MODERN COLLEGE

Wadi, Nagpur.

NOTES
Mathematics

Prof. Lalit Ukey

Unit 1 (2 Marks Question)

Q. 1) Define Statistics.

Ans : It has two different meanings :

a) In the plural sense, the word implies a set of numerical figures, usually obtained by measurement or counting. There is also collection known as data.
b) In the singular sense, 'Statistics' refers to the subject of scientific activity which deals with the theories an methods of collection, analysis an interpretation of such data.

Q. 2) What is primary Data?

Ans : Primary data are those which are collected for a specific purpose directly from the field of enquiry and hence are original in nature, such data are published by authorities who themselves are responsible for their collection.

Q. 3) What is secondary Data?

Ans : Secondary data are such numerical information which have previously been collected by some agency for one purpose and are merely compiled from that source for use in a different connection.

Q. 4) What is population?

Ans : The totality of statistical information on a particular character, from all members covered by a enquiry is called population or universe. E.g. population of income, population of registered factories in west Bengal.

Q. 5) What is Sample?

Ans : The sample is a selected part of the population and is used to throw light on the population characteristics.

Q. 6) What is Census?

Ans : In Census, information is collected from each and every member of the population, whereas sample survey ref to the study of population on the basis of information obtained from a sample. Census of population in India and other country of the world is an example of complete enumeration.

Q. 7) What is classification?

Ans : Classification is the process of arranging the collection statistical information user different categories or classes according to some common characteristic possessed by the individual members. To make the data really useful, they must be classified.

Q. 8) What is tabulation?

Ans : Tabulation may be defined as the logical and systematic organisation of statistical data in rows and columns, designed to simplify the presentation and facilitate comparisons.

Q. 9) Define Permutation?

Ans : A certain number of objects are given, each of the different arrangement that can be made out of them by taking some or all of them at a time is known as permutation.

Q.10) Define Combination?

Ans : Selection that can be formed out of a given set of objects by taking some or all of them at a time without considering their arrangement is known as combination.

Q.11) What is the fundamental rule of counting?

Ans : If there are m ways of doing one task and for each of these, there are n ways of doing another task, then the total number of ways the two tasks can be done is m x n ways.

Q.12) What is Venn Diagram?

Ans : It is often found convenient to illustrate the relationship between sets by using pictorial representation. Such a diagram is known as Venn Diagram.

Q.13) What is subset?

Ans : If every element of a set A is also an element of a set B, then A is said to be a subset of B, and we write

A B or B A

This is read "A is contained in B" or "B contains A".

Q.14) What is empty set?

Ans : A set that contains no element at all is called the null set (Also known as empty set or void set) it is denoted by the symbol .

Q.15) What do you mean by set?

Ans : Any well-defined collection of distinct objects is called a set. The objects may be anything -numbers, people, books, letters of the alphabet, rivers, lines and points geometry, outcomes of a random experiment.

(3 Marks Question)

Q. 1) What is variable?

Ans : A variable is a quantitative character of an individual or item and its values can always be measured. A variable whose values depend on chance and cannot be predicted is called a random variable or variant.

Q.2) What is attribute?

Ans : A Attribute is a qualitative character is called attribute. An attribute cannot be measured, but can only be classified under different heads or 'Categories'.

Q.3) What is discrete variable and continues variable?

Ans : Continuous variable : A variable is said to be continuous, when it can take any value within a specified interval. For example height of an individual may have any value between, say, 58 inches and 72 inches.

Discrete Variable : A discrete variable, however can take only some isolated values. The number of children per family, the number of workers in a factory, the price of cinema ticket sold during a week etc are example of discrete variable.

Q.4) Write the importance of classification?

Ans :

Q.5) What is sample survey?

Ans : The sample survey method involving only a small part of the population, has in comparison with the census method, greater flexibility as regards intensity of data collection and the degree of accuracy of the final results, depending on the amount of time and money available for the purpose.

Q.6) What is the use of Venn diagram?

Ans : A Venn diagram is a type of graphic organiser. Graphic organisers are a way of organising complex relationships visually. They allow abstract ideas to be more visible.

Although Venn diagrams are primarily a thinking tool, they can also be used for assessment. However, students must already be familiar with them before they can be used in this way.

When to use

Venn diagrams are used to compare and contrast groups of things.

They are a useful tool for formative assessment because they:

- can be used to generate discussion; and
- provide teachers with information about students' thinking.

Q.7) What is the use of tabulation?

Ans : Tabulation applications may be used for a number of different purposes. The statistical organization may generate tables for dissemination to outside users of the data, and the same organization may also generate tables to be used internally, as a tool for control and analysis of the data themselves. Some other common uses of tabulation applications are:

A) Design table stub group
B) Examine quality of data and Design Edits
C) Test Edits
D) Test Table

Q.8) Name different type of set?

Ans : Different types of sets are below

a) Null Set
b) Singleton Set
c) Finite and infinite Set
d) Equal set
e) Equivalent set
f) Subset
g) Universal set
h) Disjoint Sets

Q.9) Evaluate $^7P_3$, $^7P_4$, $^7P_5$.

$^7P_3$ = (7!)/(7-3)!
= (7x6x5)
= 210

$^7P_4$ = (7!)/(7-4)!
= (7x6x5x4)
= 840

$^7P_5$ = (7!)/(7-5)!
= (7x6x5x4x3)
= 2520

Q.10) Evaluate $^8C_5$, $^7C_3$, $^7C_2$.

$^8C_5$ = n!/r!(n-r)!
=8!/5!(8-5)!
= (8x7x6)/(3x2x1)
= 336/6
=56

$^7C_3$ = (7!)/3!(7-3)!
= (7x6x5)/3!
= 210/6
=35

$^7P_2$ = (7!)/2!(7-2)!
= (7x6)/2!
= 21

Q. 11) Selection of 5 Clerk from 20 application find the number of way of solution.

Give : n = 20 , r = 5;

nPr = n!/(n-r)!

=20!/(20-5)!

=(20x19x18x17x16)

=1860480

Q.12) Write the following in the set form.

i) Prime No. between 10 to 20

ii) All the vowel of English Alphabet.

Ans : i) {2,3,5,7,11,13,17,19}

ii) {a,e,i,o,u}

Q.13) In how many different way can 5 person stand in a line for group photograph.

Ans : 5! = 5x4x3x2x1

=120 Way

Q.14) If A={2,4,6,9,7} B = {3,6,9} find AUB and A-B.

Ans : AUB={2,3,4,6,9,7}

A-B ={2,3,7}

Q.15) Write down the following in set builder form

i) {10,20,30,40,50,}

ii) {a,e,i,o,u}

iii) {1/8,1/10,1/12,1/14,1/16}

Ans :

I) A={10,20,30,40,50}

Common property : All element are multiples of 10

A={x : x is element are multiples of 10, 1<=n <=5}

ii) A = {a,e,i,o,u}

A = { x : x is a vowel of English Alphabets}

iii) A= {1/8,1/10,1/12,1/14,1/16}

A = {x : x is denominator is even no, 8<=x <=16}

Part C (5 Marks)

Q. 1) Explain data collection in details?

Ans : Basic problem of statistical enquiry is to collect facts and figure. Relating to a particular phenomenal under study whatever the enquiry is in business economics or social science statistical data may be two types, viz ‘primary’ and ‘secondary’. Primary Data are those which are collected for a specific purpose directly from the field of enquiry, and hence are original in nature. such data are published by authorities who themselves are responsible for their collection.

Secondary Data : Secondary data are such numerical information which have previously been collected by some agency for one purpose and are merely compiled from that source for use in a different connection.

Q. 2) Differentiate between Sample and Census?

Ans:-

Sample Method	Census Method
The totality of statistical information On a particular character, from all member covered by an enquiry, is called population or universe. The sample is a selected part of the population and it is use through like on the population catachrestic	In census information collected on each and every person of the population where as sample survey refer to the study of population on basic of information often from a sample census of population in India and other country of word
Sampling is a method of collecting information from a sample that is representative of the entire population.	Census refers to a periodic collection of information about the populace from the entire population.
Sampling is quick.	Census is very time-consuming.

Q. 3) Differentiate between Classification and Tabulation?

Ans:-**Classification:-**

Classification is the process of arranging in the statistical information. Under different categories or classes according to some common characteristics possessed by the individual member to make the data really useful, the must be classified or group into homogeneous category, So that the will go with the like and the which unlike. Classification prepare the ground for enabling comparison and analysis by the instituting a logical and orderly arrangement data.

Tabulation:-

Tabulation may be defined as the logical and systematic organisation of statistics data in row and column, designed to simplify the presentation and facilitate comparison. The advantage of tabulation are.

1)Tabulation enable the significant od data readily understand and use a lasting impression than textual presentation.

2)It facilitate quick comparison of statistical data shown between row and columns.

3)Error can be omission can be readily detected when data are tabulated.

4)Repitation of explanatory terms and phrase can be avoided, and the concise tabular from clearly reveal the characteristics of data.

Q.4) Explain various set Operators?

Ans:-Different types of sets theory are:

1) Null set:- the null set, also called the empty set, is the set that does not contain anything. It is symbolized ∅or { }. There is only one null set. This is because there is logically only one way that a set can contain nothing.

The null set makes it possible to explicitly define the results of operations on certain sets that would otherwise not be explicitly definable. The intersection of two disjoint sets (two sets that contain no elements in common) is the null set.

For example:-

$\{1, 3, 5, 7, 9, ...\} \cap \{2, 4, 6, 8, 10, ...\} = \varnothing$

2) Singleton set:- A set that has one and only one element should be called as Singleton set. Sometimes, it is known as unit set. The cardinality of singleton is one. If A is a singleton, then we can express it as
A = {x : x = A}

Example: Set A = {5} is a singleton set.
3)Finite and Infinite Set:-
A set that has predetermined number of elements or finite number of elements are said to be Finite set. Like {1 ,2, 3, 4, 5, 6} is a finite set whose cardinality is 6, since it has 6 elements. Otherwise, it is called as infinite set. It may be uncountable or countable. The union of some infinite sets are infinite and the power set of any infinite set is infinite.
Examples:
Set of all the days in a week is a finite set.
Set of all integers is infinite set.

