GENESIS

Post Graduation Medical Orientation Centre

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FCPS PART-I MOCK TEST-II

SUBJECT : Radiology & Imaging

PAPER : II

Exam Date	:	**Mock-I**	**: 13-12-20/17-12-20/20-12-20**
		Mock-II	**: 25-12-20/26-12-20/27-12-20**
Exam Time	**:**	**2.30.pm-4.00pm**	
Total Number	**:**	**100**	

Question 26-50 based on single answer

1. Which of the following are correct regarding electromagnetic radiation?
a) Gamma rays are a form of electromagnetic radiation
b) The particles have a mass equivalent to that of neutrons
c) In a vacuum, the velocity of the particles differs depending on their individual properties
d) It results in a sinusoidal graph when magnetic field strength is plotted against time
e) The frequency is the interval between two

2. Which of the following statements are correct regarding an X-ray tube?
a) The tube current (mA) is increased by increasing the filament voltage
b) An increase in the tube voltage (kV) leads to a proportional increase in tube current (mA)
c) Electrons are generated by heating the anode, which is usually made from tungsten
d) The kinetic energy of electrons (keV) in the X-ray tube is dependent on the tube voltage (kV)
e) The collision of electrons with a tungsten target mainly results in the production of X-ray radiation

3. Concerning the effects of filtration:
a) It increases the intensity of the beam
b) It increases the half-value layer (HVL) of the beam
c) It reduces the peak photon energy
d) It reduces the effective photon energy
e) It increases skin exit/entry dose ratio

4. Concerning Compton interaction, which of the following are correct?
a) It involves the collision of X-ray photons with any electron
b) The probability that Compton attenuation will occur decreases as photon energy is increased c) Increasing the tube voltage results in a higher proportion of side scatter
d) The higher the scatter angle, the greater the penetration of the recoil electrons
e) An increase in the incident photon energy results in scatter photons with greater energy

5. Regarding the photoelectric effect:
a) It results in the production of Bremsstrahlung radiation
b) It results in the production of scattered photons, the energy of which is dependent on the initial photon energy (keV)
c) X-rays passing through barium cause greater scatter than those passing through human tissues
d) Ejection of a K-shell electron by an incident photon results in the production of an Auger electron
e) Auger electrons are produced as an indirect result of photoelectric radiation

6. Concerning characteristic radiation:
a) It results in photons with a fixed energy, for a given material
b) It mainly involves filament electrons dislodging L-shell electrons
c) Photon energy is directly proportional to the tube voltage
d) The rate of production of characteristic radiation is directly proportional to the filament voltage
e) Atomic number influences photon energy of K-radiation

7. Regarding secondary electrons:
a) Positrons are negatively charged electrons that result from radioactive decay
b) Beta particles can ionize atoms
c) The collision of two positrons results in two gamma photons, each with 511 keV
d) The range of the secondary electron is inversely proportional to the material density
e) Secondary electrons result in biological damage of tissues

8. Concerning absorption edges
a) K-edge binding energy is lower than L-edge binding energy
b) Between the K-shell and L-shell, the increase in photoelectric attenuation is proportional to the photon energy
c) For tungsten, the K-shell binding energy (Ek) is equal to 74 keV
d) There is a sudden increase in attenuation when photon energy reaches L-shell binding energy (EL)
e) When choosing a filter, it is important to make sure that the peak of the X-ray spectrum lies on the high-energy side of its absorption edge

9. Which of the following are true with regard to filtration?
a) The aim of filtration is to make the beam intensity more uniform by removing the very high-energy rays
b) The tube housing acts as a valuable filter
c) The predominant attenuation process in a filter should be photoelectric absorption
d) At 80 kV, the half-value layer (HVL) of a beam with 2.5 mm Al filtration is typically measured as 2–3mm Al
e) The thickness of copper required to reduce the intensity of an X-ray beam by a factor of 2 is greater than the required thickness of aluminum needed to have the same effect

10. Regarding photons:
a) X-ray photons are produced following K-electron capture
b) Collision of a positron with a negative beta particle results in the production of gamma photons
c) X-ray photons are produced following photoelectric absorption
d) They can be scattered only sideways or backwards following Compton attenuation
e) They have a mass

