

**2023**

***Time - 3 hours***

***Full Marks - 80***

*Answer ALL questions.*

*Figures in the right hand margin indicate marks.*

1. (a) Why research is needed ? Write short notes on steps; identification of problems, assessing the problem, formulating objectives and actual investigation for a scientific research. [10]
- (b) Describe the significance of the following words : [2½ × 4]
- |                |                |
|----------------|----------------|
| (i) abstract   | (ii) reviews   |
| (iii) treatise | (iv) monograph |

OR

- (a) How in a systematic procedure, a person will prepare himself to conduct one research ? [10]
- (b) Describe the significance of the following words : [2½ × 4]
- |                    |                     |
|--------------------|---------------------|
| (i) Citation index | (ii) Impact factor  |
| (iii) Scopus       | (iv) Science direct |

[ 2 ]

2. (a) Differentiate between writing a manuscript paper and writing a research report. Also give the significance and necessity of writing these two. [10]
- (b) How a research thesis is written ? Give the necessary organisational structure of thesis writing. [10]

OR

- (a) What is the importance of writing a review paper in scientific research ? And how is it prepared ? [10]
- (b) Write down the significance of bibliography in a scientific research ? What the meaning of citation style writing of research project report ? [10]
3. (a) Discuss about classical and instrumental analytical methods of analysis in chemistry. How these processes are helpful in research work ? [10]
- (b) How the analytical data are tested for accuracy ? What are the various test procedures for verification ? [10]

OR

- (a) Discuss any four instrumental methods used in chemistry for analytical purpose in research ? Also discuss how their outcomes are utilised for the purpose. [10]
- (b) What is an error in research work ? Write down various types of error obtained in various steps of research and how those are minimised ? [10]

[ 3 ]

4. (a) What do you mean by software and hardware in computational chemistry ? Can Artificial Intelligence (AI) be helpful in scientific research ? Explain. [10]
- (b) Discuss some of the application packages of Personal Computer (PC) used in computational chemistry. [10]

OR

Discuss how computer technique is used in analytical equipments listed below (any two). With the help of computer except analysing data, obtained from equipment, what else can be done : [10 × 2]

- (a) UV-Visible
- (b) FTIR
- (c) XRD