Research Methodology

1. Discuss the nature of social research and explain about historical research.

According to C. A. Moser : "Social research is a systematized investigation to gain new knowledge about social phenomenon and problems."

According to P.V. Young: "Social research is a scientific undertaking which by means of logical methods, aim to discover new facts or old facts and to analyze their sequences, interrelationships, casual explanations and natural laws which govern them."

Characteristics of social research

- It is directed towards the solution of problems.
- The ultimate goal is to discover cause-and-effect relationship between social problems.
- It emphasis the development of generalizations, principles or theories that will be helpful in predicting future occurrences.
- It is based upon observable experience or empirical evidence.
- It demands accurate observations and description. Researchers may choose from a variety or nonqualitative description of their observations.
- It involves gathering new data from primary sources or using existence data for new purpose.
- Although social research activities may at time be somewhat random and unsystematic, it is more often characterized by carefully designed procedure that applies rigorous analysis.
- It requires expertise. The researcher knows what is already known about the problem and how others have investigated.
- It strives to the objective and logical applying every possible test to validate the procedure employed, data collected and conclusion reached.
- It involves the guests for answer to unsolved problems.
- It is characterized by patient and unhurried activity. Researcher must expect disappointment and discouragement as they pursue the answer to difficult question.
- It is carefully recorded and reported. Each important term is defined, limiting factors are recognized, procedures are described in detail, reference are carefully documented, results are objectively recorded and conclusions are presented with scholarly caution and restraint.
- It is interdisciplinary in nature
- It sometimes requires courage.

Historical research is a process of collecting and interpreting data about past events or ideas in order to find how they affected the present events and ideas. It studies possible reasons behind certain events to explain their influence on the events that followed. Historical research may not just help to figure out connections between past and present events, it can also provide the researchers with information regarding possible future events. In his book "Historical Research: A Guide" (2002), W.H.McDowell defines historical research as: *"Historical research represents a systematic enquiry into the past and an attempt to separate true from fictionalized accounts of historical events, based upon the examination of a wide range of relevant source material. This is an important task because history is the source of many of our ideas, beliefs and customs. A better understanding of the past places us in a more advantageous position to appreciate change in the present and to try and learn from past mistakes."*

OR

Comment on any two of the following :-

a. Research Design

Research design is the framework of research methods and techniques chosen by a researcher to conduct a study. The design allows researchers to sharpen the research methods suitable for the subject matter and set up their studies for success.

Creating a research topic explains the type of research (experimental, survey research, correlational, semi-experimental, review) and its sub-type (experimental design, research problem, descriptive case-study).

There are three main types of designs for research:

- Data collection
- Measurement
- Analysis

The research problem an organization faces will determine the design, not vice-versa. The design phase of a study determines which tools to use and how they are used.

Research Design Elements

Impactful research usually creates a minimum bias in data and increases trust in the accuracy of collected data. A design that produces the slightest margin of error in experimental research is generally considered the desired outcome. The essential elements are:

- Accurate purpose statement
- Techniques to be implemented for collecting and analyzing research
- The method applied for analyzing collected details
- Type of research methodology
- Probable objections to research
- Settings for the research study
- Timeline
- Measurement of analysis

b. Concept and for mulation of hypothesis

The word hypothesis is a compound of two words 'hypo' and 'thesis' where 'hypo' means under and 'thesis ' means reason or rational view. Thus, hypothesis is a below reasoned view. It is a view, which is not fully reasoned. In social research and other research, hypothesis is used to mean a statement about the relationship, which helps to be investigated. According to F.N. Kerlinger, "Hypothesis is the most powerful tool man has invented to achieve dependable knowledge " Once the problem to be answer is defined, the researcher formulates theory. Theory formulation leads to hypothesis formulation. Data collection and analysis revolve around the hypothesis, when hypothesis comes to be true, it originates theory. Hypothesis is an educated guess about a problem's solution. It shows the relation between two or more variables, which need to be investigated for the truth. Nonhypothesis can be defined as logically conjectured relationship between two or more variables in testable statements.

