

# Important Study Notes on Research Aptitude UGC NET Paper 1

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***UGC NET Study materiel on Research Topics for NET Exam has been covered entirely based on topics provided in the syllabus.***

***In the 7 Parts series which can be referred using below, the first six parts contain important short study notes useful for your paper 1 preparation while the 7th part contains solved question papers of last almost 12 years MCQ Question which is asked in the previous examination.***

***Please sequentially go through them to understand them in better ways.***

## Unit-II Research Aptitude

### Introduction

After reading this blog, you should be able to answer most of the frequently asked Question from Research Methodology aptitude question asked in the various examination. This is specially collected Key Study Material of Research Aptitude For UGC NET Exam and also important for various SET examination as they are based on the same syllabus.

*After going through this blog you will learn the key concepts in Research which are important for UGC NET preparation. For the sake of simplicity, the content has been*

divided into 30 subheadings.

***Important ! its long article ...in case you wish to read offline you can download the PDF format at the end of the article.***

## **What is research? What are the different types of research?**

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### **Definition of Research :**

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Research is a logical and systematic search for new and useful information on a particular topic.

In the well-known nursery rhyme

“Twinkle Twinkle Little Star, How I Wonder What You Are”

The use of the words **how** and **what** essentially summarizes what research is. It is an investigation of finding solutions to scientific and social problems through objective and systematic analysis.

It is a search for knowledge, that is, a discovery of hidden truths. Here knowledge means information about matters. The information might be collected from different sources like experience, human beings, books, journals, nature, etc. Research can lead to new contributions to existing knowledge.

Only through research is it possible to make progress in a field. Research is indeed civilization and determines the economic, social and political development of a nation. The results of scientific research very often force a change in the philosophical view of problems which extend far beyond the restricted domain of science itself.

### **Objectives of Research**

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The prime objectives of the research are :

- to discover new facts
- to verify and test important facts
- to analyses an event or process or phenomenon to identify the cause and effect relationship
- to develop new scientific tools, concepts and theories to solve and understand scientific and nonscientific problems
- to find solutions to scientific, nonscientific and social problems and
- to overcome or solve the problems occurring in our everyday life.

Research is not confined to science and technology only. There are vast areas of research in other disciplines such as languages, literature, history and sociology. Whatever might be the subject, research has to be an active, diligent and systematic process of inquiry to discover, interpret or revise facts, events, behaviours and theories.

Applying the outcome of research for the refinement of knowledge in other subjects, or in enhancing the quality of human life also becomes a kind of research and development.

***According to Redman and Mory (1923), research is a “systematized effort to gain new knowledge”. In simple terms research refers to a search for knowledge. It is a scientific and systematic search for information on a particular topic or issue. It is also known as the art of scientific investigation.***

## **Different Types of Research**

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

### **Descriptive Versus Analytical**

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- Descriptive research consists of surveys and fact-finding inquiries of different types. The main objective of descriptive research is describing the state of affairs as it prevails at the time of the 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.
- The 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, the 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 correlation and comparative methods. Meanwhile, in Analytical research, the researcher has to use the already available facts or the information and analyze them to make a critical evaluation of the subject.

### **Applied Versus Fundamental**

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- Research can also be applied or fundamental. An attempt to find a solution to an immediate problem encountered by a firm, an industry, a business organization, 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 the 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.

### **Quantitative Versus Qualitative**

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- 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 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 considered a difficult task. Hence, while undertaking such research, seeking guidance from experienced expert researchers is important.

### **Conceptual Versus Empirical**

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- 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 the 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, 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 evidence for a given hypothesis.

## Other Types Of Research

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The remaining types of research are variations of one or more of the above-mentioned type of research.

