2006 ABR Part II – Therapy Physics Type

1. For what isotope is the ratio of dose at d=5 cm to the dose at d=1 cm the lowest? Co, Cs, I, Pd?

2. How often are electron energies checked according to TG-40? Once a week, Once a week if they are used, twice a week, etc.?

3. DVH - which plan has the lowest fraction of volume receiving 15-20 Gy?

4. What measurement device is best for a simulation room survey? ion chamber, ion chamber w/ electrometer, GM, scintillation counter?

5. If a patient is prescribed 200 cGy a fraction with 30% open and 20% wedged for each field, what dose does the patient receive if the wedge is put in the wrong field? WTF=0.25.

6. What is the definition of wedge angle?

7. Given lots of TG-51 parameters, calculate cGy/MU for photons.

8. Given lots of TG-51 parameters, calculate cGy/MU for electrons.

9. With 6 MV incident on x1 mm tissue then x2 mm bone then x3 mm lung, what is the dose to the proximal (or distal, I forget) part of the lung?

10. Shown CT with depths of tissue and lung, single direct field, and attenuation coefficients, what is the dose w/ and without heterogeneity corrections?

11. Given mixed energy, electron and photon, dose to surface = 40 Gy and PDDs at surface for each given, and dose to d=5 cm = 55 Gy, PDDs for each at d=5 given, what are the relative contributions of photons and electrons at dmax?

12. Mammosite balloon w/ diameter = 4 cm and Rx point at 1 cm from surface of balloon. What is the minimum balloon to skin distance to minimize the hot spot to 150%?

13. What thickness of Al to compensate for 5 cm of missing tissue?

14. Dose at point S is 6 mrem/hr. How much concrete shielding to get dose at point Z less than 2 mrem/hr. Point S is 6 m from iso and Point Z is 12 m from iso. Given TVL of concrete.

15. If the daily output is greater than what % is patient treatment suspended immediately according to TG-40?

16. What is the overall uncertainty in dose delivered to a point in a patient with all uncertainties taken into consideration? Kahn - 5.6%

17. What method cannot be used to verify an IMRT plan? Film, point hand calc?

18. What is the purpose of the bending magnet?

19. Where are the electrons generated in a linac?

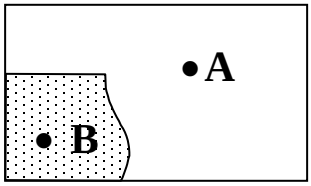
20. What does Gamma measure?

21. Calculate collimator angle for opposite lateral brain fields to match the divergence from a spine field. Field size 27cm, Spine inferior 20cm and spine superior 17cm.

22. Skyshine steradian question.

23. Shown GTV, CTV and PTV asked to identify the PTV

24. Given the dose at A, find the dose under the block at the same depth at B.



25. When to check the wedge interlock

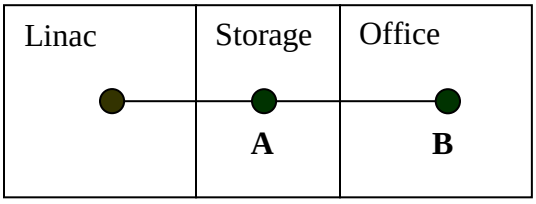
26. IMRT Head and Neck treatment. What are the dose constraints for critical organs.

27. The tolerance dose for the kidney

28. Scanning PDD curves given and asked to identify which is which.

29. What is the reference depth used in photon beam calibrations (per TG-51)

30. Shielding problem. Distances given: Linac to A=6m, Linac to B=12m. Survey meter measures xx mrem/hr at point A. Dose delivered at each treatment is also given. How many patients can be treated to limit the exposure at point B to below 2 mRem/wk



31. Gamma strength problem related to HDR treatment.

32. Question on changing Brachytherapy sources from ^{192}Ir to ^{125}I (or vice versa) and calculating activity/dose rate.

33. IMRT dose verification using small volume chamber (0.1cc). What should it's resolution (or measured error) be in order to be able to use for dose verification (ans: 0.1%, 0.5%, 1%, 3%, 10%)

34. Beam abutment question. Patient treated with 10MV photons and 16MeV electrons. Field size given. At 5cm depth what would be the case (photon side hot spot:electron side cold spot, photon side cold spot:electron side hot spot, both sides hot spots, both sides cold spots or no hot spots)

35. Morning (daily) QA for a HDR brachytherapy treatment source per TG-40

36. Daily output tolerance for X-ray and electrons (3%:5%, 3%:3%, 2%:3%, 5%:5% etc)

37. $E_p = E_0 (1-d/R_p)$ given that at depth d1, the energy is E1 and at depth d2 the energy is E2, at depth d3 what is the energy

38. Question on backscattering using block for electron beams. How does it change with energy E and Z. (increase when E and Z increases, decreases when E and Z decreases, Increases when E increases and decreases when Z increases and vice versa)

39. This time there were about 4-5 questions about the TG-51. We were provided all the detailed information about the different factors and asked to calculate the Mu's/cGy to deliver at Dmax. 2 questions about the Photon beam and 2 question about the e -beam. In some questions you have to calculate the Pion & Ppol.

40. HDR shielding calculation. Everything was provided. Just use the formula and answer was there.

41. One beam profile diagram was provided with profile line variation at the surface. The reason for that.....Ans was---Water fluctuation.

42. Shielding calculation. the thickness was calculated as per the 6 MV beam and the Exposure level was given at particular point. question was to calculate the exposure level if 18 MV beam is used for the same thickness. TVLs were given.