Hypothesis is always presented in declarative sentence form. They can be general or specific Formation:

- Hypothesis are the product of considerable speculation and imaginative guess work.
- They are based partly on known facts and explanation and partly conceptual.
- There are certain necessary condition which are conductive to their formation.
- Richness of background knowledge.
- Versatility of intellect.
- Analogy and other practices.

c. Problem formulation

A research problem is a statement that addresses a gap in knowledge, challenge or contradiction in your field. Scientists use research problems to identify and define the aim of their study and analysis. You may decide to conduct research based on a problem if you're interested in contributing to social or scientific change or adding additional knowledge to an existing topic. A research problem may also help identify key concepts and terms, overarching questions and variables.

Characteristics of a research problem

Research problems have various characteristics that are important during the experimental process. Understanding these aspects of a research problem can help as you identify and create your own. Some characteristics include:

- Reflecting on issues or required knowledge in a particular field
- Relying on evidence and data
- Being practical and manageable for the researchers involved in data collection and analysis

d. Scientific Research

Scientific researches are studies that should be systematically planned before performing them. In this review, classification and description of scientific studies, planning stage randomisation and bias are explained.

Research conducted for the purpose of contributing towards science by the systematic collection, interpretation and evaluation of data and that, too, in a planned manner is called scientific research: a researcher is the one who conducts this research. The results obtained from a small group through scientific studies are socialised , and new information is revealed with respect to diagnosis, treatment and reliability of applications. The purpose of this review is to provide information about the definition, classification and methodology of scientific research.

Before beginning the scientific research, the researcher should determine the subject, do planning and specify the methodology. In the Declaration of Helsinki, it is stated that 'the primary purpose of medical researches on volunteers is to understand the reasons, development and effects of diseases and develop protective, diagnostic and therapeutic interventions (method, operation and therapies). Even the best proven interventions should be evaluated continuously by investigations with regard to reliability, effectiveness, efficiency, accessibility and quality'.

The questions, methods of response to questions and difficulties in scientific research may vary, but the design and structure are generally the same.

2. Explain the techniques of Interview in detail as method of data collection.

Interview methods in research are different approaches you can use to conduct effective research interviews. Many researchers interview subjects as part of their research process. Conducting interviews can allow you to gain insight into the behaviors, attitudes and opinions of individuals.
Usually, interviews are most useful for research that is qualitative, which means it focuses more on concepts and experiences than on numerical values.

interview methods in research:

1. Focus group

One popular research interview method is conducting a focus group interview, which involves a group of individuals interviewed at the same time. Focus group moderators usually encourage participants to interact with one another, and they observe the group to gain insights into real attitudes and perspectives.
Often, focus group participants respond more comfortably and naturally, as the group setting can feel more authentic than other interview settings.

2. Structured interview

Structured interviews are another option. Typically, structured interviews comprise closed-ended questions, which are questions that respondents can answer with "yes" or "no." The interviewer usually asks the exact same questions in the same order to each interviewee. Often, researchers can complete structured interviews quickly, as they follow a standard format that they can easily replicate.

3. Unstructured interview

An unstructured interview, also called an informal interview, is the opposite of a structured interview. In unstructured interviews, the interviewer doesn't ask standardized questions of each interviewee. Instead, unstructured interviews rely on open-ended questions, which are questions that encourage a longer answer than a simple "yes" or "no."

In unstructured interviews, the interviewer can also ask follow-up questions and allow interviewees to expand on their answers. Therefore, an unstructured interview is more similar to an authentic conversation.

4. Semi-structured interview

You can also use a semi-structured interview method, which combines pieces of both structured and unstructured interviews. Although interviewers might follow a general plan and set of questions, they often have the flexibility to make changes. This can allow interviewers to be creative in order to get the data that they need for their research.

5. Personal interview

A personal interview takes place in person as a one-on-one interaction between an interviewer and an interviewee. Personal interviews are ideal if you want to speak directly to an individual and cater your questions to them.