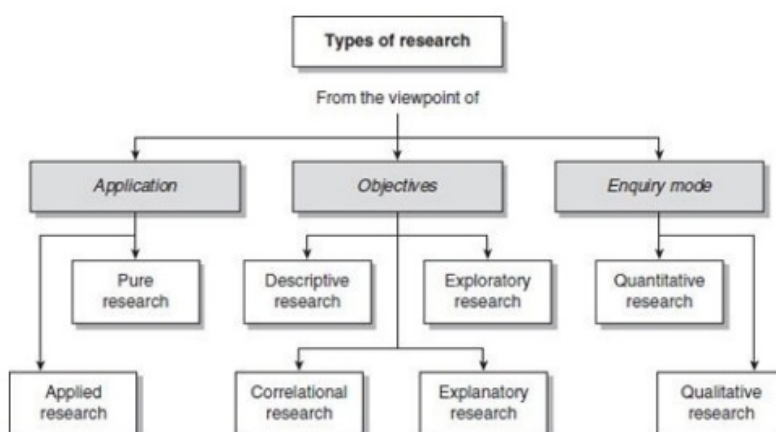
They vary in terms of the purpose of research, or the time required to complete it, or maybe based on some other similar factor. Based on time, research may either be like **one-time or longitudinal time-series research**. While the research is restricted to a single period in the former case, it is conducted over several time-periods in the latter case.

Depending upon the environment in which the research is to be conducted, it can also be **laboratory research or field-setting research, or simulation research**, besides being diagnostic or clinical. Under such research, in-depth approaches or case study method may be employed to analyze the basic causal relations. These studies usually undertake a detailed in-depth analysis of the causes of certain events of interest and use very small samples and sharp data collection methods.

The research may also be explanatory. Formalized research studies consist of substantial structure and specific hypotheses to be verified. As regards to historical research, sources like historical documents, remains, etc. Are utilized to study past events or ideas. It also includes philosophy of persons and groups of the past or any remote point of time.

## Types of research can be looked at from three different perspectives

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## Fundamental or basic research

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- Basic research is an investigation of basic principles and reasons for the occurrence of a particular event or process or phenomenon. It is also called theoretical research. Study or investigation of some natural phenomenon or relating to pure science are termed as basic research.
- Basic researches some times may not lead to immediate use or application. It is not concerned with solving any practical problems of immediate interest. But it is original or basic. It provides a systematic and deep insight into a problem and facilitates the extraction of scientific and logical explanation and conclusion on it.
- It helps build new frontiers of knowledge. The outcomes of basic research form the basis for much-applied research. Researchers working on applied research have to make use of the outcomes of basic research and explore the utility of them.
- Research on improving a theory or a method is also referred to as fundamental research. For example, suppose a theory applies to a system provided the system satisfies certain specific conditions.
- Attempts to find answers to the following questions form basic research.
  - Why are materials like that
  - What are they?
  - How does a crystal-melt?
  - Why is the sound produced when water is heated?
  - Why do we feel difficult when walking on the seashore?
  - Why are birds arrange them in '>' shape when flying in a group
- Examples of Fundamental or Basic Research :
  - All Famous Theorems of Physics
  - All Laws of Maths and science we studied from childhood

## **Applied research**

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- In an applied research one solves certain problems employing well known and accepted theories and principles. Most of the experimental research, case studies and inter-disciplinary research are essentially applied research.
- Applied research is helpful for basic research. A research, the outcome of which has immediate application is also termed as applied research.
- Such research is of practical use to current activity. For example, research on social problems has immediate use. Applied research is concerned with actual life research such as research on increasing efficiency of a machine, increasing gain factor of production of a material, pollution control, preparing vaccination for the disease, etc. They have immediate potential applications.

## **Differences between Fundamental and Applied Research**

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Differences between applied and fundamental research have been specified in a way that fundamental research studies individual cases without generalizing, and recognizes that other variables are in constant change.

Applied research, on the contrary, seeks generalizations and assumes that other variables do not change. The table below summarizes the differences between the two types of research in terms of purpose and context:

	<b>Fundamental research</b>	<b>Applied research</b>
<i>Purpose</i>	Expand knowledge of processes of business and management Results in universal principles relating to the process and its relationship to outcomes  Findings of significance and value to society in general	Improve understanding of particular business or management problem Results in solution to the problem  New knowledge limited to problem  Findings of practical relevance and value to the manager(s) in an organization(s)
<i>Context</i>	Undertaken by people based in universities Choice of topic and objectives determined by the researcher  Flexible time scales	Undertaken by people based in a variety of settings including organizations and universities Objectives negotiated with the originator  Tight time scales

**[Source – Differences between fundamental and applied research[1]]**

**Discuss various qualities of a researcher**

A researcher needs to possess certain qualities to conduct research.