4)Union set :- Union of two or else most numbers of sets could be the set of all elements that belongs to every element of all sets. In the union set of two sets, every element is written only once even if they belong to both the sets. This is denoted as '∪'. If we have sets A and B, then the union of these two is A U B and called as A union B.
Mathematically, we can denote it as A U B = {x : x ∈∈ A or x∈∈ B}
The union of two sets is always commutative i.e.A U B = B U A.
Example: A = {1,2,3}
B = {1,4,5}
A ∪ B = {1,2,3,4,5}
It should be the set of elements that are common in both the sets. Intersection is similar to grouping up the common elements. The symbol should be denoted as '∩'. If A and B are two sets, then the intersection is denoted as A ∩∩ B and called as A intersection B and mathematically, we can write it as A∩B={x:x∈A∧x∈B}A∩B={x:x∈A∧x∈B}
Example: A = {1,2,3,4,5}
B = {2,3,7}
A ∩∩ B = {2,3}

5)Difference of Sets:-
The difference of set A to B should be denoted as A - B. That is, the set of element that are in set A not in set B is A - B = {x: x ∈∈ A and x ∉ B} And, B - A is the set of all elements of the set B which are in B but not in A i.e. B - A = {x: x ∈∈ B and x ∉ A}.
Example:
If A = {1,2,3,4,5} and B = {2,4,6,7,8}, then
A - B = {1,3,5} and B - A = {6,7,8}

6)Subset of a Set
In set theory, a set P is the subset of any set Q, if the set P is contained in set Q. It means, all the elements of the set P also belongs to the set Q. It is represented as '⊆' or P ⊆⊆ Q.
Example:
A = {1,2,3,4,5}
B = {1,2,3,4,5,7,8}
Here, A is said to be the subset of B.

7)Disjoint Sets

If two sets A and B should have no common elements or we can say that the intersection of any two sets A and B is the empty set, then these sets are known as disjoint sets i.e. A ∩∩ B = ϕϕ. That means, when this condition n (A ∩ B) = 0 is true, then the sets are disjoint sets.

Example:

A = {1,2,3}

B = {4,5}

n (A ∩ B) = 0.

Therefore, these sets A and B are disjoint sets.

8)Equality of Two Sets

Two sets are said to be equal or identical to each other, if they contain the same elements. When the sets P and Q is said to be equal, if P ⊆ Q and Q ⊆ P, then we will write as P = Q.

Examples:

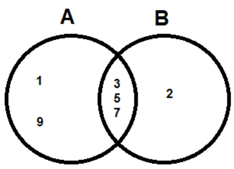
1. If A = {1,2,3} and B = {1,2,3}, then A = B.
2. Let P = {a, e, i, o, u} and B = {a, e, i, o, u, v}, then P ≠≠ Q, since set Q has element v as the extra element.

Q.5) Different between Union and Intersection of set?

Ans:-

1) **Union set:-**

The **union** of 2 sets and is denoted by . This is the set of all distinct elements that are in or . A useful way to remember the symbol is nion. We can define the union of a collection of sets, as the set of all distinct elements that are in any of these sets. A great way of thinking about union and intersection is by using Venn diagrams. These are explained as follows:



Example:-

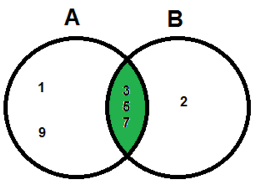
A = {1,2,3}

B = {1,4,5}

A ∪ B = {1,2,3,4,5}

2)Intersection set:-

The **intersection** of 2 sets and is denoted by . This is the set of all distinct elements that are in both and . A useful way to remember the symbol is itersection. We define the intersection of a collection of sets, as the set of all distinct elements that are in all of these sets.



Example:-

A={2,4,5,6} and B={1,4,6}

AnB={4,6}

AnB={4,6}

AnB

Q.6) Different Between permutation and Combination?

Ans:-

Permutation:A selection of objects in which the order of the objects matters.

Example: The permutations of the letters in the set {a, b, c} are:

abc acb

bac bca

cab cba

A formula for the number of possible permutations of k objects from a set of n. This is usually written nPk .

Formula:

$$ {}_{n}P_{k} = \frac{n!}{(n-k)!} = n\,(n-1)\,(n-2)\cdots(n-k+1) $$

Combination:- The number of possible combination of r objects from a set on n objects.

$$ \binom{n}{r} \text{ or } {}_{n}C_{r} \text{ or } C\,(n,r) \text{ or occasionally } C_{r}^{n} $$

Read aloud — n choose r.

Formula :

$$ \binom{n}{r} \text{ or } {}_{n}C_{r} = \frac{n!}{r!\,(n-r)!} = \frac{n\,(n-1)\,(n-2)\cdots(n-r+1)}{r!} $$

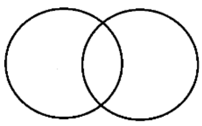
Q. 7) If A={1,2,3,4} B={4,5,6,7} by using Venn Diagram find AUB, A B.

Ans:-Given:-

A={1,2,3,4}

B={4,5,6,7}

AUB={1,2,3,4,5,6,7}



Q.8) if A{x : x N, x is a factor of 63}

1) B = {x : x N, x is a factor of 8}

2) Find A – B and B-A

Q. 9) A student must answer 3 out of 5 essay questions in a test. In How many ways student select the question?

Q.10) 1st, 2nd, 3rd prizes are to be awarded at an engineering for in which 13 exhibits have been entered. In how many different ways can the prize be awarded?

Q.11) What is Venn Diagram? Explain with an example.

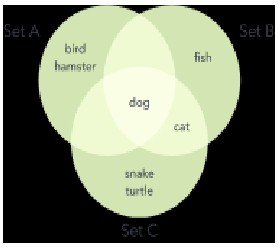
Ans:- A Venn Diagram uses overlapping circles or other shapes to illustrate the logical relationships between two or more sets of items. Often, they serve to graphically organize things, highlighting how the items are similar and different.

Venn Diagrams, also called Set Diagrams or Logic Diagrams, are widely used in mathematics, statistics, logic, teaching, linguistics, computer science and business. Many people first encounter them in school as they study math or logic, since Venn Diagrams became part of "new math" curricula in the 1960s. These may be simple diagrams involving two or three sets of a few elements, or they may become quite sophisticated, including 3D presentations, as they progress to six or seven sets and beyond. They are used to think through and depict how items relate to each within a particular "universe" or segment. Venn Diagrams allow users to visualize data in clear, powerful ways, and therefore are commonly used in presentations and reports. They are closely related to Euler Diagrams, which differ by omitting sets if no items exist in them. Venn Diagrams show relationships even if a set is empty.

Example Venn Diagram

Say our universe is pets, and we want to compare which type of pet our family might agree on.

Set A contains my preferences: dog, bird, hamster.



Set B contains Family Member B's preferences: dog, cat, fish.

Set C contains Family Member C's preferences: dog, cat, turtle, snake.

The overlap, or intersection, of the three sets contains only dog. Looks like we're getting a dog.

Of course, Venn Diagrams can get a lot more involved than that, as they are used extensively in various field

Q. 12) Explain union of set with Venn Example.

Ans:- Learn how to represent the union of sets using Venn diagram. The union set operations can be visualized from the diagrammatic representation of sets.

The rectangular region represents the universal set U and the circular regions the subsets A and B. The shaded portion represents the set name below the diagram.

Let A and B be the two sets. The union of A and B is the set of all those elements which belong either to A or to B or both A and B.

Now we will use the notation A U B (which is read as 'A union B') to denote the union of set A and set B.

Thus, $A \cup B = \{x : x \in A \text{ or } x \in B\}$.

Clearly, $x \in A \cup B$

$\Rightarrow x \in A$ or $x \in B$

Similarly, if $x \notin A \cup B$

$\Rightarrow x \notin A$ or $x \notin B$

Thus, we conclude from the definition of union of sets that $A \subseteq A \cup B$, $B \subseteq A \cup B$.

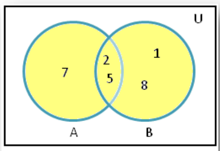
Example:- **1.** If A = {2, 5, 7} and B = {1, 2, 5, 8}. Find A U B using venn diagram.

Solution:

According to the given question we know,

A = {2, 5, 7} and B = {1, 2, 5, 8}

Now let's draw the venn diagram to find



A U B = {1, 2, 5, 7, 8}

Q. 13) What is complement of set explain with example.

Q.14) What are different law of set.

