



UNIVERSITY OF THE PUNJAB

First Semester 2015

Examination: B.S. 4 Years Programme

Roll No.

PAPER: Statistics-I

TIME ALLOWED: 2 hrs. & 30 mins.

Course Code: STAT-101 /

MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Subjective Type

Q 2:

(10 x 2 = 20)

- (i) Differentiate between Descriptive and Inferential statistics.
- (ii) Define tabulation.
- (iii) If $Y = 3 + 5X$, then find \bar{Y} if $\bar{X} = 2$.
- (iv) Write down empirical relationship between Arithmetic mean, Geometric mean and Harmonic mean.
- (v) What is the meaning of Relative Measure of Dispersion?
- (vi) Define Skewness and Kytosis?
- (vii) Differentiate between simple and composite index nos.?
- (viii) Define coefficient of determination?
- (ix) Write down any four properties of coefficient of correlation?
- (x) What is the meaning of Seasonal variation in time series?

Q 3:

- (a) Given two sets, each of n positive values, $x_{11}, x_{12}, \dots, x_{1n}$ and $x_{21}, x_{22}, \dots, x_{2n}$, Prove that the Geometric mean of the ratios of the corresponding values in the two sets is equal to the ratio of the Geometric means of the two sets. (03)
- (b) The following table shows the distribution of the maximum loads in short tons supported by a certain cables produced by a company.

Max. Loads (short tons)	9.8 – 10.2	10.3 – 10.7	10.8 – 11.2	11.3 – 11.7	11.8 – 12.2	12.3 – 12.7
No. of Cables	7	12	27	14	6	4

Determine the mean and mean deviation about mean? (07)

Q 4: (a)

Show that Fisher's Price Index no. satisfy the Time Reversal and Factor Reversal tests. (05)

(b)

Given;

Commodity	Quantity (units)		Value	
	2001	2006	2001	2006
A	100	150	600	1200
B	80	100	400	700
C	60	72	180	432
D	30	33	300	297

Compute the Fisher's quantity index number for 2006.

Q 5: (a)

Derive Spearman's coefficient of Rank correlation; (07)

(b)

The following table shows the number of bags (hundreds) of fertilizers sold by a certain dealer.

Years	Quarters			
	I	II	III	IV
2000	102	71	47	98
2001	125	106	73	231
2002	281	229	209	488
2003	484	447	457	966

If the seasonal indices computed by using the Ratio to Trend Method are 78.45, 112.65, 91.40 and 117.50, then Deseasonalized the values of years 2001 and 2003. (03)



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PAPER: Statistics-I

TIME ALLOWED: 30 mins.

Course Code: STAT-101 /

MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Objective Type

Q 1: Some possible answers are given for the following questions. Encircle the correct answer. (10)

- (i) A representative subset of Population is called as;
(a) Parameter (b) Statistic (c) Sample (d) None of these.
- (ii) The number of classes in a frequency distribution generally should be;
(a) Less than five (b) More than twenty
(c) Between five and twenty (d) All of these
- (iii) In case of an open-end classes;
(a) A median cannot be computed (b) The A.M & Median will always be equal
(c) A mean cannot be computed (d) The distribution is always positively skewed
- (iv) The sum of squared deviations of observations x_i from their arithmetic mean \bar{x} is always;
(a) Zero (b) Positive (c) Minimum (d) Maximum
- (v) The extent to which the observations vary about their average is called
(a) Dispersion (b) Central tendency
(c) Scatterness (d) Both "a" & "c" but not "b"
- (vi) If $\beta_2 > 3$, then the distribution is;
(a) Leptokurtic (b) Mesokurtic (c) Platykurtic (d) All of these
- (vii) The Geometric mean of Laspeyre's Price index no. and Paasche's Price index no. is;
(a) Value Index (b) Marshall Edgeworth Price Index no.
(c) Fisher's "Ideal" Price Index no. (d) None of these
- (viii) Dependent variable is called as;
(a) Regressand (b) Predictand (c) Random variable (d) All of these
- (ix) The correlation coefficient always lies between;
(a) 0 & 1 (b) -1 & 0 (c) -1 & 1 (d) All of these
- (x) The process of removing the seasonal component from a time series is called as;
(a) Detrending (b) Deseasonalization
(c) Cyclical variation (d) Accidental variation

UNIVERSITY OF THE PUNJAB

Roll No.



