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Multiple choice questions– IS&IR- NOV 2014

(Choose the most appropriate single answer) **Time : 1Hr**

1. Which of the following statements regarding electron binding energy is true?
   a. Independent of the electron distance from the nucleus
   b. In the range of MeV
   c. Energy needed to overcome for the electron to be ejected from the atom
   d. Independent of atomic number

2 . eV is a unit of
a. energy
b. work
c. heat
d. X-ray photon intensity

3. Filters are used to
a. increase the X-ray tube efficiency
b. reduce the heat produced at the target
c. remove the soft X-rays
d. remove the hard X-rays

4. Which of the following statements is true?
a. Large focal spot size produces high resolution images
b. Dual filament X-ray tubes are not used now-a-days
c. X-ray tubes are maintained at vacuum to decrease the heat
d. X-ray tube housing contains an oil bath to provide electrical insulation and help to cool the tube.

5. Increasing the X-ray tube KV will result in an
a. increase of the average X-ray energy
b. decrease of the average X-ray energy
c. increase of the average X-ray energy and number of X-ray photons
d. decrease of the average X-ray energy and number of X-ray photons

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6. Characteristic radiations are the characteristics of
a. Target material
b. Filament material
c. X-ray tube
d. None of the above

7. Bedside X-ray tubes consist
a. Rotating anode
b. Stationary anode
c. Molybdenum as target material
d. Target without line focus principle

8. The line focus principle may be explained as
a. Apparent focus is smaller than true size
b. Another name for heel effect
c. X-ray intensity falls as square of distance
d. Reduction in intensity at anode edge

9. Thermionic emission
a. Is nothing but x-ray production
b. Is the source of electrons
c. Is more in rotating anode
d. All are true

10. Which of the following results in the total absorption of an X-ray photon?
a. Photoelectric effect
b. Compton scatter
c. Pair production
d. Coherent scatter

11. The Half-value layer (HVL) for a material with a linear attenuation co-efficient of 0.1/cm
is approximately
a. 1 cm
b. 1.4 cm
c. 7 cm
d. 10 cm

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12. Which one of the following statements is true?
a. Beam hardening refers to the preferential loss of lower energy photons.
b. Compton interactions predominate in mammography
c. Photoelectric effect is maximum in high atomic number materials
d. Compton scatter is the reason for high subject contrast on a barium enema examinations.

13. Typical added filtration thickness in general radiography X-ray tube is
a. 0.5mm Al
b. 1.5mm Al
c. 2.5 mm Al
d. 1mm Cu

14. Radiation that leaves the X-ray tube housing when the collimators are fully closed is known as

a. primary radiation
b. secondary radiation
c. leakage radiation
d. backscattered radiation

15. A bucky grid will increase all the following EXCEPT,

a. image contrast
b. exposure times
c. geometric unsharpness
d. patient dose

16. Which one of the following statements is false?
a. Scatter increases with increased field size
b. Collimation increases image resolution
c. Scatter increases with patient thickness
d. Collimation reduces unnecessary irradiation

17. Air gap (s)
a. between X-ray tube and patient
b. introduces magnification
c. technique reduces the image contrast
d. technique could not be used in mammography

18. High ratio grids generally result in an increase in the
a. required mAs
b. image contrast
c. more scatter cleanup efficiency
d. all of the above

19. Upside down focused grid will lead to
a. more fog
b. exposure at the centre of the film
c. uniform decrease in exposure all over the film
d. None of the above

20. Which one of the following statements is false?
a. X-rays are produced when fastly moving electrons hit the nuclei of the target
atoms
b. Characteristic x-rays are produced by Tl-201 radioactive isotope
c. Characteristic x-rays are polyenergetic
d. Characteristic x-rays are produced predominantly from mammography x-ray tubes

21. X-ray tubes
a. As focal spot size decreases, the image contrast increases
b. Movable x-ray units use rotating anodes
c. Thermionic emission is the source of electrons
d. Oil is used to lubricate the rotors

22. Regarding KV

a. Applied voltage across the x-ray tubes does not influence the quantity of x-rays
b. Step down transformers are used to increase the KV
c. High KV factors are used for mammography
d. High KV factors produce wide contrast scale images

23. Tc-99m
a. Has half life of 6mins
b. "m"stands for molybdenum
c. "99" is mass number
d. Produce gamma and beta radiations

