

M.Sc. (Physics) (NEP Pattern) Semester-I  
**NEP-237 / 01MSCPH5 - Research Methodology**

P. Pages : 2

Time : Three Hours



**GUG/S/25/15142**

Max. Marks : 80

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**Either:**

1. a) Define the term 'research' and discuss its significance in various fields. Explain the objectives and motivations that drive researchers to conduct investigations. **8**
- b) Differentiate between deductive and inductive theories in the context of research and explain how they contribute to the research process. **8**

**OR**

- c) Discuss the concept of a theory in research. Explain its role in organizing and explaining empirical observations. **8**
- d) Provide a comprehensive overview of experimental, exploratory and historical research. Define and highlight their unique characteristics. **8**

**Either:**

2. a) Discuss the importance of research design in the research process. What are the key characteristics of a good research design and how they contribute to the validity and reliability of research findings? **8**
- b) Differentiate between exploratory research design and descriptive research design. Provide examples of when each type of design is most appropriate in a research study. **8**

**OR**

- c) Explain the concept of a scientific research design with a focus on experimental design. What are the key components of an experimental design, and how does it allow researchers to test hypotheses rigorously? **8**
- d) Define a hypothesis and outline the qualities of a good hypothesis. Discuss the distinction between null hypothesis and alternative hypotheses, and explain their roles in hypothesis testing. **8**

**Either:**

3. a) Discuss the concept of a research paper and its significance in the academic and scientific community. Why are research papers considered essential for the dissemination of research findings? **8**
- b) Explain the role of research paper publishers in the academic world. How do reputable publishers contribute to the quality and visibility of research papers? **8**

**OR**

- c) Define the different types of research papers. Provide examples of each type and discuss their purposes. 8
- d) Discuss the concept of impact factor and cite index in the context of research paper evaluation. How are these metrics used to assess the influence and quality of research journals? 8

**Either:**

- 4. a) Explain the concept and different categories of intellectual property right (IPR) and their significance in protecting innovations and creations. 8
- b) Describe the process of obtaining a patent for a technological innovations. What are the key steps and requirements for patent application? 8

**OR**

- c) Discuss the rights and privileges granted to patentees under Intellectual property rights. Provide examples to illustrate these rights. 8
- d) How have recent changes in IPR laws and regulations impacted innovation and technology transfer? Provide examples of emerging issues in IPR. 8

**5.** Attempt all of the following.

- a) Define the term ‘construct’ in the context of research. How does a construct differ from a concept or a variable? Give examples. 4
- b) Discuss the importance of online databases and websites for accessing physical science research papers. 4
- c) Explain the concept of self-plagiarism and its ethical implications in research publication. Why is it important for researches to avoid recycling their own work without proper citation? 4
- d) Describe the techniques and strategies for writing a patent application effectively. 4

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