Second Semester 2015
Examination: B.S. 4 Years Programme

PAPER: Statistics-II
Course Code: STAT-103,

TIME ALLOWED: 30 mins.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

OBJECTIVE

Q.1. Chose the correct option.

(1x10)

- i) Which of the following values cannot be the probability of an event.
(a) 0.8 (b) 0.0 (c) 1.75 (d) 0.36
- ii) In a group of 400 families, 300 own houses. If one family is randomly selected from this group the probability that this family owns a house is
(a) 0.75 (b) 0.25 (c) 0.80 (d) 0.40
- iii) If X and Y are mutually exclusive events from a set of events, then if X occurs
(a) Y must also occur
(b) Y cannot occur
(c) X & Y independent
(d) None
- iv) Given $P(A) = 0.40$, $P(A \cap B) = 0.15$, $P(B) = 0.50$, $P(A/B)$ is
(a) 0.60 (b) 0.30 (c) 0.80 (d) 1.26
- v) If X and Y are two random variables then $E(X+Y)$ is
(a) $E(X) + Y$ (b) $E(X) E(Y)$ (c) $E(X) + E(Y)$ (d) $E(X) - E(Y)$
- vi) Let random variable X & Y are independent then $\text{Var}(X-Y)$ is equal to
(a) $\text{Var}(X) + \text{var}(Y)$
(b) $\text{var}(X) - \text{var}(Y)$
(c) $\text{var}(X)$
(d) $\text{var}(Y)$
- vii) For Poisson distribution
(a) $\mu > \sigma^2$ (b) $\mu \leq \sigma^2$ (c) $\mu = \sigma^2$ (d) None
- viii) The binomial distribution is approximated by Poisson distribution when
(a) n is small, p is large
(b) n is large, p is small
(c) n is small
(d) p large
- ix) In normal distribution, the mean deviation is
(a) 2.45σ (b) 0.8σ (c) 0.67σ (d) 0.64σ
- x) In normal distribution the middle area of $(\mu + 2\sigma)$ is
(a) 0.6827 (b) 0.7979 (c) 0.9545 (d) 0.9973



UNIVERSITY OF THE PUNJAB

Second Semester 2015
Examination: B.S. 4 Years Programme

Roll No.

PAPER: Statistics-II
Course Code: STAT-103,

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE

Q.2. Briefly answer the following questions (2x10)

- i) Write the properties of random experiment.
- ii) Define the marginal probability.
- iii) Define dependent and independent events with examples.
- iv) Define the terms: (i) event (ii) sure event.
- v) What are its three properties of random experiment?
- vi) Write the properties of probability density function.
- vii) Write the properties of hyper geometric experiment.
- viii) Define the normal distribution.
- ix) Write any four properties of normal distribution.
- x) Let a random variable Z follow the standard normal distribution then find $P(0.6 \leq z \leq 1.67)$ and also $P(-1.67 \leq z \leq -0.6)$.

Q.3.a) Prove the addition law of Probability for any two events A & B. (10)

- b) The letters of the word 'TRIANGLE' are scrambled and letters are rearranged. Find the probability that a word will (i) begin with T (ii) begin with t or E (iii) begin with T and end with E (iv) T and E are next to each other.

Q.4.a) A random variable 'X' is of continuous type with p.d.f. (10)

$$f(x) = 2x \quad 0 < x < 1$$
$$f(x) = 0 \quad \text{otherwise}$$

Find (i) $p(x \leq 1/2)$ (ii) $p(x > 1/4)$ (iii) $p(x = 1/2)$ (iv) $p(1/4 \leq x < 1/2)$

- b) A man tosses two fair dice. What is the conditional probability that the sum of two dice will be 7, given that (i) the sum is odd (ii) the sum is greater than 6 (iii) the two dice has the same outcomes.

