(b) If $r_{12} = 0.6$, $r_{13} = 0.7$ and $r_{23} = 0.8$, then obtain the values of $R^2_{3.12}$ and $r_{23.1}$ and interpret the result.

(c) Prove that $1-R_{1.23}{}^2 = (1 - r_{12}{}^2)(1 - r_{13.2}{}^2)$. (6,3,3)

11/12/18 (Evening)

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 915 **I**

Unique Paper Code : 32375101

Name of the Paper : Statistical Methods

Name of the Course : **Statistics : G.E. for Honours**

Semester : I

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **six** questions in all. Question No. **1** is compulsory.
3. Attempt **five** more questions, selecting at least **two** questions from each of Section **A** and **B.**
4. Use of simple calculator is allowed.

1. (a) Attempt the following :

   (i) Type of living accommodation: House, Apartment, Trailer, Other is measured in _____ scale of measurement.

   (ii) When the two lines of regression coincide, then the value of r is _____ .

(iii) In case of n attributes, the total number of ultimate class frequencies is _____ .

(iv) If either (AB) = 0 or (αβ) = 0 then Q = _____ .

(v) Median = Mode + ___?___ (Mean – Mode).

(b) Let U = (X – 5)/10 and V = (Y – 4)/5. The regression coefficients are b_{UV} = 1.5 and b_{VU} = 0.8. Then, the values of b_{YX} = _____ and b_{XY} = _____ .

(c) Compute variance of first *n* natural numbers.

(d) The mean and median of 100 items are 50 and 52 respectively. The value of the largest items is 100. It was later found that it is actually 110. Therefore, the true mean and median are _____ and _____ respectively.

(e) Examine the consistency of the following data:

N = 1,000; (A) = 600, (B) = 500, (AB) = 50, the symbols having their usual meaning.

(f) Karl Pearson's co-efficient of skewness of a distribution is 0.32, mean is 29.6 and standard deviation of the distribution is 6.5, what will be the mode?

(1×5,2×5)

(b) What do you understand by independence of attributes? Find if A and B are independent, positively associated or negatively associated for the following data

(i) (A) = 490, (AB) = 294, (α) = 570 and (αB) = 380

(ii) (AB) = 256, (αB) = 768, (Aβ) = 48 and (αβ) = 144

(6,6)

7. (a) State the principle of least squares and use it to fit a curve of the form $Y = aX^b$.

(b) A sample of 12 fathers and their eldest sons gave the following data about their height in inches :

Father	65	63	67	64	60	62	70	66	68	67	69	71
Son	68	66	60	65	69	66	68	65	71	67	68	70

Calculate spearman's rank correlation coefficient.

(6,6)

8. (a) Given the following ultimate class frequencies, find the frequencies of positive class.

(ABC) = 149 (ABγ) = 738 (AβC) = 225 (Aβγ) = 1,196
(αBC) = 204 (αBγ) = 1,762 (αβC) = 171
and (αβγ) = 21,842

SECTION A

2 (a) First of the two samples has 100 items with mean 15 and variance 9. If the whole group has 250 items with mean 15.6 and variance 13.44, then find the standard deviation of the second group.

(b) The following data gives the age distribution of a group of workers in a factory.

Ages	20- 25	25-30	30-35	35-40	40-45	45- 50	50-55	55-60
Number of workers	35	45	70	105	90	74	51	30

Compute third quartile, seventh decile and fifty-seventh percentile. (6,6)

(a) For a distribution mean is 10, variance is 16, γ_1 is 1 and β_2 is 4. Find first four moments about origin.

(b) Show that for a discrete distribution, $\beta_2 > 1$. (8,4)

4. (a) Compute the average speed of a car running at a rate 15 Km per hour during the first 30 km; at 20 km per hour during the second 30 km and at 25 km per hour during the third 30 km.

(b) Pearson's coefficient of skewness for a distribution is 0.4, its coefficient of variation is 30% and its mode is 88. Find mean and median. (6,6)

5. (a) Mean and the variance of 10 observations are 17 and 33 respectively. Later on it was found that one of the observations, 26 is inaccurate and is removed. What is the mean and standard deviation of the remaining?

(b) Explain the terms skewness and kurtosis. Also explain the methods of measuring skewness and kurtosis of a frequency distribution. (6,6)

SECTION B

6. (a) Given the following data :

$$n = 30, \sum_{i=1}^{30} x_i = 150, \sum_{i=1}^{30} y_i = 90, \sum_{i=1}^{30} {x_i}^2 = 1200,$$

$$\sum_{i=1}^{30} {y_i}^2 = 450, \quad \sum_{i=1}^{30} x_i y_i = 630.$$

(i) Obtain the correlation coefficient between X and Y.

(ii) Obtain both the lines of regression.

(iii) Estimate X when Y = 10.