1. Define and discuss in brief any four:
   (a) Explain the natural source of Quinine and its application.
   (b) Who invented the sulfa drugs and what is the source of sulfa drugs?
   (c) What is thalidomide tragedy?
   (d) Who discovered the RNAi process?
   (e) Define the terms 'teratogen and teratogenicity.'

2. Explain in detail any two:
   (a) Discuss the chronological development of the pharmaceutical industries.
   (b) Explain the key impact of r-DNA technology upon the production of pharmaceutically important proteins.
   (c) How do the antisense technologies help in the treatment of disease?
3 Explain in detail any **two**:

(a) Discuss the therapeutic application of Superoxide dismutase.

(b) Describe the immunological response of the biopharmaceuticals.

(c) Explain the nature of the drug development

4 Explain in detail any **two**:

(a) Discuss the vital role of regulatory affairs department.

(b) Describe the investigational new drug application process.

(c) Explain the structure, responsibility and regulation of FDA.