11. Concerning radiation damage to tissues, which of the following are correct?
a) It is caused directly by photoelectrons
b) Cells with high mitotic rates are less affected
c) It is caused by free radicals
d) Secondary electrons cause damage to tissue in a linear pattern
e) It is caused directly by X-rays

12. Which of the following are correct regarding deterministic effects of radiation?
a) It has a minimum threshold below which it does not occur
b) The severity of the effect increases with dose
c) The probability of the effect occurring increases with dose
d) They can be hereditary in nature
e) Increasing the dose results in an increase in the severity of the disease

13. Which of the following are correct regarding thermoluminescent dosimeters (TLDs)?
a) A TLD is not susceptible to environmental effects, especially high temperature
b) A TLD shows a linear response to illumination and can be read only once
c) TLD sensitivity is not significantly better than film
d) A TLD needs a filter
e) They can give readings down to 0.01mSv

14. Regarding workers and dose limits:
a) The dose limit for carers is the same as for the public
b) Trainees under the age of 18 must not receive an effective dose of more than 6Sv
c) Workers must be designated as classified if their annual dose limit exceeds 20mSv
d) Classified workers must be over 18 years of age
e) It is mandatory to monitor the dose of all staff members who work with radiation

15.The approximate protection requirements for the walls/screens of a typical diagnostic X-ray room would be:
a) 2 mm of lead
b) 2 cm of glass
c) 2 cm of barium plaster
d) 2 cm of concrete
e) 24 cm of brick

16. Which of the following are correct regarding electronic dosimeters?
a) They are not highly energy dependent
b) Their sensitivity can be 100 times that of a film badge
c) They can be gas-filled tubes
d) They do not need a filter
e) They are useful in identifying methods of dose reduction for procedures with a potential high dose to staff

17. With regard to radiation protection of staff:
a) The main radiation dose to staff in the room is from leakage radiation from the X-ray tube
b) Standing close to the patient avoids scatter within the room and hence reduces the radiation dose
c) Wearing lead aprons protects against the primary beam
d) The Ionising Radiation Regulations 1999 (IRR99) are concerned with setting dose limits for worker, not the IRMER. The equivalent dose limit for the lens of a classified worker should not exceed 150 mSv per annum.
e) Lead goggles can protect against cataracts

18. Concerning the focal spot:
a) A larger actual focal spot allows greater tube currents
b) Increasing the anode angle increases the maximum permissible exposure factors that can be used
c) A typical size of focal spot in general radiography is 1 mm
d) Focal spot size has no effect on contrast
e) A larger focal spot size increases the amount of scatter

19. Regarding the heel effect:
a) It is more pronounced in worn-out anodes with a rugged surface
b) It is less pronounced in tubes with rotating compared with stationary anodes
c)For a given film size, it is more noticeable on images acquired with a long focus-to-film distance
d) In mammography, the anode side of the tube should be directed towards the chest wall
e) It is useful in spine radiographs

20. Regarding collimation:
a) It allows the operator to adjust the filtration of the X-ray beam
b) It employs a light beam diaphragm
c) The collimators are constructed of material that is highly attenuating to X-rays
d) It reduces scatter
e) It does not affect the effective dose to the patient

21. Regarding slice thickness in CT:
a) Increasing the slice width increases the noise
b) Increasing the slice thickness reduces the spatial resolution
c) Reducing the slice thickness increases the partial volume effect
d) The slice thickness cannot be less than the detector width
e) In single-slice CT, the pitch does not affect the noise

22.Microbubbles used as ultrasound contrast agents:
a) Have a gaseous core
b) Are similar in diameter to neutrophils
c) Have resonance frequency in a low MHz range
d) Mainly accumulate in the blood pool
e) Can be destroyed by ultrasound waves

23. Regarding nuclear magnetic resonance imaging (MRI):
a) In an external magnetic field, more hydrogen nuclei align with their magnetic moments parallel to the external field than antiparallel
b) Protons subject to a strong static external magnetic field start to precess in phase
c) The frequency of precession (Larmor frequency) of protons in a static magnetic field of 1.5 T equals 42.6 MHz
d) At 1.5 T, the precessional frequency of hydrogen nuclei in fat is 220 Hz lower than that of hydrogen nuclei in water
e) Apart from hydrogen, other nuclei that can be polarized in an external magnetic field include carbon 12C and oxygen 16O

