

## PROVISIONAL ANSWER KEY

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Question1:-For heavier nuclei, stability requires :

- A:-Fewer neutrons than protons
- B:-Equal neutrons and protons
- C:-More neutrons than protons
- D:-No neutrons

Correct Answer:- Option-C

Question2:-The half-life of cobalt-60 is approximately 5.26 years. Its mean life is approximately :

- A:-3.5 years
- B:-5.26 years
- C:-7.6 years
- D:-10 years

Correct Answer:- Option-C

Question3:-A generator operating at 100 kV and 500 mA has a capacity of :

- A:-5 kW
- B:-50 kW
- C:-500 kW
- D:-0.5 kW

Correct Answer:- Option-B

Question4:-For a tungsten target ( $Z = 74$ ), what voltage is required to get efficiency  $\approx 0.01$  (1%)?

A:-100 kV

B:-150 kV

C:-200 kV

D:-250 kV

Correct Answer:- Option-B

Question5:-Added filtration results in a beam with :

A:-Lower energy

B:-Higher average energy

C:-No energy change

D:-Reduced penetration

Correct Answer:- Option-B

Question6:-The ions considered in exposure are :

A:-Both positive and negative together

B:-Only neutral atoms

C:-Ions of one sign only

D:-Only electrons

Correct Answer:- Option-C

Question7:-The special unit of equivalent dose is :

A:-Gray (Gy)

B:-Sievert (Sv)

C:-Roentgen (R)

D:-Becquerel (Bq)

Correct Answer:- Option-B

Question8:-Kerma measures

A:-Ionization in air

B:-Energy transferred to charged particles

C:-Energy absorbed in tissue only

D:-Energy absorbed in air only

Correct Answer:- Option-B

Question9:-The TLD material developed and used by BARC for Personnel Monitoring Service is

A:-LiF : Dy

B:-LiF : Mn

C:-CaSO<sub>4</sub> : Dy

D:-CaSO<sub>4</sub> : Mn

Correct Answer:- Option-C

Question10:-Photoelectric effect results a small changes in Z result in large change in absorption due to its

A:-Z dependence

B:-1/Z dependence

C:-Z<sup>2</sup> dependence

D:-Z<sup>3</sup> dependence

Correct Answer:- Option-D

Question11:-At which vertebral level is the manubriosternal joint usually found?

A:-T2 - T3

B:-T4 - T5

C:-T6 - T7

D:-T8 - T9

Correct Answer:- Option-B

Question12:-Which carpal bone lies in the proximal row on the radial side?

A:-Lunate

B:-Scaphoid

C:-Triquetrum

D:-Pisiform

Correct Answer:- Option-B

Question13:-The obturator foramen is formed by

A:-Ilium and Sacrum

B:-Pubis and Ischium

C:-Ilium and Pubis

D:-Sacrum and Coccyx

Correct Answer:- Option-B

Question14:-The main function of the pectoral girdle is to :

A:-Protect the heart

B:-Attach the upper limb to the axial skeleton

C:-Support the lower limb

D:-Aid in digestion

Correct Answer:- Option-B

Question15:-The lymphatic system plays an important role in :

A:-Digestion

B:-Respiration

C:-Defense against pathogens

D:-Bone formation

Correct Answer:- Option-C

Question16:-The respiratory center is located in the :

A:-Cerebrum

B:-Cerebellum

C:-Medulla oblongata

D:-Spinal cord

Correct Answer:- Option-C

Question17:-Which gland is the largest salivary gland?

A:-Sublingual gland

B:-Submandibular gland

C:-Parotid gland

D:-Buccal gland

Correct Answer:- Option-C

Question18:-Which enzyme is present in the stomach and contributes to chyme formation?

A:-Amylase

B:-Lipase

C:-Pepsin

D:-Trypsin

Correct Answer:- Option-C

Question19:-Which pancreatic hormone is secreted by beta ( $\beta$ ) cells?

A:-Glucagon

B:-Insulin

C:-Somatostatin

D:-Pancreatic polypeptide

Correct Answer:- Option-B

Question20:-Which valve closes at the beginning of systole?

