

Paper I — RESEARCH METHODOLOGY
(Held in April 2010)

Time : Three hours

Maximum : 100 marks

PART A — (5 × 5 = 25 marks)

Answer ALL the questions.

1. Briefly discuss the art of writing thesis.
2. Explain the various types of errors.
3. Find by Newton's method, the real root of the equation $3x = \cos x + 1$.
4. Explain multiplication table and its role in spectroscopy.
5. Discuss the various looping constructs in C++.

PART B — (5 × 15 = 75 marks)

Answer ALL the questions.

6. (a) Explain in detail the qualitative and quantitative analysis of research.

Or

- (b) Explain in detail
- (i) Presenting a seminar paper.
 - (ii) Literature survey methods.

7. (a) Explain linear regression and polynomial regression. Bring out the differences.

Or

- (b) (i) Explain the method of least squares.
(ii) Fit a straight line to the following data :

x : 0 5 10 15 20 25

y : 12 15 17 22 24 30

8. (a) Evaluate $\int_0^b \frac{dx}{1+x^2}$ by using

- (i) Trapezoidal rule
- (ii) Simpson's 1/3 rule and
- (iii) Simpson's 3/8 rule.

Or

- (b) Using Newton's divided difference formula, find the values of $f(2)$, $f(8)$ and $f(15)$ given the following table.

x : 4 5 7 10 11 13

$f(x)$: 48 100 294 900 1210 2028

9. (a) Discuss the matrix representation of a group. Write the character of a group element in a particular representation.

Or

- (b) Construct the character table for point group C_{2v} and C_{3v} . Discuss in detail the molecular vibrations.

10. (a) (i) Explain the various operators of C++ with examples.
(ii) Discuss recursion and inline function with examples.

Or

- (b) Explain inheritance concept in C++. Discuss any one inheritance with an example.

Paper II — COURSE WORK I
(Held in April 2010)

Time : Three hours

Maximum : 100 marks

PART A — (5 × 5 = 25 marks)

Answer ALL questions.

1. Show that $\psi(\bar{r}_1, \bar{r}_2)$ must be either symmetric or anti symmetric from the Schrodinger equation.
2. Obtain the total energy of the field for a system of Bosons.
3. What are phase diagrams and phase rules? Explain.
4. Explain active switching and passive switching.
5. What is relative concentration error? Explain its implications.