24.According to the UK Medicine and Healthcare products Regulatory Agency (MHRA) Safety Guidelines for Magnetic Resonance Imaging Equipment in Clinical Use (2007), an MRIexamination is not allowed under any circumstances when the following is present:
a) A pacemaker
b) A hip/knee joint replacement
c) An intracranial aneurysm clip
d) A metallic heart valve
e) A first-trimester pregnancy

25. Desirable properties of a radionuclide for imaging include:
a) High levels of cross-reactivity with blood proteins
b) A half-life measured in hours, not minutes or days
c) It decays to a stable daughter
d) Low activity per unit volume
e) Emission of beta particles

Each question below contains five suggested answers- choose the <u>one best</u> response to each question (26-50)

26.How much of the generated energy actually utilized for taking an X-Ray?
a) 0.1%
b) 1%
c) 10%
d) 100%
e) 99%

27. Dental X-Ray is also known as
a) Orthopedics
b) Orthopentology
c) Orthology
d) Orthopantomography
e) Dentomology

28. What should be the minimum distance maintained when an X-Ray is being taken?
a) 10 m
b) 15 m
c) 35 m
d) 50 m
e)33cm

29. Which of the following needs the longest exposure for an X-Ray image?
a) Thoracic
b) Abdomen
c) Spine
d) Pelvis
e) Chest

30.The X-Ray is recorded on a plate coated with
a) Gold Halide
b) Silver Halide
c) Copper Halide
d) Iron Halide
e) Mercury halide

31.Which of the following machines is often placed together with an X-Ray machine?
a) Endoscopy
b) Ultrasound
c) Fluoroscopy
d) C – Arm
e) MRI

32.The SI unit of Dose equivalent is
a) Miligray
b) Gray
c) Sievert
d) Joule
e) Kg

33.The SI unit of Radioactivity is
a) Curie
b) Becquerel
c) Gray
d) Sievert
e) Joule/kg

34. The added filtration of a diagnostic xray tube typically consist of
a) Aluminum or copper
b) Copper or tin
c) Tin or lead
d) Aluminum and beryllium
e) Iron

35.Which anatomical area has the highest inherent contrast
a) Pelvis
b) Skull
c) Thorax
d) Abdomen
e) Thigh

36. Manmade radiations account for what percentage of background dose
a) 3%
b) 10%
c) 14%
d) 20%
e) 40%

37. The most commonly used personal radiation monitor
a) TLD
b) Dosimeter
c) Film badge
d) DDI

38. Which interection process doesnot take place in the range of intensities of a diagnostic beam
a) Photoelectric interection
b) Compton interection
c) Pair production
d) Coherent scatter
e) All are true

39. Which of the following is electromagnetic and ionizing radiation
a) Ultraviolet
b) Visible light
c) X-ray
d) Radiowave
e) Infrared

40. The voltage of an xray beam is conventionally measured in
a) Joule per second
b) Kvp
c) mAs
d) kg
e) meter

41. Ionization of atom produces
a) Free electron
b) Ionized atom
c) Positive atom
d) All of the atom
e) None of the above

42. The device that converts mechanical energy to electrical energy is called
a) Transformer
b) Generator
c) Motor
d) Amplifier
e) Transistor

43. The target material used in Mammographic unit is
a) Molybdenum
b) Tungsten
c) Copper
d) Iron
e) Tin

44.What type of beam restrictor device is called "Variable Aperture Diaphragm "
a) Cone
b) Cylinder
c) Collimator
d) Diaphragm
e) None of the above

45. Which type of transformer is used in filament circuit
a) Autotransformer
b) Step up transformer
c) Step down transformer
d) All are true
e) None of the above

46. Why is the rotating anode is more desirable than stationary anode in general radiography room
a) Increases recorded details
b) High efficiency for heat dissipation
c) Allow for greater range of SID usage
d) None of the above
e) All are true

47. The process of " boiling off" of electron at the filament is called
a) Heel effect
b) Thermionic emission
c) Space charge effect
d) Ionization
e) Thermal conductivity

48. The cathode end of xray tube pocesses a _ charge)
a) Negative
b) Positive
c) Neutral
d) Both
e) None of the above

49. Focal spot is a part of
a) Cathode
b) Anode
c) Filament
d) Circuit
e) Generator

50. Calcium can be detected as micro calcification in mammography due to their
a) Atomic number
b) Physical density
c) Color
d) Electron number
e) Low Kvp