24. Radioactivity

a. Could be altered through high temperature and high pressure
b. The SI unit is Bq
c. Effective half life is more than both physical and biological half life
d. Becomes zero after 5 half lives

25. Fixers

a. Are alkaline
b. Remove all unexposed silver ions from x-ray films
c. Replenishment is not needed in automatic processor
d. Should be changed while spectral matching differs

26 . Partial volume artifact

a. Does not arise in MRI
b. Could be reduced by reducing the slice thickness
c. Could be reduced by reducing the matrix size
d. Does not arise in multi slice spiral CT

27. HR CT
a.Uses low mAs
b. Special reconstruction algorithms could be used without increasing the noise
c. Very useful in pediatric cases
d. High resolution CT images could be used to create high quality 3D reconstructed
images

28. Most modern CT units have CT numbers from about

a. +1000 to +4000
b. -1000 to +4000
c. −1000 to +1000
d. −1000 to −4000

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29. Artifact due to the motion of patient can be seen as

a.Streak

b.ring

c.star

d.none of these

30 Beam hardening artifact is due to

a.Rapid absorption of low energy photons.

b.Rapid absorption of high-energy photons.

c.Miscalibration of detector.

d. None of these.

31.Ring artifact is due to

a. Rapid absorption of low energy photons.

b. Miscalibration of detector.

c. Due to patient motion

d. None of above

32. A diagnostic X-ray tube has two foci normally in order to

a.Minimize image unsharpness

b. Double its life

c. Increase radiation output

d. Halve the risk of overloading

33. Most predominant interaction in diagnostic Radiology

a.Compton effect

b.Thomson's scattering

c. Photo electric effect

d. Pair production

34. In rotating anode tube heat dissipation mainly by

a.Conduction

b.convection

c.radiation

d.None of the above

35. Image contrast is better in case of

a.Photoelectric effect

b.Compton effect

c.Pair production

d.Photon disintegration

36. X-ray tube glass envelope is made up of

a.Borosilicate

b.Silica

c.cadmium oxalate

d.None

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37. The quantity of X-ray's depends on

a.KV

b.mA

c.Tempt. of filament

d.None

38. In spiral CT high voltage supply from the H.T generator to the x- ray tube is given through electrically conducting

a.Cables

b.Slip rings

c.Both

d.Independent remote charges

39. Most of the spiral CT scanners make use of which generation geometry of x-ray tube and detector.

a.2^{nd} generation

b.3^{rd} generation

c.4^{th} generation

d.electron beam CT

40. In spiral CT during scanning which of the following used

a.Continuous rotation of x-ray tube

b.Continuous translation of table

c.Continuous rotation of x-ray tube and continuous table translation.

d.All of above

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41. In spiral CT as pitch increases longitudinal resolution

a.Decreases

b.Increases

c.does not change

d.Sometimes increases & sometimes decreases

42. In spiral CT which of the following linear interpolation (LI) algorithm gives better longitudinal resolution

a.360^0LI

b.180^0LI

c.90^0LI

d.270^0LI

43.In spiral CT as pitch increases total exposure time

a.Increases

b.decreases

c.does not change

d.increases and decreases

44. For a conventional CT scan and spiral CT scan with pitch 1, with same tube operating parameters and same slice thickness the radiation dose will be

a. Same

b.more for conventional CT scan

c.more for spiral CT

d.Less for spiral CT

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45. In spiral CT as pitch increases radiation dose

a.Increases

b.decreases

c.Remains the same

d.None of the above

46. Multislice helical CT scanners are equipped with

a.Multiple x-ray tubes

b.multi raw of detectors

c.multiple x-ray tubes and multi raw of detectors

d.multiple x-ray tubes and single raw of detectors

47. Alpha particles have a mass of approximately

a.One-twelfth the mass of a carbon atom

b.One-third the mass of a carbon atom

c.One-half the mass of a carbon atom

d.Twice the mass of a carbon atom

48. An increase in EMF in an X-ray tube will affect the

a.Cathode temperature

b.Quality of beam

c.Quantity of beam

d.Number of valve tubes utilized.

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49. The focal spot size of an x-ray tube is best measured by

a.Exposure with step-wedge device

b.Pin-hole camera

c.Spinning top

d.Wire mesh exposure

50. Which of the following is most usually done investigation for lump in breast

a.Soft tissue mammography

b.Xeroradiography

c.Contrast media injected into duct

d.Ultrasonography.

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(Candidate's signature)