A:-Aortic valve

B:-Pulmonary valve

C:-Mitral valve

D:-Both mitral and tricuspid

Correct Answer:- Option-D

Question21:-The test to determine adequate filtration of an X ray beam is by measuring

A:-Exposure output

B:-Half Value Layer (HVL)

C:-Kilovoltage (kV)

D:-Patient exposure

Correct Answer:- Option-B

Question22:-When the distance from the X ray source is doubled, the beam intensity is

A:-Reduced by half

B:-Increased by half

C:-Reduced by one fourth

D:-Increased by one fourth

Correct Answer:- Option-C

Question23:-X rays were discovered by

A:-Madam Curie

B:-Henri Bequerel

C:-Roentgen

D:-Hounsfield

Correct Answer:- Option-C

Question24:-In intravenous urography (IVU) the first image taken after contrast injection is

A:-Urogram

B:-Nephrogram

C:-Pyelogram

D:-Venogram

Correct Answer:- Option-B

Question25:-Ball Catcher's view is

A:-Both hands lateral

B:-Both hands anterior oblique

C:-Both hands posterior oblique

D:-Both hands PA view

Correct Answer:- Option-C

Question26:-Anterior superior iliac spine is related to which part of the body ?

A:-Knee

B:-Skull

C:-Chest

D:-Hip

Correct Answer:- Option-D

Question27:-In radiography, Water's projection is used to image

A:-Sacroiliac joint

B:-Paranasal sinuses

C:-Mastoid air cells

D:-Patella

Correct Answer:- Option-B

Question28:-In radiography, the radiographic base line is

A:-Interpupillary line

B:-Infraorbital line

C:-Orbitomeatal line

D:-Auricular line

Correct Answer:- Option-C

Question29:-The following are properties of X rays, EXCEPT

A:-Ionise gases

B:-Electrically neutral

C:-Highly penetrating invisible rays

D:-Can be focussed by lens

Correct Answer:- Option-D

Question30:-A developer solution for manual processing contain all the following, EXCEPT

A:-Sodium sulphite

B:-Sodium thiosulphate

C:-Sodium Carbonate

D:-Metol

Correct Answer:- Option-B

Question31:-In a film badge, the filter used for detecting neutrons is

A:-Lead

B:-Copper

C:-Cadmium

D:-Plastic

Correct Answer:- Option-C

Question32:-Regarding Computed tomography (CT), table movement per gantry rotation is called

A:-Voxel

B:-Window level

C:-Pixel

D:-Pitch

Correct Answer:- Option-D

Question33:-Effective shielding material for beta radiation is

A:-Lead

B:-Paper

C:-Perspex

D:-Copper

Correct Answer:- Option-C

Question34:-Thermoluminescent dosimeter (TLD) to measure effective body dose should be worn

A:-Inside the lead apron stomach position

B:-Outside the lead apron chest position

C:-Outside the lead apron stomach position

D:-Inside the lead apron chest position

Correct Answer:- Option-D

Question35:-The effective dose from a PA chest examination is typically

A:-0.02 mSv

B:-2 mSv

C:-0.2 mSv

D:-20 mSv

Correct Answer:- Option-A

Question36:-The radiographic procedure to visualise intracranial vessels is called

A:-Perfusion scintigraphy

B:-Myelography

C:-Cisternography

D:-Cerebral angiography

Correct Answer:- Option-D

Question37:-The CT number of water is

A:-1000 HU

B:-+ 1000 HU

C:-0 HU (zero HU)

D:-100 HU

Correct Answer:- Option-C

Question38:-The regulatory board for radiation installations in India is

A:-Bhabha Atomic Research Centre

B:-Atomic Energy Regulatory Board

C:-Board of Radiation and Isotope Technology

D:-Indian Association of Medical Physicists

Correct Answer:- Option-B

Question39:-DEXA is used for

A:-CT scan

B:-MRI

C:-Cardiac catheterisation

D:-Bone Mineral Densitometry

Correct Answer:- Option-D

Question40:-In MRI , TR and TE are expressed in

A:-Minutes

B:-Seconds

C:-Milli seconds

D:-Microseconds

Correct Answer:- Option-C

Question41:-Which principle of medical ethics ensures that the patient is the primary decision-maker in their own care?

A:-Beneficence

B:-Justice

C:-Respect for Autonomy

D:-Non-maleficence

Correct Answer:- Option-C

Question42:-According to AERB, what is the annual radiation dose limit for occupational workers, averaged over five consecutive years?

A:-1 mSv

B:-5 mSv

C:-10 mSv

D:-20 mSv

Correct Answer:- Option-D

Question43:-According to AERB guidelines, where is the safest place for a technologist to store their TLD badge after completing their routine work?

