INI CET Orthopaedics

Sample Paper – 2

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

Instructions

- This paper contains **15** Multiple Choice Questions (Single Best Response), modelled on the Orthopaedics content of **INI CET** (Institutes of National Importance Combined Entrance Test) conducted by AIIMS New Delhi.
- The **15-question** length matches the number of Orthopaedics 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.

Trauma and Fracture Principles

Q1. The wrist deformity shown below follows a fall on the back of a flexed hand. In this Smith fracture (a reverse Colles injury) of the distal radius, the distal fragment is displaced:

(A) Dorsally (as in a Colles fracture)

(B) Volar (palmar) direction, giving a ‘garden-spade’ deformity

(C) Laterally towards the radius only

(D) There is no displacement of the fragment

Q2. A fracture of the shaft of the radius combined with dislocation of the distal radioulnar joint is known as a:

(A) Galeazzi fracture-dislocation

(B) Monteggia fracture-dislocation

(C) Bennett fracture

(D) Nightstick fracture

Q3. In the Gustilo-Anderson classification of open fractures, a wound larger than 10 cm with extensive soft-tissue damage but with adequate soft-tissue coverage of the bone is graded as:

(A) Type IIIA

(B) Type I

(C) Type II

(D) Type IIIC

Fracture Complications and Emergencies

Q4. A child develops a fixed flexion deformity of the wrist and fingers some weeks after a supracondylar fracture of the humerus. This Volkmann ischaemic contracture results primarily from ischaemic necrosis of the:

(A) Intrinsic muscles of the hand only

(B) Flexor muscles of the forearm following ischaemia

(C) Extensor muscles of the forearm

(D) Skin and subcutaneous fat alone

Q5. Avascular necrosis of the femoral head is a well-recognised late complication of an intracapsular femoral neck fracture. The principal reason is that the fracture disrupts the:

(A) Obturator artery within the ligamentum teres, the main adult supply

(B) Retinacular branches of the medial femoral circumflex artery supplying the head

(C) Nutrient artery entering the distal femoral shaft

(D) Superior gluteal artery

Q6. A young man in a road accident presents with the hip held flexed, adducted and internally rotated, together with a foot drop. This posterior hip dislocation is most likely to have injured the:

(A) Femoral nerve

(B) Obturator nerve

(C) Sciatic nerve

(D) Superior gluteal nerve

Paediatric Orthopaedics

Q7. Which Salter-Harris type of physeal injury, in which the fracture line passes through the growth plate and then exits through a metaphyseal fragment, is the commonest of all?

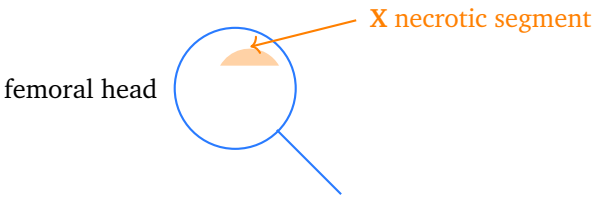
(A) Type I

(B) Type III

(C) Type IV

(D) Type II

Q8. The femoral head schematic below shows idiopathic avascular necrosis in a 6-year-old boy who presents with a painless limp. This condition is:



(A) Slipped capital femoral epiphysis

(B) Developmental dysplasia of the hip

(C) Perthes disease

(D) Transient synovitis of the hip

Bone and Joint Infection and Metabolic Bone Disease

Q9. In chronic osteomyelitis, the fragment of dead, avascular bone that acts as a persistent focus of infection, surrounded by a sheath of new living bone (the involucrum), is called the:

(A) Sequestrum

(B) Cloaca

(C) Brodie abscess

(D) Osteophyte

Q10. An acutely painful, red, swollen first metatarsophalangeal joint (podagra) in a middle-aged man, with negatively birefringent needle-shaped crystals on joint aspiration, indicates deposition of:

(A) Calcium pyrophosphate dihydrate crystals

(B) Cholesterol crystals

(C) Hydroxyapatite crystals

(D) Monosodium urate crystals

Q11. According to the WHO criteria, osteoporosis is diagnosed on dual-energy X-ray absorptiometry (DEXA) when the bone mineral density T-score is:

(A) Between -1.0 and -2.5

(B) Above $+1.0$

(C) Between 0 and -1.0

(D) At or below -2.5

Bone Tumours

Q12. A locally aggressive tumour arising in the epiphysis of a long bone (typically the distal femur) in a young adult, showing a lytic 'soap-bubble' appearance on X-ray, is a:

(A) Giant cell tumour (osteoclastoma)