Radiology & Imaging Mock-II Paper-II

1. TFFTF [Ref: Christensen's Diagnostic Radiology]

Explanation

a) True

b) False. The different types of electromagnetic radiation differ in their properties and are made up of photons, which do not have a mass or electric charge

c) False. All forms of electromagnetic radiation travel with the velocity of light in a vacuum.

d) True. Electromagnetic radiation produces a sinusoidal graph when electric or magnetic field strength is plotted against time or distance, travelling with velocity (C). The peak field strength is called the amplitude (A)

e) False. Frequency (f) is the number of crests passing a point in a second. The interval between successive crests is called the period.

2. TFFTF [Ref: Christensen's Diagnostic Radiology]

a) True. The filament is heated by passing an electrical current through it, known as the tube current, which subsequently emits electrons.

b) False. The tube voltage affects the kinetic energy of each electron (keV), not the tube current, i.e) number of electrons.

c) False. Electrons are released by heating the cathode filament.

d) True.

e) False. The collision of electrons with tungsten results mainly in the production of heat, due to interaction with outer electrons.

3. FTFFT [Ref: Christensen's Diagnostic Radiology]

a) False. Intensity refers to the total energy per unit area, passing per unit time, which is reduced by filtration

b) True. Filtration results in beam hardening, resulting in a more penetrative beam, and causing an increase in HVL

c) False. Filtration causes the peak photon energy to increase, i.e) the energy level that the largest numbers of photons have

d) False. Filtration increases the minimum and effective photons, i.e) those that contribute to the image

e) True. Filtration reduces the skin dose while having little effect on the image.

4. FTFTT [Ref: Christensen's Diagnostic Radiology]

a) False. Compton interaction refers to the interaction of incident photons with free or loosely bound electrons only.

b) True. Attenuation generally decreases with increasing photon energies. However, the rate of decrease is much higher for photoelectric than for Compton attenuation

c) False. Increasing the tube voltage results in increased photon energy (keV) that in turn causes less side scatter.

d)True. The greater the scatter angle, the greater the energy and range of there coil electrons.

e) True.

5. FFTFT [Ref: Christensen's Diagnostic Radiology+ FRCR Physics Note by Abdullah Sarah]

a) False. The photoelectric effect involves an incident photon removing a bound electron from its shell, resulting in the hole created being filled by electrons from outer shells, causing the emission of characteristic radiation.

b) False. Unlike the Compton effect, the energy of the incident photon is completely absorbed after colliding with the electron and the photon disappears, resulting in no scatter photons.

c) True. Barium has a higher atomic number than human tissue and therefore produces characteristic radiation as a result of the photoelectric effect, with sufficient energy to exit the patient

d) False. Ejection of the electron results in the production of characteristic radiation and an ejected electron (called a photoelectron).

e) True. The characteristic radiation produced as a result of the photoelectric effect is absorbed almost immediately in material with a low atomic number, resulting in the ejection of a further low-energy electron (Auger electron).

6. TFFTT [Ref: Christensen's Diagnostic Radiology+ FRCR Physics Note by Abdullah Sarah]

a) True. Characteristic radiation results in the end production of photons that have the same energy, constituting a line spectrum, i.e) the difference in binding energies between the two shells, which is constant for a given material.

b) False. It mainly involves filament electrons dislodging K-shell electrons.

c) False. The tube voltage and filament voltage increase the rate of production of photons, but do not influence the photon energy, which is dependent on the atomic number of the target material.

d) True

e) True. An increase in atomic number results in an increase in the binding energy of electrons and hence K-radiation.

7. FTFTT [Ref: Christensen's Diagnostic Radiology+ FRCR Physics Note by Abdullah Sarah]

a) False. Positrons are positively charged electrons that result from radioactive decay.

b) True. Beta particles are produced as a result of radioactive decay. Similar to photoelectrons (photoelectric effect) and recoil electrons (Compton effect), they travel through material and interact with

the outer shell of nearby atoms, resulting in them becoming ionized or excited)
c) False. The collision of a positron with a negatively charged electron results in two gamma photons.
d) True.
e) True.

