

## **LONG QUESTIONS**

### **1 . MEANING OF RESEARCH OBJECTIVES AND TYPES OF RESEARCH.**

Research refers to a search for knowledge. Research is an art of scientific investigation. The Advanced Learner's Dictionary of Current English lays down the meaning of research as, "a careful investigation or inquiry specially through search for new facts in any branch of knowledge".

Redman and Mory define research as a," Systematized effort to gain new knowledge". Some people consider research as a movement, a movement from the known to the unknown.

According to Clifford Woody, research comprises defining and redefining problems, formulating hypothesis or suggested solutions collecting, organising and evaluating data, making deductions and reaching conclusions; to determine whether they fit the formulating hypothesis.

**OBJECTIVES OF RESEARCH** 1. To gain familiarity with a phenomenon or to achieve new insights into it. (exploratory or formulative research studies) 2. To describe accurately the characteristics of a particular individual, situation or a group. (descriptive research) 3. To determine the frequency with which something occurs or with which it is associated with something else. (studies with this object known as diagnostic research) 4. To test a hypothesis of a causal relationship between variables. (such studies are known as hypothesis testing research}

Types Of Research:

There are different types of research. The basic ones are as follows.

1. Descriptive Versus Analytical: Descriptive research consists of surveys and fact-finding enquiries of different types. The main objective of descriptive research is describing the state of affairs as it prevails at the time of study. The term 'ex post facto research' is quite often used for descriptive research studies in social sciences and business research. The most distinguishing feature of this method is that the researcher has no control over the variables here. He/she has to only report what is happening or what has happened. Majority of the ex post facto research projects are used for descriptive studies in which the researcher attempts to examine phenomena, such as the consumers' preferences, frequency of purchases, shopping, etc. Despite the inability of the researchers to control the variables, ex post facto studies may also comprise attempts by them to discover the causes of the selected problem. The methods of research adopted in conducting descriptive research are survey methods of all kinds, including correlational and comparative methods. Meanwhile in the Analytical research, the researcher has to use the already available facts or information, and analyse them to make a critical evaluation of the subject.

2. Applied Versus Fundamental: Research can also be applied or fundamental in nature. An attempt to find a solution to an immediate problem encountered by a firm, an industry, a business organisation, or the society is known as applied research. Researchers engaged in such researches aim at drawing certain conclusions confronting a concrete social or business problem. On the other hand, fundamental research mainly concerns generalizations and formulation of a theory. In other words, "Gathering knowledge for knowledge's sake is termed 'pure' or 'basic' research" (Young

in Kothari, 1988). Researches relating to pure mathematics or concerning some natural phenomenon are instances of Fundamental Research. Likewise, studies focusing on human behaviour also fall under the category of fundamental research. Thus, while the principal objective of applied research is to find a solution to some pressing practical problem, the objective of basic research is to find information with a broad base of application and add to the already existing organized body of scientific knowledge

3. Quantitative Versus Qualitative: Quantitative research relates to aspects that can be quantified or can be expressed in terms of quantity. It involves the measurement of quantity or amount. Various available statistical and econometric methods are adopted for analysis in such research. Which includes correlation, regressions and time series analysis etc., On the other hand, Qualitative research is concerned with qualitative phenomena, or more specifically, the aspects related to or involving quality or kind. For example, an important type of qualitative research is ‘Motivation Research’, which investigates into the reasons for certain human behaviour. The main aim of this type of research is discovering the underlying motives and desires of human beings by using 7 in-depth interviews. The other techniques employed in such research are story completion tests, sentence completion tests, word association tests, and other similar projective methods. Qualitative research is particularly significant in the context of behavioural sciences, which aim at discovering the underlying motives of human behaviour. Such research helps to analyse the various factors that motivate human beings to behave in a certain manner, besides contributing to an understanding of what makes individuals like or dislike a particular thing. However, it is worth noting that conducting qualitative research in practice is considerably a difficult task. Hence, while undertaking such research, seeking guidance from experienced expert researchers is important.