(B) Osteosarcoma

(C) Ewing sarcoma

(D) Chondroblastoma

Q13. The commonest benign bone tumour, a cartilage-capped bony outgrowth (exostosis) projecting from the metaphysis of a long bone away from the nearby joint, is an:

(A) Enchondroma

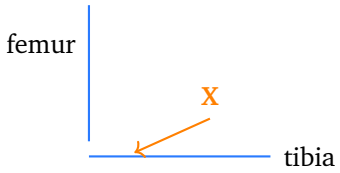
(B) Osteoid osteoma

(C) Osteochondroma

(D) Osteoblastoma

Spine, Arthritis and Sports Injuries

Q14. At the knee shown below, backward displacement of the tibia on the femur with the knee flexed (a positive posterior drawer test, marked **X**) indicates injury to the:



(A) Anterior cruciate ligament

(B) Medial collateral ligament

(C) Posterior cruciate ligament

(D) Lateral meniscus

Q15. A patient has shoulder pain that is worst between 60 and 120 degrees of abduction (a painful arc) with weakness of the first part of abduction. The muscle most likely torn is the:

(A) Deltoid

(B) Supraspinatus (rotator cuff)

(C) Teres major

(D) Pectoralis major

Detailed Solutions

Q1.

Solution

Concept – the Smith fracture: A Smith fracture is a fracture of the distal radius that is the mirror image of a Colles fracture.

Step 1 – read the displacement: The distal fragment is displaced **volar (palmar)**, producing a 'garden-spade' deformity marked **X**. It usually follows a fall on the back of a flexed hand.

Step 2 – contrast: A Colles fracture is the reverse, with dorsal displacement and the classic 'dinner-fork' deformity.

Why the other options are wrong:

- A, dorsal displacement: this describes a Colles fracture, not a Smith fracture.
- C, lateral displacement only: not the defining pattern of a Smith fracture.
- D, no displacement: a Smith fracture is by definition volarly displaced.

Final Answer: Volar (palmar) displacement $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q1

Q2.

Solution

Concept – the Galeazzi fracture-dislocation: Certain forearm injuries pair a shaft fracture with a joint dislocation, and the two named patterns are easily confused.

Step 1 – define Galeazzi: A **Galeazzi** injury is a fracture of the **radial shaft** (usually the distal third) together with **dislocation of the distal radioulnar joint (DRUJ)**.

Step 2 – the memory aid: Think 'GRUesome MUGgeR': Galeazzi = Radius fracture with Ulna (distal) dislocation; Monteggia = Ulna fracture with Radial head dislocation.

Why the other options are wrong:

- B, Monteggia: a proximal ulnar shaft fracture with a radial head dislocation, the reverse pattern.
- C, Bennett fracture: an intra-articular fracture-dislocation of the base of the first metacarpal.

- D, nightstick fracture: an isolated fracture of the ulnar shaft, with no DRUJ dislocation.

Final Answer: Radial shaft fracture with DRUJ dislocation $\Rightarrow$ A

Answer: (A) Go Back to Q2

Q3.

Solution

Concept – Gustilo-Anderson classification: This system grades open (compound) fractures by wound size, contamination and soft-tissue damage.

Step 1 – match the grade: A wound larger than 10 cm with extensive soft-tissue damage but with **adequate soft-tissue coverage** of the bone is **Type IIIA**.

Step 2 – the rest of the scale: Type I is under 1 cm and clean; Type II is 1 to 10 cm with moderate damage; Type IIIB has extensive soft-tissue loss needing a flap; Type IIIC involves an arterial injury requiring repair.

Why the other options are wrong:

- B, Type I: a small clean wound under 1 cm, not this large injury.
- C, Type II: a wound of 1 to 10 cm, smaller than described.
- D, Type IIIC: reserved for an associated arterial injury needing vascular repair.

Final Answer: Adequate coverage of a large wound $\Rightarrow$ A

Answer: (A) Go Back to Q3

Q4.

Solution

Concept – Volkmann ischaemic contracture: This is a late sequela of an untreated forearm compartment syndrome, classically after a supracondylar humeral fracture in a child.

Step 1 – name the mechanism: Ischaemia of the **flexor muscles of the forearm** (chiefly in the deep flexor compartment) leads to muscle necrosis, which heals by fibrosis and contracts.

Step 2 – the result: The fibrosed, shortened flexors produce a fixed flexion deformity of the wrist and fingers that partly eases when the wrist is flexed.

Why the other options are wrong:

- A, intrinsic hand muscles only: the primary insult is to the forearm flexors, not the hand intrinsics.
- C, extensor muscles: the deformity is a flexion contracture, driven by flexor ischaemia.
- D, skin and fat alone: the contracture arises from muscle necrosis and fibrosis, not skin.

