Roll No. | | | | | | |

Answer Sheet No._____ 85

Sig. of Candidate._____

Sig. of Invigilator._____

RADIOGRAPHIC TECHNIQUES HSSC–I

SECTION – A (Marks 20)

Time allowed: 25 Minutes

NOTE: Section–A is compulsory. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) The small area in the X-ray tube from which the radiation emanates is called:

A. Diaphragm B. Focal Spot

C. Focusing Cup D. Cathode

(ii) Which metal is used on the target of the anode?

A. Molybdenum B. Rhenium

C. Graphite D. Tungsten alloy

(iii) Which of the following machines works on the principle of "Mutual Induction"?

A. Generator B. Motor

C. Transformer D. Diode Tube

(iv) Increasing the filtration of an 80 KV X-ray beam from 2 to 3 mm Al will:

A. Increase the intensity B. Soften the beam

C. Decrease the effective beam energy D. None of these

(v) Changing from a low ratio grid to a high ratio grid:

A. Decrease in patient exposure B. Increase in patient exposure

C. Decrease in image contrast D. Positioning to be less critical

(vi) The factor that indicates how much attenuation will take place per centimerter is know as:

A. Mass attenuation coefficient B. Linear attenuation coefficient

C. Decay rate D. Atomic number

(vii) Collimators are used to:

A. Reduce the radiation beam spread B. filter the radiation beam

C. Increase film latitude D. Decrease film latitude

(viii) X-rays and Gamma rays:

A. Always travel in a straight line B. Influenced by an electrical field

C. Influenced by a magnetic field D. None of these

(ix) A small focal spot is used to:

A. Reduce patient exposure B. Decrease image noise

C. Decrease visibility of detail D. Reduce image blurring

(x) The mass of an atom is:

A. Distributed uniformly all around B. Concentrated in the orbital electrons

C. Concentrated in the nucleus D. Zero as protons and electrons are same

(xi) The anode of a diagnostic X-ray tube is angled to give:

A. Proper reflection of the electron beam
B. Smaller actual focal spot
C. Smaller effective focal spot
D. Higher beam homogeneity

(xii) The X-ray tube current (mA) influences which **ONE** of the following parameters:

A. Maximum X-ray energy
B. Number of X-ray photons
C. Mean energy (quality) of the X-rays
D. Patient penetration

(xiii) X-ray generators produce radiation through:

A. Bremsstrahlung processes
B. K-shell emission processes
C. Radioactive decay
D. Both A and B

(xiv) What does keV stand for?

A. Kilo electron volt
B. Kinetic energy volt
C. Kinetic energy velocity
D. Kilo energy volt

(xv) The scattered radiation during a diagnostic X-ray examination arises mainly as a result of:

A. Coherent scattering
B. Photoelectric absorption
C. Compton effect
D. None of these

(xvi) The effect of increasing the frequency of a photon:

A. Increase its wavelength
B. Decrease its wavelength
C. Increase its velocity
D. Decrease its velocity

(xvii) Changing from 10:1 grid ratio to a 5:1 grid ratio in a radiographic procedure:

A. Decrease in patient exposure
B. Improve contrast
C. Decrease blurring
D. Increase in patient exposure

(xviii) As distance increases, radiation intensity:

A. Decreases
B. Increases
C. Remains same
D. All of these

(xix) Difference in density between adjacent areas of a radiograph is referred to as:

A. Brightness
B. Density
C. Contrast
D. Detail

(xx) The most common material used to provide protection against X-rays is:

A. Tungsten
B. Lead
C. Copper
D. Ceramic bricks

For Examiner's use only:

Total Marks:	**20**
Marks Obtained:	

RADIOGRAPHIC TECHNIQUES HSSC–I

86

Time allowed: 2:35 Hours **Total Marks Sections B and C: 80**

NOTE: Answer any ten parts from Section 'B' and any three questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.

SECTION – B (Marks 50)

Q. 2 Answer any TEN parts. The answer to each part should not exceed 2 to 4 lines. **(10 x 5 = 50)**

(i) List the three primary functions of the X-ray tube's protective housing.

(ii) Explain the three causes of X-ray tube failure.

(iii) What is tube current in an X-ray tube?

(iv) How are frequency and wavelength related?

(v) What is the function of the filament?

(vi) Why is a vacuum created in the X-ray tube?

(vii) In which direction should the anode be placed for an AP projection of the femur?

(viii) Define the heel effect and describe how it can be used to the radiographer's advantage.

(ix) Discuss the purpose of the focusing cup.

(x) Why is the filament embedded in a focusing cup?

(xi) Briefly describe how to use a tube rating chart.

(xii) What is attenuation?

(xiii) List the three parts of the anode assembly.

(xiv) What is the frequency of a 70 keV X-ray?

(xv) What is the difference between a high-voltage generator and a high-voltage transformer?

SECTION – C (Marks 30)

Note: Attempt any THREE questions. All questions carry equal marks. **(3 x 10 = 30)**

Q. 3 **a.** Briefly describe three imaging windows of the electromagnetic spectrum.

b. Describe inverse square law.

Q. 4 **a.** Explain the phenomenon of thermionic emission.

b. An X-ray imaging system that draws a current of 80 ampere is supplied with 220 V. What is the power consumed?

Q. 5 **a.** Discuss the working principle of an electric motor.

b. Discuss the properties and advantages of series and parallel resistance circuits.

Q. 6 **a.** How does the anode rotate inside a glass enclosure with no mechanical connection to the outside?

b. At 80 kVp, what is the energy in joules of the electron arriving at the X-ray tube target?

Q. 7 Define or otherwise identify the following:

a. Automatic exposure control (AEC)

b. Focusing cup

c. X-ray quality

d. Mutual induction

e. Bremsstrahlung X-rays