8. FFFTT [Ref: Fundamental Physics of Radiology by W.J. Meradith]

a) False. K-edge binding energy is higher than L-edge binding energy.
b) False. As photon energy increases, photoelectric attenuation decreases between the L-shell and the K-shell.
c) False. The atomic number of tungsten is 74. Its K-shell binding energy is 70 keV
d) True
e) True

9. FTTTF [Ref: Christensen's Diagnostic Radiology]

a) False. Filtration aims to remove a large proportion of lower energy photons, which are mainly absorbed by the patient and do not contribute to the image)
b) True. The tube housing forms part of the inherent filtration along with the insulating oil, glass inserts and the target itself.
c) True. Photoelectric absorption is inversely proportional to photon energy and therefore attenuates the lower energy photons.
d) True. Total filtration ¼ inherent filtration þ added filtration.
e) False .Copper has a higher atomic number than aluminium and hence a greater photoelectric absorption efficiency.

10. TTTFF [Ref: Christensen's Diagnostic Radiology]

a) True) Characteristic X-ray radiation is released when an electron from the outer shell fills the hole in the K-shell left by the captured electron.
b) True) Positrons collide with a negative beta particle resulting in the production of gamma photons with 511 keV each.
c) True
d) False. Photons may be scattered in any direction; however, electrons are projected sideways or forwards only.
e) False

11. TFTFF [Ref: Christensen's Diagnostic Radiology]

a) True. When secondary electrons (e)g. photoelectrons and recoil electrons) pass through tissue, they result in ionization and excitation of atoms resulting in tissue damage)
b) False. Cells with higher mitotic levels are more prone to radiation damage)
c) True. Ionization by secondary electrons, results in damage to biological tissue either by rupturing covalent bonds or by the production of free radicals, which result in oxidation of organic molecules.
d) False. Secondary electrons have a tortuous path, as negative electrons easily deflect them, leaving a track of ionized atoms behind
e) False. X-rays and gamma rays result in ionization of atoms via secondary electrons and are therefore indirectly ionizing agents.

12. TTFFT [Ref: The Fundamental of x-ray and Radium physics 8th Edition]

a) True. Deterministic effect is characterized as having a threshold dose below which the effect will not occur
b) True. Once the threshold has been exceeded, increasing the dose results in the severity of the disease increasing.
c) False. The effect occurs once the threshold is exceeded
d) False
e) True

13. FTTTF

a) False.High temperatures can remove all the information from the TLD.
b) True.
c) True.
d) True. They are used in conjunction with filters set in the badge holder.
e) False. Optically simulated luminescent dosimeters can give readings down to 0.01 mSv. TLD sensitivity is similar to that of films (0.1 mSv).

14. FFFTF [Ref: FRCR Physics Note by Abdullah Sarah]

a) False. The IRR99 permits the dose limit to be relaxed for carers who are willingly exposed to doses higher than the limits set for the public)
b) False. A non-classified worker (trainee) under the age of 18 should not receive a dose more than 6 mSv, not 6 Sv. Millisieverts (mSv) is commonly used to measure the effective dose in diagnostic medical procedures (1 mSv = 103 Sv).
c) False. Workers are designated as classified if their annual dose limit exceeds 6 mSv. The effective dose limit for classified workers is 20 mSv.
d) True. Classified workers must be over 18 years of age and certified as being medically fit, prior to employment, to work as a classified person.
e) False. The IRR99 makes it mandatory to monitor the dose of classified workers only. In practice, the employer monitors the majority of staff working in a controlled area to monitor and keep dose limits within acceptable limits.

15.TFTFT [Ref: FRCR Physics Note by Abdullah Sarah]

a) True.
b) False.
c) True.
d) False. Generally, 150 mm solid concrete provides sufficient shielding.
e) True. 120 mm solid brick= 1 mm lead)

16. FTTFT

a) False. Their response is highly energy dependent.

b) True. They are able to measure down to 1 mSv, while film sensitivity is not better than 0.1 mSv.

c) True. They can be based on Geiger-Müller tubes (gas-filled tubes).

d) False.They are placed behind a filter to give an accurate reading.

e) True. Because they provide a direct reading, they are useful for dose reduction for high-dose procedures.

