QB365 Question Bank Software Study Materials

Introduction to Statistical Methods and Econometrics Important 2,3 & 5 Marks Questions With Answers (Book Back and Creative)

12th Standard

Economics

Total Marks : 75

2 Marks

10 x 2 = 20

1) What is Statistics?

   Answer : (i) Statistics as a science of estimates and probabilities.

   (ii) Statistics is the collection, organisation, presentation, analysis and interpretation of numerical data.

2) What are the kinds of Statistics?

   Answer : There are two major types of statistics.

   (i) Descriptive statistics

   (ii) Inferential statistics

3) What do you mean by Inferential Statistics?

   Answer : The branch of statistics concerned with using sample data to make an inference about a population of data is called Inferential Statistics.

4) What are the kinds of data?

   Answer : (i) Based on characteristics there are quantitative and qualitative data.

   (ii) Qualitative data is classified as nominal data and rank data.

   (iii) Based on the data sources there are primary data and secondary data.

5) Define Correlation.

   Answer : (i) Correlation is a statistical device that helps to analyse the covariation of two or more variables.

   (ii) Correlation is the relationship between two or more variables which vary with the other in the same or the opposite direction.

6) Define Regression.

   Answer : (i) Regression means going back and it is a mathematical measure showing the average relationship between two variables.

   (ii) It indicates the cause and effect relationship between the variables and establishes functional relationship.

7) What is Econometrics?

   Answer : Econometrics may be defined as the social science in which the tools of economic theory, mathematics and statistical inference are applied to the analysis of economic phenomena.

8) What is central tendency?

   Answer : 1. Central value is called a measure of central tendency or an average or a measure of locations. There are five averages.

   2. Among them mean, median and mode are called simple averages and the other two averages geometric mean and harmonic mean are called special averages.

9) List the Limitations of statistics.

   Answer : 1. Statistics is not suitable to the study of qualitative phenomenon

   2. Statistical laws are not exact:

   3. Statistics table may be misused:

   4. Statistics is only one of the methods of studying a problem.

   What are the 5 averages?

10)

Answer : (i) Simple averages mean - Indian, mode.

(ii) Special averages - geometric mean, harmonic mean.

3 Marks   10 x 3 = 30

11) What are the functions of Statistics?

Answer : (I) Statistics presents facts in a definite form.

(ii) It simplifies mass of figures.

(iii) It facilitates comparison.

(iv) It helps in formulating and testing.

(v) It helps in prediction.

(vi) It helps in the formulation of suitable policies.

12) Find the Standard Deviation of the following data:14,22,9,15.20,17,12.11

Answer :

S.No	xx	$x - \bar{x}$	$(x - \bar{x})^2$
1	14	14 - 15 = -1	1
2	22	22 - 15 = 7	49
3	9	9 - 15 = -6	36
4	15	15 - 15 = 0	0
5	20	20 - 15 = 5	25
6	17	17 - 15 = 2	4
7	12	12 - 15 = 2	9
8	11	11 - 15 = 4	16
N = 8	120		140

$\bar{x} = \frac{120}{8} = 15$

$\sigma = \sqrt{\frac{\sum(x-\bar{x})^2}{n}}$

$= \sqrt{\frac{140}{8}}$

$= \sqrt{17.5}$

=4.18

Ans: 4.18

13) State and explain the different kinds of Correlation

Answer : Three of the most important ways of classifying correlation are:

(i) Based on the direction of change of variables

Positive Correlation:

(i) The correlation is said to be positive if the values of two variables move in the same direction.

(ii) Ex. Y = a + bx

Negative Correlation:

(i) When the values of variables move in the opposite directions.

(ii) Ex. Y = a - bx

(ii) Based on the number of variables studied.

Simple Correlation:

(i) If only two variables are taken for study.

Multiple Correlations:

(i) If three or more than three variables are studied simultaneously.

$$Ex : Q_d = f(P, P_v, P, t, y)$$

Partial Correlation:

(i) If there are more than two variables but only two variables are considered keeping the other variables constant, then the correlation is said to be Partial Correlation.

(iii) Based on the constancy of the ratio of change between the variables

Linear Correlation:

(i) When on the amount of change in one variable tends to bear a constant ratio to the amount of change in the other.

(ii) Ex. Y = a + bx^2

Non Linear:

(i) The amount of change in one variable does not bear a constant ratio to the amount of change in the other variables.

(ii) Ex. Y = a + bx^2

14)   Mention the uses of Regression Analysis.

     Answer : (i) Besides verification it is used for the prediction of one value, in relation to the other given value.

     (ii) Regression coefficient is an absolute figure. If we know the value of the independent variable, we can find the value of the dependent variable.

     (iii) It has wider application, as it studies linear and nonlinear relationship between the variables.

     (iv) It is widely used for further mathematical treatment.

15)   Specify the objectives of econometrics.