Q.5. A lawyer commutes daily from his sub urban home to his mid-town office. On average the trip one way takes 24 minutes with a standard deviation of 3.8 minutes. Assume the distribution of the trip times to be normally distributed. (10)

- a. What is the probability that a trip will take at least $\frac{1}{2}$ hour?
- b. If the office opens at 9:00 am and he leaves his house at 8:45 am daily. What percentage of the time is he late for work?
- c. If he leaves the house at 8:35 am and coffee is served at the office from 8:50 am until 9:00 am, what is the probability that he misses the coffee?



UNIVERSITY OF THE PUNJAB

Roll No.

Second Semester 2015
Examination: B.S. 4 Years Programme

PAPER: Business Statistics
Course Code: STAT-121 /

TIME ALLOWED: 30 mins.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Note: Attempt All questions. Use of Scientific Calculators and Statistical tables is allowed but exchange of any thing i.e calculators etc. is not allowed.

Objective Type		Marks
Q1	Tick on the correct option	10
i)	The first hand information is known as; (a) Secondary data (b) Primary data (c) Grouped data (d) None of these	
(ii)	The process of arranging data into rows and columns is called; (a) Ogive (b) Qualitative data (c) Classification (d) Tabulation	
(iii)	If $X = 70 + 4u, \sum u = 20, n = 10$, then the value of arithmetic mean is; (a) 80 (b) 78 (c) 88 (d) 84	
(iv)	The sum of absolute deviations is minimum, if these deviations are taken from; (a) A.M. (b) G.M. (c) Mode (d) Median	
(v)	The two regression coefficients have always; (a) Same signs (b) Opposite signs (c) No signs (d) Not definite	
(vi)	The coefficient of correlation (r) is independent of; (a) Origin only (b) Scale of measurement only (c) Both origin and scale of measurement (d) None of these	
(vii)	The variance of constant is equal to; (a) Unity (b) Zero (c) Constant (d) None of these	
(viii)	If $(AB) < \frac{(A)(B)}{N}$, then the association is; (a) Perfect (b) Zero (c) Positive (d) Negative	
(ix)	A Discrete Probability Distribution may be represented by; (a) A graph (b) A table (c) A mathematical equation (d) All of these	
(x)	Base year weighted index numbers are; (a) Paasche's (b) Fisher's (c) Marshall's (d) Laspeyre's	



UNIVERSITY OF THE PUNJAB

Second Semester 2015
Examination: B.S. 4 Years Programme

Roll No.

PAPER: Business Statistics

TIME ALLOWED: 2 hrs. & 30 mins.

Course Code: STAT-121 / 10133

MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Short Questions

Q2	<ul style="list-style-type: none"> (i) What is descriptive statistics? (ii) Differentiate between quantitative and qualitative variables? (iii) If mode is less than mean then what type of skewness exists? (iv) Differentiate between measure of location and measure of dispersion. (v) Given that $b_{yx} = 0.75$ and $r = 0.70$, find b_{xy}? (vi) Define Regression and Correlation? (vii) Define composite index numbers? (viii) What is meant by probability distribution? (ix) Write down properties of coefficient of correlation? (x) What is fisher's ideal index number? 	10×2
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Long Questions