4. Conceptual Versus Empirical: The research related to some abstract idea or theory is known as Conceptual Research. Generally, philosophers and thinkers use it for developing new concepts or for reinterpreting the existing ones. Empirical Research, on the other hand, exclusively relies on the observation or experience with hardly any regard for theory and system. Such research is data based, which often comes up with conclusions that can be verified through experiments or observation. Empirical research is also known as experimental type of research, in which it is important to first collect the facts and their sources, and actively take steps to stimulate the production of desired information. In this type of research, the researcher first formulates a working hypothesis, and then gathers sufficient facts to prove or disprove the stated hypothesis. He/she formulates the experimental design, which according to him/her would manipulate the variables, so as to obtain the desired information. This type of research is thus characterized by the researcher’s control over the variables under study. In simple term, empirical research is most appropriate when an attempt is made to prove that certain variables influence the other variables in some way. Therefore, the results obtained by using the experimental or empirical studies are considered to be the most powerful evidences for a given hypothesis.

## **Q2 What is the Importance of research.**

**Ans .**According to a famous Hudson Maxim, “All progress is born of inquiry. Doubt is often better than overconfidence, for it leads to inquiry, and inquiry leads to invention”. It brings out the significance of research, increased amount of which makes the progress possible.

Research encourages scientific and inductive thinking, besides promoting the development of logical habits of thinking and organisation. The role of research in applied economics in the context of an economy or business is greatly increasing in modern times. The increasingly complex nature of government and business has raised the use of research in solving operational problems. Research assumes significant role in the formulation of economic policy for both, the government and business. It provides the basis for almost all government policies of an economic system. Government budget formulation, for example, depends particularly on the analysis of needs and desires of people, and the availability of revenues, which requires research. Research helps to formulate alternative policies, in addition to examining the consequences of these alternatives. Thus, research also facilitates the decision-making of policy-makers, although in itself is not a part of research. In the process, research also helps in the proper allocation of a country's scarce resources. Research is also necessary for collecting information on the social and economic structure of an economy to understand the process of change occurring in the country. Collection of statistical information, though not a routine task, involves various research problems. Therefore, large staff of research technicians or experts are engaged by the government these days to undertake this work. Thus, research as a tool of government economic policy formulation involves three distinct stages of operation: (i) investigation of economic structure through continual compilation of facts; (ii) diagnosis of events that are taking place and analysis of the forces underlying them; and (iii) the prognosis i.e., the prediction of future developments (Wilkinson and Bhandarkar, 1979). Research also assumes significance in solving various operational and planning problems associated with business and industry. In several ways, operations research, market research and motivational research are vital and their results assist in taking business decisions. Market research refers to the investigation of the structure and development of a market for the formulation of efficient policies relating to purchases, production and sales. Operational research relates to the application of logical, mathematical, and analytical techniques to find solution to business problems, such as cost minimization or profit maximization, or the optimization problems. Motivational research helps to determine why people behave in the manner they do with respect to market characteristics. More specifically, it is concerned with the analysis of the motivations underlying consumer behaviour. All these researches are very useful for business and industry, and are responsible for business decision-making. Research is equally important to social scientists for analyzing the social relationships and seeking explanations to various social problems. It gives intellectual satisfaction of knowing things for the sake of knowledge. It also possesses the practical utility for the social scientist to gain knowledge so as to be able to do something better or in a more efficient manner. The research in social sciences is concerned with both knowledge for its own sake, and knowledge for what it can contribute to solve practical problems.

### **Q 3. Explain various types Of Research Design**

**Ans.** There are different types of research designs. They may be broadly categorized as: (1) Exploratory Research Design; (2) Descriptive and Diagnostic Research Design; and (3) Hypothesis-Testing Research Design.

**Exploratory Research Design:** The Exploratory Research Design is known as formulative research design. The main objective of using such a research design is to formulate a research problem for an in-depth or more precise investigation, or for developing a working hypothesis from an operational aspect. The major purpose of such studies is the discovery of ideas and insights. Therefore, such a research design suitable for such a study should be flexible enough to provide opportunity for considering different dimensions of the problem under study. The in-built flexibility in research design is required as the initial research problem would be transformed into a more precise one in the exploratory study, which in turn may necessitate changes in the research procedure for collecting relevant data.