Ans:- **1. Commutative Laws:**

For any two finite sets A and B;

(i) $A \cup B = B \cup A$

(ii) $A \cap B = B \cap A$

2. Associative Laws:
For any three finite sets A, B and C;
(i) (A ∪ B) ∪ C = A ∪ (B ∪ C)
(ii) (A ∩ B) ∩ C = A ∩ (B ∩ C)
Thus, union and intersection are associative.
3. Idempotent Laws:
For any finite set A;
(i) A ∪ A = A
(ii) A ∩ A = A
4. Distributive Laws:
For any three finite sets A, B and C;
(i) A ∪ (B ∩ C) = (A ∪ B) ∩ (A ∪ C)
(ii) A ∩ (B ∪ C) = (A ∩ B) ∪ (A ∩ C)
Thus, union and intersection are distributive over intersection and union respectively.
5. De Morgan's Laws:
For any two finite sets A and B;
(i) A – (B ∪ C) = (A – B) ∩ (A – C)
(ii) A - (B ∩ C) = (A – B) ∪ (A – C)
De Morgan's Laws can also we written as:
(i) (A ∪ B)' = A' ∩ B'
(ii) (A ∩ B)' = A' ∪ B'
More laws of algebra of sets:
6. For any two finite sets A and B;
(i) A – B = A ∩ B'
(ii) B – A = B ∩ A'
(iii) A – B = A ⇔ A ∩ B = ∅
(iv) (A – B) ∪ B = A ∪ B
(v) (A – B) ∩ B = ∅
(vi) A ⊆ B ⇔ B' ⊆ A'
(vii) (A – B) ∪ (B – A) = (A ∪ B) – (A ∩ B)
7. For any three finite sets A, B and C;
(i) A – (B ∩ C) = (A – B) ∪ (A – C)
(ii) A – (B ∪ C) = (A – B) ∩ (A – C)
(iii) A ∩ (B - C) = (A ∩ B) - (A ∩ C)
(iv) A ∩ (B △ C) = (A ∩ B) △ (A ∩ C)

Q. 15) Write a note on Singleton and finite set.
Ans:-
Singleton set:- A set that has one and only one element should be called as Singleton set. Sometimes, it is known as unit set. The cardinality of singleton is one. If A is a singleton, then we can express it as A = {x : x = A}
Example: Set A = {5} is a singleton set.
Finite set:- A set is said to be Finite, if it is empty or contain specify number of element (i.e).If the number of element can be counted and the counting and the counting process can be completed .
Example:-A={1,2,3,4,5……..n}

UNIT 2 (2 Marks)

Q 1):- Define Logarithm

Ans:-The logarithm is the inverse operation to explorational, just as division in the inverse multiplication. That means the logarithm of a number is the exponent to which another fixed number, the base ,must be raised to product that number.

Q 2):- What Is Antilog?

Ans:- Antilog is the inverse log function of logarithm function, used to calculate Inverse Log values with respect to the base values. Antilog is also known as Inverse logarithm.

Q 3):- What is common log?

Ans:- The common logarithm is very much useful. The logarithm with base 10 is known as common logarithm.

Q 4):- What is natural log?

Ans:- In computation, the base 10 is usually omitted. Natural or Napierian logarithm is the logarithm with base e

Q 5):- What is percentage error?

Ans:-The percentage error is define as the percentage of the difference between measured values and exact value. The measured value is also known as approximated value or experiment value. It is the value calculated by us. Exact value is also called theoretical value which is the value known by us. The percentage error is said to be the percent of the error in exact value.

Q 6):- What do mean by growth?

Ans:- One may use the compound interest formula in the case where the value of money is uniformly increase at a constant rate. If the value increase at the rate of r% per annum then after n years he final amount will be.

Q 7):- What is compound interest?

Ans:- When you take out a loan, interest is calculated for the first period (be it a month or a year). This interest is then added to the original total. Following on from that, the interest for the next period is calculated but is based on the gross figure from the first period. From there, well, you get the idea.

Q 8):- What is depreciation?

Ans:- The monetary value of an asset decreases over time due to use, wear and tear or obsolescence. This decrease is measured as depreciation.

Q 9):- What is function?

Ans:- A function is a special relationship where each input has a single output.
It is often written as "f(x)" where x is the input value.
Example: f(x) = x/2 ("f of x is x divided by 2") is a function, because each input "x" has a single output "x/2":

- f(2) = 1
- f(16) = 8
- f(−10) = −5

Q 10):-What is interpolation?

Ans:-Interpolation has been defined as the art of reading between the lines of a table and the term usually denoted the process of finding the intermediate value of a function from a set of given value of the function.

Q 11):-What is phenomenal?

Ans:- In mathematics, a polynomial is an expression consisting of variables (also called indeterminates) and coefficients, that involves only the operations of addition, subtraction, multiplication, and non-negative integer exponents of variables. An example of a polynomial of a single indeterminate x is $x^2 - 4x + 7$.

Q 12):-What is degree of polynomial?

Ans:- The degree of a polynomial is the highest degree of its monomials (individual terms) with non-zero coefficients. The degree of a term is the sum of the exponents of the variables that appear in it, and thus is a non-negative integer.

Q 13):- What do mean by significant figure?

Ans:-The significant figure of a quotative are those starting from the first non-zero digit on the left to the end of the last digit accurately specified on the right.

Q 14):-What is the function argument?

Ans:- An argument of a function is a specific input in the function, also known as an independent variable. When it is clear from the context which argument is meant, the argument is often denoted by the abbreviation arg.

Q 15):-What is the use of sigma notation?

Ans:- Summation Notation. Often mathematical formulae require the addition of many variables Summation or sigma notation is a convenient and simple form of shorthand used to give a concise expression for a sum of the values of a variable.

(UNIT 2 3 Marks)

Q 1):- What are various laws of algorithm

Ans:- Let a be a positive number such that a does not equal 1, let n be a real number, and let u and v be positive real numbers.

Logarithmic Rule 1: $Log_a(uv) = Log_a(u) + Log_a(v)$

Logarithmic Rule 2: $Log_a\left(\frac{u}{v}\right) = Log_a(u) - Log_a(v)$

Logarithmic Rule 3: $Log_a(u^n) = nLog_a(u)$

Q 2):- What is common log with example?

Ans:- Logarithms to base 10 are called common logarithms. We often write "$\log_{10}$" as "log" or "lg". Common logarithms can be evaluated using a scientific calculator.

Recall that by the definition of logarithm.

$\log Y = X \Leftrightarrow Y = 10^X$

Example:-

Q 3):-What is natural log with example?

Ans:- Besides base 10, another important base is e. Log to base e are called natural logarithms. "$\log_e$" are often abbreviated as "ln". Natural logarithms can also be evaluated using a scientific calculator.

By definition

$\ln Y = X \Leftrightarrow Y = e^X$

Using a calculator, we can use common and natural logarithms to solve equations of the form $a^x = b$, especially when b cannot be expressed as a^n.

Q 4):- What is compound interest? Explain with formula

Ans:- Compound interest is the addition of interest to the principal sum of a loan or deposit, or in other words, interest on interest. It is the result of reinvesting interest, rather than paying it out, so that interest in the next period is then earned on the principal sum plus previously accumulated interest.

P = principal amount (the initial amount you borrow or deposit)
r = annual rate of interest (as a decimal)
t = number of years the amount is deposited or borrowed for.
A = amount of money accumulated after n years, including interest.
n = number of times the interest is compounded per year

$A = P (1 + r/n)^{(nt)}$

Q 5):- What is the use of antilog?

Ans:-The antilogarithm of a number is that quotative whose logarithm is the given number. Since log 695.5=2.8425,antilog 2.8425=659.8

In order to find antilog 2.8425 by using the log table, we first consider only the decimal part, namely 0.8425. The process of reading the antilog table exactly similar to that of the log table. The first two digit (including zero) immediately after the decimal point of number are found from the extreme left column of the table, the third digit from the column heading, and forth digit from the mean-difference column, thus obtained 6950+8=6958. The decimal point has to be inserted

Q 6):- What is nominal rate of interest?

Ans:-When the interest is calculated more than one in a year, the declared annual rate of interest is known as nominal rate of interest. But the actual rate of interest compounded annually is known as effective rate of interest. If r% be the rate of interest on Rs 100 for one year, then

Q 7):- What is effective rate of interest?

Ans:- When the interest is calculated more than one in a year, the declared annual rate of interest is known as nominal rate of interest. But the actual rate of interest compounded annually is known as effective rate of interest. If r% be the rate of interest on Rs 100 for one year, then

Q 8):- Define absolute and relative error.

Ans:- In words, the absolute error is the magnitude of the difference between the exact value and the approximation. The relative error is the absolute error divided by the magnitude of the exact value. The percent error is the relative error expressed in terms of per 100.

Q 9):-What is arithmetic progression?

Ans:- n mathematics, an arithmetic progression (AP) or arithmetic sequence is a sequence of numbers such that the difference between the consecutive terms is constant. For instance, the sequence 5, 7, 9, 11, 13, 15, . . . is an arithmetic progression with *common difference* of 2.

If the initial term of an arithmetic progression is a_1 and the common difference of successive members is *d*, then the *n*th term of the sequence (a_n) is given by:

$A_n=a_1+(n-1)d$

and in general

$a_n=a_m+(n-m)d$

A finite portion of an arithmetic progression is called a finite arithmetic progression and sometimes just called an arithmetic progression. The sum of a finite arithmetic progression is called an arithmetic series

Q 10):- What is geometric progression?

Ans:- In mathematics, a geometric progression, also known as a geometric sequence, is a sequence of numbers where each term after the first is found by multiplying the previous one by a fixed, non-zero number called the *common ratio*. For example, the sequence 2, 6, 18, 54, ... is a geometric progression with common ratio 3. Similarly, 10, 5, 2.5, 1.25, ... is a geometric sequence with common ratio 1/2.

Examples of a geometric sequence are powers r^k of a fixed number r, such as 2^k and 3^k. The general form of a geometric sequence is

$a, ar, ar^2, ar^3, ar^4, ...$

where $r \neq 0$ is the common ratio and a is a scale factor, equal to the sequence's start value.

Q 11) If log2=x:log3=y then explain the following in the term of x and y .

i. Log(6)1/2 b.log 24

Q 12) Solve for x:log x-1/3log 8=log7

Q 13) Difference between simple interest and compound interest.

Ans:-

BASIS FOR COMPARISON	SIMPLE INTEREST	COMPOUND INTEREST
Meaning	Simple Interest refers to an interest that is calculated as a percentage of the principal amount.	Compound Interest refers to an interest which is calculated as a percentage of principal and accrued interest.
Return	Less	Comparatively high
Principal	Constant	Goes on changing during the entire borrowing period.
Growth	Remains uniform	Increases rapidly
Interest charged on	Principal	Principal + Accumulated Interest
Formula	Simple Interest = P*r*n	Compound Interest = P*(1 + r)^nk

Q 14) Find the 10th term of arithmetic progression.2,4,6.

Q 15) Find the 6th term of geometric progression.4,8,16.

5-Marks

Q 1) What is logarithm? Explain law of logarithm with example.

