INI CET Radiology

Sample Paper – 7

Duration: 14 Minutes **Maximum Marks: 15**

Instructions

- This paper contains **15** Multiple Choice Questions (Single Best Response), modelled on the Radiodiagnosis (Radiology) content of **INI CET** (Institutes of National Importance Combined Entrance Test) conducted by AIIMS New Delhi.
- The **15-question** length matches the number of Radiology items you actually meet in the real 200-question paper.
- Each correct answer carries **+1 mark**. There is **negative marking of one-third (0.33) mark** for every incorrect answer; unattempted questions carry no penalty.
- Every question has **exactly one best answer**. Choose the single most appropriate option.
- Attempt this practice paper in one timed sitting of about **14 minutes**, the pace the real computer-based test demands.

Physics and Radiation Safety

Q1. Compared with a conventional film-screen system, a key advantage of digital radiography is that it:

(A) Has a wide dynamic range and allows post-processing of a single exposure

(B) Cannot be windowed or magnified after acquisition

(C) Requires chemical wet processing in a darkroom

(D) Has a narrower exposure latitude than film

Q2. In CT dosimetry, the quantity obtained by multiplying the volume CT dose index (CTDIvol) by the scan length is the:

(A) Dose-length product (DLP)

(B) Effective dose in sieverts

(C) Entrance skin dose

(D) Bremsstrahlung yield

Q3. During fluoroscopy, a feature that reduces patient dose by displaying the last acquired frame without continued radiation is:

(A) Continuous high-dose screening throughout the study

(B) Last-image-hold display

(C) Removal of the anti-scatter grid in every case

(D) Increasing the frame rate to the maximum

Imaging Modalities and Contrast Media

Q4. Shear-wave elastography is increasingly used to assess liver fibrosis because it measures:

(A) The iron content of hepatocytes

(B) The fat fraction of the liver only

(C) Tissue stiffness from the speed of a propagating shear wave

(D) The vascular flow velocity in the portal vein

Q5. Time-of-flight (TOF) MR angiography can image flowing blood *without* intravenous contrast because it relies on:

(A) Iodinated contrast opacifying the lumen

(B) The bright signal of inflowing unsaturated blood against suppressed stationary tissue

(C) Ionising radiation from a rotating X-ray tube

(D) Radioactive tracer uptake by the vessel wall

Q6. A patient reports pain and swelling at the cannula site during a power injection of iodinated contrast for CT. The most appropriate immediate step is to:

(A) Continue the injection at a higher flow rate

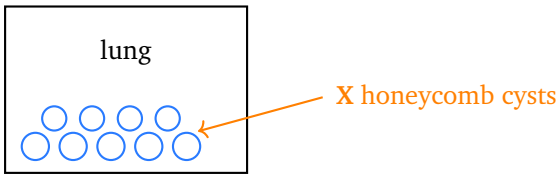
(B) Give intravenous adrenaline immediately

(C) Ignore it, as extravasation is always harmless

(D) Stop the injection, elevate the limb and apply a cold compress, then assess the swelling

Chest and Cardiovascular Radiology

Q7. The HRCT sketch below shows clustered subpleural cystic air spaces stacked in layers (marked **X**). This 'honeycomb' appearance indicates:



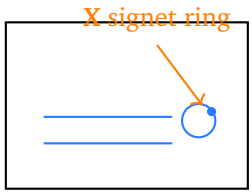
(A) An acute pneumothorax

(B) Simple pulmonary oedema

(C) A single lung abscess

(D) End-stage interstitial fibrosis (usual interstitial pneumonia)

Q8. The HRCT sketch below shows thickened, dilated bronchi running as parallel 'tram-track' lines, one seen end-on as a 'signet ring' beside its artery (marked **X**). This indicates:



(A) Bronchiectasis

(B) Lobar pneumonia

(C) Pleural effusion

(D) A normal bronchovascular pattern

Gastrointestinal and Genitourinary Radiology

Q9. On a *supine* abdominal radiograph, both the inner (mucosal) and outer (serosal) walls of a bowel loop are outlined by gas, making the wall clearly visible. This Rigler (double-wall) sign indicates:

(A) Normal intraluminal gas only

(B) Pneumoperitoneum (free intraperitoneal air)

(C) A pleural effusion

(D) Fatty liver

Q10. On a barium meal, a feature that favours a *benign* gastric ulcer rather than a malignant one is:

(A) Smooth mucosal folds radiating right up to the ulcer crater, which projects beyond the lumen

(B) An irregular filling defect with nodular heaped-up margins

(C) Abrupt cut-off of folds well short of the crater

(D) A rigid, non-distensible ‘leather-bottle’ stomach

Q11. On contrast-enhanced CT of acute pancreatitis, non-enhancing areas of the gland that fail to take up contrast indicate:

(A) Normal pancreatic parenchyma

(B) A simple hepatic cyst

(C) Pancreatic necrosis

(D) An accessory spleen

Musculoskeletal and Neuroradiology

Q12. A patient has suspected spinal cord compression with a soft-tissue mass. The single best imaging modality to show the cord and surrounding soft tissue is:

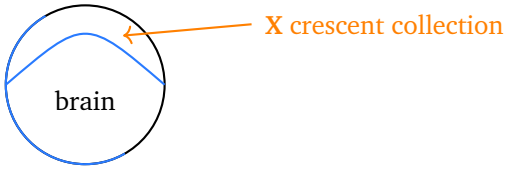
(A) Plain radiography alone

(B) MRI of the spine

(C) A bone scan

(D) Ultrasound of the back

Q13. The head-CT sketch below shows a crescent-shaped extra-axial collection following the brain surface and crossing suture lines (marked **X**). If this collection is *hypodense* (dark) relative to brain, it most likely represents:



(A) An acute extradural haematoma

(B) A subarachnoid haemorrhage

(C) A hyperdense acute subdural haematoma

(D) A chronic subdural haematoma

Interventional, Nuclear and Emergency Radiology

Q14. Uterine artery embolisation is a minimally invasive treatment offered for symptomatic uterine fibroids. It works by:

(A) Surgically removing the whole uterus through an open incision

(B) Delivering external-beam radiotherapy to the pelvis

(C) Injecting embolic particles into the uterine arteries to devascularise and shrink the fibroids

(D) Placing a stent across the renal artery

Q15. Which pairing of a nuclear-medicine radiotracer with its main clinical use is correct?

(A) Technetium-99m sestamibi for localising a phaeochromocytoma

(B) MIBG for localising a parathyroid adenoma

(C) Technetium-99m sestamibi for a parathyroid adenoma, and MIBG for a phaeochromocytoma or neuroblastoma

(D) Both sestamibi and MIBG only image the thyroid gland

Detailed Solutions

Q1.

Solution

Concept – digital radiography versus film-screen: Digital detectors capture the X-ray image as electronic data rather than on film.

Step 1 – state the advantage: Digital systems have a **wide dynamic range** (broad exposure latitude), so a single exposure can be **windowed, magnified and post-processed** on the workstation.

Step 2 – the practical gain: Fewer repeat exposures are needed for over- or under-exposure, and images are stored and transmitted electronically (PACS).

Why the other options are wrong:

- B, cannot be windowed: post-processing is precisely the strength of digital imaging.
- C, wet processing: is a film-screen (darkroom) requirement, not digital.
- D, narrower latitude: digital in fact has a *wider* exposure latitude than film.

Final Answer: Wide dynamic range with post-processing $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q1

Q2.

Solution

Concept – CT dose descriptors: CTDI and DLP quantify the radiation delivered during a CT scan.

Step 1 – define the product: The **dose-length product (DLP)** equals the volume CT dose index (CTDIvol) multiplied by the scan length, so it reflects the total dose over the scanned region.

Step 2 – the use: DLP (mGy·cm) can be multiplied by a body-region conversion factor to estimate effective dose.

Why the other options are wrong:

- B, effective dose: is *derived* from DLP with a k-factor, not the direct product.
- C, entrance skin dose: is a surface radiography quantity, not CTDIvol $\times$ length.
- D, bremsstrahlung yield: describes X-ray production, not a dose index.

Final Answer: Dose-length product ⇒ A

Answer: (A) Go Back to Q2

Q3.

Solution

Concept – dose reduction in fluoroscopy: Fluoroscopy delivers continuous radiation, so dose-saving features matter.

Step 1 – name the feature: Last-image-hold freezes and displays the final acquired frame on the monitor *without* further radiation, so the operator can study it dose-free.

Step 2 – other measures: Pulsed fluoroscopy, tight collimation and keeping the image intensifier close to the patient further cut dose.

Why the other options are wrong:

- A, continuous high-dose screening: increases, not reduces, dose.
- C, removing the grid: is not a routine last-frame dose feature and can worsen image quality.
- D, higher frame rate: raises dose; lower pulse rates reduce it.

Final Answer: Last-image-hold display ⇒ B

Answer: (B) Go Back to Q3

Q4.

Solution

Concept – shear-wave elastography: Elastography estimates how stiff (fibrosed) tissue is.

Step 1 – state the principle: A push pulse generates a **shear wave**; the ultrasound system measures its **propagation speed**, which rises with tissue stiffness, giving an estimate of liver fibrosis.

Step 2 – the value: It is non-invasive and can reduce the need for liver biopsy in staging fibrosis.