Usually, the following three methods are considered in the context of a research design for such studies. They are (a) a survey of related literature; (b) experience survey; and (c) analysis of ‘insight-stimulating’ instances.

**2. Descriptive And Diagnostic Research Design:** A Descriptive Research Design is concerned with describing the characteristics of a particular individual or a group. Meanwhile, a diagnostic research design determines the frequency with which a variable occurs or its relationship with another variable. In other words, the study analyzing whether a certain variable is associated with another comprises a diagnostic research study. On the other hand, a study that is concerned with specific predictions or with the narration of facts and characteristics related to an individual, group or situation, are instances of descriptive research studies. Generally, most of the social research design falls under this category. As a research design, both the descriptive and diagnostic studies share common requirements, hence they are grouped together. However, the procedure to be used and the research design need to planned carefully. The research design must also make appropriate provision for protection against bias and thus maximize reliability, with due regard to the completion of the research study in an economical manner. The research design in such studies should be rigid and not flexible. Besides, it must also focus attention on the following: a) Formulation of the objectives of the study, b) Proper designing of the methods of data collection, c) Sample selection, d) Data collection, e) Processing and analysis of the collected data, and f) Reporting the findings.

**3. Hypothesis-Testing Research Design:** Hypothesis-Testing Research Designs are those in which the researcher tests the hypothesis of causal relationship between two or more variables. These studies require procedures that would not only decrease bias and enhance reliability, but also facilitate deriving inferences about the causality. Generally, experiments satisfy such requirements. Hence, when research design is discussed in such studies, it often refers to the design of experiments.

#### **Q4 Explain Characteristics Of A Good Research Design:**

**Ans** A good research design often possesses the qualities of being flexible, suitable, efficient, economical and so on. Generally, a research design which minimizes bias and maximizes the reliability of the data collected and analysed is considered a good design (Kothari 1988). A research design which does not allow even the smallest experimental error is said to be the best design for investigation. Further, a research design that yields maximum information and provides

an opportunity of viewing the various dimensions of a research problem is considered to be the most appropriate and efficient design. Thus, the question of a good design relates to the purpose or objective and nature of the research problem studied. While a research design may be good, it may not be equally suitable to all studies. In other words, it may be lacking in one aspect or the other in the case of some other research problems. Therefore, no single research design can be applied to all types of research problems. A research design suitable for a specific research problem would usually involve the following considerations: i. The methods of gathering the information; ii. The skills and availability of the researcher and his/her staff, if any; iii. The objectives of the research problem being studied; iv. The nature of the research problem being studied; and v. The available monetary support and duration of time for the research work.

#### **Q5 Meaning of Hypothesis and characteristics Of Hypothesis**

**Ans** “Hypothesis may be defined as a proposition or a set of propositions set forth as an explanation for the occurrence of some specified group of phenomena either asserted merely as a provisional conjecture to guide some investigation in the light of established facts” (Kothari, 1988). A research hypothesis is quite often a predictive statement, which is capable of being tested using scientific methods that involve an independent and some dependent variables. For instance, the following statements may be considered: i. “Students who take tuitions perform better than the others who do not receive tuitions” or, ii. “The female students perform as well as the male students. These two statements are hypotheses that can be objectively verified and tested. Thus, they indicate that a hypothesis states what one is looking for. Besides, it is a proposition that can be put to test in order to examine its validity.