Ans:- The laws of logarithms mc-bus-loglaws-2009-1 Introduction There are a number of rules known as the laws of logarithms. These allow expressions involving logarithms to be rewritten in a variety of different ways. The laws apply to logarithms of any base but the same base must be used throughout a calculation.

The laws of logarithms

The three main laws are stated here:

1)First Law log A + log B = log AB

This law tells us how to add two logarithms together. Adding log A and log B results in the logarithm of the product of A and B, that is log AB.

For example, we can write log10 5 + log10 4 = log10(5 × 4) = log10 20 The same base, in this case 10, is used throughout the calculation. You should verify this by evaluating both sides separately on your calculator.

2) Second Law log A − log B = log A B So, subtracting log B from log A results in log A B .

For example, we can write loge 12 − loge 2 = loge 12 2 = loge 6 The same base, in this case e, is used throughout the calculation. You should verify this by evaluating both sides separately on your calculator.

3) Third Law log A n = n log A So,

for example log10 5 3 = 3 log10 5 You should verify this by evaluating both sides separately on your calculator.

Two other important results are www.mathcentre.ac.uk 1 c mathcentre 2009 log 1 = 0, logm m = 1 The logarithm of 1 to any base is always 0, and the logarithm of a number to the same base is always 1. In particular,

log10 10 = 1, and loge e = 1

Q 2) Difference between common log and natural log.

Ans:- For numerical calculations, common logarithm is very much useful. The logarithm with base 10 is know as common logarithms. In computation, the base 10 is usually omitted.

Natural or Napierian logarithm is the logarithm with the base e, where

E=1+1/1!+1/2!+1/3!+-----∞

An approximate value of e=2.71828

Q 3) Solve for x

a. **Log4(x-3)+log4(x+3)=2**

Explanation:

Log4(x-3)+log4(x+3)=2

Log4((x-3)(x+3))=2

$(x+3)(x-3)=4^2$

$x^2-9=16$

$x^2=16+9$

$x^2=25$

x=5 or x = -5

but if x=-5 then log4(x+3) not exists so solution is x=5

b. **Log x-(1/3) log8=log7**

Explanation:

Log x-(1/3) log8=log7

Log(x)-log(8 ^(1/3))=log(7)

Log(x)-log(2)=log(7)

Log(x)=log(7)+log(2)

Log(x)=log(7*2)

Log(x)=log(14)

X=14

Q.4) Solve for base e

a. $7e^{2x}+2.5=20$

$7e^{2x}=20-2.5$ (Subtract 2.5 from both side divide both side by 7 rewrite in log form Divide both side by 2)

$e^{2x}=17.5/7$

$e^{2x}=2.5$

$2x = \ln 2.5$

X=.458

b. $e^{x+1}=30$

$\ln(e^{x+1})=\ln(30)$

$x + 1 = \ln(30)$

$x= \ln(30)- 1 \approx 2.4012$

Q. 5) if log N = 2log x_log y then solve for N in term of x and y.

Q.6) The prize of z machine depreciated by 10% every year if the machine is brought for 18000 and sold after 3 year what prize will it fetch?

Q.7) What are the type of errors? Explain.

Q.8) The 35^{th} term of an Arithmetic progression is 69. Find the sum of its 69 terms.

Q.9) How many term of Geometric progression have their sum 8184?

Q.10) Give function f(x)=3x+1

a. f(2)

b. f(-1)

c. f(6)

Q.11) Evaluate

Unit III [2marks]

1.What is frequency?

Ans:- The frequency of a particular data value is the number of times the data value occurs. For example, if four students have a score of 80 in mathematics, and then the score of 80 is said to have a frequency of 4. The frequency of a data value is often represented by f.

2.What is cumulative frequency?

Ans:- Technically, a cumulative frequency distribution is the sum of the class and all classes below it in a frequency distribution. All that means is you're adding up a value and all of the values that came before it.

3.What is arithmetic mean?

Ans:-Arithmetic mean of a set of observations is defined to be their sum, divided by the number of observation. a set of data is found by taking the sum of the data, and then dividing the sum by the total number of values in the set. A mean is commonly referred to as an average.

4. What is geometric mean?

Ans:- Geometric mean of a group of n observations is the n-th root of theire product. It is defined only when all observations have the same sign, and none of them is zero.

5.What is median?

Ans:-Median is a set of observations is the middle-most value when the observation are arranged in order of magnitude. The number of observations smaller then median is same as the number greater then it. Median divides the observations into two equal parts. The real measure of central tendency , as extremely large or small observations and can be calculated from frequency distributions with open- end classes.

Qu. 6) What is quartile?

Ans:- Quartile deviation is based on the lower quartile Q1Q1 and the upper quartile Q3Q3. The difference Q3−Q1 Q3−Q1 is called the inter quartile range. The difference Q3−Q1Q3−Q1 divided by 22 is called semi-inter-quartile range or the quartile deviation. Thus Q.D=Q3−Q12

The quartile deviation calculated from the sample data does not help us to draw any conclusion (inference) about the quartile deviation in the population.

7.What is mode?

Ans:-Mode of a given set of observation of the value which occurs with the maximum frequency . It is the most typical or prevalent value , and at a times represent the true characteristics of a distribution as a measure of a tendency . Mode is used in business, because is most likely to occur . Meteorological forecasts are, in fact base on mode.

8.What is Range?

Ans:-Range of a set of observations is the difference between the maximum and the minimum values.

9.What is mean Deviation?

Ans:- The mean deviation also called mean absolute deviation, it is used as a measure of dispersion where the number of values or quantities is small, otherwise standard deviation is used.

10.What is standard deviation?

Ans:-Standard deviation of a set of a observation is the square-root of the arithmetic mean of squares of deviations from arithmetic mean .In short, S.D. may be defined as "Root-Mean-Square-Deviation from mean".

11.What is Dispersion?

Ans: The dispersion is the tendency of data to be scattered over a range. Dispersion is the important feature of a frequency distribution. It is also called spread or variation. Range, variance and standard deviation are all measures of dispersion. Common measure of dispersion are, range, inter quartile range and quartile deviation, average deviation or mean deviation and standard deviation.

12.What is the measure of dispersion?

Ans:- In statistics, dispersion (also called variability, scatter, or spread) is the extent to which a distribution is stretched or squeezed. Common examples of measures of statistical dispersion are the variance, standard deviation, and interquartile range.

13.What is the Harmonic mean?

Ans:-Harmonic mean is a set of observation is a reciprocal of the arithmetic mean of their reciprocal . Like G.M., H.M. is defined only no observation is zero.

14.What is graph?

Ans:-Diagrams are appealing to the eyes as well as to intellect , and are therefore helpful in assimilating the data readily and quickly. A chart can clarify a complex problem and reveal hidden facts . It is sometimes necessary in finding the trend in time series and also in finding relations between several sets of observations. The graph may be used as means of checking mistakes.

15.What is Diagram?

Ans:- Diagrams are appealing to the eyes as well as to intellect , and are therefore helpful in assimilating the data readily and quickly. A chart can clarify a complex problem and reveal hidden facts . It is sometimes necessary in finding the trend in time series and also in finding relations between several sets of observations. The graph may be used as means of checking mistakes.

[Unit III] 3 Marks

1.What is the significance of graph?

Ans:- Diagrams are appealing to the eyes as well as to intellect , and are therefore helpful in assimilating the data readily and quickly. A chart can clarify a complex problem and reveal hidden facts . It is sometimes necessary in finding the trend in time series and also in finding relations between several sets of observations. The graph may be used as means of checking mistakes.

2.What is the use of diagram?

Ans:- A diagram is a symbolic representation of information according to some visualization technique. Diagrams have been used since ancient times, but became more prevalent during the Enlightenment. Sometimes, the technique uses a three-dimensional visualization which is then projected onto a two-dimensional surface. The word graph is sometimes used as a synonym for diagram.

3.What is cumulative frequency distribution?

Ans:-In statistical investigation, sometime we are interested in the number of observation smaller than (or greater than) a given value. In such cases, or chief concern is the accumulated frequency upto (or above) some value of the variable. This accumulated frequency is know as 'cumulative frequency' .

4. What is the relative frequency distribution?

Ans:-Relative frequency denotes the class frequency expressed as a fraction of the total frequency.

Relative frequency=Class frequency/Total frequency

The sum of all the relative frequency is equal to unit .when relative frequency are shown against the corresponding classes.

5. State the advantages of Arithmetic Mean

Ans:- It is rigidly defined

It is easy to calculate and simple to follow

It is based on all the observations

UNIT 4 (2 Marks)

Q.1) What is skewness?

Ans : The term 'Skewness' refers to lack of symmetry i.e. when a distribution is not symmetrical is called skewness distribution.

Q.2) What is kurtosis?

Ans : Kurtosis refers to the degree of "peakedness" of the frequency curve. Two distributions may have the same average, dispersion and skewness. Yet in one there may be high concentration of value near the mode, showing a sharper peak in the frequency curve than in the other. This characteristic of the frequency distribution is known as "Kurtosis".

Q.3) What is correlation?

Ans : The word 'correlation' is used to denote the degree of association between variables. IF two variable x and y are so related that variations in the magnitude of one variable tend of accompanied by variations in the magnitude of the other variable, they are said to be correlation.

Q.4) What is regression?

Ans : a measure of the relation between the mean value of one variable (e.g. output) and corresponding values of other variables (e.g. time and cost).

Q.5) What is covariance?

Ans : Covariance is a measure of how much two random variables vary together. It's similar to variance, but where variance tells you how a *single* variable varies, **co** variance tells you how **two** variables vary together.

Q.6) What are the component of time series analysis?

Ans : The factors that are responsible for bringing about changes in a **time series**, also called the **components** of **time series**, are as follows: Secular Trends (or General Trends) Seasonal Movements. Cyclical Movements. Irregular Fluctuations.

Q.7) Define probability?

Ans : The word probability literally denotes 'chance', and the theory of probability deals with laws governing the chances of phenomena which are unpredictable in nature. In mathematics and statistics a numerical measure of uncertainty is practiced by the important branch of statistics called the theory of probability.

