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 occur in the absorption of an electron beam as it pass es from air into a tissue medium and from tissue into an air cavity.
(b) Give a specific example and show how computer planning may assist in treatment strategy.

2. Discuss the concepts of and give definitions of the uniits of kerma, absorbed dose, dose equivalent, effective dose, activity, linear energy transfer, stopping power, integral dose.

PART B

3. (a) Sketch central axis depth dose curves for:
i) A 6MV and a 10 MV photon beam
ii) A 6MeV and a 10MeV electron beam, each of 10 x 10 cm2, incident vertically at 100cm SSD on a water phantom.
(b) Explain the important features of these curves, and discuss the clinical signifiicance of these features.

4. (a) Describe a wedge filter, explain what it does, and indicate its uses in radiotherapy.
(b) Outline the various methods of implementing wedge filtration on linear accelerators.
(c) Define the wedge angle of a wedge filter.
(d) Explain the principles underlying the use of a "wedged pair" of beams.

5. Compare the physical advantages and disadvantages of electron beam compared to photon beam therapy in the treatment of :
(a) Chest wall recurrences following mastectomy
(b) Tonsillar carcinoma
(c) Extensive skin cancer of the outer canthus.

6. (a) Write short notes on the physical aspects of brachytherapy moulds for treatment of skin malignancy.
(b) Write short notes on the Paris system of interstitial brachytherapy.

August, 1996