A:-On the X-ray control panel

B:-Inside the X-ray installation room

C:-In a radiation-free area outside the X-ray room

D:-In the darkroom

Correct Answer:- Option-C

Question44:-In a radiology department, who bears the ultimate responsibility for obtaining informed consent, even if the task is delegated to a technologist?

A:-The referring physician

B:-The radiologist

C:-The hospital administrator

D:-The lead technologist

Correct Answer:- Option-B

Question45:-Which fundamental principle of radiation protection states that all exposures should be kept as low as reasonably achievable (ALARA)?

A:-Justification

B:-Optimization

C:-Limitation

D:-Accountability

Correct Answer:- Option-B

Question46:-In pediatric imaging, a technologist selects a lower exposure factor (mAs) that results in a slightly higher level of noise. Despite the reduced aesthetic quality, the image remains sufficient to visualize the specific anatomical structures required for the doctor's diagnosis. This deliberate practice of balancing patient safety with "just enough" image quality is best described by which principle?

A:-The Law of Bergonie and Tribondeau

B:-The ALARA Principle

C:-The ALADA Principle

D:-The 15% Rule

Correct Answer:- Option-C

Question47:-For fixed radiography installations, where must the technologist stand during the exposure to protect themselves from scattered radiation?

A:-Behind the X-ray tube

B:-Next to the patient to provide comfort

C:-Behind a protective barrier

D:-In the darkroom

Correct Answer:- Option-C

Question48:-In an emergency situation where life-saving radiological procedures are necessary but consent cannot be obtained, the procedure should be performed based on:

A:-The referring doctor's convenience

B:-The patient's best interests

C:-A court order

D:-The availability of insurance

Correct Answer:- Option-B

Question49:-During Interventional Radiology (IR) procedures, what additional protective measures should be used to minimize radiation dose to medical personnel?

A:-Standard surgical masks

B:-Ceiling suspended screens and couch hanging lead flaps

C:-Increasing the room lighting

D:-

Using plastic drapes on the X-ray tube

Correct Answer:- Option-B

Question50:-Which of the following statements correctly matches the type of radiation dose with its SI unit?

A:-Absorbed dose is measured in Gray (Gy), while equivalent and effective doses are measured in Sievert (Sv)

B:-Absorbed dose is measured in Sievert (Sv), while effective dose is measured in Gray (Gy)

C:-Equivalent dose is measured in Gray (Gy), while absorbed dose is measured in Coulomb/kg

D:-Effective dose is measured in Gray (Gy), while absorbed dose is measured in Sievert (Sv)

Correct Answer:- Option-A

Question51:-The SI unit of absorbed dose is

A:-Roentgen

B:-Gray

C:-Sievert

D:-Curie

Correct Answer:- Option-B

Question52:-Which of the following is used as the source in a conventional telecobalt unit?

A:-Iridium - 192

B:-Cesium - 137

C:-Cobalt - 60

D:-Iodine - 125

Correct Answer:- Option-C

Question53:-The "D-max" (Depth of maximum dose) for a 6 MV photon beam is approximately

A:-0.5 cm

B:-1.5 cm

C:-2.5 cm

D:-3.0 cm

Correct Answer:- Option-B

Question54:-The half-life of Cobalt-60 is approximately :

A:-30 years

B:-5.26 years

C:-74 days

D:-1600 years

Correct Answer:- Option-B

Question55:-Inverse square law states

A:-Dose  $\propto$  distance

B:-Dose  $\propto$  1/distance<sup>2</sup>

C:-Dose  $\propto$  distance<sup>2</sup>

D:-Dose independent

Correct Answer:- Option-B

Question56:-The half-value layer (HVL) is the thickness of material required to reduce the beam intensity by

A:-25%

B:-50%

C:-75%

D:-100%

Correct Answer:- Option-B

Question57:-Thermoluminescent Dosimeters (TLD) commonly use which material?

A:-Silver bromide

B:-Lithium Fluoride (LiF)

C:-Silicon

D:-Lead

Correct Answer:- Option-B

Question58:-Isocenter is defined as

A:-The center of the tumor

B:-The intersection point of the gantry, collimator and couch axes

C:-The point of maximum dose

D:-The surface of the patient

Correct Answer:- Option-B

Question59:-The target in a high-energy Linear Accelerator is typically made of :

A:-Copper

B:-Tungsten

C:-Aluminum

D:-Lead

Correct Answer:- Option-B

Question60:-Brachytherapy "High Dose Rate" (HDR) usually refers to a dose rate of

A:-> 12 Gy/hour

B:-< 2 Gy/hour

C:-5 Gy/year

D:-1 Gy/day

Correct Answer:- Option-A

Question61:-Which of the following is a common screening test for Cervical Cancer?