- First of all, the nature of a researcher must be of the temperament that vibrates in unison with the theme which he is searching. Hence, the seeker of knowledge must be truthful with the truthfulness of nature, which is much more important, much more exacting than what is sometimes known as truthfulness. The truthfulness relates to the desire for accuracy of observation and precision of statement. Ensuring facts is the principal rule of science, which is not an easy matter.
- The difficulty may arise due to an untrained eye, which fails to see anything beyond what it has the power of seeing and sometimes even less than that. This may also be due to the lack of discipline in the method of science. An unscientific individual often remains satisfied with the expressions like approximately, almost, or nearly, which is never what nature is. Real research cannot see two things which differ, however minutely, as the same.
- A researcher must possess an alert mind. Nature is constantly changing and revealing itself in various ways. A scientific researcher must be keen and watchful to notice such changes, no matter how small or insignificant they may appear. Such receptivity has to be cultivated slowly and patiently over time by the researcher through practice.

- An individual who is ignorant or not alert and receptive during his research will not make a good researcher. He will fail as a good researcher if he has no keen eyes or mind to observe the unusual changes in the routine. Research demands a systematic immersion into the subject matter by the researcher grasp even the slightest hint that may culminate into significant research problems. In this context, Cohen and Negal cited by (Selltiz et al, 1965; Wilkinson and Bhandarkar, 1979) state that “the ability to perceive in some brute experience the occasion of a problem is not a common talent among men... it is a mark of scientific genius to be sensitive to difficulties where less gifted people pass by untroubled by doubt”.
- Scientific inquiry is pre-eminently an intellectual effort. It requires the moral quality of courage, which reflects the courage of a steadfast endurance. The process of conducting research is not an easy task. There are occasions when a research scientist might feel defeated or completely lost. This is the stage when a researcher would need immense courage and a sense of conviction. The researcher must learn the art of enduring intellectual hardships.
- A researcher should cultivate the habit of reserving judgment when the required data are insufficient.

## Different types of research design

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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

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The Exploratory Research Design is known as the formative 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 the opportunity for considering different dimensions of the problem under study. The inbuilt 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.

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Usually, the following three methods are considered in the context of a research design for such studies. They are

- a survey of related literature;
- experience survey; and
- analysis of ‘insight stimulating’ instances.

### **Descriptive And Diagnostic Research Design**

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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.

### **Hypothesis-Testing Research Design**

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Hypothesis-Testing Research Designs are those in which the researcher tests the hypothesis of the 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.

### **Some of the important concepts relating to Research Design**

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Research Design helps to decide upon issues like what, when, where, how much, by what means etc. Concerning an enquiry or a research study. A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure.’

Research design is the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement and analysis of data (Selltiz et al, 1962).

### **Dependent And Independent Variables**

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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 depending 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 the 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 the original commodity. In other words, demand is a dependent variable which is determined by the independent variables like the price of the original commodity, income and price of substitutes.

### **Extraneous Variables**

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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 school performance.

- However, since it is not directly related to the purpose of the study undertaken by the 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 are completely controlled, and the influence of independent variable/s is evident.

### **Control**

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One of the most important features of a good research design is to minimize the effect of the extraneous variable(s). Technically, the term 'control' is used when a researcher designs the study in such a manner that minimizes the effects of extraneous variables.

The term 'control' is used in experimental research to reflect the restraint in experimental conditions.

### **Research Hypothesis**

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When a prediction or a hypothesized relationship is tested by adopting scientific methods, it is known as the research hypothesis.

The research hypothesis is a predictive statement which relates to a dependent variable and an independent variable. Generally, a research hypothesis must consist of at least one dependent variable and one independent variable.