Q.8) What is time Series?

Ans : A time series is a collection of observations of well-defined data items obtained through repeated measurements over time. For example, measuring the value of retail sales each month of the year would comprise a time series. This is because sales revenue is well defined, and consistently measured at equally spaced intervals. Data collected irregularly or only once are not time series.

Q.9) What is Moments?

Ans : Given n observations x1, x2,......xn and an arbitrary constant A,

$1/n \sum(x-A)$ is called the 1st moment about A.

$1/n \sum(x-A)^2$ is called the 2nd moment about A.

$1/n \sum(x-A)^3$ is called the 3rd moment about A.

Q.10) What is conditional probability?

Ans : The **conditional probability** of an event B is the probability that the event will occur given the knowledge that an event A has already occurred. This probability is written P(B|A), notation for the probability of B given A. In the case where events A and B are independent (where event A has no effect on the probability of event B), the conditional probability of event B given event A is simply the probability of event B, that is P(B).

If events A and B are not independent, then the probability of the intersection of A and B (the probability that both events occur) is defined by
P(A and B) = P(A)P(B|A).

From this definition, the conditional probability P(B|A) is easily obtained by dividing by P(A):

$$P(B|A) = \frac{P(A \text{ and } B)}{P(A)}$$

Q.11) What is Independent event?

Ans : Several events are considered to be 'independent' in the probability sense, or statistically independent, if the probability of occurrence of any of them remains unaffected by the supplementary knowledge regarding occurrence or non-occurrence of any number of the remaining events.

Q.12) What is Rank correlation?

Ans : The product moment correlation coefficient (r) is calculated by using value of the variable. The correlation coefficient between the two series of ranks is called Rank correlation coefficient. It is given by the formula $R=1- 6 \sum d^2/N(N^2-1)$

Q.13) What is curve fitting?

Ans : The process of finding such a curve or its equation on the basis of a give set of observation is called curve fitting. Type of curve fitting : Straight line, parabola, etc.

Q.14) What is parabola?

Ans : Parabola is the geometrical representation of an equation of the form
$y=a+bx+cx^2$
Parabola is a special type of curve.

Q.15) What is bivariate data?

Ans : The word 'bivariate' is used to describe situations in which two characters are measured on each individual or item, the characters being represented by two variable. Statistical data relating to the simultaneous measurement of two variables are called bivariate data.

3 Marks

Q. 1) What is curve fitting method?

Ans : Curve fitting is the process of constructing a **curve**, or mathematical function, that has the best **fit** to a series of data points, possibly subject to constraints. The following curve fitting methods are uses in curve fitting

a) Straight line 2) Parabola 3) Free hand method 4) Least squares 5) Fitting Exponential and Geometric curve.

Q. 2) define Kars Person's co-efficient?

Ans : Karl person's co-efficient quantitatively measures degree of relationship between two variable

Definition : A ration between the co-variance between two variable to the product of their standard deviations is called karl pearson's correlation co-efficient.

$r=\sum xy/ \backslash| \sum x^2 \sum y^2$

There are two methods use 1) Actual mean and 2) Assume mean

Q. 3) What do you mean by the term bivariate data?

Ans : Bivariate data deals with two variables that can change and are compared to find relationships. If one variable is influencing another variable, then you will have bivariate data that has an independent and a dependent variable. This is because one variable depends on the other for change. An independent variable is a condition or piece of data in an experiment that can be controlled or changed. A dependent variable is a condition or piece of data in an experiment that is controlled or influenced by an outside factor, most often the independent variable.

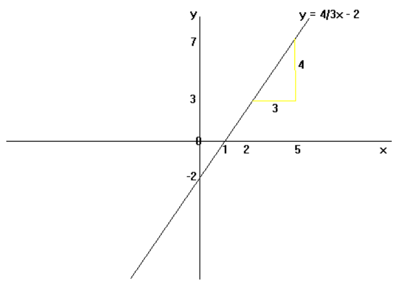
Q. 4) What do you mean by positive and negative co-relation?

Ans : Notice that most of the points increase both vertically and horizontally. You may notice that we have graphed the number of reading hours on the *x*-axis, horizontally, and the test scores on the *y*-axis, vertically. When a bivariate data set shows an overall increase in numbers like this, it is called a **positive correlation**, where the dependent variables and independent variables in a data set increase or decrease together.

If the numbers sloped downward, like the bivariate data in the graph below, then you have a data set with a **negative correlation**, where the dependent variables and independent variables in a data set either increase or decrease opposite from one another.

Q. 5) What is straight line equation?

Ans : Equations of straight lines are in the form y = mx + c (m and c are numbers). m is the gradient of the line and c is the y-intercept (where the graph crosses the y-axis).



NB1: If you are given the equation of a straight-line and there is a number before the 'y', divide everything by this number to get y by itself, so that you can see what m and c are.

NB2: Parallel lines have equal gradients.

Q. 6) What is parabola?

Ans : Parabola is the geometrical representation of an equation of the form

$y=a+bx+cx^2$

Parabola is a special type of curve.

Q. 7) Write down the type of regression?

Ans :

- Linear Regression : Linear Regression establishes a relationship between dependent variable (Y) and one or more independent variables (X) using a best fit straight line
- Logistic Regression : Logistic regression is used to find the probability of event=Success and event=Failure.
- Polynomial Regression : A regression equation is a polynomial regression equation if the power of independent variable is more than 1.
- Stepwise Regression : is used when we deal with multiple independent variables.
- Ridge Regression : Ridge Regression is a technique used when the data suffers from multicollinearity
- Lasso Regression : Lasso regression differs from ridge regression in a way that it uses absolute values in the penalty function, instead of squares.
- ElasticNet Regression : ElasticNet is hybrid of Lasso and Ridge Regression techniques. It is trained with L1 and L2 prior as regularizer.

Q. 8) What is the measure of trend?

Ans : Trend is measured to study the regular or irregular variation, which is possible only when Trend values are isolated.

We can measure trend with the help of any of the following methods:

a> Graphic model
b> Semi-average method
c> Moving average method
d> Curve- fitting by method of least squares

Q.9) What do you mean by finite probability space?

Ans : A finite probability space is a finite set Ω 6= ∅ together with a function Pr : Ω → R+ such that 1. ∀ω ∈ Ω, Pr(ω) > 0 2. X ω∈Ω Pr(ω) = 1. The set Ω is the sample space and the function Pr is the probability distribution.

Q.10) What is the property of Liner regression?

Ans : A simple linear regression model is one of the pillars of classic econometrics. Despite the passage of time, it continues to raise interest both from the theoretical side as well as from the application side. One of the many fundamental questions in the model concerns determining derivative characteristics and studying the properties existing in their scope, referring to the first of these aspects. The literature of the subject provides several classic solutions in that regard. In the paper, a completely new design is proposed, based on the direct application of variance and its properties, resulting from the non-correlation of certain estimators with the mean, within the scope of which some fundamental dependencies of the model characteristics are obtained in a much more compact manner. The apparatus allows for a simple and uniform demonstration of multiple dependencies and fundamental properties in the model, and it does it in an intuitive manner. The results were obtained in a classic, traditional area, where everything, as it might seem, has already been thoroughly studied and discovered.

Q.11) Find out probable error n=64, r=0.6

Ans :

$$\text{P.E.} = 06745 \left[\frac{1-r^2}{\sqrt{n}}\right]$$

$= 0.6745\ [1\text{-}0.6^2/\ \sqrt{64}]$

$=0.6745\ [0.64/8]$

$=0.05396$

Q.12) Find out which co-relation is more significate

a. Boys r = 0.37 P.E. =0.072
b. Girls r = 0.29 P.E. =0.025

Q.13) Find out limit of correlation r=0.6 n=64

Ans :

P.E. = 06745

$= 0.6745 [1-0.6^2/ \sqrt{64}]$

$=0.6745 [0.64/8]$

$=0.054$

Limit of Correlation : $r \pm$ **P.E =0.6+0.054 = 0.654**

Q.14) What is the probability of flipping a coin and not landing on heads?

Ans : In this case coin are flipping ½ chances to not landing on heads.

P(E)= no of unfavourite outcomes/Total no of outcomes

=1/2

Q.15) What is the probability of drawing a number card less than 4 from a standard deck of cards.

Part - C

(Each question carries **Five** marks)

UNIT – III

1. Describe the merits and demerits of mean.

Ans : **MEAN**

The arithmetic mean (or simply "mean") of a sample is the sum of the sampled values divided by the number of items in the sample.

MERITS OF ARITHEMETIC MEAN

1. ARITHEMETIC MEAN RIGIDLY DEFINED BY ALGEBRIC FORMULA
2. It is easy to calculate and simple to understand
3. IT BASED ON ALL OBSERVATIONS AND IT CAN BE REGARDED AS REPRESENTATIVE OF THE GIVEN DATA
4. It is capable of being treated mathematically and hence it is widely used in statistical analysis.
5. Arithmetic mean can be computed even if the detailed distribution is not known but some of the observation and number of the observation are known.
6. It is least affected by the fluctuation of sampling

DEMERITS OF ARITHMETIC MEAN

1. It can neither be determined by inspection or by graphical location
2. Arithmetic mean cannot be computed for qualitative data like data on intelligence honesty and smoking habit etc
3. It is too much affected by extreme observations and hence it is not adequately represent data consisting of some extreme point
4. Arithmetic mean cannot be computed when class intervals have open ends

2. Following is the frequency distribution of marks obtained by 50 students in a test of Statistics. Calculate mean and mode.