A:-Mammography

B:-PSA test

C:-Pap Smear

D:-Colonoscopy

Correct Answer:- Option-C

Question62:-The biological mechanism by which cancer spreads from the primary site to distant organs is:

A:-Mitosis

B:-Metastasis

C:-Apoptosis

D:-Hypertrophy

Correct Answer:- Option-B

Question63:-Which of the following is a radio-resistant tumor?

A:-Seminoma

B:-Osteosarcoma

C:-Lymphoma

D:-Small cell lung cancer

Correct Answer:- Option-B

Question64:-Etiology of Mesothelioma is strongly linked to:

A:-Tobacco

B:-Alcohol

C:-Asbestos exposure

D:-High fat diet

Correct Answer:- Option-C

Question65:-The term "Adjuvant Radiotherapy" refers to treatment given:

A:-Before surgery

B:-During surgery

C:-After the primary treatment (like surgery)

D:-Instead of surgery

Correct Answer:- Option-C

Question66:-The "TNM" staging system is maintained by:

A:-WHO

B:-AJCC/UICC

C:-Red Cross

D:-UNESCO

Correct Answer:- Option-B

Question67:-The anatomical landmark 'Carina' is located at the level of:

A:-C4

B:-T4-T5

C:-T10

D:-L1

Correct Answer:- Option-B

Question68:-The 'Sentinel Lymph Node' is:

A:-The largest node in the body

B:-The first node to receive lymphatic drainage from a tumor

C:-A node in the groin only

D:-A node that is never cancerous

Correct Answer:- Option-B

Question69:-The most common histological type of Head and Neck cancers is:

A:-Adenocarcinoma

B:-Squamous Cell Carcinoma

C:-Small Cell Carcinoma

D:-Sarcoma

Correct Answer:- Option-B

Question70:-Which virus is strongly associated with Nasopharyngeal Carcinoma?

A:-HPV

B:-Epstein-Barr Virus (EBV)

C:-HIV

D:-Hepatitis B

Correct Answer:- Option-B

Question71:-D<sub>0</sub> represents the dose required to reduce the surviving fraction of cells to \_\_\_\_\_ % of cells.

A:-63%

B:-50%

C:-0%

D:-37%

Correct Answer:- Option-D

Question72:-Dose limit for stochastic effect for occupational exposure is

A:-10 mSV

B:-20 mSV

C:-50 mSV

D:-30 mSV

Correct Answer:- Option-C

Question73:-The most aggressive form of Thyroid cancer is

A:-Papillary Thyroid Cancer

B:-Follicular Thyroid Cancer

C:-Medullary Thyroid Cancer

D:-Anaplastic Thyroid Cancer

Correct Answer:- Option-D

Question74:-According to AJCC 9<sup>th</sup> edition, Ca breast cT3 represents

A:-Size of the lesion more than or equal to 2 cm

B:-Size of the lesion is less than 2 cm

C:-Tumour size more than 5 cm

D:-Tumour size more than 4 cm

Correct Answer:- Option-C

Question75:-The 4 Rs of Radiobiology include all except

A:-Repair

B:-Regeneration

C:-Reassortment

D:-Reoxygenation

Correct Answer:- Option-B

Question76:-Example for a high LET radiation

A:-X-ray

B:-Alpha particle

C:-Electron

D:-Gamma rays

Correct Answer:- Option-B

Question77:-Conventional fractionation in radiotherapy means

A:-1.3 Gy

B:-2 Gy

C:-3 Gy

D:-4 Gy

Correct Answer:- Option-B

Question78:-The primary purpose of fractionation in radiotherapy is to:

A:-Increase tumour hypoxia

B:-Reduce normal tissue damage

C:-Eliminate all tumour cells instantly

D:-Avoid use of high-energy beams

Correct Answer:- Option-B

Question79:-Short-course radiotherapy schedule for rectal cancer

A:-20 Gy/5 fractions

B:-25 Gy/5 fractions

C:-30 Gy/10 fractions

D:-50 Gy/25 fractions

Correct Answer:- Option-A

Question80:-The commonest site of metastasis in carcinoma of the prostate is

A:-Lung

B:-Brain

C:-Liver

D:-Bone

Correct Answer:- Option-D

Question81:-The Imaging technique most useful for soft tissue delineation in brain radiotherapy is

