

**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 labeled diagrams should be drawn wherever relevant.

PART A

1. 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.
2. Define and write short notes on the following quantities used in radiotherapeutic physics:
 - a) absorbed dose
 - b) dose equivalent
 - c) integral dose
 - d) energy

PART B

3. Discuss the physical principles of After-loading in interstitial and intracavitary brachytherapy. Detail the advantages and disadvantages on manual versus remote automatic afterloading.
4. Write concise notes on the following topics:
 - a) The basic features of a radiation protection programme for Dose Equivalent Limitation.
 - b) The types and particular features of personal monitors used in a radiotherapy department.
 - c) The occupational exposure of women of reproductive capacity.
 - d) Emergency procedures required in the case of gross spillage of urine from a patient receiving radioactive iodine for the treatment of thyroid carcinoma.
5. Write notes on the following:
 - a) The safety measures required during the insertion and removal of Iridium-192 implants.
 - b) The safety measures required in the nursing of patients being treated with Iridium-192 implants.
 - c) The safety measures required in the storage, transport, use and cleaning of Strontium-90 applicators.
6. Write notes on devices used with linear accelerators to obtain reproducibility in accurate field definition when a patient is undergoing treatment over a four week period.

September, 1990.