You can also ask follow-up questions to gain additional insights. Usually, personal interviews have higher response rates than other interview options, making them ideal if you need to gather a significant amount of accurate data.

6. Phone interview

You can also conduct interviews over the phone. Phone interviews can be an easy way to gather responses. This interview method is also relatively inexpensive, making it ideal if you want to collect data quickly without expending too many resources.

7. Online interview

Online interviews are another research interview option. Online interviews can involve surveys or video chat applications. In this method, interviewers and interviewees don't have to be in the same location at the same time. This can allow you to collect data quickly from a large group of subjects.

OR

Explain any two of the following :-

(a) Types and sources of data

Quantitative data can be expressed as a number or can be quantified. Simply put, it can be measured by numerical variables.

Quantitative data are easily amenable to statistical manipulation and can be represented by a wide variety of statistical types of graphs and charts such as line, bar graph, scatter plot, and etc.

Qualitative data can't be expressed as a number and can't be measured. Qualitative data consist of words, pictures, and symbols, not numbers.

Qualitative data is also called categorical data because the information can be sorted by category, not by number.

Qualitative data can answer questions such as "how this has happened" or and "why this has happened".

Nominal data is used just for labeling variables, without any type of quantitative value. The name 'nominal' comes from the Latin word "nomen" which means 'name'.

The nominal data just name a thing without applying it to order. Actually, the nominal data could just be called "labels."

Ordinal data shows where a number is in order. This is the crucial difference from nominal types of data.

Ordinal data is data which is placed into some kind of order by their position on a scale. Ordinal data may indicate superiority.

However, **you cannot do arithmetic with ordinal numbers** because they only show sequence.

(b) Observation method

Observational research is a research technique where you observe participants and phenomena in their most natural settings. This enables researchers to see their subjects make choices and react to situations in their natural setting, as opposed to structured settings like research labs or focus groups.

Different kinds of observational research

Naturalistic observation

With naturalistic observation, observation occurs directly in the environment where the phenomenon occurs. The observations are made as unobtrusively as possible with the researcher not directly interacting with the participants in any way.

Participant observation

With participant observation, researchers actively participate in the study itself. In addition to observing behaviors, a researcher might conduct interviews, take notes, look at documents, and take photographs.

Structured observation

With structured observation, researchers do not observe in the natural setting, but instead in a lab or a simulated environment. A structured observation is meant to observe a specific, limited set of behaviors. This method is less natural, but enables less variables to be at play.

(c) Characteristics of a good questionnaire.

A questionnaire is a research instrument used by any researcher as a tool to collect data or gather information from any source or subject of his or her interest from the respondents. It has a specific goal to understand topics from the respondent's point of view. It consists of a set of written or printed questions with a choice of answers devised for survey or statistical studies. It is the most popular type of primary data collection, which can be used to gather both quantitative data (in form of numerals) and qualitative data (in form of words and figures) or mixed data, which is a continuation of both quantitative and qualitative data.

Qualities of a Good Questionnaire:

1. Limited Number of questions: The number of questions in the questionnaire should be as limited as possible, and questions should be asked only related to the purpose of the inquiry.

2. Proper sequence of questions: Questions must be placed in the proper sequence, like simple and direct questions must be placed at the start of the questionnaire, and hard and indirect questions must be placed at the last.

3. Simplicity: The language of the questions should be simple and easy to understand, and the questions should be short. Complex questions must be avoided.

4. Instructions: A good questionnaire must have clear and proper instructions for filling out the forms.

5. No undesirable questions: Undesirable questions like personal questions, which can offend the respondents, must be avoided.

6. Non-controversial question: The question should be asked in such a way that they can be answered impartially.

7. Calculations: Questions involving calculations must be avoided, as they can be complex and time-consuming..

8. Objective-type questions: More focus should be given to objective-type questions, whereas subjective-type of questions should be avoided.