A:-MRI scan

B:-CT scan

C:-PET scan

D:-X-ray

Correct Answer:- Option-A

Question82:-The target volume that includes setup uncertainties and internal organ motion added to the CTV is

A:-GTV

B:-CTV

C:-PTV

D:-ITV

Correct Answer:- Option-C

Question83:-Following radiation exposure, the skin reaction after 2 to 3 weeks is

A:-Fibrosis

B:-Necrosis

C:-Erythema

D:-Ulceration

Correct Answer:- Option-C

Question84:-Which immobilisation device is commonly used in head and neck radiotherapy?

A:-VacLoc

B:-Thermoplastic mould

C:-Breast board

D:-Belly board

Correct Answer:- Option-B

Question85:-Radiation myelopathy is injury to which organ?

A:-Spleen

B:-Skin

C:-Parotid

D:-Spinal cord

Correct Answer:- Option-D

Question86:-A field technique with a lateral parallel opposed lateral beam arrangement is commonly used in

A:-Larynx

B:-Oesophagus

C:-Breast

D:-Prostate

Correct Answer:- Option-A

Question87:-An X-ray Machine which can reproduce radiation treatment conditions is called

A:-Cyclotron

B:-Magnetron

C:-Linear accelerator

D:-Simulator

Correct Answer:- Option-D

Question88:-The Primary treatment for locally advanced cervical cancer is

A:-Surgery alone

B:-Concurrent chemoradiation

C:-Chemotherapy alone

D:-Immunotherapy alone

Correct Answer:- Option-B

Question89:-Half-life of Iridium-192 is

A:-6 hours

B:-74 days

C:-9 hours

D:-5 years

Correct Answer:- Option-B

Question90:-The technique of delivering radiotherapy where the gantry continuously rotates while modulating beam intensity is

A:-IMRT

B:-2 D RT

C:-Hyperfractionated RT

D:-VMAT

Correct Answer:- Option-D

Question91:-Which of the following techniques uses daily imaging to verify patient positioning before treatment?

A:-Conventional Radiotherapy

B:-Image-Guided Radiotherapy

C:-Orthovoltage therapy

D:-Teletherapy without imaging

Correct Answer:- Option-B

Question92:-The main purpose of immobilization devices in radiotherapy is to:

A:-Reduce cost

B:-Improve patient comfort only

C:-Ensure reproducibility of treatment position

D:-Decrease machine time

Correct Answer:- Option-C

Question93:-Which of the following is a basic principle of radiation protection?

A:-Increase exposure time

B:-Decrease distance from source

C:-Use shielding

D:-Avoid documentation

Correct Answer:- Option-C

Question94:-The unit of absorbed radiation dose is:

A:-Sievert (Sv)

B:-Gray (Gy)

C:-Becquerel (Bq)

D:-Coulomb (C)

Correct Answer:- Option-B

Question95:-Intensity Modulated Radiotherapy differs from 3DCRT because:

A:-It uses higher energy beams

B:-It modulates beam intensity across the field

C:-It does not require planning

D:-It is less precise

Correct Answer:- Option-B

Question96:-A common gap in radiotherapy delivery in resource-limited settings is:

A:-Excess availability of machines

B:-Lack of trained personnel

C:-Overuse of imaging

D:-High patient compliance

Correct Answer:- Option-B

Question97:-Which ethical principle is most important while taking informed consent?

A:-Justice

B:-Autonomy

C:-Non-maleficence

D:-Confidentiality

Correct Answer:- Option-B

Question98:-When a patient is anxious before treatment, the best initial approach is to:

A:-Ignore the anxiety

B:-Increase sedation immediately

C:-Delay treatment indefinitely

D:-Provide clear explanation and reassurance

Correct Answer:- Option-D

Question99:-In Image-Guided, Radiotherapy, the main advantage is:

A:-Reduced treatment cost

B:-Real-time verification of target position

C:-Elimination of planning CT

D:-No need for immobilization

Correct Answer:- Option-B

Question100:-The typical energy range of megavoltage beams used in external beam radiotherapy is :

A:-50 — 150 kVp

B:-200 — 400 kVp

C:-1 — 25 MV

D:-100 — 200 MeV

Correct Answer:- Option-C