

(8 pages)

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M.Sc. (CBCS) DEGREE EXAMINATION,  
APRIL 2025.

Fourth Semester

Chemistry

Skill Enhancement Course – III — SCIENTIFIC  
RESEARCH METHODOLOGY

(For those who joined in July 2023 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (15 × 1 = 15 marks)

Answer ALL questions.

Choose the correct answer :

1. A hypothesis is best described as
  - (a) A proven fact
  - (b) A well-supported theory
  - (c) A testable explanation for an observed phenomenon
  - (d) A guess based on no prior knowledge
2. Which type of research aims to explore and describe a phenomenon without manipulating variables?
  - (a) Experimental research
  - (b) Descriptive research
  - (c) Correlational research
  - (d) Quasi-experimental research
3. What is the difference between basic research and applied research?
  - (a) Basic research solves immediate problems, while applied research expands fundamental knowledge
  - (b) Applied research solves immediate problems, while basic research expands fundamental knowledge
  - (c) Basic research is more important than applied research
  - (d) Applied research is more theoretical than basic research

4. What is the purpose of a literature review in research?
- (a) To summarize all existing knowledge on a topic
  - (b) To identify gaps in existing research and inform the research question
  - (c) To criticize previous studies and find flaws in their methods
  - (d) To avoid conducting original research
5. What is a citation?
- (a) A reference to a source of information
  - (b) A summary of a research article
  - (c) A type of research method
  - (d) A plagiarism detection tool
6. What is the purpose of using a citation management tool?
- (a) To automatically generate citations and bibliographies
  - (b) To search for relevant research articles
  - (c) To analyze research data
  - (d) To communicate with other researchers

7. What is an impact factor?
- (a) A measure of the frequency with which an average article in a journal has been cited
  - (b) The number of articles published in a journal
  - (c) The number of readers of a journal
  - (d) The cost of publishing in a journal
8. What is a PowerPoint template?
- (a) A video file used in presentations
  - (b) A slide background without any design
  - (c) A blank slide for creating presentations from scratch
  - (d) A pre-designed slide layout that can be used for presentations
9. Digital plagiarism is considered as \_\_\_\_\_.
- (a) A minor issue with no real consequences
  - (b) An ethical violation and, in some cases, a legal issue
  - (c) A necessary part of online research
  - (d) A sign of creativity and resourcefulness
10. How long do patents usually last for \_\_\_\_\_.
- (a) 10 years                      (b) 60 years
  - (c) 40 years                      (d) 20 years

11. What is "self-plagiarism"?
- (a) Submitting your own previously published work as new work
  - (b) Citing your own previous work
  - (c) Collaborating with yourself on a research project
  - (d) Paraphrasing your own previous work
12. A computer program is considered as \_\_\_\_\_.
- (a) Literature works      (b) Artistic works
  - (c) Technical works      (d) Trade secret
13. Degree of scattering in transmission electron microscope is a function of \_\_\_\_\_.
- (a) wavelength of electron beam used.
  - (b) number of atoms that lie in the electron path
  - (c) number and mass of atoms that lie in the electron path
  - (d) mass of atoms that lie in the electron path
14. In SEM, the image is formed by the electrons that \_\_\_\_\_.
- (a) reflect back      (b) ionize
  - (c) undergo inversion      (d) pass through

15. The AFM uses a \_\_\_\_\_ to scan the surface of a molecule.
- (a) X-ray film      (b) Nanosized tip
  - (c) Non-metal tip      (d) Nanodrop

PART B — (5 × 4 = 20 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

16. (a) What is research gap and why it important in scientific research?
- Or
- (b) Explain the purpose and significance of scientific research.
17. (a) Differentiate between the Monographs and Treatises.
- Or
- (b) Explain the various types of data bases used for online searching.
18. (a) Explain the different types of reference formats.
- Or
- (b) Discuss the guideline of references and bibliography.

19. (a) Define plagiarism. Give the types of plagiarism.

Or

(b) Write a publisher note outlining the journal publisher's plagiarism policy.

20. (a) What are X-ray? Explain the origin of X-rays.

Or

(b) Write a short note on STM.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

21. (a) Briefly describe the different steps involved in a research process.

Or

(b) Explain the problems encountered by researchers in India.

22. (a) Write the significance of chemical abstract and impact factor.

Or

(b) Illustrate with suitable examples explain the methods to retrieve the information about a specific compound and the box to locate Journals.

23. (a) Illustrate the essential components of the research proposal.

Or

(b) Explain, how will you communicate your research output to the various audience.

24. (a) Identify and explain the types IPR with suitable examples.

Or

(b) Discuss the potential consequences and propose measures to prevent scientific misconduct.

25. (a) Explain the principle, techniques and applications of SEM.

Or

(b) (i) Differentiate between powder and single crystal XRD.

(ii) Give the applications of HRTEM.