

[This question paper contains 8 printed pages]

**Your Roll No.** : .....

**Sl. No. of Q. Paper** : **8078** **I**

Unique Paper Code : 2343010020

Name of the Paper : Research Methodology  
(Computer Science)

Name of the Course : **B.Sc. (H) Computer  
Science (NEP-UGCF)**

Semester : VI

**Time : 3 Hours**

**Maximum Marks : 90**

**Instructions for Candidates :**

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
- (b) All Parts of Question No. **1** (Section A) are compulsory.
- (c) Attempts any four questions from Section B.
- (d) Parts of a question must be answered together.
- (e) Use of scientific calculator is allowed.

**Section - A**

1. (a) What do you mean by Research ? Explain its significance. 3

P.T.O.

- (b) What is difference between deductive and inductive research ? 3
- (c) What is a citation-index ? Explain the significance of SCI and SCIE indexing in academic publishing. 3
- (d) Give any **three** reasons on the basis of which a paper might be rejected by the journal. 3
- (e) Name any **six** general tools of research. 3
- (f) The marks obtained by 5 students in a test are : 45, 50, 55, 60, 65. Calculate the Standard Deviation (SD) of the marks. 3
- (g) A student has a Z-score of 4.5 : 4
  - (i) Calculate its IQ score.
  - (ii) Calculate its stanine score.
- (h) Identify whether the following statements are **True** or **False** : 4
  - (i) Intellectual property is often divided into two categories-industrial property and copyright and related rights.
  - (ii) Research methodology and research methods are exactly the same.
  - (iii) The research problem should be stated after the data collection.
  - (iv) Plagiarism can occur even if the source is cited incorrectly.

- (v) WoS indexed articles are considered credible in academic research.
  - (vi) Impact factor is used to measure author's research impact.
  - (vii) Bibliography is always placed at the end of the research article.
  - (viii) Exploratory research is conducted when the problem is not clearly defined.
- (i) Select the most appropriate answer for the following multiple-choice questions : 4
1. Which of the following is **not** a characteristic of research ?
    - (a) Systematic approach
    - (b) Objective analysis
    - (c) Random guesswork
    - (d) Logical reasoning
  2. In research, a hypothesis is :
    - (a) a proven fact
    - (b) a temporary assumption
    - (c) a statistical error
    - (d) a variable
  3. Which of the following is an example of primary data ?
    - (a) Census reports
    - (b) Research articles
    - (c) Data from experiments
    - (d) Textbooks

4. The first step in the research process is :
  - (a) Data collection
  - (b) Hypothesis formulation
  - (c) Identifying the research problem
  - (d) Literature review
5. Quantitative research deals with :
  - (a) Feelings and emotions
  - (b) Descriptive data
  - (c) Numerical data
  - (d) Visual interpretation
6. Which research design is best for studying cause-effect relationships ?
  - (a) Exploratory research
  - (b) Descriptive research
  - (c) Experimental research
  - (d) Qualitative research
7. A literature review is used to :
  - (a) Publish new results
  - (b) Identify gaps in existing research
  - (c) Create statistical models
  - (d) Eliminate errors in experiments
8. Patent is an intellectual right related to :
  - (a) Inventions
  - (b) Watermark
  - (c) Rights of authors
  - (d) Geographical indication

### Section - B

2. (a) What is plagiarism ? Name any **two** plagiarism tools. Mention **three** ways to avoid plagiarism. 5
- (b) The following data gives the number of hours studies and marks obtained by 5 students : 10

Hours Studied (X)	Marks Obtained (Y)
2	40
4	50
6	60
8	70
10	80

- (i) Compute the average deviation of marks obtained.
  - (ii) Compute geometric mean of hours studied.
  - (iii) Compute the standard deviation of marks obtained.
  - (iv) Find Z-score of marks 65.
  - (v) Pearson correlation coefficient ( $r$ ) is 1 and Coefficient of determination ( $r^2$ ) is 1. Interpret the relation between X and Y.
3. (a) Consider the following propositions : 5

**Case 1 : Proposition :** All humans are mortal.

Socrates is a human.

**Conclusion :** Therefore, Socrates is mortal.

**Case 2 : Observation:** All humans lived and died.

**Pattern :** All observed humans have eventually died implies they are mortal.

Which research method – deductive or inductive – is demonstrated in Case 1 and Case 2 respectively ? Justify your answer.

- (b) You are given the number of days taken to complete each of 11 different tasks. Use the data below to compute the mean, median, mode, second quartile and IQR of tasks completion times. 10

Tasks	No. of Days
Task 1	2
Task 2	6
Task 3	11
Task 4	14
Task 5	20
Task 6	20
Task 7	8
Task 8	7
Task 9	6
Task 10	3
Task 11	2

4. (a) Calculate and interpret the difference in the variance of marks obtained by a student in nine subjects in semester I (S1) and Semester II (S2). 5

S1	45	46	49	25	17	18	13	56	58
S2	47	49	43	27	29	38	37	60	50

- (b) Differentiate between the following using examples : 10
- (i) Basic and Applied Research
  - (ii) Evaluation Research and Development Research
  - (iii) Quantitative and Qualitative Research
5. (a) What do you understand by peer-review ? Who all are considered as the peers in the peer-review process ? 5
- (b) In a standard normal distribution, what percentage of data falls within each of the following intervals : 10
- (i) within 1 standard deviation of the mean ( $-1\sigma$  to  $+1\sigma$ )
  - (ii) within 2 standard deviation of the mean ( $-2\sigma$  to  $+2\sigma$ )
  - (iii) within 3 standard deviation of the mean ( $-3\sigma$  to  $+3\sigma$ )

Represent the same using a graph. Show the change in the graph :

- (i) if the data is positively skewed ?
- (ii) if the data is negatively skewed ?

6. (a) What does TRIPS stand for ? Identify and briefly explain any **four** key areas of intellectual property that are covered under the TRIPS Agreement. 5
- (b) Explain Nominal, Ordinal, Interval and Ratio data with examples. 10
7. (a) What is a hypothesis ? What are the steps involved in hypothesis testing ? 5
- (b) (i) A researcher has published 7 papers, and the citation counts for each paper are : 21, 18, 12, 9, 7, 4, 2. Calculate the h-index and i10 index for this researcher. 5
- (ii) A journal cites 1220 articles in 2024, and publishes 100 articles in 2023, 150 articles in 2022, 310 articles in 2021. Calculate its impact factor and CiteScore for the year 2024. 5

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