

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : **3059**
Unique Paper Code : 2223510030 **L**
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 :C
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. Z and T-tables are permitted.

1. (a) Define qualitative research and state any two of its basic tenets. 3
(b) What are the important requirements for using the Z-test? 3
(c) A researcher receives an email promising quick publication within 3 days after paying a fee. The journal is not indexed in reputed databases. Comment on the authenticity of the journal. Justify your answer with suitable reasons. 3
(d) Define the terms falsification and fabrication. 3
(e) What is the purpose of the introduction section in a research paper? 3
(f) Discuss how research funding contributes to scientific advancement and technology in India. 3
(g) Discuss the role of methodology and experimental setup in research. 3

2. (a) Describe the importance of literature survey in research. Discuss various open-source and paid tools used for managing and tracking literature. 9
- (b) Define qualitative research and state any two of its basic tenets. 3
- (c) Explain the importance of data analysis and discussion of results in a research paper.
3. (a) Fit a straight line of the form 12
- $$Y = a + bX$$
- | | | | | | |
|----------|----------|----------|----------|----------|----------|
| X | 1 | 2 | 3 | 4 | 5 |
| Y | 2 | 4 | 5 | 4 | 6 |
- to the data:
Find:
- (i) $\bar{X}$ and $\bar{Y}$
- (ii) the least squares estimates of a and b
- (iii) the fitted regression equation.
- (b) Write and discuss the relationship between mean, median, and mode in symmetrical distribution, positively skewed distribution and negatively skewed distribution. 6
4. (a) Name a commonly used database in condensed matter physics. Explain the nature of data and information it contains. 5
- (b) Compare SNIP, SJR, and CiteScore as journal evaluation metrics. Discuss the role of altmetrics in modern research evaluation. 9
- (c) A journal has a Raw Impact per Paper of 3 and a field citation potential of 1.5. calculate the SNIP value and interpret the result. 5
- 5 (a) Explain the purpose of COPE Guidelines and discuss their role in maintaining ethics in academic publishing 7
- (b) Discuss how redundant publications can mislead the scientific community and inflate research outcomes. 6
- (c) What are research Records? Discuss its types . 5
- 6 (a) Compare patents, trademarks and copyrights with respect to their scope and duration of protection in India. 6
- (b) Explain the role of simulation in experimental design. Discuss how simulations help in predicting system behavior, optimizing parameters, and reducing experimental cost and risk. 6
- (c) Explain curve fitting using linear and nonlinear regression. Discuss the gradient search method for nonlinear curve fitting. 6