Q3	Find <i>coefficient of variation</i> from the following data <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Groups</th> <th style="padding: 5px;">30 – 39</th> <th style="padding: 5px;">40 – 49</th> <th style="padding: 5px;">50 – 59</th> <th style="padding: 5px;">60 – 69</th> <th style="padding: 5px;">70 – 79</th> <th style="padding: 5px;">80 – 89</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px; text-align: center;">F</td> <td style="padding: 5px; text-align: center;">10</td> <td style="padding: 5px; text-align: center;">14</td> <td style="padding: 5px; text-align: center;">26</td> <td style="padding: 5px; text-align: center;">20</td> <td style="padding: 5px; text-align: center;">18</td> <td style="padding: 5px; text-align: center;">12</td> </tr> </tbody> </table>	Groups	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79	80 – 89	F	10	14	26	20	18	12	10					
Groups	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79	80 – 89															
F	10	14	26	20	18	12															
Q4	The mean value of X is 54 and mean value of Y is 28. The regression coefficient of X on Y is -0.2 and the regression coefficient of Y on X is -1.5 . Find <ul style="list-style-type: none"> (i) The value of Y, when $X = 60$ (ii) The value of coefficient of correlation "r" 	10																			
Q5	Test the hypothesis that the performance in Business independent of performance in Commerce at 5% level of significance. <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="padding: 5px;">Commerce</th> <th colspan="3" style="padding: 5px;">Business</th> </tr> <tr> <th style="padding: 5px;">High Marks</th> <th style="padding: 5px;">Median Marks</th> <th style="padding: 5px;">Low Marks</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">High Marks</td> <td style="padding: 5px; text-align: center;">56</td> <td style="padding: 5px; text-align: center;">71</td> <td style="padding: 5px; text-align: center;">23</td> </tr> <tr> <td style="padding: 5px;">Median Marks</td> <td style="padding: 5px; text-align: center;">47</td> <td style="padding: 5px; text-align: center;">163</td> <td style="padding: 5px; text-align: center;">40</td> </tr> <tr> <td style="padding: 5px;">Low Marks</td> <td style="padding: 5px; text-align: center;">17</td> <td style="padding: 5px; text-align: center;">46</td> <td style="padding: 5px; text-align: center;">37</td> </tr> </tbody> </table>	Commerce	Business			High Marks	Median Marks	Low Marks	High Marks	56	71	23	Median Marks	47	163	40	Low Marks	17	46	37	10
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UNIVERSITY OF THE PUNJAB

Roll No.

Third Semester 2015
Examination: B.S. 4 Years Programme

PAPER: Statistics-III
Course Code: STAT-201/

TIME ALLOWED: 30 mins.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

OBJECTIVE TYPE

Note: Attempt all questions. Cutting and overwriting is not allowed:

- Q.1. Some possible answers are given for each of the followings. Encircle or tick the correct answer.
- (i) Suppose for a certain population $\sigma_{\bar{x}}$ is calculated to be 20, when sample of size 25 are taken. What must be the value of σ for an infinite population?
(a) 1000 (b) 100 (c) 500 (d) 4
- (ii) A border patrol check post that stops every 10th van for checking is using.
(a) Simple random sampling (b) Stratified random sampling (c) Systematic sampling (d) Cluster sampling
- (iii) If sampling distribution of \bar{x} is normal. We would expect 98% of the sample means to lie within the limits.
(a) $\mu_{\bar{x}} \pm 2\sigma_{\bar{x}}$ (b) $\mu_{\bar{x}} \pm 1.96\sigma_{\bar{x}}$ (c) $\mu_{\bar{x}} \pm 2.58\sigma_{\bar{x}}$ (d) $\mu_{\bar{x}} \pm 2.33\sigma_{\bar{x}}$
- (iv) If population standard deviation (σ) is unknown and sample size is small confidence interval for population mean is based on
(a) χ^2 - distribution (b) Normal distribution (c) F - distribution (d) t - distribution
- (v) If $E(\hat{\theta}) < \theta$ then $\hat{\theta}$ is
(a) Unbiased (b) Biased (c) Consistent (d) Negatively biased
- (vi) When $S^2 = \frac{\Sigma(x-\bar{x})^2}{n}$ then $E(S^2)$ is
(a) σ^2 (b) $\frac{\sigma^2}{n}$ (c) $\frac{(n-1)}{n}\sigma^2$ (d) $\frac{\sigma^2}{n-1}$
- (vii) If we reject H_0 when it is true is classified as
(a) Type-II error (b) Type-I error (c) sampling error (d) Standard error
- (viii) The probability of rejecting H_0 when it is false is
(a) Power of the test (b) Size of the test (c) Level of the test (d) Level of significance
- (ix) To test the hypotheses about the population variance σ^2 for its some specified value, we use
(a) χ^2 - distribution (b) Normal distribution (c) F - distribution (d) t - distribution
- (x) To test the hypotheses about the equality of two population variances, we use
(a) χ^2 - distribution (b) Normal distribution (c) F - distribution (d) t - distribution



UNIVERSITY OF THE PUNJAB

Third Semester 2015
Examination: B.S. 4 Years Programme

Roll No.