**Characteristics Of Hypothesis:** A hypothesis should have the following characteristic features:- i. A hypothesis must be precise and clear. If it is not precise and clear, then the inferences drawn on its basis would not be reliable. ii. A hypothesis must be capable of being put to test. Quite often, the research programmes fail owing to its incapability of being subject to testing for validity. Therefore, some prior study may be conducted by the researcher in order to make a hypothesis testable. A hypothesis “is tested if other deductions can be made from it, which in turn can be confirmed or disproved by observation” iii. A hypothesis must state relationship between two variables, in the case of relational hypotheses. iv. A hypothesis must be specific and limited in scope. This is because a simpler hypothesis generally would be easier to test for the researcher. And therefore, he/she must formulate such hypotheses. v. As far as possible, a hypothesis must be stated in the simplest language, so as to make it understood by all concerned. However, it should be noted that simplicity of a hypothesis is not related to its significance. vi. A hypothesis must be consistent and derived from the most known facts. In other words, it should be consistent with a substantial body of established facts. That is, it must be in the form of a statement which is most likely to occur. vii. A hypothesis must be amenable to testing within a stipulated or reasonable period of time. No matter how excellent a hypothesis, a researcher should not use it if it cannot be tested within a given period of time, as no one can afford to spend a life-time on collecting data to test it

#### **Q6 Explain procedure Of Hypothesis Testing:**

**Ans** Testing a hypothesis refers to verifying whether the hypothesis is valid or not. Hypothesis testing attempts to check whether to accept or not to accept the null hypothesis. The procedure of hypothesis testing includes all the steps that a researcher undertakes for making a choice between the two alternative actions of rejecting or accepting a null hypothesis. The various steps involved in hypothesis testing are as follows:

- 1) Making a Formal Statement: This step involves making a formal statement of the null hypothesis ( $H_0$ ) and the alternative hypothesis ( $H_a$ ). This implies that the hypotheses should be clearly stated within the purview of the research problem. For example, suppose a school teacher wants to test the understanding capacity of the students which must be rated more than 90 per cent in terms of marks, the hypotheses may be stated as follows: Null Hypothesis  $H_0 : = 100$  Alternative Hypothesis  $H_1 : > 100$
- 2) Selecting A Significance Level: The hypotheses should be tested on a pre-determined level of significance, which should be specified. Usually, either 5% level or 1% level is considered for the purpose. The factors that determine the levels of significance are: (a) the magnitude of difference between the sample means; (b) the sample size; (c) the variability of measurements within samples; and (d) whether the hypothesis is directional or non-directional In sum, the level of significance should be sufficient in the context of the nature and purpose of enquiry.
- 3) Deciding The Distribution To Use: After making decision on the level of significance for hypothesis testing, the researcher has to next determine the appropriate sampling distribution. The choice to be made generally relates to normal distribution and the t-distribution. The rules governing the selection of the correct distribution are similar to the ones already discussed with respect to estimation.
- 4) Selection Of A Random Sample And Computing An Appropriate Value: Another step involved in hypothesis testing is the selection of a random sample and then computing a suitable value from the sample data relating to test statistic by using the appropriate distribution. In other words, it involves drawing a sample for furnishing empirical data.
- 5) Calculation Of The Probability: The next step for the researcher is to calculate the probability that the sample result would diverge as far as it can from expectations, under the situation when the null hypothesis is actually true.
- 6) Comparing The Probability: Another step involved consists of making a comparison of the probability calculated with the specified value of  $\alpha$ , i.e. The significance level. If the calculated probability works out to be equal to or smaller than the  $\alpha$  value in case of one-tailed test, then the null hypothesis is to be rejected. On the other hand, if the calculated probability is greater, then the null hypothesis is to be accepted. In case the null hypothesis  $H_0$  is rejected, the researcher runs the risk of committing the Type I error. But, if the null hypothesis  $H_0$  is accepted, then it involves some risk (which cannot be specified in size as long as  $H_0$  is vague and not specific) of committing the Type II error

#### **Q 7 Explain various steps in sampling design**

Ans A researcher should take into consideration the following aspects while developing a sample design:

- 1) Type Of Universe: The first step involved in developing sample design is to clearly define the number of cases, technically known as the universe. A universe may be finite or infinite. In a finite universe the number of items is certain, whereas in the case of an infinite universe the number of items is infinite (i.e., there is no idea about the total number of items). For example, while the population of a city or the number of workers in a factory comprise finite universes, the number of stars in the sky, or throwing of a dice represent infinite universe.
- 2) Sampling Unit: Prior to selecting a sample, decision has to be made about the sampling unit. A sampling unit may be a geographical area like a state, district, village, etc., or a social unit like a family, religious community, school, etc., or it may also be an individual. At times, the researcher would have to choose one or more of such units for his/her study.
- 3) Source List: Source list is also known as the ‘sampling frame’, from which the sample is to be selected. The source list consists of names of all the items of a universe. The researcher has to prepare a source list when it is not available. The source list must be reliable, comprehensive, correct, and appropriate. It is important that the source list should be as representative of the population as possible.
- 4) Size Of Sample: Size of the sample refers to the number of items to be chosen from the universe to form a sample. For a researcher, this constitutes a major problem. The size of sample must be optimum. An optimum sample may be defined as the one that satisfies the requirements of representativeness, flexibility, efficiency, and reliability. While deciding the size of sample, a researcher should determine the desired precision and the acceptable confidence level for the estimate. The size of the population variance should be considered, because in the case of a larger variance generally a larger sample is required. The size of the population should be considered as it also limits the sample size. The parameters of interest in a research study should also be considered, while deciding the sample size. Besides, costs or budgetary constraint also plays a crucial role in deciding the sample size.  
(A) Parameters Of Interest: The specific population parameters of interest should also be considered while determining the sample design. For example, the researcher may want to make an estimate of the proportion of persons with certain characteristic in the population, or may be interested in knowing some average regarding the population. The population may also consist of important sub-groups about whom the researcher would like to make estimates. All such factors have strong impact on the sample design the researcher selects.  
(B) Budgetary Constraint: From the practical point of view, cost considerations exercise a major influence on the decisions related to not only the sample size, but also on the type of sample selected. Thus, budgetary constraint could also lead to the adoption of a non-probability sample design.  
(c) Sampling Procedure: Finally, the researcher should decide the type of sample or the technique to be adopted for selecting the items for a sample. This technique or procedure itself may represent the sample design. There are different sample designs from which a researcher should select one for his/her study. It is clear that the researcher should select that design which, for a given sample size and budget constraint, involves a smaller error.

### **Q8 Explain different Types Of Sample Designs**

**Ans** Sample designs may be classified into different categories based on two factors, namely, the representation basis and the element selection technique. Under the representation basis, the sample may be classified as: I. Non-probability sampling II. Probability sampling While probability sampling is based on random selection, the nonprobability sampling is based on ‘non-random’ selection of samples.

I. Non-Probability Sampling: Non-probability sampling is the sampling procedure that does not afford any basis for estimating the probability that each item in the population would have an equal chance of being included in the sample. Non-probability sampling is also known as deliberate sampling, judgment sampling and purposive sampling. Under this type of sampling, the items for the sample are deliberately chosen by the researcher; and his/her choice concerning the choice of items remains supreme. In other words, under non-probability sampling the researchers select a particular unit of the universe for forming a sample on the basis that the small number that is thus selected out of a huge one would be typical or representative of the whole population. For example, to study the economic conditions of people living in a state, a few towns or village may be purposively selected for an intensive study based on the principle that they are representative of the entire state. In such a case, the judgment of the researcher of the study assumes prime importance in this sampling design.

Quota Sampling: Quota sampling is also an example of non-probability sampling. Under this sampling, the researchers simply assume quotas to be filled from different strata, with certain restrictions imposed on how they should be selected. This type of sampling is very convenient and is relatively less expensive. However, the samples selected using this method certainly do not satisfy the characteristics of random samples. They are essentially judgment samples and inferences drawn based on that, would not be amenable to statistical treatment in a formal way.

