Roll No. ☐☐☐☐☐☐

Answer Sheet No._____

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)   Approximate energy of X-rays used for diagnostic purpose is:
A.   10 to 20 kVp   B.   30 to 150 kVp   C.   200 to 300 kVp   D.   300 to 1000 kVp

(ii)   The best X-ray efficiency is produced when the target material has:
A.   Low atomic number   B.   High atomic number
C.   Low hardness   D.   Low melting point

(iii)   The maximum number of electrons which can be accommodated in M-shell of an atom is:
A.   6   B.   8   C.   32   D.   18

(iv)   Which is the unit of Energy in System International?
A.   Watt   B.   Joule   C.   Newton   D.   Meter

(v)   Which of the following particles makes the nucleus positive?
A.   Electron   B.   Neutron   C.   Proton   D.   Neutrino

(vi)   Excessive heat in the anode of X-ray tube results in the tube life
A.   Increased   B.   reduced   C.   Improved   D.   None of these

(vii)   Higher tube currents and shorter exposure times are possible with the:
A.   Rotating anode   B.   Stationary anode   C.   Focusing cup   D.   Tube filament

(viii)   Target material usually has:
A.   High atomic number   B.   High melting point
C.   High thermal conductivity   D.   All of these

(ix)   The focusing cup is:
A.   Negatively charged   B.   Positively charged
C.   Neutral   D.   None of these

(x)   The protective housing of X-ray tube guards against:
A.   Excessive radiation exposure   B.   Leakage radiation
C.   Electrical shock   D.   All of these

(xi)   Roentgen is the unit of:
A.   Radiation exposure   B.   Radiation absorbed dose
C.   Radiation which goes into waste   D.   Radioactivity

(xii)   The energy of photon is directly proportional to its:
A.   Wavelength   B.   Distance   C.   Amplitude   D.   Frequency

(xiii)   The penetrating ability of an X-ray beam is greatest for which of following wavelengths:
A.   3 nm   B.   9 nm   C.   0.1 nm   D.   100.0 nm

(xiv)   Inverse square law is defined, the intensity of radiation reduced as inversely proportional:
A.   Square of the distance   B.   Square root of the distance
C.   Cube root of the distance   D.   All of these

(xv)   Electric power is defined as:
A. $P = VI$ B. $P = RI$ C. $P = \dfrac{I}{V}$ D. $P = \dfrac{V}{R}$

(xvi)   Any charge in motion induces:
A.   Gravitational field   B.   Electric field   C.   Magnetic field   D.   All of these

(xvii)   Which one of the following is true for X-ray quantity?
A.   Inversely proportional to mAs   B.   Inversely proportional to the kVp
C.   Varies directly with distance   D.   Reduced by filtration

(xviii)   Any action which disturbs the electrical balance of the atoms which make up matter is referred to as:
A.   Attenuation   B.   Absorption   C.   Ionization   D.   Decay

(xix)   The three main steps in processing a radiograph are:
A.   Developing, filling, fixation   B.   Developing, fixation, washing
C.   Exposure, developing, fixation   D.   Developing, reticulation, fixation

(xx)   Relatively low kVp values are used in some X-ray procedures for the purpose of:
A.   Increasing penetration   B.   Decreasing patient exposure
C.   Increasing contrast sensitivity   D.   Decreasing area contrast

For Examiner's use only:

Total Marks: 20

Marks Obtained: ☐

—— 1HA 1650 ——

RADIOGRAPHIC TECHNIQUES   HSSC–I

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)   What is the reason for the filament to be embedded in focusing cup?

(ii)   List the five major controls on the operator's console.

(iii)   What precautions are necessary when using and storing radiographic film?

(iv)   Explain the three causes of x-ray tube failure?

(v)   What are the three functions of the anode serves in an x-ray tube?

(vi)   Describe the factors which affect the x-ray quantity and quality.

(vii)   List and describe the two types of anodes.

(viii) Write the inverse square law and describe its meaning.

(ix)   Explain the working of a Transformer.

(x)   Describe three cardinal principal of radiation protection.

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

(xii)   State Ohm's law.

(xiii) Identify and explain the three important parts of a radiographic film.

(xiv)   Summarize the basic process of developing film.

(xv)   The radiographic table must be radiolucent. Define and explain radiolucent.

SECTION – C (Marks 30)

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

Q. 3   (a)   Discus the working of an Electric Generator.   **(5)**

(b)   What is the total circuit resistance when resistive elements of 5, 10, 15 and 20 ohm are connected in a series.   **(5)**

Q. 4   (a)   How frequency and wavelength are related and describe their relationship?   **(5)**

(b)   A radiographer holds a 3 kg x-ray tube, 2.0 meters above the ground. What is its potential energy?   **(5)**

Q. 5   (a)   Differentiate between ionizing and non ionizing radiation.   **(5)**

(b)   A force of 250 N is required to move a patient over a distance of 1.5 meters. What is the work involved?   **(5)**

Q. 6   (a)   Explain two devices used for personal monitoring.   **(6)**

(b)   A radiographic exposure required 100 mAs. Find the number of electrons in this exposure?   **(4)**

Q. 7   Define or otherwise identify the following: **(10)**

i)	Optical density	ii)	Electromotive force	iii)	Gauss and Tesla
iv)	HVL	v)	SID		

— 1HA 1650 —