PAPER: Statistics-III

TIME ALLOWED: 2 hrs. & 30 mins.

Course Code: STAT-201

MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE TYPE

Q.2. Write short answers to the following questions. (20 Marks) 2 each

- (i) What is the difference between sampling error and standard error?
- (ii) Differentiate between the simple and composite hypotheses?
- (iii) Discuss type-I and type-II error?
- (iv) What is precision?
- (v) Why statistic is a variable and parameter is a constant?
- (vi) Discuss the term non-response?
- (vii) Write down the assumptions of t-distribution.
- (viii) What are the properties of a good point estimator? Discuss any one of them.
- (ix) Define the terms estimation, Estimator and Estimate.
- (x) What is Bias? How it occurs in sample survey.

Q.3. The random variable X has the following probability distribution: (5)

X	4	5	6	7
P(X)	0.25	0.35	0.30	0.10

Find the probability that the mean of 25 items will be less than 5.5.

Q.4. If x_1, x_2, \dots, x_n , be a random sample of size 'n' taken from a Normal population (μ, σ^2) find Maximum Likelihood Estimator of σ^2 when μ is known. (5)

Q.5. (a) A random sample of 500 members of the labor on a certain region showed that 43 were unemployed. Construct 90% Confidence Interval for proportion of unemployed on the region.

(b) If X is normally distributed and given the sample values as $\bar{X} = 42, S = 10, n = 25$. Find 98% confidence Interval for σ^2 . (2.5)

Q.6. Two random samples taken independently from normal population with identical variances yield the results as

$$n_1 = 12, \bar{x}_1 = 10, s_1^2 = 1200, n_2 = 20, \bar{x}_2 = 18, s_2^2 = 1000,$$

Test the hypotheses that the difference between population; means is 10 against alternative that it is less than 10 at 5% level of significance. (5)

Q.7. Following calculations have been obtained from two samples selected from normally distribution populations.

$$n_1 = 11, n_2 = 6, \bar{x}_1 = 50.3, \bar{x}_2 = 37.8, S_1^2 = 46.74, S_2^2 = 51.47,$$

Test whether the two populations have the same variances at 5% level of significance. (5)



UNIVERSITY OF THE PUNJAB

Third Semester 2015
Examination: B.S. 4 Years Programme

Roll No.

PAPER: Elementary Statistics
Course Code: STAT-211/

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE

(SECTION 1)

Q.2: Write short answers to the following questions. (20) Marks

- (i) Define Statistics.
- (ii) Differentiate between sampling and non-sampling error.
- (iii) Differentiate between primary and secondary data .
- (iv) Define independent and dependent variable.
- (v) Define Correlation and Regression.
- (vi) Define Type-I error and Type-II error.
- (vii) Write down two properties of correlation coefficient.
- (viii) What is meant by Skewness and how it is measured.
- (ix) Describe association and chi-square test .
- (x) Write down any two properties of Normal Distribution.

SECTION 2

Solve the following questions:

(30) Marks

Q.3: A Managing director of a large firm would like to use employee's personal characteristics to measure relationship between job performance and initiative. He took a sample of 10 employees and got the following data:

Job Performance(X)	45	65	73	63	83	45	60	73	74	69
Initiative (Y)	47	49	33	37	36	42	37	43	33	43

Compute correlation coefficient between job performance and initiative. (10) Marks

Q. 4: The following frequency distribution gives the ages of 100 college Students:

Ages	14-15	16-17	18-19	20-21	22-23	24-25	Total
Number of students	6	16	20	31	15	12	100

Calculate Arithmetic Mean, Median and Mode.

