

# **The Royal Australian and New Zealand College of Radiologists**

*Examination for Diploma, Part I*

*Radiation Oncology*

*Radiotherapeutic Physics*

*Time Allowed : 3 hours*

*ALL QUESTIONS are to be attempted. All questions are of equal value. Clearly labelled diagrams should be drawn wherever relevant.*

1. Discuss the physical principles, design details and operational features of a electron linear accelerator.
2. Discuss in detail the data used by the International Commission on Radiological Protection in deriving the limits of exposure to ionizing radiation. What is the basic philosophy on which the levels of risk are set for the various population groups?
3.
  - a. Describe the processes that can occur when a radioactive material undergoes decay. Illustrate the answer with five different decay schemes.
  - b. Write short notes on physical half-life, biological half-life and effective half-life.
4. Discuss the advantages and disadvantages of using electron beams of appropriate energy over the use of x-rays in the treatment of malignant lesions in head and neck regions.
5. Discuss the roles of both simulators and computerised tomography in treatment planning.
6. Discuss the advantages and disadvantages in the use of automatic afterloading in brachytherapy. Two regimes : High Dose Rate and Low Dose Rate are in use. Describe the physical features of typical equipment used in these two dose systems.

*February 1990.*