Final Answer: Ischaemic necrosis of the forearm flexors $\Rightarrow$ B

Answer: (B) Go Back to Q4

Q5.

Solution

Concept – blood supply of the femoral head: The adult femoral head depends on a vulnerable retinacular supply that an intracapsular fracture can sever.

Step 1 – name the vessels: The **retinacular branches of the medial femoral circumflex artery** provide the dominant supply to the femoral head in adults.

Step 2 – the consequence: An intracapsular neck fracture tears these retinacular vessels, so the head is starved of blood and undergoes avascular necrosis.

Why the other options are wrong:

- A, artery of ligamentum teres: contributes little in adults and cannot maintain the head alone.
- C, nutrient artery of the shaft: supplies the diaphysis, not the head.
- D, superior gluteal artery: supplies the gluteal muscles, not the femoral head.

Final Answer: Torn medial femoral circumflex retinacular branches $\Rightarrow$ B

Answer: (B) Go Back to Q5

Q6.

Solution

Concept – posterior hip dislocation: The classic limb posture points to the direction of dislocation and the nerve at risk.

Step 1 – read the posture: A hip held **flexed, adducted and internally rotated**

indicates a posterior dislocation, the commonest type (often a dashboard injury).

Step 2 – name the nerve: The femoral head is driven posteriorly against the **sciatic nerve**, causing a foot drop and weak knee flexion.

Why the other options are wrong:

- A, femoral nerve: lies anteriorly and is spared in a posterior dislocation.
- B, obturator nerve: at risk in anterior/obturator dislocations, not posterior.
- D, superior gluteal nerve: supplies hip abductors and does not cause a foot drop.

Final Answer: Sciatic nerve injury $\Rightarrow$ C

Answer: (C) Go Back to Q6

Q7.

Solution

Concept – Salter-Harris Type II: The Salter-Harris system grades physeal injuries by the path of the fracture line.

Step 1 – define Type II: In a **Type II** injury the fracture runs along the physis and then exits through a triangular **metaphyseal fragment** (the Thurston-Holland fragment).

Step 2 – the key fact: Type II is by far the **commonest** physeal injury, and it carries a good prognosis for continued growth.

Why the other options are wrong:

- A, Type I: a pure separation through the physis with no bony fragment.
- B, Type III: passes through the epiphysis into the joint.
- C, Type IV: crosses the epiphysis, physis and metaphysis together.

Final Answer: Type II (commonest physeal injury) $\Rightarrow$ D

Answer: (D) Go Back to Q7

Q8.

Solution

Concept – Perthes disease: Perthes is an idiopathic avascular necrosis of the femoral head in children, shown as the necrotic segment marked **X**.

Step 1 – match the picture: A boy aged 4 to 8 years with a **painless limp** and radiographic collapse of part of the femoral head has **Perthes disease** (Legg-Calve-Perthes disease).

Step 2 – the course: The head passes through avascular, fragmentation, reossification and remodelling stages; the aim of treatment is containment of the head within the acetabulum.

Why the other options are wrong:

- A, slipped capital femoral epiphysis: affects older, often overweight adolescents, not 4 to 8 year olds.
- B, developmental dysplasia of the hip: presents in the newborn with instability, not painless limp with head necrosis.
- D, transient synovitis: a self-limiting painful hip with a normal femoral head on X-ray.

Final Answer: Perthes disease $\Rightarrow$ C

Answer: (C) Go Back to Q8

Q9.

Solution

Concept – chronic osteomyelitis: Persistent bone infection produces characteristic dead and reactive bone changes.

Step 1 – define the sequestrum: The **sequestrum** is a fragment of dead, avascular bone that acts as a nidus harbouring bacteria out of reach of antibiotics.

Step 2 – the surrounding bone: The living body walls it off with a sheath of new subperiosteal bone called the **involucrum**, which may have holes (cloacae) that discharge pus.

Why the other options are wrong:

- B, cloaca: the opening in the involucrum through which pus drains, not the dead bone itself.
- C, Brodie abscess: a localised subacute intraosseous abscess, a different entity.

- D, osteophyte: a degenerative bony outgrowth of osteoarthritis, unrelated to infection.

Final Answer: Dead avascular bone is the sequestrum $\Rightarrow$ A

Answer: (A) Go Back to Q9

Q10.

Solution

Concept – gout: Acute gout is a crystal arthropathy classically striking the first metatarsophalangeal joint.

Step 1 – identify the crystal: Monosodium urate crystals, which are **needle-shaped and negatively birefringent** under polarised light, cause the acute podagra.

Step 2 – the pathology: Hyperuricaemia drives urate deposition in and around the joint, triggering an intense neutrophilic inflammatory response.