(10) Marks

Q. 5: Assume that the systolic Blood Pressure of men is normally distributed with mean BP 120 mm of Hg and standard deviation 10 mm of Hg. Determine the proportion of men whose BP is above 140 mm of Hg. (5) Marks

Q.6: A restaurant management tells to its customers that the average cost of a dinner is Rs.500 with standard deviation Rs.75. A group of concerned customers think that the average cost is higher. In order to test the restaurant claims, 100 customers purchase a dinner at the store and mean price is Rs.520. Perform a hypothesis test at 1% level of significance. (5) Marks



UNIVERSITY OF THE PUNJAB

Roll No.

Third Semester 2015

Examination: B.S. 4 Years Programme

PAPER: Elementary Statistics

TIME ALLOWED: 30 mins.

Course Code: STAT-211/

MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

OBJECTIVE

Q.1: MCQ'S (Multiple choice questions) One mark for each correct option. (10)Marks

- (i) Weight of students in a college is an example of:
- (a) discrete variable (b) qualitative variable
(c) Attribute (d) continuous variable
- (ii) The mode of the following data 8,5,8,7,3,5,4,4,6,9,4,2,4,3,4 is :
- (a) 8 (b) 4
(c) 7 (d) 3
- (iii) A numerical quantity calculated from sample observations is called:
- (a) Statistic (b) parameter
(c) Constant (d) None of above
- (iv) Record of students in Registers of office is an example of:
- (a) primary data (b) secondary data
(c) Condensed data (d) grouped data
- (v) Sampling error can be reduced by:
- (a) Increasing sample size (b) decreasing sample size
(c) Fixing the size (d) none
- (vi) For a symmetrical distribution:
- (a) mean, mode, median are equal
(b) mean, mode, median not equal
(c) mean is greater than mode
(d) mean is less than mode
- (vii) Enrolment of students in Punjab University is best shown by:
- (a) Simple bar chart (b) histogram
(c) Pie chart (d) frequency polygon
- (viii) Range of 5, 0, 2, 9, 12, 16, 14 is:
- (a) 16 (b) 9 (c) 14 (d) 12
- (ix) For a 2×3 contingency table the degree of freedom is:
- (a) 2 (b) 6
(c) 4 (d) 3
- (x) A deserving candidate is failed in an interview is an example of:
- (a) Correct decision (b) type -II error
(c) Type -I error (d) level of significance

UNIVERSITY OF THE PUNJAB

Roll No.



Fourth Semester 2015
Examination: B.S. 4 Years Programme

PAPER: Probability and Statistics
Course Code: STAT-221 /

TIME ALLOWED: 30 mins.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Part-1 (OBJECTIVE)

Note: Attempt ALL questions. Cutting and overwriting is not allowed.
All questions carry equal marks.

Q.1.	Some possible answers are given for each of the followings, encircle (or tick) the correct answer.	(10x1)
i)	A random variable contain	
	a) Single value. b) Large number of values.	
	c) Random values according to the definition of variable.	
	d) Fixed values according to the definition of variable.	
ii)	Graph of uniform resembles with	
	a) Normal Distribution. b) Histogram.	
	c) Pie chart. d) Bar.(Diagram)	
iii)	Distribution functions of discrete and continuous random variables move	
	a) in same direction. b) In opposite direction.	
	c) only upwords. d) not any of a, b, or c	
iv)	Poisson distribution is supposed to belong	
	a) Most occurring events. b) Less occurring events.	
	c) Dependent events. d) Equally likely events.	
v)	Probability function is generally meant as	
	a) Discrete probabilities. b) Continuous probabilities.	
	c) Both of a and b d) not any of a or b	
vi)	The relation between mean and variance of the Binomial distribution is	
	a) mean= variance b) mean > variance	
	c) mean < variance d) not any of a, b, or c	
vii)	The random variable X have the values from 0,1,2,3,...∞ for	
	a) Normal distribution. b) Binomial distribution.	
	c) Exponential distribution. d) Poisson distribution.	
viii)	The variance of Bernoulli distribution is	
	a) npq b) pq	
	c) np d) nq	
ix)	For a Standard Normal probability distribution, the mean and standard deviation are	
	a) 1 and 1 respectively b) 1 and 0 respectively	
	c) 0 and -1 respectively d) 0 and 1 respectively	
x)	In a Normal distribution with mean μ and standard deviation Ω , mean deviation is equal to	
	a) 1Ω b) 0.8Ω	
	c) 0.6745Ω d) 2Ω	



