[This question paper contains 2 printed pages.]

**Sr. No. of Question Paper** : **8114**                 **J**

Unique Paper Code      :    2513010016

Name of the Paper      :    Research Methodology

Name of the Course     :    **B.Sc. (H) Electronics (DSE)**

Semester                  :    VI

Duration : 3 Hours                       Maximum Marks : 90

## Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. There are **seven** questions in all, out of which you have to attempt any **five** questions.
3. **All** questions carry equal marks.
4. **First** Question is Compulsory.

1. (a) Describe the role of a questionnaire in data collection?

   (b) Difference between reference and citation?

   (c) What is a sample in research, and why is it used?

   (d) What is bibliography?

   (e) What is a variable in research?

   (f) Define research problems.                        (6×3=18)

2. (a) How do statistical methods contribute in understanding research, and drawing meaningful conclusions in empirical studies?

   (b) How would you define research? Explain its significance. What are the components, criteria, and qualities of a good research study?

   (c) Explain the significance of a research report and its characteristics. Describe the layout of a research report.           (3×6=18)

3. (a) Explain the process of formulating a research problem statement. Why is it crucial to the research process?

   (b) Provide an example of how you would form a hypothesis for a study on consumer behavior in the digital age

   (c) Explain the importance of properly formulating a research problem.
                                              (3×6=18)

4.  Write short notes on **(any three)**

    (a) Use of AI in research

    (b) Sampling design

    (c) Hypothesis Testing

    (d) Ethical consideration in educational research                    (3×6=18)

5.  (a) Explain the types of secondary data that are commonly used in scientific research, such as XRD and Raman spectroscopy etc. How is each data type useful for analysis?

    (b) "Research is much concerned with proper fact finding analysis and evaluation." Do you agree with this statement? Justify.

    (c) What is the role of simulation techniques in solving differential equations? Provide an example of how simulations are used in a real-world scenario.                    (3×6=18)

6.  (a) Define a literature review. What is its purpose in the research process? Explain the general procedure for conducting a literature review. Mention the key steps involved.

    (b) Why is validation important in research? Discuss the role of data validation in ensuring the reliability of research findings. How would you identify the problem in your research model and compare experimental or theoretical data with your model?

    (c) Discuss the step-by-step procedure for conducting a literature review. How would you organize and synthesize the findings from different sources in a literature review?                    (3×6=18)

7.  **Case Study:** You are tasked with writing a literature review on the impact of AI on healthcare outcomes.

    (a) What are the key sources you would look into for conducting a literature review on this topic?

    (b) How would you structure your literature review to provide a clear understanding of the topic's background and current developments?

    (c) Imagine that you have validated your findings with experimental data from a healthcare study. How would you compare the theoretical framework you proposed with the experimental data? Discuss the steps of validation you would take.                    (3×6=18)