Chapter 6

1. According to the current NCRP recommendations, the guidance level for cumulative exposures should be calculated using the formula: 14:25

   A. Age x 5 rem
   B. 5 (age-18) in rem
   C. Age x 1 rem
   D. (age x 2)^2 in rem

2. The neutron contamination of a photon beam is likely at energies of: 14:59

   A. 100-400 keV
   B. 800-900 keV
   C. 1-3 MeV
   D. 7-20 MeV

3. When calculating the effective annual dose equivalent limit for a therapist, which of the following exposures should be considered? The dose received: 14:28

   A. From your own thyroid uptake study
   B. From your own exposure while helping in brachytherapy procedures
   C. From nuclear fallout
   D. From your own dental radiographs

4. For therapeutic treatment units operating above 150 keV warning light indicators must be mounted on the:

   1. Control console *2. Outside of the treatment door* *3. Treatment table*

   A. 1 & 2 only
   B. 1 & 3 only
   C. 2 & 3 only
   D. 1, 2, & 3

   15:59

5. The automatic collision sensor on the collimator of a megavoltage treatment unit shall be tested for operability at least once a: 15:44

   A. Year
   B. Month
   C. Week
   D. Day

6. The NCRP recommends that the effective annual dose equivalent limit to individuals in the general population be limited to_____ the occupational limit. 14:35

   A. 1/100 of
   B. 1/10 of
   C. 2 times
   D. 10 times

7. Which of the following would serve as the best method for protection from a high energy gamma source?

   A. Wearing a lead apron
   B. Wearing rubber gloves
   C. Increasing the distance from the source
   D. Increasing the time you are exposed 17:101

8. It is recommended that the fetus should not exceed _____for the entire gestation period. 14:30

   A. 0.1 rem (.001 mSv)
   B. 0.5 rem (.005 mSv)
   C. 1.5 rem (.015 mSv)
   D. 3.0 rem (.03 mSv)

9. The effective annual dose equivalent limit to the whole body that an occupational radiation worker can receive is: 14:24

   A. 5 mrem (.05 mSv)
   B. 1,000 mrem (10 mSv)
   C. 5,000 mrem (50 mSv)
   D. 25,000 mrem (250 mSv)

10. If opening a therapy room access door has accidentally interrupted a therapy treatment, the treatment can be continued by: 15:58

1. Closing the door 2. Resetting the machine 3. Hitting the control panel "on" switch

A. 1 & 2 only
B. 1 & 3 only
C. 2 & 3 only
D. 1, 2, & 3

11. Failure of which of the following machine and electrical safety devices would result in a machine that is unsafe for use? 22:35

1. Limit switches 2. Collision ring 3. Monitor chamber

A. 1 & 2 only
B. 1 & 3 only
C. 2 & 3 only
D. 1, 2, & 3

12. The indicator light for the treatment room is not illuminated. A possible cause is: 22:35

1. Burnt out bulb 2. The x-ray machine is off 3. Wedge filter has been removed

A. 1 & 2 only
B. 1 & 3 only
C. 2 & 3 only
D. 1, 2, & 3

13. Which of the following radiation sources would be most difficult to shield against?

A. 50 keV x-ray
B. 250 keV x-ray
C. Tc99m gamma (150 keV)
D. Co60 gamma (1.5 MeV)

14. In the calculation of an occupational worker's dose equivalent limit, consideration shall be given to:

A. Internal exposures
B. External exposures
C. Both of the above 19:28
D. Neither of the above

15. The elapsed timer of a therapy treatment unit shall have which of the following? 15:58

1. Preset termination device
2. A method for preserving accumulated dose
3. A minimum exposure as short as 1 sec.

A. 1 only
B. 2 only
C. 3 only
D. 1, 2, & 3

16. According to the NCRP recommendations, the annual dose limit for non-stochastic (somatic) effects to all tissues other than the eye should not exceed: 14:26

A. 5 rem (50 mSv)
B. 15 rem (150 mSv)
C 30 rem (300 mSv)
D. 50 rem (500 mSv)

17. The radiation safety officer must be informed immediately if personnel monitor devices are: 16:76

1. Lost 2 Damaged 3. Left in a treatment room

A. 1 & 2 only
B. 1 & 3 only
C 2 & 3 only
D 1, 2, & 3

18. The area in which a radiation therapy unit is located must be posted with a sign and radiation symbol which says:

A. Stop! Radiation Danger
B. Caution: High Radiation Area
C Radiation Hazard 15:78
D Caution Radiation in Use

19. During external beam radiation therapy, the "beam ON" condition is permitted only when: 15:58

A. Treatment doors are closed
B. Exposure switch is manually depressed
C. Collimation is employed
D. Unit is properly aligned

Refer to the statement below in answering questions 20-21:

A radiation worker received an occupational dose of 300 mrem, a natural background dose of 200 mrem, and had 5000 mrem of medical exposures during the year.