UNIVERSITY OF THE PUNJAB

Fourth Semester 2015
Examination: B.S. 4 Years Programme

Roll No.

PAPER: Probability and Statistics
Course Code: STAT-221 / 11-22407

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Part-2 (SUBJECTIVE)

Q.4.	Write short answers to each of the followings.	(2 x10)
i)	Define Event, Trial and outcome.	
ii)	Differentiate between Joint and Marginal probabilities.	
iii)	Write one example of, each of the, Mutually exclusive event, Dependent event and Independent event.	
iv)	Write three axioms of probability.	
v)	Write the properties of a Distribution Function for a continuous variable.	
vi)	Write the properties of a Binomial Probability Experiment.	
vii)	Differentiate between Normal Probability Distribution and Standard Normal Probability Distribution.	
viii)	Let a random variable Z follow the Standard Normal Distribution, find $P(0.6 \leq Z \leq 1.67)$ and also $P(-1.67 \leq Z \leq -0.6)$.	
ix)	Let X follow the Uniform Distribution $f(x) = 1/(b-a)$, $a \leq x \leq b$ then prove that mean of X be equal to $(a+b)/2$	
x)	A Binomial Distribution tends to become Normal Distribution; discuss.	
Q.5.	An urn contains 10 white and 3 black balls. Another urn (second urn) contains 3 white and 5 black balls. Two balls are transferred from first urn and placed in the second and then one ball is taken from the second urn. What is the probability that it is a white ball?	(06)
Q.6.	Three cooks A, B and C, bake a special kind of cake, and with respective probabilities 0.02, 0.03 and 0.05 it fails to rise. In the restaurant where they work, A bakes 50 percent of these cakes, B bakes 30 percent of these cakes and C bakes 20 percent of these cakes. What proportion of "failures" is caused by A?	(06)
Q.7.	A continuous random variable X has distribution function F(x) as follows $F(x) = 0$, for $x < 0$. $F(x) = 2x^2/5$, for $0 < x \leq 1$. $F(x) = \frac{3}{5} + \frac{2}{5} \left\{ 3x - \frac{x^2}{2} \right\}$ for $1 < x \leq 2$. $F(x) = 1$ for $x > 2$. Find $P(X < 1.5)$.	(06)
Q.8.	A and B play a game in which A's probability of winning is $2/3$. In a series of 7 games. What is the probability that A will win (i) 6 or more games (ii) from 3 to 4 games	(06)
Q.9.	A random sample of 1,000 iron rods are tested for their length and it is found that the mean and standard deviation are 14.40 meters and 2.5 meters respectively. If the lengths of rods are normally distributed, then find (i) how many rods will be between 12 and 16 meters? What are the chances that any rod selected at random will be 15 meters length or above?	(06)



UNIVERSITY OF THE PUNJAB

Roll No.

Fourth Semester 2015
Examination: B.S. 4 Years Programme

PAPER: Statistics-IV

TIME ALLOWED: 30 mins.

Course Code: STAT-203 / ~~STAT-2031~~

MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Q.1 Encircle the correct answer in the following.