Why the other options are wrong:

- A, iron content: is assessed by MRI relaxometry, not shear-wave speed.
- B, fat fraction only: is measured by other techniques (for example MRI-

PDFF), not elastography.
- D, portal-vein flow: is a Doppler measurement, not stiffness.

Final Answer: Tissue stiffness from shear-wave speed ⇒ C

Answer: (C) Go Back to Q4

Q5.

Solution

Concept – time-of-flight MR angiography: TOF MRA images vessels using flow-related enhancement, not contrast.

Step 1 – state the mechanism: Stationary tissue is saturated by repeated pulses, while **fresh, unsaturated blood flows in** and gives a bright signal, so vessels stand out *without* intravenous contrast.

Step 2 – the use: TOF is widely used for the intracranial and carotid circulation, especially where contrast is undesirable.

Why the other options are wrong:

- A, iodinated contrast: is a CT/X-ray agent and is not used in TOF MRA.
- C, ionising radiation: MRI uses magnetic fields and radiofrequency, not X-rays.
- D, radioactive tracer: describes nuclear medicine, not MR angiography.

Final Answer: Bright inflowing unsaturated blood ⇒ B

Answer: (B) Go Back to Q5

Q6.

Solution

Concept – contrast extravasation: Contrast can leak into the soft tissues around the cannula during injection.

Step 1 – state the immediate step: Stop the injection, **elevate the limb** to aid resorption, apply a **cold compress**, and **assess the swelling** for signs of a compartment syndrome or skin compromise.

Step 2 – follow-up: Most small extravasations settle conservatively; large volumes or neurovascular compromise need surgical review.

Why the other options are wrong:

- A, higher flow rate: worsens the extravasation.
- B, adrenaline: treats anaphylaxis, not a simple extravasation.
- C, ignore it: large-volume extravasation can cause tissue injury and must be assessed.

Final Answer: Stop, elevate, cold compress and assess ⇒ D

Answer: (D) Go Back to Q6

Q7.

Solution

Concept – honeycombing on HRCT: Honeycombing marks irreversible, end-stage lung fibrosis.

Step 1 – read the HRCT: Clustered subpleural cystic air spaces stacked in layers (**X**) with thick walls are honeycombing, the hallmark of a **usual interstitial pneumonia (UIP)** pattern.

Step 2 – the distribution: UIP is typically basal and subpleural, often with traction bronchiectasis, and underlies idiopathic pulmonary fibrosis.

Why the other options are wrong:

- A, pneumothorax: gives a peripheral lucency with a pleural line, not stacked cysts.
- B, pulmonary oedema: shows ground-glass and septal lines, not honeycomb cysts.
- C, single abscess: is one thick-walled cavity, not clustered subpleural cysts.

Final Answer: End-stage interstitial fibrosis (UIP) ⇒ D

Answer: (D) Go Back to Q7

Q8.

Solution

Concept – bronchiectasis on HRCT: Bronchiectasis is irreversible bronchial dilatation.

Step 1 – read the HRCT: Parallel **tram-track** lines are thickened, dilated bronchi seen along their length; a dilated bronchus seen end-on beside its smaller artery gives the **signet-ring sign** (**X**).

Step 2 – the criterion: A bronchus wider than its adjacent pulmonary artery (a

bronchoarterial ratio above 1) confirms bronchiectasis.

Why the other options are wrong:

- B, lobar pneumonia: shows consolidation with air bronchograms, not dilated tram-track bronchi.
- C, pleural effusion: is a dependent pleural opacity, not a bronchial sign.
- D, normal pattern: a bronchus is normally *narrower* than its artery, so a signet ring is abnormal.

Final Answer: Bronchiectasis $\Rightarrow$ A

Answer: (A) Go Back to Q8

Q9.

Solution

Concept – Rigler (double-wall) sign: On a supine film, free air can outline both sides of the bowel wall.

Step 1 – interpret the sign: When gas lies *inside* the lumen and free gas lies *outside* in the peritoneum, both the mucosal and serosal surfaces are seen, giving the Rigler sign of **pneumoperitoneum**.

Step 2 – related supine signs: The football sign (large central lucency) and outlining of the falciform ligament also indicate free intraperitoneal air.

Why the other options are wrong:

- A, normal intraluminal gas: outlines only the inner wall, not both surfaces.
- C, pleural effusion: is a chest finding, unrelated to bowel-wall gas.
- D, fatty liver: is a parenchymal change with no double-wall sign.

Final Answer: Pneumoperitoneum $\Rightarrow$ B

Answer: (B) Go Back to Q9

Q10.

Solution

Concept – benign gastric ulcer versus carcinoma on barium meal: Ulcer morphology helps separate benign from malignant disease.

Step 1 – read the benign features: A **benign** ulcer shows **smooth mucosal folds radiating to the crater**, and the crater **projects beyond** the expected gastric

lumen (an out-pouching).