20. The total occupational dose of radiation this person received during the year is: 14:25

A. 200 mrem
B. 300 mrem
C. 5200 mrem
D. 5300 mrem

21. The total dose of radiation this person received during the year: 14:25

A. 200 mrem
B. 300 mrem
C. 5200 mrem
D. 5500 mrem

22. When not in use radiation therapy units shall be: 15:58

A. Turned off at the console
B. Left in the stand by position
C. Locked to prevent their unauthorized use
D. Left on to insure consistency

23. If an isocentric unit is designed with a beam interceptor, it should reduce the output of the useful beam to less than:

A. .1%
B. .5%
C. 1% 12:36
D. 3%

24. If a radiation worker is exposed to a dosage of 180 mR/hour at a 100 cm SSD, what will the exposure be for this worker at 160cm SSD if he/she is exposed for 45 minutes? 4:63

A. 33.2 mR
B. 52.7 mR
C. 70.3 mR
D. 105.4 mR

25. A high radiation area sign should be posted in an area where the exposure rate exceeds: 12:41

A. 10 mR/hour
B. 100 mR/hour
C. 100 mR/day
D. 100 mR/week

26. According to the NCRP, the annual equivalent dose limit for non-stochatic (somatic) effects for the lens of the eye is: 14.26

A. 1 rem (10 mSv)
B. 3 rem (30 mSv)
C. 5 rem (50 mSv)
D. 15 rem (50 mSv)

27. Once a pregnancy becomes known, the exposure to an embryo-fetus shall be no greater than _____ per month. 14:30

A. .05 rem (.5 mSv)
B. .5 rem (5 mSv)
C. 1.8 rem (18 mSv)
D. 3.6 rem (36 mSv)

28. A non-occupational worker may not be exposed to more than_____ whole body radiation during the full work year. 14:38

A. 5000 mrem (50 mSv)
B. 3000 mrem (30 mSv)
C. 1000 mrem (10 mSv)
D. 500 mrem (5 mSv)

29. A megavoltage therapy unit shall have emergency "OFF" buttons installed: 15:58

A. In the treatment room
B. On the control console
C. Both of the above
D. Neither of the above

30. A sign "CAUTION RADIATION This Equipment Produces Radiation When Energized" must be placed on the: 16:78

1. Control Console *2. Treatment head* *3. Treatment table*

A. 1 only
B. 2 only
C. 3 only
D. 1, 2, & 3

31. The structural shielding requirements for a teletherapy unit can be reduced by employing: 12:36

1. Beam interceptors *2. Monitoring chambers* *3. Door interlocks*

A. 1 only
B. 2 only
C. 3 only
D. 1, 2 & 3

32. A protective device installed on a simulator to prevent tube and table top impacts is called a/an: 22:32

A. Collision ring
B. Emergency switch
C. Stop gap switch
D. Limiting switch

33. An occupational radiation worker is exposed to 675 mrem per month. How many months can this individual work without excessing the dose equivalent limit for the year? 19:48

A. 4 months
B. 6 months
C. 7 months
D. 8 months

34. In order to remain within the permitted dose equivalent limits for an occupational worker, an individual should not receive more than 19:48

A. 10 mrem/week
B. 50 mrem/week
C. 100 mrem/week
D. 300 mrem/week

35. A non-occupational exposure limit of 5000 mrem per year is permitted in special situations concerning:

A. Uranium mining
B. Radon testing
C. Radioactive family members
D. Radionuclide manufacturer

36. On linear accelerators, machine panel indicators provide information about 22:24

1. Beam energy *2 Field symmetry* *3 Beam on/off*

A. 1 & 2 only
B. 1 & 3 only
C 2 & 3 only
D 1, 2, & 3

37. Before activating a linear accelerator and giving a treatment, the technologist should visually confirm which of the following displays agree with their respective settings?

1. MU'S *2 Dose monitor* *3 Wedge number*

A. 1 & 2 only
B. 1 & 3 only
C 2 & 3 only
D 1, 2, & 3

38. Which of the following would be considered a backup system to closed-circuit TV in a linear accelerator treatment room? 22:21

