II) Annual 2017
Subject: Statistics **Paper: (II)** Course Code: STA-401
Course Title: Statistics-II
Time Allowed: 3:00 Hours Maximum Marks: 75 Pass Marks: 33%

Note:- *Attempt any five question in all, at least two questions from each section. Use of Scientific calculators and statistical tables are allowed.*

Section-I

Q.1 (a) Differentiate between: (6)
(i) Stratum and cluster
(ii) Probability sampling and non-probability sampling
(iii) Sampling errors and non-sampling errors

(b) A population consists of 2, 4, 6, 8, 10 and 12. Draw all possible samples of size $n = 3$ without replacement and calculate means for all the samples. Verify that: (9)

$\mu_{\overline{x}} = \mu$ and $\delta_{\overline{x}} = \frac{\delta}{\sqrt{n}}\sqrt{\frac{N-n}{N-1}}$.

Q.2 (a) Define sampling distribution of sample proportion and state its properties. (6)

(b) A small professional society has $N = 4500$ members. The president has mailed $n = 400$ questionnaires to a random sample of members asking whether they wish to affiliate with a larger group. Assuming that the proportion of the entire membership favoring consolidation is $p = 0.7$, find the probability that the sample proportion P will differ from this by no more than 0.05. (9)

Q.3 (a) Define statistical inference, point estimation and interval estimation. (6)

(b) A random sample of 75 university students is selected and 16 are found to have cars on campus. Find a 95% confidence interval of the students who have cars on campus. (9)

Q.4 (a) Differentiate between: (6)
(i) Acceptance region and rejection region
(ii) Type-I error and type-II error
(iii) One-tailed test and two-tailed test

(b) Suppose that the mean μ of a random variable X is unknown but the variance for X is known to be 144. Should we reject the null hypothesis $H_0: \mu = 15$ in favor of the alternative hypothesis $H_1: \mu \neq 15$ at $\alpha = 0.05$, if a random sample of 64 observations gives a mean $\overline{X} = 12$? (9)

Q.5 (a) Define chi-square distribution and state its application in statistics. (6)

(b) A sample of 9 parts produced by a certain production process gives the following respective measurements in inches: 5, 7, 2, 4, 8, 9, 8, 6, and 5. Test the hypothesis that the process has the variance equal to 4 (inches)^2 at 5% percent level of significance. (9)

Section-II

Q.6 (a) What is the χ^2-test of goodness of fit? What are the assumptions of using this test? (6)

(b) Test whether the following data may be regarded as confirming to a Poisson distribution? (9)

x	0	1	2	3	4	5	6	7
f	305	365	210	80	28	9	2	1

Q.7 (a) Define regression, regressor and regressand. (6)

(b) Below are the average heights for the students of different ages at some university: (9)

Age (years)	birth (0)	2	3	5	7	10	14
Height (cm)	50.8	83.8	91.4	106.6	119.3	137.1	157.5

Calculate the least squares line to predict height at certain age. Also calculate the coefficient of linear correlation between age and height.

Q.8 (a) Distinguish between simple correlation, partial correlation and multiple correlation. (6)

(b) Three variables have in pairs simple correlation coefficients given by: (9)

$$r_{12} = 0.80,\ r_{13} = -0.70,\ r_{23} = -0.90.$$

Calculate all partial correlation coefficients and all multiple correlation coefficients.

Q.9 (a) Define analysis of variance. What are the assumptions in using one-way analysis of variance? (6)

(b) Construct the analysis of variance table for the following data: (9)

Factor *A*	Factor *B*			
	1	2	3	4
1	15	31	20	30
2	22	11	45	26
3	33	37	30	44
4	18	31	49	34
5	37	30	36	21

Test the hypotheses that:
(i) Factor *A* has no effect on yields.
(ii) Factor *B* has no effect on yields.

Model Paper

GOVERNMENT COLLEGE UNIVERSITY, FAISALABAD

BA Annual 2017

Subject: Statistics **Paper: (Optional)** Course Code: STA-421

Course Title: Statistics

Time Allowed: 3:00 Hours Maximum Marks: 100 Pass Marks: 33%

Note: - *Attempt any five questions. All questions carry equal marks.*

Q. 1 (a). Define Statistics. What is the most important word in this definition? Why? What are two major branches of Statistics? Which branch is more worthwhile? Why?

Q. 1 (b). Name any two charts that can be made using qualitative data? Also name any five graphs that can be made using quantitative data.

Q. 1 (c). What sort of tables can be made of qualitative as well as quantitative data?

Q. 2 (a). Define central tendency. Which measures of central tendency are you familiar with? Distinguish between mean, median and mode.

Q. 2 (b). Find arithmetic mean of the following data.

x	30-39	40-49	50-59	60-69	70-79
f	3	11	23	9	4

Q. 3 (a). What do you know about dispersion? What are frequently used measures of dispersion? What measure of dispersion do you prefer for quantitative data? Why? Is there any measure of dispersion for qualitative data?

Q. 3 (b). Calculate standard deviation and coefficient of variation for the data of given in Q. 2(b).

Q. 4 (a). Define skewness and kurtosis. What are coefficient of skewness and kurtosis for normal data?

Q. 4 (b). Compute coefficient of skewness using any formula of your choice using the data given in Q. 2(b).

Q. 5 (a). Define attribute and contingency table. What is meant by independence of two attributes?

Q. 5 (b). Test whether 2 attributes, Subjects and Hobbies, are associated with each other or not? (5)

Hobbies↓ Subjects→	Math	Chemistry	Physics
Music	24	83	17
Drama	10	26	44

Also find coefficient of contingency and comment on your results.

Q. 6 (a). Define correlation. What are possible values and signs of a correlation coefficient? Name two variables from daily life that are known to be positively correlated with each other. Also name any two variables from daily life that are negatively correlated with each other.

Q. 6 (b). The following are the number of inquiries which a real estate agency received in eight weeks about houses for rent (X) and houses for sale (Y). If X = 60 72 47 38 17 45 33 57 and corresponding Y = 82, 85, 62, 53, 29, 50, 69, 88. Find coefficient of correlation and interpret it.

Q. 7 (a). What is regression? How is it different from correlation? What areprimary objectives of regression analysis?

Q. 7 (b). Find least square regression line of Y on X using the data given in Q. 6 (b). How would you interpret intercept and slope of this estimated regression line.

Q. 8 (a). Define Sampling, Population and Sample.Briefly describe any two non-probability sampling techniques.

Q. 8. (b). Take all possible samples of size 4 with replacement from a population consisting of two numbers, 2 and 4. Make a frequency distribution of sample means. Also verify that

(i) $\mu = \mu_{\bar{x}}$ and (ii) $\frac{\sigma^2}{n} = \sigma^2_{\bar{x}}$