17. FFFTT [Ref: Christensen's Diagnostic Radiology]

a) False. Leakage radiation from the X-ray tube is than 2% of the dose received by staff in the room. Scatter radiation from Compton interaction within the patient is the main radiation dose to staff.

b) False. The principles of radiation protection are: i. Time: the shorter the exposure time, the lower the dose received ii. Distance: the inverse square law states that the intensity of the beam reduces from a source as distance increases iii. The thicker/denser the material, the better the shielding it provides.

c) False.

d) True

e) True. Lead goggles are often used by interventionists.

18. TTTTF

a) True.

b) True. Increasing the anode angle increases the size of the actual focal spot and so a greater tube current or kVp may be used)

c) True.

d) True.

e) False. It does not affect scatter.

19. TFFFT [Ref: Christensen's Diagnostic Radiology]

a) True. The electrons penetrate deeper into the anode material and the photons produced have a greater distance to travel through it.

b) False. Anode rotation does not directly affect the heel effect. However, the heel effect is of less significance in stationary anodes tubes as they tend to have larger anode angles (due to thermal factors), and the field uniformity is not as critical in the applications they are used in.

c) False. With a long focus-to-film distance, only the central, more uniform part of the beam is used to produce the image and the heel effect is less noticeable)

d) False.The anode side (with a lower intensity of the beam due to the heel effect) should point away from the chest wall (where the thickness of breast tissue is less).

e) True. It may be used to compensate for varying patient thickness along the cranio-caudal axis. For example, antero-posterior (AP) images of the thoracic spine are normally more penetrated (darker) towards the upper vertebrae) With the anode facing cranially, more uniform images can be obtained)

20. FTTTF [Ref: The Fundamental of X-ray and Radium Physics by Joseph Selman 8th]

a) False. It allows adjustment of the beam size.It has no effect on filtration.

b) True. This is a light source that projects as though it originated from the X-ray focus, allowing the operator to see the position of the beam projected onto the patient

c) True

d) True. Less tissue is irradiated by directing the X-ray beam onto a smaller target area

e) False. It decreases the volume of tissue irradiated and the radiation dose

21. FTFTT [Ref: Nisho's book +FRCR Physics Note by Abdullah Sarah]

a) False. Increasing the slice thickness reduces noise but reduces spatial resolution and increases the partial volume effect at the same time.

b) True.

c) False.

d) True.

e) True. In a single-slice scanner, the pitch does not affect the noise, but it affects spatial resolution and the partial volume effect, while in multi-slice scanners, increasing the pitch increases the noise

22. TFTTT

a) True. The core is either air or inert gas (e)g. nitrogen, perfluoropropane, perfluorocarbon) encapsulated in an albumin or lipid shell.

b) False. The diameter of microbubbles is usually 1–4mm(upto7mm), so they are slightly smaller or comparable in size to red blood cells (6–8mm) and much smaller than neutrophils (12–15mm). This allows them to cross pulmonary capillaries and produce systemic enhancement after intravenous injection.

c) True. Their resonance frequency happens to fall within the range of frequencies used in clinical ultrasound, which is why they are useful in imaging.

d) True. However, certain microbubbles can also be taken up by the reticular endothelial system (RES) of the liver and spleen (passive targeting).

e) True. Ultrasound waves of high energy cause disruption and collapse of the microbubbles