Marks	Number of Students
0–10	4
10 – 20	6
20–30	20
30–40	10
40–50	7
50-60	3

Ans :

Marks	Number of Students(F)	Mid Value (x)	dx=x-25	fdx
0–10	4	5	-20	-80
10 – 20	6	15	-10	-60
20–30	20	25	0	0
30–40	10	35	10	100
40–50	7	45	20	140
50-60	3	55	30	90
	n=50			∑fdx=190

Mean = x+∑fdx/n
Mean = 25 + 190/50
Mean = 28.8

Mode :

Mark	Tally Bar	No of student (I)	II(1+2)	III(2+3)	IV (1+2+3)	V (2+3+4)	VI (3+4+5)
0–10	|	4	10		30		
10–20	|||	6		26		36	
20–30	||||||	20	30				37
30–40	|||	10		17	20		
40–50	|	7	10				
50-60		3					

L1=20, L2=30, F1=20, F0=6,F2=10
Put the value in the formula
Z=L1+(F1-f0)/2(f1)-F0-F2 x (L2-L1)
Z=20 + 20-6/2x20-6-10 x 10
Z=20 + 14/24 x10
Z=20+5.83
Z=25.83R

3. Calculate standard deviation for the following
a. 12, 17, 14, 11, 21 ,28, 27, 29, 38.
Ans :

X	dx=x-21	dx^2
12	-9	81
17	-4	16
14	-7	49
11	-10	100
21	0	0
28	7	49
27	6	36
29	8	64
38	17	289
N=9	∑dx=8	$\sum dx^2=684$

$SD=\sqrt{\sum dx^2/n-(\sum dx/n)^2}$

$SD=\sqrt{684/9-(8/9)^2}$

$SD=\sqrt{75.23}$

SD = 8.67

4. Compute the mean and median for the distribution given below

Value x	Frequency f
20	2
29	4

30	4
39	3
44	2

Ans :

Value x	Frequency f	fx	Cf
20	2	40	2
29	4	116	6
30	4	120	10
39	3	117	13
44	2	88	15
	N=15	∑fx=481	

Mean = ∑fx/n
Mean = 481/15
Mean = 32.06

Median :
M =size of (n+1/2)th item
M= size of (15+1/2)th item
m= 8th item
Hence median value is 30
Now look the cumulative frequency(cf) take on 10 item because 8 is not their the size of item against it is 30.

5. Find the mean deviation about mode of a numerical data set.
109 112 109 110 109 107 104 104 104 111 111 109 109 104 104
Ans :

F	x-mode
104	-5
104	-5
104	-5
104	-5
104	-5
107	-2
109	0
109	0
109	0
109	0
109	0
110	1
111	2
111	2
112	3
∑f =1616	∑(x-mode)=-19

Mean deviation about mode = ∑(x-mode)/n

6. Find the quartile deviation of the given data.
10, 12, 34, 34, 45, 23, 42, 36, 34, 22, 20, 27, 33.

Ans :
10
12
20
22
23
27
33
34
34
34
36
42
45

N=13

Q1 = Size of (n+1/4)th item
Q1 = size of (14/4)th item
Q1 = Size of 3.5^{th} item
Mean 4^{th} place
Q3 = Size of 3 (n+1/4) item
Q3 = size of 3 x 3.5^{th} item
Q3 = size of 10.5^{th} item
QD=Q3-Q1/2
Mean 11^{th} place
QD = 36 – 22/2
QD = 7

7. Compute the quartile deviation for the distribution given below

Value x	Frequency f
20	2
29	4
30	4
39	3
44	2

Ans :

Value x	Frequency f	CF
20	2	2
29	4	6
30	4	10
39	3	13
44	2	15

Q1=Size of (n+1/4)th item
Q1= size of (15+1/4)th item
Q1= 4

Mean 4th item
Q3= size of 3(n+1/4)th item
Q2= size of 3(4)th item
Q2=12
Mean 12th item
QD = Q3-Q1/2
QD= 13 – 6 /2
QD = 7/2 = 3.5

8. For a group of 50 male workers the mean and standard deviation of their daily wages are Rs. 63 and Rs.9 respectively. For a group of 40 female workers these values are Rs.54 and Rs.6 respectively. Find the mean and variance of the combined group of 90 workers.
Ans :

Solution:

Here $n_1 = 50$, $\overline{X}_1 = 63$, $S_1{}^2 = 81$
$n_2 = 40$, $\overline{X}_2 = 54$, $S_2{}^2 = 36$

Combined Arithmetic Mean $= X_c = \frac{n_1\overline{X}_1 + n_2\overline{X}_2}{n_1+n_2}$
$= X_c = \frac{50(63)+40(54)}{50+40} = \frac{5310}{90} = 59$

Combined Variance $S_c{}^2 = \frac{n_1\left[S_1{}^2 + \left(\overline{X}_1 - \overline{X}_c\right)^2\right] + n_2\left[S_2{}^2 + \left(\overline{X}_2 - \overline{X}_c\right)^2\right]}{n_1+n_2}$
$= \frac{50\left[81+(63-59)^2\right]+40\left[36+(54-59)^2\right]}{50+40}$
$= \frac{4850+2440}{90} = \frac{7290}{90} = 81$

9. Find the combined Standard Deviation from the following data.

	A	B
No of observation	100	150
Average	250	420
SD	10	6.4

Ans : Find Combined SD $\sigma_{12}=\sqrt{\frac{N1(\sigma_1^2+d1^2)+N2(\sigma_2^2 + d2^2)}{N1+N2}}$

Given Data : N_1= 100, N_2=150, X1 = 250, X2=420, σ_1=10, σ_2=6.4
First Fine Combine mean
$X_{12}=N_1X_1+N_2X_2/N_1+N_2$
X_{12}=100*250+150*420/100+150
X_{12}=25000+63000/250
X_{12}=352
Find d1=|x1-X12| &d2=|x2-X12|
d1=|250-352| & d2 = |420-352|
d1=102 & d2 = 68
put the value in combined SD formula
SD $\sigma_{12}=\sqrt{\frac{N1(\sigma_1^2+d1^2)+N2(\sigma_2^2 + d2^2)}{N1+N2}}$
$=\sqrt{100((10)^2+(102)^2)+150(6.4)^2+(68)^2}$

250

=/100(100+10404)+150(40.96+4624)
250

=/1050400+699744
250

=/1050400+699744
250

=83.66

10.Find the coefficient of variation 100, 145, 170, 150?
Ans :
Coefficient of variation = SD/mean x 100
100,145,170,150
Mean(X) = x1+x2….. xn/n
X= 100+145+170+150/4
X = 565/4
X = 141.25

X	dx=mv-x	dx^2
100	-45	2025
145	0	0
170	25	625
150	5	25
N=4	∑dx=-15	∑ dx^2=2675

SD=/ $\sum dx^2/n - (\sum dx/n)^2$

SD=/2675/4 – $(-15/4)^2$

SD=/668.75-14.06
SD=/654.69
SD = 25.58

Coefficient of variation = SD/mean
=25.58/141.25
=.181

Part - C
(Each question carries **Ten** marks)
UNIT – III
1. Calculate the arithmetic mean of the daily income of 10 families
a. Families 1 2 3 4 5 6 7 8 9 10
b. Income Rs. 18 20 35 55 38 54 100 85 37 53
Ans :

Families (x)	Income Rs (f)	fx
1	18	18
2	20	40
3	35	105
4	55	220
5	38	190
6	54	324
7	100	700
8	85	680
9	37	333
10	53	530
	N=495	∑fx=3140

A.M.= ∑fx/n
A.M. = 3140/495
A.M. = 6.34

2. Compute the geometric mean from the following data:
a. Marks 0-10 10-20 20-30 30-40 40-50
b. No. of student 5 7 15 25 8
Ans :

Marks (x)	No. Of Student (f)	M.V.	Log	Log.f
0-10	5	5	0.6989	3.4945
10-20	7	15	1.1760	8.232
20-30	15	25	1.3979	20.9685
30-40	25	35	1.5440	38.6
40-50	8	45	1.6532	13.2256
	N=60			∑log.f = 84.5206

G.M. = Antilog (∑log.f/n)
G.M. = Antilog (84.5206/60)
G.M. = Antilog of 1.4086
G.M. =

3. Calculate the Arithmetic mean, Geometric mean and Harmonic mean from the following
frequency distribution.
a. Variable : 3 4 5 6 7 8 9 10 11

b. Frequency : 2 5 9 14 15 8 6 3 1

Ans : Arithmetic Mean

Variable (x)	Frequency (f)	fx
3	2	6
4	5	20
5	9	45
6	14	84
7	15	105
8	8	64
9	6	54
10	3	30
11	1	11
	N=63	Σfx = 419

Arithmetic Mean = Σfx/n
= 419/63
= 6.69

Geometric Mean =

Variable (x)	Frequency (f)	Log	Σlog.f
3	2	0.4771	0.9542
4	5	0.6020	3.01
5	9	0.6989	6.2901
6	14	0.7781	10.8934
7	15	0.8450	12.675
8	8	0.9030	7.224
9	6	0.9542	5.7252
10	3	1	3
11	1	1.0413	1.0413
	N=63		Σlog.f = 50.8132

G.M. = Antilog (Σlog.f/n)

G.M. = Antilog (50.8132/63)

G.M. = Antilog 0.8065

G.M. =

Harmonic Mean

4. Calculate median and mode from the following data:
a. Class : 0-7 7-14 14-21 21-28 28-35 35-42
b. Frequency : 7 11 24 19 12 9
Ans : Median

Class(x)	Frequency (f)	fc
0-7	7	7
7-14	11	18
14-21	24	42
21-28	19	61
28-35	12	73
35-42	9	82
	N=82	

Median= Size of (n/2)th item
M=size of 82/2 th item
M=size of (41)th item
Which lies in the group 14-21 by Interpolation
L1=14, L2=21, F1=24, m=41, c=18
Put the value in the formula
M=L1+(L2-L1/f1)(m-c)
M=14 + (21-14/24) (41-18)
M=14 + (7/24) (23)
M=14 + 6.7
M= 20.7

Mode :

Class(x)	Tally Bar	Frequency (f)	1+2	2+3	1+2+3	2+3+4	3+4+5
0-7	|	7	18		43		
7-14	|||	11		35		54	
14-21	||||||	24	43				55
21-28	|||	19		31	40		
28-35	|	12	21				
35-42		9					