II. Probability Sampling: Probability sampling is also known as ‘choice sampling’ or ‘random sampling’. Under this sampling design, every item of the universe has an equal chance of being included in the sample. In a way, it is a lottery method under which individual units are selected from the whole group, not deliberately, but by using some mechanical process. Therefore, only chance would determine whether an item or the other would be included in the sample or not. The results obtained from probability or random sampling would be assured in terms of probability. That is, the researcher can measure the errors of estimation or the significance of results obtained from the random sample. This is the superiority of random sampling design over the deliberate sampling design. Random sampling satisfies the law of statistical regularity, according to which if on an average the sample chosen is random, then it would have the same composition and characteristics of the universe. This is the reason why the random sampling method is considered the best technique of choosing a representative sample

### **Q9 Explain various Methods of Collecting Primary Data**

**Ans** Primary data may be obtained by applying any of the following methods:

1. Direct Personal Interviews.
2. Indirect Oral Interviews.
3. Information from Correspondents.
4. Mailed Questionnaire Methods.
5. Schedule Sent Through Enumerators.

1. Direct Personal Interviews: A face to face contact is made with the informants (persons from whom the information is to be

obtained) under this method of collecting data. The interviewer asks them questions pertaining to the survey and collects the desired information. Thus, if a person wants to collect data about the working conditions of the workers of the Tata Iron and Steel Company, Jamshedpur, he would go to the factory, contact the workers and obtain the desired information. The information collected in this manner is first hand and also original in character. There are many merits and demerits of this method, which are discussed as under: Merits: 1. Most often respondents are happy to pass on the information required from them when contacted personally and thus response is encouraging. 2. The information collected through this method is normally more accurate because interviewer can clear doubts of the informants about certain questions and thus obtain correct information. In case the interviewer apprehends that the informant is not giving accurate information, he may cross-examine him and thereby try to obtain the information. Indirect Oral Interviews: Under this method of data collection, the investigator contacts third parties generally called 'witnesses' who are capable of supplying necessary information. This method is generally adopted when the information to be obtained is of a complex nature and informants are not inclined to respond if approached directly. For example, when the researcher is trying to obtain data on drug addiction or the habit of taking liquor, there is high probability that the addicted person will not provide the desired data and hence will disturb the whole research process. Mailed Questionnaire Method: Under this method, a list of questions pertaining to the survey which is known as 'Questionnaire' is prepared and sent to the various informants by post. Sometimes the researcher himself too contacts the respondents and gets the responses related to various questions in the questionnaire.

#### **Q10 Explain Various principles of research design.**

**Ans1.** The Principle of Replication

2. The Principle of Randomization and
3. The Principle of Local Control

1. The Principle Of Replication: According to this principle, the experiment should be repeated more than once. Thus, each treatment is applied in many experimental units instead of one. This way the statistical accuracy of the experiments is increased. For example, suppose we are going to examine the effect of two varieties of wheat. Accordingly, we divide the field into two parts and grow one variety in one part and the other variety in the other. Then we compare the yield of the two parts and draw conclusion on that basis. But if we are to apply the principle of replication to this experiment, then we first divide the field into several parts, grow one variety in half of these parts and the other variety in the remaining parts. Then we collect the data of yield of the two varieties and draw conclusion by comparing the same. The result so obtained will be more reliable in comparison to the conclusion we draw without applying the principle of replication. The entire experiment can be repeated several times for better results.

2. The Principle Of Randomization: When we conduct an experiment, the principle of randomization provides us a protection against the effects of extraneous factors. This means that this principle indicates that the researcher should design or plan the experiment in such a way that the variations caused by extraneous factors can all be combined under the general heading of 'chance'. For example, when a researcher grows one variety of wheat , say , in the first half of the

parts of a field and the other variety he grows in the other half, then it is just possible that the soil fertility may be different in the first half in comparison to the other half. If this is so the researcher's result is not realistic. In this situation, he may assign the variety of wheat to be grown in different parts of the field on the basis of some random sampling technique i.e., he may apply randomization principle and protect himself against the effects of the extraneous factors. Therefore, by using the principle of randomization, he can draw a better estimate of the experimental error.