3. Discuss the process of data analysis.

The data analysis process is a collection of steps required to make sense of the available data. Identifying the critical stages in a data analysis process is a no-brainer. However, each step is equally important to ensure that the data is analyzed correctly and provides valuable and actionable information. Let's take a look at the five essential steps that make up a data analysis process flow.

Step 1: Define why you need data analysis

Before getting into the nitty-gritty of data analysis, a business must first define why it requires a well-founded process in the first place. The first step in a data analysis process is determining why you need data analysis. This need typically stems from a business problem or question, such as:

- How can we reduce production costs without sacrificing quality?
- What are some ways to increase sales opportunities with our current resources?
- Do customers see our brand positively?

In addition to finding a purpose, consider which metrics to track along the way. Also, be sure to identify sources of data when it’s time to collect.

This process can be long and arduous, so building a roadmap will greatly prepare your data team for all the following steps.

Step 2: Collect data

After a purpose has been defined, it's time to begin collecting the data needed for analysis. This step is important because the nature of the collected data sources determines how in-depth the analysis is.
Data collection starts with primary sources, also known as internal sources. This is typically structured data gathered from CRM software, ERP systems, marketing automation tools, and others. These sources contain information about customers, finances, gaps in sales, and more.
Then comes secondary sources, also known as external sources. This is both structured and unstructured data that can be gathered from many places.
For example, if you're looking to perform a sentiment analysis toward your brand, you could gather data from review sites or social media APIs.

While it's not required to gather data from secondary sources, it could add another element to your data analysis. This is becoming more common in the age of big data.

Step 3: Clean unnecessary data

Once data is collected from all the necessary sources, your data team will be tasked with cleaning and sorting through it. Data cleaning is extremely important during the data analysis process, simply because not all data is good data.
Data scientists must identify and purge duplicate data, anomalous data, and other inconsistencies that could skew the analysis to generate accurate results.

Step 4: Perform data analysis

One of the last steps in the data analysis process is analyzing and manipulating the data. This can be done in a variety of ways.
One way is through data mining, which is defined as "knowledge discovery within databases". Data mining techniques like clustering analysis, anomaly detection, association rule mining, and others could unveil hidden patterns in data that weren't previously visible.
There's also business intelligence and data visualization software, both of which are optimized for decision-makers and business users. These options generate easy-to-understand reports, dashboards, scorecards, and charts.
Data scientists may also apply predictive analytics, which makes up one of the four data analytics used today (descriptive, diagnostic, predictive, prescriptive). Predictive analysis looks ahead to the future, attempting to forecast what will likely happen next with a business problem or question.

OR

Discuss the process of classification in data analysis.

Answers :

For performing statistical analysis, various kinds of data are gathered by the investigator or analyst. The information gathered is usually in raw form which is difficult to analyse. To make the analysis meaningful and easy, the raw data is converted or classified into different categories based on their characteristics. This grouping of data into different categories or classes with similar or homogeneous characteristics is known as the **Classification of Data.**

Each division or class of the gathered data is known as a **Class.** The different basis of classifications of statistical information are Geographical, Chronological, Qualitative (Simple and Manifold), and Quantitative or Numerical.

For example, if an investigator wants to determine the poverty level of a state, he/she can do so by gathering the information of people of that state and then classifying them on the basis of their income, education, etc.

*According to **Conner, "Classification** is the process of arranging things (either actually or notionally) in groups or classes according to their resemblances and affinities, and gives expression to the unity of attributes that may exist amongst a diversity of individuals."*

Data classification steps

- **Gather information.** At the start of a data categorization project, organizations must identify and inspect the data that needs to be classified or reclassified. It's important to know where it resides, how valuable it is, how many copies exist and who has access to it.
- **Develop a framework.** Data scientists and other stakeholders collaborate to develop a framework within which to organize the data. They assign metadata or other tags to the information. This approach enables machines and software to instantly sort data in different groups and categories. Anything from file type to character units to size of data packets may be used to sort the information into searchable, sortable categories.
- **Apply standards.** Companies must ensure their data classification strategy conforms to their internal data protection and handling practices and reflects industry standards and customer expectations. Unauthorized disclosure of sensitive information could be a breach of protocol and, in some countries, a crime. To enforce proper protocols and protect against data breaches, the protected data must be categorized and sorted according to the nature of its sensitivity.
- **Process data.** This step requires taking stock of the database and identifying and sorting data according to the established framework.