A. Mirror
B. Intercom
C Collision interlocks
D Modulator

39. Direct window viewing from a location outside the therapy room is required for _____ type installations.

1.. Orthovoltage *2. Megavoltage* *3. Supervoltage*

A. 1 & 2 only
B. 1 & 3 only
C. 2 & 3 only
D. 1, 2, & 3

15:59

40. If a wedge is employed for a treatment but the beam does not come on, a likely cause is: 15:57

A. Improper wedge material
B. Wedge does not match programmed value
C. Hinge angle is deficient
D. Any of the above

41. According to the ALARA concept of the N.C.R.P., the radiation exposure to an individual should be:

A. Kept at permitted MPD's
B. Carefully monitored at all times
C. Kept as low as possible
D. Kept on all children

14:15

42. The fraction of time that a radiation beam is directed at a specific barrier or area is termed the: 12:48

A. Use factor
B. Workload factor
C. Occupancy factor
D. Attenuation factor

43. To protect the unborn fetus of a pregnant technologist, the following recommendation is generally made:

A. Quit work immediately
B. Do not work in the therapy department
C. Work in the low radiation areas only
D. Do not take any special precautions

2:543

44. Concrete is usually used in the walls of therapeutic rooms instead of lead because: 12:18

A. A smaller total mass of concrete is required
B. Mass for mass, concrete walls are cheaper than lead
C. The protection calculations are easier

45. In order to insure patient safety, the NCRP requires testing of the interlock system at least once a:

A. Day
B. Week
C. Month
D Year

15:78

46. The use of finger badge monitoring is of particular importance to those persons involved with the

A. Holding of infants
B. Positioning of patients
C. Injections of contrast medias
D Injections of radionucleides

17:92

47. The factors that must be considered in the determination of the thickness for a radiation barrier is, are

1. Weekly workload *2. Use factors* *3. Occupancy factors*

A. 1 only
B. 2 only
C 3 only
D 1, 2, & 3

12:52

48. Maximum allowable leakage for walls, floors, etc. for a controlled area is 12:6

A. .01 cGy/week
B. .03 cGy/week
C. 0.1 cGy/week
D. 1.0 cGy/week

49. While treating a patient on a linear accelerator an equipment malfunction causes the main circuit breaker to be tripped, the therapist should do all of the following EXCEPT,

A. Remove patient from treatment room
B. Record treatment dosage received on mechanical counter
C. Reset circuit breaker and continue treating
D. Calculate required remaining dosage

50. According to the NCRP the housing of a cobalt teletherapy machine shall be constructed so that at 1 meter from the source with the beam "off" the maximum leakage kerma rate through the housing is: 15:69

A. 2 mR/hr.
B. 5 mR/hr.
C. 10 mR/hr.
D. 20 mR/hr.

51. Should an equipment malfunction occur which is potentially hazardous to personnel or equipment, which of the following procedures should be done first?

A. Call the RSO
B. Remove the patient from the room
C. Hit emergency off button
D. Inform maintenance personnel

52. When high energy accelerators above 10 MeV are used, neutron activation is most likely to occur in: 17:131

A. Plastic syringes
B. Lead shields
C. Glass containers
D. None of the above

53. When a collimated sealed source is employed for radiation therapy in the "on" position, housing leakage should not exceed _____ of the useful beam air kerma: 15:69

A. .1%
B. 1
C. 2%
D. 4%

54. Patients can be monitored during treatments by the use of: 15:59

1. Lead glass windows 2. Television systems 3. Intercom systems

A. 1 & 2 only
B. 1 & 3 only
C. 2 & 3 only
D. 1, 2, & 3

55. After a radioisotope is injected into the body, the rate at which it is expelled by the body is termed the: 12:472

A. Physiologic half-life
B. Biologic half-life
C. Effective half-life
D. Affected half-life

56. Which of the following is true concerning a power failure of a cobalt-60 unit: 8:64

A. Patient must be removed from the therapy table immediately
B. The technologist must manually return the source to the off position
C. A leaded drape is placed on the source head
D. The source is automatically returned to the off position

57. The ICRP recommends a yearly leakage test at the surface of a collimated sealed source. A result of 3.3Kbg indicates: 15:72

A. The source is adequately housed
B. The source is improperly shielded
C. Collimator is too close to the source
D. Detection unit needs calibration

58. With all megavoltage type installations the beam orientation shall be restricted by mechanical or electrical means to: 15:58

1. Primary protective barriers 2. Secondary protective barriers 3. Blocked treatment fields

A. 1 only
B. 2 only
C. 3 only
D. 1, 2, & 3

59. During a radiation treatment direct patient assistance may be provided if the beam energy is below: 17:125

A. 400 keV
B. 250 keV
C. 50 keV
D. Any of the above

69. The length of time it takes for a radionuclide to reduce its intensity to one-half of its original intensity by a normal decaying process is called the: 2:45

A. Half-value layer
B. Effective half-life
C. Biological half-life
D. Physical half-life

70. All of the following are advantages of film badges EXCEPT: 17:90

A. Provides permanent record
B. Exposure to interpretation delay
C. Measure dose over large range
D. Radiation type can be determined