     Answer : (i) The general objective of Econometrics is to give empirical content to economic theory

     (ii) The specific objectives are :

     (i) It helps to explain the behaviour of a forthcoming period that is forecasting economic phenomena.

     (ii) It helps to prove the old and established relationships among the variables or between the variables.

     (iii) It helps to establish new theories and new relationships.

     (iv) It helps to test the hypotheses and estimation of the parameter.

16)   Differentiate the economic model with econometric model.

     Answer : (i) Models in Mathematical Economics are developed based on Economic Theories, while Econometric Models are developed based on Economic Theories to test the validity of Economic Theories in reality through the actual data.

     (ii) Regression Analysis in Statistics does not concentrate more on error term while Econometric Models concentrate more on error terms

17)   Discuss the important statistical organizations (offices) in India.

Answer : **Central Statistical Office (CSO)**

(i) It is responsible for co-ordination of statistical activities in the country and for evolving and maintaining statistical standards.

(ii) It compiles National Accounts, conducts Annual Survey of Industries and Economic Census, compiles Index of Industrial Production and Consumer Price Indices.

(iii) It deals with social statistics, training, international co-operation, Industrial Classification, etc.

National Sample Survey

Organisation

NSSO has four divisions:

(i) Survey Design and Research Division

(ii) Field Operations. Division

(iii) Data Processing Division

(iv) Co-ordination and Publication Division

The Programme Implementation Wing has 3 Divisions:

(i) Twenty Point Programme

(ii) Infrastructure Monitoring and Project Monitoring

(iii) Member of Parliament Local Area Development Scheme.

1. There is National Statistical Commission and one autonomous Institute, i.e., Indian Statistical Institute.

18) List the wings of Programme Implementation.

Answer : The Programme Implementation Wing has three Divisions, namely,

(i) Twenty Point Programme

(ii) Infrastructure Monitoring and Project Monitoring

(iii) Member of Parliament Local Area Development Scheme.

19) Distinguish between linear and non linear correlation.

Answer : **Linear Correlation:** Correlation is said to be linear when the amount of change in one variable tends to bear a constant ratio to the amount of change in the other.

Ex. $Y = a + bx$

Non Linear: The correlation would be non-linear if the amount of change in one variable does not bear a constant ratio to the amount of change in the other variables.

Ex. $Y = a + bx^2$

20) What are the aims of econometrics analysis?

Answer : Aims of econometric analysis:

1. Testing economic hypotheses

2. Quantifying economic parameters

3. Forecasting

4. Establishing new facts from statistical evidence (e.g. empirical relationships among variables).

5 Marks   5 x 5 = 25

21) Elucidatethe nature and scope of Statistics.

Answer : **Nature of Statistics**

(i) Different Statisticians and Economists differ in views about the nature of statistics.

(ii) Some call it a science and some say it is an art

(iii) Tippet considers Statistics both as a science as well as an art.

Scope of statistics

(i) Statistics is applied in every sphere of human activity social and physical.

Statistics and Economics

(i) Statistical data and techniques are immensely useful in solving many economic problems.

Statistics and Firms

(i) Statistics is used in many firms to find whether the product is conforming to specifications or not.

Statistics and Commerce

(i) Market survey helps to find the present conditions and to forecast the likely changes in future.

Statistics and Education

- Statistics is necessary for the formulation of policies to start new course.

- Public and private educational institutions do research and development work to test the past knowledge and evolving knowledge.

Statistics and Planning

(i) In the modern world, a "world of planning" almost all the organisations in the government are using planning for efficient working, for the formulation of policy decisions and execution of the same.

(ii) In India, statistics play an important role in planning both at the central and the state government levels, but the quality of data is highly unscientific.

Statistics and Medicine

(i) t-test is used to compare the efficiency of two medicines.

Statistics and Modern applications

(i) Recent developments in computer and information technology have enabled statistics to integrate their models and thus make statistics a part of decision making procedures of many organisations.

(ii) There are many software packages available for solving simulation problems.

22) Calculate the Karl Pearson Correlation Co-efficient for the following data

Demand of Product X	23	27	28	29	30	31	33	35	36	39
Sale of Product Y:	18	22	23	24	25	26	28	29	30	32

Answer :

S.NO.	X	Y	XY	X²	Y²
1	23	18	414	529	324
2	27	22	594	729	484
3	28	23	644	784	529
4	29	24	696	841	576
5	30	25	750	900	625
6	31	26	806	961	676
7	33	28	924	1089	784
8	35	29	1015	1225	841
9	36	30	1080	1296	900
10	39	32	1248	1521	1024
N=10	311	257	8171	9875	6763

$$r = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{N \sum X^2 - (\sum X)^2} \sqrt{N \sum Y^2 - (\sum Y)^2}}$$

$$= \frac{(10 \times 8171) - 311 \times 257}{\sqrt{(10 \times 9875) - (311)^2} \sqrt{10 \times 6763 - (257)^2}}$$

$$= \frac{81710 - 79927}{\sqrt{98750 - 96721} \sqrt{67630 - 66049}}$$

$$= \frac{1783}{\sqrt{2029} \sqrt{1581}} = 0.9955$$

Ans: + 0.9955 high correleated

23) Find the regression equation Y on X and X on Y for the following data:

Y	45	48	50	55	65	70	75	72	80	85
X	25	30	35	30	40	50	45	55	60	65

Answer :

S.No	X	X - X̄	(X - X̄)²	Y	Y - Ȳ	(Y - Ȳ)²	XY
1	45	-19.5	380.25	25	-18.5	342.25	360.75
2	48	-16.5	272.25	30	-13.5	182.25	222.75
3	50	-14.5	210.25	35	-8.5	72.25	123.25
4	55	-9.5	90..25	30	-13.5	182.25	128.25
5	65	0.5	0.25	40	-3.5	12.25	-1.75
6	70	5.5	30.25	50	6.5	42.25	35.75
7	75	10.5	110.25	45	1.5	2.25	15.75
8	72	7.5	56.25	55	11.5	132.25	86.25
9	80	15.5	240.25	60	16.5	272.25	255.75
10	85	20.5	420.25	65	21.5	462.25	440.75
10	645		1810.50	435		1702.5	1667.5

$\bar{X} = \frac{645}{10} = 64.5$

$\sigma x = \sqrt{\frac{\sum(x-\bar{x})^2}{n}}$

$= \sqrt{\frac{1810.50}{10}}$

$= \sqrt{181.05} = 13.4$

$\bar{\gamma} = \frac{435}{10} = 43.5$

$\sigma y = \sqrt{\frac{\sum(y-\bar{y})^2}{n}}$

$= \sqrt{\frac{1702.5}{10}} = \sqrt{170.25} = 13.05$

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

$= \frac{1667.5}{\sqrt{1810.50}\sqrt{1702.5}}$

$= \frac{1667.5}{42.55 \times 41.25} = \frac{1667}{1755} = 0.95$

$\bar{x} = 64.5$

$\bar{y} = 43.5$

$\sigma y = 13.05$

$\sigma x = 13.4$

r =0.95

The regression X on Y is

$x - \bar{x} = r \times \frac{\sigma x}{\sigma y} \times (y - \bar{y})$

$x - 64.5 = 0.95 \times \left(\frac{13.4}{13.05}\right) \times y - 43.5$

x-64.5 =(0.95 x 1.03) x y-43.5

x =0.9785 x (y-43.5)+64.5

x =0.9785 y-42.56+64.5

x =0.9785 y+21.94

The regression Y on X is

$y - \bar{y} = r \times \frac{vy}{\sigma x} \times (x - \bar{x})$

$y - 43.5 = 0.95 \times \frac{13.05}{13.4} \times x - 64.5$

y=0.95(0.97) x (x-64.5)+43.5

y=0.9215 x (x-64.5)+43.5

y=0.9215 x-59.44 + 43.5

Ans: y=0.9215 x-15.94

24) Describe the application of Econometrics in Economics.

Answer : Econometrics is the statistical and mathematical analysis of economic relationships, often serving as a basis for economic forecasting. It is used by economists to study relationships between economic variables Econometrics is interesting because it provides the tools to enable us to extract useful information about important economic policy issues from the available data. It is used to understand economic issues and test theories. Without evidence economic theories are abstract and has no bearing on reality. Econometrics is a set of tools we can use to confront theory with real world data. A study' could estimate a key parameter such as the price elasticity of demand for it or econometric techniques could be used to generate forecasts. It is used to develop, estimate and evaluate models which relate economic or financial variables.

25) Find out graphically, if there is any correlation between price yield per plot (qtls); denoted by Y and quantity of fertilizer used (kg); denote by X.

Plot No:	1	2	3	4	5	6	7	8	9	10

Y:	3.5	4.3	5.3	5.8	6.4	7.3	7.2	7.5	7.8	8.3
X:	6	8	9	12	10	15	17	20	18	24

Answer : The correlogram of the given data is show in Figure 4-3
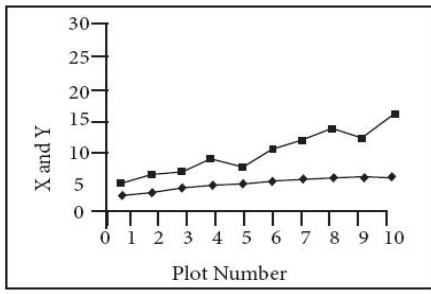
The figure shows that the two curves move in the same direction and, moreover, they are very close to each other, suggesting a close relationship between price yield per plot (qtls) and quantity of fertilizer used (kg).