4. Explain the concept of mean, median and mode as measure of central tendency explain its uses.

Mean: Arithmetic mean is the most often used method to find a mean or average. It is calculated by taking a sum of a set of numbers and dividing it by the count of the numbers in the set. It is used when all the values in the given data have the same unit of measurement such as all the given numbers are heights, miles, hours, etc.

Uses of mean:

- It is used in algebraic treatment.
- It is used to calculate the average score in sports such as cricket.
- It is also used in many diverse fields i.e.' economics, anthropology, and history.
- It is also used to measure the average temperature of the earth to measure global warming.
- It is also used to measure the annual rainfall of a particular area.

Median : the median is the value that splits an ordered list of data values in half. Half the values are below it and half are above—it's right in the middle of the dataset. The median is the same as the second quartile or the 50th percentile. It is one of several measures of central tendency.

Uses of median:

- Median is used when the exact midpoint of the distribution is needed or the 50% point is wanted.
- When extreme scores affect the mean at that time median is the best measure of central tendency.
- Median is used when it is required that certain scores should affect the central tendency, but all that is known about them is that they are above or below the median.
- Median is used when the classes are open ended or it is of un equal cell size.

Mode : Mode is the most frequently occurring scores in a distribution. As an average it represents the most typical value of a series which almost coincides with the existing items. It is never affected by extreme scores but by the extreme frequencies of the values.

Uses of mode:

- When we want a quick and approximate measure of central tendency.
- When we want a measure of central tendency which should be typical value. For example when we want to know the typical dress style of Indian women i.e. the most popular dress style. Like this the average marks of a class is called modal marks.

OR

Explain any two of the following :-

(a) Significance and types of correlation

Significance of the Study of Correlation:

- Correlation measures the strength of relationship between two or more variables. For example, the relationship between income and consumption expenditure, price and quantity demanded etc.
- When the nature of relationship between variables is known, it is easy to predict the value of one variable when the other variable is known.
- It helps in understanding the behaviour of various economic variables like, demand, supply, GDP, interest, money supply, inflation, income and expenditure and so on.
- In business firms, it helps in making decisions on cost, price, sales, advertisement etc.

TYPES:

- **Positive Correlation:**

  Correlation between two variables is said to be positive when both the variables move in the same direction. This means, when one variable increases, the other also increases and when one decreases, the other also decreases. For instance, correlation between income and expenditure is said to be positive because as one's income increases, his expenditure also increases.

- **Negative Correlation:**

  Correlation between two variables is said to be negative when both the variables move in the opposite direction. This means, when one variable increases, the other decreases and when one decreases, the other increases. For example, the correlation between demand and price is said to be negative because as price increases, the quantity demanded decreases and as price decreases, the quantity demanded increases.

- **Simple Correlation:**

  When the relationship between only two variables is studied, it is a simple correlation. In case of partial and multiple correlation, there are more than two variables that are related.

- **Partial Correlation:**

  In a partial correlation, there are more than two variables that are related but the relationship between two variables alone is studied, assuming the other variables to be constant.

- **Linear Correlation:**

  When the ratio of change between two variables is constant, then the correlation is said to be linear. In linear correlation, the change in one variable is in a constant proportion to the other variable.

- **Non-Linear Correlation:**

  When the ratio of change between two variables increases or decreases, then the correlation is said to be non-linear or curvi-linear.

(b) Difference between parametric and Non-Parametric test.

Parametric Test Definition

A parametric test is a kind of hypothesis test which gives generalizations for generating records regarding the mean of the primary/original population. The t-test is carried out based on the students' t-statistic, which is often used in that value.