**3. The Principle Of Local Control:** This is another important principle of experimental designs. Under this principle, the extraneous factor which is the known source of variability is made to vary deliberately over as wide a range as necessary. This needs to be done in such a way that the variability it causes can be measured and hence eliminated from the experimental error. The experiment should be planned in such a way that the researcher can perform a two-way analysis of variance, in which the total variability of the data is divided into three components attributed to treatments (varieties of wheat in this case), the extraneous factor (soil fertility in this case) and experimental error. In short, through the principle of local control we can eliminate the variability due to extraneous factors from the experimental error.

## **Short Questions**

### **Q1 What is research process.**

Ans .Research process consists of a series of steps or actions required for effectively conducting research. The following are the steps that provide useful procedural guidelines regarding the conduct of research: (1) Formulating the research problem; (2) Extensive literature survey; (3) Developing hypothesis; (4) Preparing the research design; (5) Determining sample design; (6) Collecting data; (7) Execution of the project; (8) Analysis of data; (9) Hypothesis testing; (10) Generalization and interpretation, and (11) Preparation of the report or presentation of the results.

### **Q2 . Dependent And Independent Variables:**

Ans A magnitude that varies is known as a variable. The concept may assume different quantitative values like height, weight, income etc. Qualitative variables are not quantifiable in the strictest sense of the term. However, the qualitative phenomena may also be quantified in terms of the presence or absence of the attribute(s) considered. The phenomena that assume different values quantitatively even in decimal points are known as 'continuous variables'. But all variables need not be continuous. Values that can be expressed only in integer values are called 'non-continuous variables'. In statistical terms, they are also known as 'discrete variables'. For example, age is a continuous variable, whereas the number of children is a non-continuous variable. When changes in one variable depend upon the changes in other variable or variables, it is known as a dependent or endogenous variable, and the variables that cause the changes in the dependent variable are known as the independent or explanatory or exogenous variables. For example, if demand depends upon price, then demand is a dependent variable, while price is the independent variable. And, if more variables determine demand, like income and price of the substitute commodity, then demand

also depends upon them in addition to the price of original commodity. In other words, demand is a dependent variable which is determined by the independent variables like price of the original commodity, income and price of substitutes.

### **Q3 .Meaning of Extraneous Variables:**

**Ans** The independent variables which are not directly related to the purpose of the study but affect the dependent variables, are known as extraneous variables. For instance, assume that a researcher wants to test the hypothesis that there is a relationship between children's school performance and their self-confidence, in which case the latter is an independent variable and the former, a dependent variable. In this context, intelligence may also influence the school performance. However, since it is not directly related to the purpose of the study undertaken by the researcher, it would be known as an extraneous variable. The influence caused by the extraneous variable(s) on the dependent variable is technically called the 'experimental error'. Therefore, a research study should always be framed in such a manner that the influence of extraneous variables on the dependent variable/s is completely controlled, and the influence of independent variable/s is clearly evident.

### **Q4 Meaning of the Level Of Significance:**

**Ans** It is a certain percentage that should be chosen with great care, reason and insight. If for instance, the significance level is taken at 5 per cent, then it means that H<sub>0</sub> would be rejected when the sampling result has a less than 0.05 probability of occurrence when H<sub>0</sub> is true. In other words, the five per cent level of significance implies that the researcher is willing to take a risk of five per cent of rejecting the null hypothesis, when (H<sub>0</sub>) is actually true. In sum, the significance level reflects the maximum value of the probability of rejecting H<sub>0</sub> when it is actually true, and which is usually determined prior to testing the hypothesis.

### **Q5 Meaning of Type I And Type II Errors:**

**Ans** As regards the testing of hypotheses, a researcher can make basically two types of errors. He/she may reject H<sub>0</sub> when it is true, or accept H<sub>0</sub> when it is not true. The former is called as Type I error and the latter is known as Type II error. In other words, Type I error implies the rejection of a hypothesis when it must have been accepted, while Type II error implies the acceptance of a hypothesis which must have been rejected. Type I error is denoted by  $\alpha$  (alpha) and is known as  $\alpha$  error, while Type II error is usually denoted by  $\beta$  (beta) and is known as  $\beta$  error.

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