Whereas the relationships that are assumed but not to be tested are predictive statements that are not to be objectively verified, thus are not classified as research hypotheses.

**Experimental and Non-experimental Hypothesis Testing Research:** When the objective of the research is to test a research hypothesis, it is known as hypothesis-testing research. Such research may be like the experimental design or non-experimental design.

- The research in which the independent variable is manipulated is known as ‘experimental hypothesis-testing research’, whereas the research in which the independent variable is not manipulated is termed as ‘non-experimental hypothesis-testing research’. For example, assume that a researcher wants to examine whether family income influences the school attendance of a group of students, by calculating the coefficient of correlation between the two variables. Such an example is known as non-experimental hypothesis-testing research because the independent variable – family income is not manipulated here.
- Again assume that the researcher randomly selects 150 students from a group of students who pay their school fees regularly and then classify them into two sub-groups by randomly including 75 in Group A, whose parents have regular earning, and 75 in Group B, whose parents do not have regular earning. Assume that at the end of the study, the researcher conducts a test on each group to examine the effects of regular earnings of the parents on the school attendance of the student.
- Such a study is an example of experimental hypothesis-testing research because in this particular study the independent variable regular earnings of the parents have been manipulated

### **Experimental And Control Groups**

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When a group is exposed to usual conditions in experimental hypothesis-testing research, it is known as ‘control group’. On the other hand, when the group is exposed to a certain new or special condition, it is known as an ‘experimental group’.

In the afore-mentioned example, Group A can be called as a control group and Group B as an experimental group. If both the groups, A and B are exposed to some special feature, then both the groups may be called as 'experimental groups'. Research design may include only the experimental group or both the experimental and control groups together.

## **Treatments**

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Treatments refer to the different conditions to which the experimental and control groups are subject to. In the example considered, the two treatments are the parents with regular earnings and those with no regular earnings. Likewise, if a research study attempts to examine through an experiment the comparative effect of three different types of fertilizers on the yield of rice crop, then the three types of fertilizers would be treated as the three treatments.

## **Experiment**

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Experiment refers to the process of verifying the truth of a statistical hypothesis relating to a given research problem.

- For instance, an experiment may be conducted to examine the yield of a certain new variety of rice crop developed. Further, Experiments may be categorized into two types, namely, 'absolute experiment' and 'comparative experiment'.
- If a researcher wishes to determine the impact of chemical fertilizer on the yield of a particular variety of rice crop, then it is known as an absolute experiment. Meanwhile, if the researcher wishes to determine the impact of chemical fertilizer as compared to the impact of bio-fertilizer, then the experiment is known as a comparative experiment.

**Experimental Unit(s):** Experimental units refer to the pre-determined plots, characteristics of the blocks, to which different treatments are applied. It is worth mentioning here that such experimental units must be selected with great caution.

## **What is a Hypothesis and discuss the characteristic of a hypothesis?**

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The 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 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.

The characteristics of a hypothesis are as follow:

- 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.
- A hypothesis must be capable of being put to test. Quite often, the research programmes fail to owe to its incapability of being subject to testing for validity. Therefore, some prior study may be conducted by the researcher 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” (Kothari, 1988).
- A hypothesis must state the relationship between two variables, in the case of relational hypotheses.
- 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.
- As far as possible, a hypothesis must be stated in the simplest language, to make it understood by all concerned. However, it should be noted that the simplicity of a hypothesis is not related to its significance.
- A hypothesis must be consistent and derived from the most known facts. In other words, it should be consistent with a substantial body of facts. That is, it must be in the form of a statement which is most likely to occur.
- A hypothesis must be amenable to testing within a stipulated or reasonable period. No matter how excellent a hypothesis, a researcher should not use it if it cannot be tested within a given period, as no one can afford to spend a lifetime on collecting data to test it.
- A hypothesis should state the facts that give rise to the necessity of looking for an explanation. This is to say that by using the hypothesis, and other known and accepted generalizations, a researcher must be able to derive the original problem condition. Therefore, a hypothesis should explain what it wants to explain, and for this, it should also have an empirical reference.