23 . TFFTF [Ref: MRI made Easy]
TFFTF
a) True
b) False. Protons align with the external field, but precess with different phases, cancelling each other's transverse magnetization. Therefore, the resulting net transverse magnetization (MXY) is zero. Their phases are synchronized ('phase coherence') by an external 90radiofrequency pulse whose frequency is equal to the Larmor frequency.
c) False. This is the processional frequency in a 1 T magnetic field) At 1.5 T, it would be proportionally higher, i.e 63.9 MHz.
d)True. This is called chemical shift and is utilized in some fat saturation techniques and opposed-phase imaging.
e) False. Nuclear magnetic resonance is a property of nuclei with odd numbers of protons and/or neutrons (e)g. 13C. Nuclei with even numbers of protons and neutrons have a zero net magnetic moment and cannot be polarized
24. TFFFF [Ref: MRI made Easy]
a) True. According to the most recent MHRA guidance, patients with implanted pacemakers must not be examined by magnetic resonance (MR) diagnostic equipment. No provision is currently made for MR-safe pacemakers.
b) False. Patients should be monitored carefully; heat generation in the prosthesis is a potential problem
c) False.Patients with non-ferromagnetic clips (titanium, tantalum, vanadium) can be examined)
d) False. The force from the external magnetic field is minimal compared with the force exerted by the beating heart.
e) False. The decision to scan should be based on the balance of clinical benefit and risks (which remain unknown, with excessive heating being potentially harmful).
25. a) False. This would result in high blood pool activity, which may reduce uptake in the target organ.
b) True. The half-life should ideally be a few hours, roughly equal to the time from injection to scanning.
c) True. Decay should be to a stable daughter inorder to minimize the dose to the patient.
d) False. A radionuclide should have a high specific activity, i.e) high activity per unit volume)
e) False.Beta particles act as secondary electrons and deposit an unnecessary dose in patients.
26. Explanation: The X -Rays that are generated have a tendency to scatter. Thus, they are collimated) Also, the emitted X – Rays also strike against the metallic plate/radioactive material to produce more X – Rays. Also, energy is lost in the form of heat and light. Thus, effectively only 1% of the energy is used to produce X-Ray images.
27. Explanation: Orthopantomography is the panoramic radiograph of the teeth. The teeth also need X-Ray to look into deformity, disease, in growths or outgrowths. It shows the tooth structure and ensures that the teeth are fine without any problems or deformities.
28. D [Ref: FRCR Physics Note by Abdullah Sarah]
Explanation: Normally when an X-Ray is being taken, the people who are not supposed to be exposed to the radiations will be in a safe room where the radiation does not reach due to protective glass and other precautions. However, in case a potable X-Ray is being used and the X-Ray is being performed on the bedside, then the one who performs the X-Ray must wear a protective lead jacket and the other people must maintain a distance of minimum 50 m.
29. **C [Ref: Radiopedia]**
Explanation: Spine needs around 0.20 seconds of exposure for the image to form properly. This can be because the spine faces a lot of obstruction when exposed to the X-Ray so needs almost twice the exposure time of thoracic and abdominal regions. They require only around 0.10 seconds of exposure
30. B **[Ref: The Fundamental of X-ray and Radium Physics by Joseph Selman 8th]**
Explanation: The plate coated with Silver Halide, mostly silver bromide is used to image the X – Rays. Silver halides when exposed to X – Rays end up becoming black and so the images of the X – Rays are formed.
31. C [Ref: The Fundamental of X-ray and Radium Physics by Joseph Selman 8th]
Explanation: Fluoroscopy is a process in which a radioactive dye is injected or ingested by the patient. The dye moves along the path in the body and emits radiation. Sometimes, X – Rays may have to fall on the dye to make it emit radiations. These radiations are collected to form images thus a fluoroscopic setup is often found together with an X-Ray setup.
32. C [Ref: The Fundamental of X-ray and Radium Physics by Joseph Selman 8th]
33. B [Ref: The Fundamental of X-ray and Radium Physics by Joseph Selman 8th]
34. A **[Ref: The Fundamental of X-ray and Radium Physics by Joseph Selman 8th]**
35. C
36. C **[Ref: The Fundamental of X-ray and Radium Physics by Joseph Selman 8th]**
37. A
38. C [Ref: The Fundamental of X-ray and Radium Physics by Joseph Selman 8th]
39. C [Ref: The Fundamental of X-ray and Radium Physics by Joseph Selman 8th]
40. B [Ref: The Fundamental of X-ray and Radium Physics by Joseph Selman 8th]

41. D [Ref: Christensen's Diagnostic Radiology]
42. B [Ref: The Fundamental of X-ray and Radium Physics by Joseph Selman 8th]
43. A [Ref: The Fundamental of X-ray and Radium Physics by Joseph Selman 8th]
44. C
45. C [Ref: The Fundamental of X-ray and Radium Physics by Joseph Selman 8th]
46. B [Ref: Christensen's Diagnostic Radiology]
47. B [Ref: Christensen's Diagnostic Radiology]
48. A [Ref: The Fundamental of X-ray and Radium Physics by Joseph Selman 8th]
49. B [Ref: The Fundamental of X-ray and Radium Physics by Joseph Selman 8th]
50. A [Ref: Radiopedia]