Mode lies in the group of 25-30
By interpolation
L1=14, L2=21, f1=24, f0=11, f2=19
Mode = L1+(f1-f0/2f1-f0-f2) (L2-L1)
Mode = 14 + (24-11/2*24-11-19)(21-14)
Mode = 14 +(13/18)(7)
Mode = 14 + (6.27)
Mode = 20.27

5. Calculate standard deviation from the following data regarding the marks obtained by students in an Accountancy practical test:

a. Marks 1 2 3 4 5 6 7 8 9
b. No. of students 32 41 57 98 123 83 46 17 3

Marks (x)	No. Of Student (f)	Dx=xBar-x (x=5)	fdx	fdx^2
1	32	-4	-128	16384
2	41	-3	-123	15129
3	57	-2	-114	12996
4	98	-1	-98	9604
5	123	0	0	0
6	83	1	83	6889
7	46	2	92	8464
8	17	3	51	2601
9	3	4	12	144
	N=500		∑fdx=-225	$\sum fdx^2$ =72211

SD=$\sqrt{\sum fdx^2/n - (\sum fdx/n)^2}$

SD=$\sqrt{72211/500 - (-225/500)^2}$

SD=$\sqrt{144.422-(-0.2025)}$
SD=$\sqrt{144.6245}$
SD = 12.025

6. Compute the standard deviation and mean deviation from the following data:
a. Class (X) : 0-10 10-20 20-30 30-40 40-50 50-60 60-70
b. Frequency (f) : 8 12 17 14 9 7 4

Class (x)	Frequency (f)	MV	Dx=xBar-mv (x=5)	fdx	fdx^2
0-10	8	5	-30	-240	57600
10-20	12	15	-20	-240	57600
20-30	17	25	-10	-170	28900
30-40	14	35	0	0	0
40-50	9	45	10	90	8100
50-60	7	55	20	140	19600
60-70	4	65	30	120	14400
	N=71			∑fdx=-300	$\sum fdx^2$ =186200

SD=$\sqrt{\sum fdx^2/n - (\sum fdx/n)^2}$ x i

SD=$\sqrt{186200/71 - (-300/71)^2}$ x 10

SD=$\sqrt{2622.53-(17.81)}$ x 10
SD=$\sqrt{2604.72}$ x10
SD = 51.03 x10
SD = 510.3

Mean Deviation :

Class (x)	Frequency (f)	MV	Dx=xBar-mv (x=5)	Fdx(+-Sing ignored)
0-10	8	5	-30	240
10-20	12	15	-20	240
20-30	17	25	-10	170
30-40	14	35	0	0
40-50	9	45	10	90
50-60	7	55	20	140
60-70	4	65	30	120
	∑f=71			∑fdx=1000

Mean Deviation = ∑fdx/∑f
=1000/71
=14.08

Part - C
(Each question carries **Five** marks)
UNIT – IV
1. Calculate and analyze the correlation coefficient between the number of study hours and the number of sleeping hours of different students.

Number of Study Hours	2	4	6	8	10
Number of Sleeping Hours	10	9	8	7	6

Ans :

No of Study Hours (X)	No of Sleeping Hours (Y)	XY	X^2	Y^2
2	10	20	4	100
4	9	36	16	81
6	8	48	36	64
8	7	56	64	49
10	6	60	100	36
∑x=30	∑y=40	∑xy=220	$\sum x^2=220$	$\sum y^2=330$

$r=\sum xy/\sqrt{\sum x^2 \sum y^2}$

$r=220/\sqrt{220 \times 330}$
r=220/269.44
r=0.81

2. From the following data, compute the coefficient of correlation between X & Y

	X Series	Y Series
Number of Items	15	15
Arithmetic Mean	25	18
Sum of Square Deviations	136	138

The summation of the products of the deviations of X and Y series from their arithmetic means = 122.

Ans : Given : $\sum xy=122$, $\sum x=25$, $\sum y=18$, $\sum x^2=136$, $\sum y^2=138$,

$r=\sum xy/\sqrt{\sum x^2 \sum y^2}$

$r=122/\sqrt{136 \times 138}$

r=122/136.99

r=0.89

4) Find Spearman's rank correlation coefficient between X and Y for this set of data:

XX 13 20 22 18 19 11 10 15

YY 17 19 23 16 20 10 11 18

Ans :

XX	YY	R1(rank)	R2	D= (R1-R2)	D^2
13	17	6	5	1	1
20	19	2	3	-1	1
22	23	1	1	0	0
18	16	4	6	-2	4
19	20	3	2	1	1
11	10	7	8	-1	1
10	11	8	7	1	1
15	18	5	4	1	1
N=8					$\sum D^2=10$

$rk=1- 6(D^2)/n(n^2-1)$

rk= 1 – 6(10)/8(64-1)

rk = 1 – 60/504

rk = 1 – 0.12

rk = 0.88

4. A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?

Ans :

Bag Contains 2 red ball, 3 green ball, 2 blue ball

Total no of ball is = 7

Total no of outcome is = ${}^7C_1$

By using formula of combination

= n!/r!(n-r)!

= 7!/1(7-1)!

=7x6! / 6!

=7

Blue ball = 2

Only 1 ball is come
Hence $^2C_1$
By using Formula of combination
= n!/r!(n-r)!
= 2!/1(2-1)!
=2

Hence by using probability formula
Probability = no of varable outcome/total no of outcome
=2/7

5. From a pack of 52 cards, two cards are drawn together at random. What is the probability of both the cards being kings?
Ans : Total Cards = 52
Cards are drawn together =2
Hence by using formula
Probability = no of varable outcome/total no of outcome
Probability = 2/52
Probability =1/25

6. Prove that P(AUB)=P(A)+P(B)-P(AB).
Ans :

7. Fit a least square line for the following data.

X	1	2	3	4	5
Y	2	5	3	8	7

Ans :

X	Y	X^2	Xy	X^2Y
1	2	1	2	2
2	5	4	10	20
3	3	9	9	27
4	8	16	32	128
5	7	25	35	175
$\sum x = 15$	$\sum y=25$	$\sum x^2=55$	$\sum xy=88$	$\sum x^2y=351$

The equation of least square line Y = a+bx
Normal equation for 'a' $\sum y=na+b\sum x$

$25 = 5a + 15\,b$ ------------1

Normal Equation for 'b' $\sum xy = a\sum x + b\sum x^2$

88 = 15a+55b ------------- 2

Eliminate a from equation (1) and (2) multiply equation (1) by 3 and subtract form equation 2

75 = 15a+45b
88 = 15a+55b
- - -

-13 = -10b ----------- 3

b=-13/-10

b=1.3

Put the value B in equation 1

25 = 5a + 15*1.3

25 = 5a + 19.5

5.5 = 5a

a= 5.5/5

a = 1.1

Put the value a and b in least square line equation

Y = a +bx

Y = 1.1 + 1.3 x

8. From the following data calculate correlation coefficient:

$\Sigma x = 247$ $\Sigma y = 486$ $\Sigma xy = 20,485$ $\Sigma x^2 = 11,409$ $\Sigma y^2 = 40,022$ $n = 6$

Ans :

$R= n(\Sigma xy)-(\Sigma x)(\Sigma y)/\sqrt{n(\Sigma x)^2 - (\Sigma n)^2 * n(\Sigma y^2)-(\Sigma y)^2}$

$R= 6(20485)-247*486/\sqrt{6(11409)-(247)2 * 6(40022)}-(486)$

$R= 12910-120042/\sqrt{7445 \times 3936}$

R=2868/5413.335

R=0.53

10. Two dice are rolled, find the probability that the sum is

a) equal to 1 b) equal to 4 c) less than 13

Ans :

a) The sample space S of two dice is shown below.

S = { (1,1),(1,2),(1,3),(1,4),(1,5),(1,6)
(2,1),(2,2),(2,3),(2,4),(2,5),(2,6)
(3,1),(3,2),(3,3),(3,4),(3,5),(3,6)
(4,1),(4,2),(4,3),(4,4),(4,5),(4,6)
(5,1),(5,2),(5,3),(5,4),(5,5),(5,6)
(6,1),(6,2),(6,3),(6,4),(6,5),(6,6) }

Let E be the event "sum equal to 1". There are no outcomes which correspond to a sum equal to 1, hence

Where,

No of favourite outcome = n(E)

Total No of outcome = n(S)

P(E) = n(E) / n(S)

= 0 / 36 = 0

b) Three possible outcomes give a sum equal to 4: E = {(1,3),(2,2),(3,1)}, hence.

P(E) = n(E) / n(S) = 3 / 36 = 1 / 12

c) All possible outcomes, E = S, give a sum less than 13, hence.