## **What are the things should be kept in mind while drafting a Questionnaire**

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A questionnaire is widely used for data collection in social research. It is a reasonably fair tool for gathering data from large, diverse, varied and scattered social groups. The questionnaire is the media of communication between the investigator and the respondents. However, in this connection, the following general points may be borne in mind:

### **Size Of The Questionnaire Should Be Small**

A researcher should try his best to keep the number of questions as small as possible, keeping in

view the nature, objectives and scope of the enquiry. Respondent's time should not be wasted by asking irrelevant and unimportant questions. A large number of questions would involve more work for the investigator and thus result in a delay on his part in collecting and submitting the information. A large number of unnecessary questions may annoy the respondent and he may refuse to cooperate. A reasonable questionnaire should contain from 15 to 25 questions at large. If a still larger number of questions are a must in any enquiry, then the questionnaire should be divided into various sections or parts.

### **The Questions Should Be Clear**

The questions should be easy, brief, unambiguous, non-offending, courteous in tone, corroborative in nature and to the point, so that much scope of guessing is left on the part of the respondents.

### **The Questions Should Be Arranged In A Logical Sequence**

Logical arrangement of questions reduces a lot of unnecessary work on the part of the researcher because it not only facilitates the tabulation work but also does not leave any chance for omissions or commissions. For example, to find if a person owns a television, the logical order of questions would be: Do you own a television? When did you buy it? What is it make? How much did it cost you? Is its performance satisfactory? Have you ever got it serviced?

### **Questions Should Be Simple To Understand**

The vague words like good, bad, efficient, sufficient, prosperity, rarely, frequently, reasonable, poor, rich etc., should not be used since these may be interpreted differently by different persons and as such might give unreliable and misleading information. Similarly, the use of words having double meaning like price, assets, capital income etc., should also be avoided.

### **Questions Should Be Comprehensive & Easily Answerable:**

Questions should be designed in such a way that they are readily comprehensible and easy to answer for the respondents. They should not be tedious nor should they tax the respondents' memory. At the same time questions involving mathematical calculations like

percentages, ratios  
etc., should not be asked.

### **Questions Of Personal & Sensitive Nature Should Not Be Asked:**

There are some questions which disturb the respondents and he/she may be shy or irritated by hearing such questions. Therefore, every effort should be made to avoid such questions. For example, 'do you cook yourself or your wife cooks?' 'Or do you drink?' Such questions will certainly irk the respondents and thus be avoided at any cost. If unavoidable then the highest amount of politeness should be used.

### **Types Of Questions:**

Under this head, the questions in the questionnaire may be classified as follows:

#### **(a) Shut Questions:**

Shut questions are those where possible answers are suggested by the framers of the questionnaire and the respondent is required to tick one of them. Shut questions can further be subdivided into the following forms:

##### ◦ **Simple Alternate Questions:**

In this type of questions, the respondent has to choose from the two clear cut alternatives like 'Yes' or 'No', 'Right or Wrong' etc. Such questions are also called as dichotomous questions. This the technique can be applied with elegance to situations where two clear cut alternatives exist.

##### ◦ **Multiple Choice Questions:**

Many times it becomes difficult to define a clear cut alternative and accordingly in such a situation additional answers between Yes and No, like Do not know, No opinion, Occasionally, Casually, Seldom etc., are added.

#### **• Leading Questions Should Be Avoided:**

Questions like 'why do you use a particular type of car, say Maruti car' should preferably be framed into two questions

- **Cross Checks:**

The questionnaire should be so designed as to provide internal checks on the accuracy of the information supplied by the respondents by including some connected questions at least with respect to matters which are fundamental to the inquiry.

It would be practical in every sense to try out the questionnaire on a small scale before using it for the given inquiry on a large scale. This has been found extremely useful in practice. The given questionnaire can be improved or modified in the light of the drawbacks, shortcomings and problems faced by the investigator in the pretest.