Step 2 – the malignant contrast: A malignant ulcer sits *within* an irregular mass, with nodular heaped-up (rolled) margins and folds that stop short of the crater.

Why the other options are wrong:

- B, irregular filling defect with nodular margins: favours carcinoma.
- C, folds cut off short of the crater: is a malignant feature.
- D, leather-bottle stomach: is linitis plastica, a malignant infiltrating pattern.

Final Answer: Smooth radiating folds, crater projecting beyond lumen ⇒ A

Answer: (A) Go Back to Q10

Q11.

Solution

Concept – acute pancreatitis on contrast CT: CT grades severity and detects complications of pancreatitis.

Step 1 – interpret the finding: Areas of the gland that **fail to enhance** after intravenous contrast represent **pancreatic necrosis**, a marker of severe (necrotising) pancreatitis.

Step 2 – other complications: CT also shows peripancreatic fluid collections, pseudocysts, abscess and vascular complications such as pseudoaneurysm.

Why the other options are wrong:

- A, normal parenchyma: enhances uniformly after contrast.
- B, hepatic cyst: is a well-defined liver lesion, not a pancreatic non-enhancing area.
- D, accessory spleen: is a rounded splenic-density nodule, not gland necrosis.

Final Answer: Pancreatic necrosis ⇒ C

Answer: (C) Go Back to Q11

Q12.

Solution

Concept – choosing MRI over CT for the cord: MRI gives superior soft-tissue contrast; CT is best for bony detail.

Step 1 – name the modality: MRI of the spine is the single best investigation to display the **spinal cord and soft-tissue mass**, showing compression, oedema and marrow involvement.

Step 2 – the trade-off: CT excels at cortical bone and fractures but is far less sensitive for cord and soft-tissue detail.

Why the other options are wrong:

- A, plain radiography: shows bony alignment only, not the cord.
- C, bone scan: detects osteoblastic activity, not cord compression.
- D, ultrasound: cannot image the cord through the adult bony spine.

Final Answer: MRI of the spine $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q12

Q13.

Solution

Concept – subdural haematoma and its evolving density: A subdural haematoma is a crescent-shaped collection that crosses suture lines, and its CT density changes with age.

Step 1 – read the CT: A crescent collection following the brain surface (**X**) that is **hypodense (dark)** relative to brain indicates a **chronic subdural haematoma** (weeks old, as blood breaks down).

Step 2 – the time course: Acute subdural blood is *hyperdense* (bright) in the first days, becomes isodense at 1 to 3 weeks, then hypodense when chronic.

Why the other options are wrong:

- A, extradural haematoma: is biconvex and does *not* cross suture lines.
- B, subarachnoid haemorrhage: is bright blood in the sulci and cisterns, not a crescent.
- C, hyperdense acute subdural: is bright, whereas the stem specifies a hypodense collection.

Final Answer: Chronic subdural haematoma $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q13

Q14.

Solution

Concept – uterine artery embolisation: This is an image-guided interventional treatment for fibroids.

Step 1 – state the mechanism: Under fluoroscopic guidance, **embolic particles are injected into the uterine arteries**, cutting off the blood supply so the fibroids **infarct and shrink**, easing bleeding and bulk symptoms.

Step 2 – the benefit: It preserves the uterus and avoids open surgery, with a shorter recovery than hysterectomy or myomectomy.

Why the other options are wrong:

- A, open hysterectomy: is surgical removal, not embolisation.
- B, external-beam radiotherapy: is not the treatment for benign fibroids.
- D, renal artery stent: treats renal artery stenosis, an unrelated procedure.

Final Answer: Embolic particles into the uterine arteries $\Rightarrow$ C

Answer: (C) Go Back to Q14

Q15.

Solution

Concept – matching nuclear tracers to their targets: Different radiotracers localise to specific tissues.

Step 1 – state the correct pairing: **Technetium-99m sestamibi** localises a **parathyroid adenoma**, while **MIBG** (metaiodobenzylguanidine) localises **phaeochromocytoma and neuroblastoma** (catecholamine-producing tumours).

Step 2 – the basis: Sestamibi is retained by mitochondria-rich parathyroid tissue; MIBG is a noradrenaline analogue taken up by chromaffin and neural-crest tumour cells.

Why the other options are wrong:

- A, sestamibi for phaeochromocytoma: reverses the correct pairing.
- B, MIBG for parathyroid: reverses the correct pairing.
- D, both image only the thyroid: neither tracer is a thyroid-only agent.

Final Answer: Sestamibi for parathyroid, MIBG for phaeochromocytoma/neuroblastoma ⇒ C

Answer: (C) Go Back to Q15

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	A	2	A	3	B	4	C	5	B
6	D	7	D	8	A	9	B	10	A
11	C	12	B	13	D	14	C	15	C