The t-statistic test holds on the underlying hypothesis, which includes the normal distribution of a variable. In this case, the mean is known, or it is considered to be known. For finding the sample from the population, population variance is identified. It is hypothesized that the variables of concern in the population are estimated on an interval scale.

Non-Parametric Test Definition

The non-parametric test does not require any population distribution, which is meant by distinct parameters. It is also a kind of hypothesis test, which is not based on the underlying hypothesis. In the case of the non-parametric test, the test is based on the differences in the median. So this kind of test is also called a distribution-free test. The test variables are determined on the nominal or ordinal level. If the independent variables are non-metric, the non-parametric test is usually performed.

(c) Measurement of dispersion.

Measures of dispersion can be defined as positive real numbers that measure how homogeneous or heterogeneous the given data is. The value of a measure of dispersion will be 0 if the data points in a data set are the same. However, as the variability of the data increases the value of the measures of dispersion also increases.

Measures of Dispersion Example

Suppose we have two data sets A = {3, 1, 6, 2} and B = {1, 5, 9, 10}. The variance(population) of A is 3.5 and the variance(population) of B is 12.68. This implies that data set B is more variable than data set A. Thus, the variance helps to draw a comparison between the two data sets A and B on the basis of variability.

Absolute Measures of Dispersion

If the dispersion of data within an experiment has to be determined then absolute measures of dispersion should be used. These measures usually express variations in a data set with respect to the average of the deviations of the observations.

Relative Measures of Dispersion

If the data of separate data sets have different units and need to be compared then relative measures of dispersion are used. The measures are expressed in the form of ratios and percentages thus, making them unitless.

5. **Discuss the essential steps in research report writing.**

Answers :

Report writing is one of the most diverse and complex of all writing tasks. Writing a report, whether for academic use or business purpose, is a powerful tool of providing factual information, recorded data, investigations, researches, analysis etc. to a person or organization who wants to use that information. A report is defined as an orderly and systematic presentation of factual information that supports in problem-solving and decision making process.

A good report serves as an investigating and decision making tool as it clearly presents the analysis and statistical information of the factors relevant to a particular matter. This kind of research paper is also used for planning and critical evaluation as it contains useful analytical information about key resources and other important aspects to an issue.

There are different types of reports, each with different structure and format; however in this post, we will only focus on Academic report writing.

University students are often required to write research reports for assessment purposes, particularly in the fields of Psychology, Marketing, Sciences and Engineering. The ultimate goal of writing a research report to provide a clear understand of your research topic, analysis and outcome of the study to the audience or examiner.

Below listed are five essentials of a perfect research report.

1. **Factual Accuracy**
   A report writer should be extra careful in quoting facts and statistical data. Since the information given in the report is research-based whose findings and analysis are used for making crucial decisions, a writer must gather info from scholarly and legitimate sources and must proofread the info at least twice in order to avoid presenting incorrect data.

2. **Precision and Objectivity**
   A student before drafting a report, any academic topic should keep in mind that such a research paper should be objective in nature, i.e. free from the writer's personal opinions. A professional essay writer is also definite about the actual purpose of the report and does not drift away from it throughout the paper. A writer can turn a report into a valuable research paper when it is written with precision because it brings credibility and trust in the findings or information provided in the report.

3. **Relevance**
   Another characteristic of a good quality report is relevance. A report writer must always include those empirical evidences, statistics and facts which are relevant to the actual subject or objective of the report. Citing info from irrelevant sources can make the paper weak and its findings unreliable. The key here is to only look for the relevant pieces of information from scholarly sources i.e. journals, published reports, books etc. and to give their proper reference. For an impressive research report, accurate date and relevant facts are inevitable.

4. **Clarity**

   For an academic report, a student must prepare a rough outline of the things that will be included in the document. Using pointers will help in addressing all the main points in the report. Also the language of the report should be simple and clear. Try to avoid long sentences and complicated terms but at the same time, the language should be formal an academic.

5. **Perfect Format**

   Your report should follow a standard format which includes abstract, introduction, research or analysis, results/findings, conclusion and references.