Why the other options are wrong:

- A, calcium pyrophosphate: causes pseudogout with rhomboid, positively birefringent crystals, often at the knee.
- B, cholesterol crystals: seen in chronic effusions, not acute podagra.
- C, hydroxyapatite: associated with calcific tendinitis, not this crystal picture.

Final Answer: Monosodium urate crystals $\Rightarrow$ D

Answer: (D) Go Back to Q10

Q11.

Solution

Concept – WHO diagnosis of osteoporosis: DEXA reports bone mineral density as a T-score (standard deviations from the young adult mean).

Step 1 – state the cut-off: Osteoporosis is defined by a T-score **at or below** -2.5.

Step 2 – the full scale: A T-score above -1.0 is normal; between -1.0 and -2.5 is osteopenia; a value at or below -2.5 with a fragility fracture is established (severe) osteoporosis.

Why the other options are wrong:

- A, -1.0 to -2.5: this range defines osteopenia, not osteoporosis.

- B, above $+1.0$: within the normal range.
- C, 0 to -1.0: also normal bone density.

Final Answer: T-score at or below $-2.5 \Rightarrow$ D

Answer: (D) Go Back to Q11

Q12.

Solution

Concept – giant cell tumour of bone: A giant cell tumour (osteoclastoma) is a locally aggressive lesion with a distinctive site and X-ray appearance.

Step 1 – read the clues: An **epiphyseal** lytic tumour of a long bone (typically the distal femur or proximal tibia) in a young adult, showing an expansile **'soap-bubble'** appearance, is a **giant cell tumour**.

Step 2 – the behaviour: It is usually benign but locally aggressive, tends to recur after curettage and rarely metastasises to the lung.

Why the other options are wrong:

- B, osteosarcoma: a malignant metaphyseal tumour with a sunburst reaction and Codman triangle.
- C, Ewing sarcoma: a diaphyseal small round-cell tumour with an onion-skin reaction.
- D, chondroblastoma: also epiphyseal but a rarer, smaller benign cartilage tumour of adolescents.

Final Answer: Giant cell tumour $\Rightarrow$ A

Answer: (A) Go Back to Q12

Q13.

Solution

Concept – osteochondroma: Osteochondroma is the commonest benign bone tumour.

Step 1 – match the description: It is a **cartilage-capped bony outgrowth (exostosis)** projecting from the metaphysis of a long bone, pointing **away from the nearby joint**.

Step 2 – the significance: It is usually asymptomatic; malignant change to chondrosarcoma is rare and suggested by cap thickening or new growth in an adult.

Why the other options are wrong:

- A, enchondroma: a benign cartilage lesion within the medulla (often of the hand), not a surface exostosis.
- B, osteoid osteoma: a small painful lesion with a nidus, giving night pain relieved by NSAIDs.
- D, osteoblastoma: a larger, rarer bone-forming tumour, often of the spine.

Final Answer: Osteochondroma ⇒ C

Answer: (C) Go Back to Q13

Q14.

Solution

Concept – testing the posterior cruciate ligament: A specific drawer test localises cruciate ligament injury at the knee.

Step 1 – match the test: A positive **posterior drawer test**, in which the tibia can be pushed **backwards** on the femur with the knee flexed (marked **X**), indicates a **posterior cruciate ligament (PCL)** tear.

Step 2 – the mechanism: The PCL normally restrains posterior tibial translation, so its rupture (often a dashboard injury) lets the tibia sag and slide backwards.

Why the other options are wrong:

- A, anterior cruciate ligament: injury gives a positive *anterior* drawer and Lachman test.
- B, medial collateral ligament: assessed by valgus stress, not the drawer test.
- D, lateral meniscus: tested by the McMurray test, giving a click rather than translation.

Final Answer: Posterior cruciate ligament ⇒ C

Answer: (C) Go Back to Q14

Q15.

Solution

Concept – rotator cuff (supraspinatus) tear: The rotator cuff stabilises the shoulder, and the supraspinatus is the most commonly torn tendon.

Step 1 – read the sign: A **painful arc between 60 and 120 degrees** of abduction

with weakness of the initial phase of abduction points to a **supraspinatus** tear or impingement.

Step 2 – the anatomy: The supraspinatus initiates abduction and its tendon is compressed under the acromion, so a tear or tendinopathy causes pain in the mid-arc.

Why the other options are wrong:

- A, deltoid: powers abduction beyond 90 degrees and is not the cause of the mid-arc pain.
- C, teres major: an adductor and medial rotator, not an initiator of abduction.
- D, pectoralis major: an adductor and flexor of the arm, unrelated to the painful arc.

Final Answer: Supraspinatus (rotator cuff) tear $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q15

Answer Key

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