(10)

1. The degree of freedom of randomized complete block design with "a" treatments "b" blocks for mean square error is:
(a) $b - a$ (b) $a(b-1)$ (c) $(a-1)(b-1)$ (d) $b(a-1)$
2. The analysis of variance is used to test:
(a) Equality of more than one populations
(b) Equality of more than one sample means
(c) Equality of more than one population variances
(d) None of these
3. Extraneous source of variation in experimental design is controlled by:
(a) Randomization (b) Replication (c) Local Control (d) All of these
4. The correlation coefficient will be zero only if:
(a) The Y intercept of the regression line is equal to zero
(b) The slope of the regression line is equal to zero
(c) The line passes through origin
(d) None of these
5. The estimated coefficient of determination is equal to
(a) The square of the correlation coefficient
(b) Variation in Y explained by regression
(c) 1 minus the proportion of variation in Y explained by regression
(d) The square of slope of the estimated regression line
6. The coefficient of determination for Multiple Regression is 0.81. Thus, the multiple correlation coefficient is:
(a) -0.9 (b) +0.9 (c) 0.6561 (d) Both (a) & (b)

P.T.O.

7. A Chi-square value can never be negative because:

- (a) Square of the differences is used
- (b) The absolute value of the differences is used
- (c) None of these
- (d) Both (a) & (b)

8. Assume that a chi-square test is to be performed on a contingency table with four rows and four columns. How many degrees of freedom should be used?

- (a) 16
- (b) 8
- (c) 9
- (d) 6

9. If we have large enough sample sizes, we can discard which of the assumptions associated with ANOVA?

- (a) The samples are drawn from a normal population
- (b) Each population has the same variance
- (c) Both (a) & (b)
- (d) None of these

10. If we want to test whether the proportion of more than two populations are equal, we use:

- (a) Analysis of variance
- (b) t-test
- (c) F-test
- (d) Chi-square test



UNIVERSITY OF THE PUNJAB

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TIME ALLOWED: 2 hrs. & 30 mins.

Course Code: STAT-203 /

MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Q.II Attempt following question. (20)

- i. Write down the properties of chi-square distribution.
- ii. How is the chi-square independence test similar to goodness of fit? How is it different?
- iii. Write the assumptions of multiple linear regression model.
- iv. Differentiate between multiple and partial correlations.
- v. Define multiple coefficient of determination? What does it measure?
- vi. What are the assumptions under lying analysis of variance?
- vii. Discuss why it is not a good statistical procedure to perform several t-test pairs of means when several means are to be compared suggest the alternate procedure
- viii. What are Basic Experimental designs?
- ix. What are the basic principles of an experimental design.
- x. Define Regression and correlation.

Q.III Following is the record of the no. of male and female births in families having children. Test whether the data are consistent with hypothesis that binomial law holds with the chance of male birth as 0.57: (06)

No. of male birth	0	1	2	3	More than 3
No. of families	30	180	290	200	60

Q.IV From a sample of 200 pairs of observations the following calculations are made which follow $Y = \alpha + \beta X + \epsilon$ (06)

$$\Sigma X = 11.34, \Sigma Y = 20.72, \Sigma X^2 = 12.16, \Sigma Y^2 = 84.96, \Sigma XY = 22.13$$

Find 95% confidence limits for mean value of Y when $X_i = 0.10$

Q.V Following are the treatment and block totals and other calculations in a RCB design. (06)

Treatments totals: 286, 293, 240, 404, 322

Block totals: 361, 428, 407, 349

Total sum of squares uncorrected is 124069. Perform analysis and draw conclusions.

Q. VI The following calculations were obtained from 10 sets of observations which follow $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \epsilon$ (06)

$$\Sigma Y = 20, \Sigma X_1 = 30, \Sigma X_2 = 40, \Sigma Y^2 = 88.2, \Sigma X_1^2 = 92,$$

$$\Sigma X_2^2 = 163, \Sigma X_1 Y = 59, \Sigma X_2 Y = 88, \Sigma X_1 X_2 = 119.$$

Find co-efficient of determination of the above model.

Q.VII Following are the calculations in a L.S. Design. Row SS = 46.67, Column SS = 14.02, Treatment SS = 196.61, Total SS = 285.34, Treatment means are 6.84, 6.46, 13.12, 7.96, 4.92. Perform analysis and apply lsd test. (06)