P(E) = n(E) / n(S) = 36 / 36 = 1

10.A box contains three coins: two regular coins and one fake two-headed coin (P(H)=1P(H)=1), You pick a coin at random and toss it. What is the probability that it lands heads up

Ans :

There are three coins the probability of head come

1st & 2nd coin are regular coin 3rd coin are fake

{(HHH), (HTH), (THH),(TTH)}

P(E) = n(E) / n(S)

P(E) = 1/3

Part - C

(Each question carries **Ten** marks)

UNIT – IV

1. Calculate Skewness from the following distribution:

i. X 1 2 3 4 5 6 7

ii. F 5 7 3 1 4 6 9

ANS :

X	F	Xf
1	5	5
2	7	14
3	3	9
4	1	4
5	4	20
6	6	36
7	9	63
N=7	∑f=35	∑xf=151

Mean =∑xf/n

= 151/7

=21.57

Mode =

X	Tally Bar	F	II	III	IV	V	VI
1	||	5	12		15		
2	||	7		10		11	
3	||	3	4				8
4	|	1		5	11		
5	||	4	10			19	
6	||	6		15			
7	|||	9					

Mode = 7

SK = mean – mode
SK = 21.57 – 7
SK = 14.57

2. Calculate Karl Pearson's Coefficient of Skewness for the following data

- 25 15 23 40 27 25 23 25 20

X
15
20
23
23
25
25
25
27
40
$\sum x = 223$

Mean = $\sum x/n$
= 223/9
Mean = 24.77

Mode = 25 is mode because 25 repeated 3 time

X	dx=x-mv	dx^2
15	-10	100
20	-5	25
23	-2	4
23	-2	4
25	0	0
25	0	0
25	0	0
27	2	4
40	15	225
N=9	$\sum dx=-2$	$\sum dx^2=362$

$SD=\sqrt{(\sum dx^2/n) - (\sum dx/n)^2}$

$SD=\sqrt{(362/9) - (-2/9)^2}$

$SD = \sqrt{40.17}$
SD = 6.33

3. From the following data find the coefficient of correlation .

X : 1 2 3 4 5 6 7 8 9
Y : 9 8 10 12 11 13 14 16 15

Ans :

No of Study Hours (X)	No of Sleeping Hours (Y)	XY	X^2	Y^2
1	9	9	1	81
2	8	16	4	64
3	10	30	9	100
4	12	48	16	144
5	11	55	25	121
6	13	78	36	169
7	14	98	49	196
8	16	128	64	256
9	15	135	81	225
$\sum x=45$	$\sum y=108$	$\sum xy=597$	$\sum x^2=285$	$\sum y^2=1356$

$r = \sum xy / \sqrt{\sum x^2 \sum y^2}$

$r = 597 / \sqrt{285 * 1356}$

$r = 597 / \sqrt{386460}$

r= 597/621.65

r= 0.96

Q.4) Fit a straight line regression of Y on X from the following table.

X : 0 1 2 3 4 5 6
Y : 2 1 3 2 4 3 5

Ans :

(X)	(Y)	X^2	Y^2	XY
0	2	0	4	0
1	1	1	1	1
2	3	4	9	6
3	2	9	4	6
4	4	16	16	16
5	3	25	9	15
6	5	36	25	30
$\sum x=21$	$\sum y=20$	$\sum x^2=91$	$\sum y^2=68$	$\sum xy=74$

Here n = 7

$X = \sum x/n = 21/7 = 3$

$Y = \sum y/n = 20/7 = 2.85$

Regression cof. : $byx = \dfrac{\sum xy - \sum x . \sum y/n}{\sum x^2 - (\sum x)^2/n}$

Regression cof. : $byx = \dfrac{74 - 21 * 20/7}{91 - (21)^2/7}$

Regression cof. : byx = $\frac{74 - 140}{91 - 63}$

byx = $\frac{-66}{28}$

byx =2.35

Regression cof. : bxy = $\frac{\sum xy - \sum x . \sum y/n}{\sum y^2 - (\sum y)^2/n}$

Regression cof. : byx = $\frac{74 - 21 * 20/7}{68 - (20)^2/7}$

Regression cof. : bxy = $\frac{74 - 140}{68 - 57.14}$

Regression cof. : bxy = $\frac{-66}{10.86}$

bxy =6.07

Hence straight line regression y on x

y – y(bar) = byx(x-x(bar))

= 3.25 (x – 3)

=3.25 x – 9.75

5. What is the probability of throwing two dice and getting the sum of the fallen numbers greater than 3?

Ans. S = { (1,1),(1,2),(1,3),(1,4),(1,5),(1,6)

(2,1),(2,2),(2,3),(2,4),(2,5),(2,6)

(3,1),(3,2),(3,3),(3,4),(3,5),(3,6)

(4,1),(4,2),(4,3),(4,4),(4,5),(4,6)

(5,1),(5,2),(5,3),(5,4),(5,5),(5,6)

(6,1),(6,2),(6,3),(6,4),(6,5),(6,6) }

Where,

No of favourite outcome = n(E)

Total No of outcome = n(S)

P(E) = n(E) / n(S)

P(E)=33/36

6. What is the probability of throwing one dice and get :

a) the even number

b) the number divisible by three

c) the number less than six ?

Ans.s={1,2,3,4,5,6}

1) the even number

No of favourite outcome = n(E)

Total No of outcome = n(S)
P(E) = n(E) / n(S)
P(E)=3/6
P(E)=3/2

2)the number divisible by three
No of favourite outcome = n(E)
Total No of outcome = n(S)
P(E) = n(E) / n(S)
P(E)=2/6
P(E)=2/3

3)the number less than six
No of favourite outcome = n(E)
Total No of outcome = n(S)
P(E) = n(E) / n(S)
P(E)=5/6

7. Explain the procedure of curve fitting.
Ans :
8. Explain in detail Time series analysis.
Ans : When quantitative data are arranged in the order of their occurrence, the resulting statistical series is called a time series. The quantitative values are usually recorded over equal time interval daily, weekly, monthly, quarterly, half yearly, yearly, or any other time measure. Monthly statistics of Industrial Production in India, Annual birth-rate figures for the entire world, yield on ordinary shares, weekly wholesale price of rice, daily records of tea sales or census data are some of the examples of time series. Each has a common characteristic of recording magnitudes that vary with passage of time.

Time series are influenced by a variety of forces. Some are continuously effective other make themselves felt at recurring time intervals, and still others are non-recurring or random in nature. Therefore, the first task is to break down the data and study each of these influences in isolation. This is known as decomposition of the time series. It enables us to understand fully the nature of the forces at work. We can then analyse their combined interactions. Such a study is known as time-series analysis.

Components of time series

A time series consists of the following four components or elements :

1. Basic or Secular or Long-time trend;
2. Seasonal variations;
3. Business cycles or cyclical movement; and
4. Erratic or Irregular fluctuations.

9. From the following data of the age of husband and the age of wife, form two regression lines and calculate the husband's age when the wife's age is 16.

Husband's age:36 23 27 28 28 29 30 31 33 35
Wife's age :29 18 20 22 27 21 29 27 29 28

Ans.

Husbands (x)	Wife(y)	U(x)	V(y)	u2	v2	uv
36	29	6	4	36	16	24
23	18	-7	-7	49	49	49
27	20	-3	-5	9	25	15
28	22	-2	-3	4	9	6
28	27	-2	2	4	4	4
29	21	-1	-4	1	16	4
30	29	0	4	0	16	0
31	27	1	2	1	4	2
33	29	3	4	9	16	12
35	28	5	3	25	9	15
∑x=300	∑y=250	∑u(x)=0	∑v(y)=0	∑u2=138	∑v2=164	∑uv=131

Given ∑x=300, ∑y=250, ∑v(x)=0, ∑u(y)=0, ∑u2=138, ∑v2=164, ∑uv=131

Put the value in the formula:- Regression cof. : $byx = \frac{\sum xy - \sum x. \sum y/n}{\sum x^2 - (\sum x)^2/n}$

Regression cof : $byx = \frac{131 - 0*0/10}{138 - (0)^2/10}$

Regression cof.: $byx = \frac{131 - 0}{138 - 0}$

$byx = \frac{-131}{-138}$

byx = 0.94

Regression cof. : $bxy = \frac{\sum xy - \sum x. \sum y/n}{\sum y^2 - (\sum y)^2/n}$

Regression cof. : $byx = \frac{131 - 0* 0/10}{164 - (0)^2/10}$

Regression cof. : $bxy = \frac{131 - 0}{164 - 0}$

Regression cof. : $bxy = \frac{-131}{-164}$

bxy =0.79

Hence straightline regression y on x
y – y(bar) = byx(x-x(bar))
y-25 = 0.94(x – 30)

y =0.94x – 28.2+25
y =0.94X-3.2

Hence straightline regression x on y
x – x(bar) = bxy(y-y(bar))
x-30 = 0.79(y – 25)
y =0.79y – 19.75+30
y =0.79Y+10.25

when the wife age =16(y) find the husband age

put the value of x in equ. Second

x=0.79*16-10.25
x=12.64+10.25
x=22.89
x=23yr

10.Find the regression equation form the following data:

Age of husband : 18 19 20 21 22 23 24 25 26 27
Age of wife : 17 17 18 18 19 19 19 20 21 22

Husbands (x)	Wife(y)	U(x)	V(y)	u2	v2	Uv
18	17	-5	0	25	0	0
19	17	-4	0	16	0	0
20	18	-3	1	9	1	3
21	18	-2	1	4	1	2
22	19	-1	2	1	4	2
23	19	0	2	0	4	0
24	19	1	2	1	4	2
25	20	2	3	4	9	6
26	21	3	4	9	16	12
27	22	4	5	16	25	20
∑x=225	∑y=173	∑u(x)=	∑v(y)=	∑u2=85	∑v2=64	∑uv=47

Given ∑x=250, ∑y=173, ∑v(x)=0, ∑u(y)=0, ∑u2=85, ∑v2=64, ∑uv=47

Put the value in the formula:- Regression cof. : $byx = \frac{\sum xy - \sum x . \sum y/n}{\sum x^2 - (\sum x)^2/n}$

Regression cof : $byx = \frac{47 - 0*0/10}{85 - (0)^2/10}$

Regression cof.: $byx = \frac{47-0}{85-0}$

$byx = \frac{-47}{-85}$

byx = 0.55

Regression cof. : bxy = $\frac{\sum xy - \sum x . \sum y/n}{\sum y^2 - (\sum y)^2/n}$

Regression cof. : byx = $\frac{47 - 0^* 0/10}{64 - (0)^2/10}$

Regression cof. : bxy = $\frac{47-0}{64-0}$

Regression cof. : bxy = $\frac{-47}{-64}$

bxy =0.73

Hence straightline regression y on x

y – y(bar) = byx(x-x(bar))

y-17 = 0.55(x – 23)

y =0.55x-12.65+17

y =0.55x+4.35

Hence straightline regression x on y

x – x(bar) = bxy(y-y(bar))

x-23 = 0.73(y –17)

y =0.73– 12.41+30

y =0.73y+17.59