

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : **2584**

Unique Paper Code : 2223510030

Name of the Paper : Research Methodology

Name of the Course : **B.Sc. (Prog.) Physical Sciences_NEP:UGCF-2022**

Semester :VI- Semester (DSE Paper)

Question Paper Set Number :D

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. Q1 is compulsory. Answer any SIX parts from Q1 and FIVE questions in ALL.
3. Use of a non-programmable calculator is allowed.
4. Attempt all the parts of questions together.
5. Zand T-tables are permitted.

1. (a) Name two tools or software commonly used to detect plagiarism. 3
- (b) What are the basic types of Intellectual Property Rights (IPR)? 3
- (c) What is a research problem? Give one example. 3
- (d) Why is proper referencing and bibliography management important in academic writing? 3
- (e) What is plagiarism? Explain its types, methods of detection, and strategies to avoid it. 3
- (f) Name two open-source graphical software tools used for data visualization and briefly state their purpose. 3
- (g) Explain the role of *scientific search engines*, *INFLIBNET*, *e-journals*, and *Scopus* in supporting academic research. 3

2. (a) What does research mean? What are the objectives of research? What are applications & types of research? What are the steps to do research? 9
- (b) Discuss the basic tenets of qualitative research with suitable examples 3
- (c) Explain curve fitting using linear regression. Derive the normal equations and discuss how parameters are estimated in linear models. 6
3. (a) Write a short note on “Measures of Central Tendency and Measures of Dispersion” with at least one example. 9
- (b) Find out the Covariance and Correlation Matrices for given data, 9
- | Sample | X | Y |
|--------|----|----|
| 1 | 4 | 5 |
| 2 | 8 | 10 |
| 3 | 12 | 15 |
| 4 | 16 | 20 |
4. (a) Explain the significance of indexing databases and citation databases in academic research, with particular reference to Web of Science and Scopus. 9
- (b) A researcher has published 10 papers with the following citation counts [45,30,25,20,15,12,8,6,4,2]. (i) Calculate the h-index and g-index of the researcher. (ii) Determine the i10-index. 9
5. (a) Discuss the ethical issues related to *authorship, conflict of interest, and the handling of complaints and appeals*. How do these issues affect the credibility of scientific research, and what measures can be taken to uphold integrity and transparency in scholarly publishing? 9
- (b) Elaborate on the distinctions between *patents, copyrights, and trademarks*, and describe the procedure for obtaining a patent. 9
6. (a) Country A has an average farm size of 191 acres, while Country B has an average farm size of 199 acres. Assume the data were attained from two samples with standard deviations of 38 and 12 acres and sample sizes of 8 and 10, respectively. Is it possible to infer that the average size of the farms in the two countries is different at $\alpha = 0.05$? Assume that the populations are normally distributed 6
- (b) Discuss the different parts of the research report? Compare APA and MLA referencing styles in detail with suitable examples 9
- (c) Explain redundant publications. Discuss concepts such as salami slicing, duplicate publication, and selective reporting. 3