provide rotational stability, a second screw or an anti-rotation wire may be necessary. To head to be buried sub-chondrally, thus protecting articular surfaces. A single screw, synovial fluid may wash away the fracture haematoma, thus preventing callus inter-fragmentary compression is achieved, bone heals by primary healing, with little locking screws. Other screw includes rafting screw, position screw, anti-glide screws and anti-augmentation. A screw is a surgical device, which converts a torsional force, to a compression force at a fracture site. In orthopaedic surgery, screws are primarily used to achieve inter-fragmentary compression of fracture fragments. They are also commonly used to secure a plate to a bone. Non-locking screws function differently as compared to locking screws. Other screws include rafting screws, position screws, anti-glide screws and poller (blocking) screws. Headless screws are used to achieve inter-fragmentary compression at fracture sites or to achieve fusion at sites of osteotomy. When a good inter-fragmentary compression is achieved, bone heals by primary healing, with little or no callus formation. This is especially useful in intra-articular fractures, where the synovial fluid may wash away the fracture haematoma, thus preventing callos formation and hence, secondary bone healing. The 'headless' design allows the screw head to be buried sub-chondrally, thus protecting articular surfaces. A single screw, while being able to provide good compression, does not provide rotational stability. To provide rotational stability, a second screw or an anti-rotation wire may be necessary.

Answer 1

a) Headless compression screw. (1 mark)
b) i. Headless. ii. Camulated.
v. Variable core diameter.
vi. Variable thread depth. (4 marks for any four)
c) Differential pitch allows interfragmentary compression to be achieved, provided the advancing threads have crossed the fracture site. (2 marks)
d) Rotational stability is not provided. (1 mark)
e) Fracture fixation and arthrodesis. (2 marks)

Description 2
A screw is a surgical device, which converts a torsional force, to a compression force at a fracture site. In orthopaedic surgery, screws are primarily used to achieve inter-fragmentary compression of fracture fragments. They are also commonly used to secure a plate to a bone. Non-locking screws function differently as compared to locking screws. Other screws include rafting screws, position screws, anti-glide screws and poller (blocking) screws. Headless screws are used to achieve inter-fragmentary compression at fracture sites or to achieve fusion at sites of osteotomy. When a good inter-fragmentary compression is achieved, bone heals by primary healing, with little or no callus formation. This is especially useful in intra-articular fractures, where the synovial fluid may wash away the fracture haematoma, thus preventing callos formation and hence, secondary bone healing. The ‘headless’ design allows the screw head to be buried sub-chondrally, thus protecting articular surfaces. A single screw, while being able to provide good compression, does not provide rotational stability. To provide rotational stability, a second screw or an anti-rotation wire may be necessary.

Answer 2

a) Headless compression screw. (1 mark)
b) i. Headless. ii. Camulated.
v. Variable core diameter.
vi. Variable thread depth. (4 marks for any four)
c) Differential pitch allows interfragmentary compression to be achieved, provided the advancing threads have crossed the fracture site. (2 marks)
d) Rotational stability is not provided. (1 mark)
e) Fracture fixation and arthrodesis. (2 marks)

Description 3
A screw is a surgical device, which converts a torsional force, to a compression force at a fracture site. In orthopaedic surgery, screws are primarily used to achieve inter-fragmentary compression of fracture fragments. They are also commonly used to secure a plate to a bone. Non-locking screws function differently as compared to locking screws. Other screws include rafting screws, position screws, anti-glide screws and poller (blocking) screws. Headless screws are used to achieve inter-fragmentary compression at fracture sites or to achieve fusion at sites of osteotomy. When a good inter-fragmentary compression is achieved, bone heals by primary healing, with little or no callus formation. This is especially useful in intra-articular fractures, where the synovial fluid may wash away the fracture haematoma, thus preventing callos formation and hence, secondary bone healing. The ‘headless’ design allows the screw head to be buried sub-chondrally, thus protecting articular surfaces. A single screw, while being able to provide good compression, does not provide rotational stability. To provide rotational stability, a second screw or an anti-rotation wire may be necessary.

Answer 3

a) i. An expanosile bony lesion, arising from the metaphysis of the left ulna. ii. Extending into the epiphysis and subchondral bone.
iii. Cortical thinning.
iv. No sclerosis.
v. No periosseous reaction.
vi. Narrow zone of transition.
vii. No calcifications.
viii. Septate lesion.
ix. Adjacent radius looks intact. (4 marks for any four)
b) Giant cell tumour (GCT) of bone (1 mark)
c) Hematoxylin and eosin (H&E) stain. (1 mark)
d) i. Multinucleated giant cells.
ii. Nucleus of the giant cells is the same size as the surrounding stromal cells. (2 marks)
e) Magnetic Resonance Imaging (MRI). (1 mark)
f) Campuaci gradeing. (1 mark)

Description 4
A locally aggressive benign tumour of bone, the giant cell tumour (GCT) represents about 5% of all primary bone tumours. Metastases can occur in up to 9% of patients. In up to 90% are epiphyseal in location, often extending into subchondral bone. Histologically, the GCT demonstrates multinucleated giant cells, with nuclei resembling those of the surrounding stromal cells. This is in stark contrast to the multinucleated giant cells in tuberculosis, wherein, the nuclei are arranged.
eccentrically in a 'horseshoe' pattern. Recent studies have shown some response of the GCTs to chemotherapy, bisphosphonates and anti-RANKL therapy. However, the mainstay of treatment remains surgical excision. Following excision and simple curettage, they often have a high rate of recurrence. Hence, 'extended' curettage is often advised. Due to the juxta-articular involvement in GCTs, joint destruction is often present, and following excision of the lesion, complex surgical procedures are often needed to restore joint function.

References:

Answer 5

a) Tension band wiring of the olecranon. (1 mark)
b) Principle of TBW: when a tension band wire is applied to the tension side of an eccentrically loading bone, the tension band wire absorbs this tension force and converts it to an inter fragmentary compression force at the compression side of the bone, upon loading of the bone. (2 marks)
c) Commi nuted fractures or segmental fractures. (1 mark)
d) i. Choosing a cerclage (tension) wire of appropriate size. (1 mark)
ii. Ideal location of the drill hole for passing the cerclage wire is about four centimetres distal to the fracture. (1 mark)
iii. Aim the Kirshner wires anteriorly, to ensure purchase of the anterior cortex of proximal ulna. (1 mark)
iv. Placement of the Kirshner wires to be perpendicular to the fracture plane and parallel to each other. (1 mark)
e) i. Tension band wire fixation with intramedullary screw. (1 mark)
ii. Tension band plating. (1 mark)

Description 5

Tension band wiring (TBW) is a principle of fixation, wherein inter-fragmentary compression is achieved at a fracture site on an eccentrically loading bone. It provides a form of dynamic compression, and it is most often applied at intra-articular fractures in eccentrically loaded bones such as olecranon and patella. It is contraindicated in fractures where there is comminution at the compression side. Following an adequate fixation, early mobilization is recommended, as appropriate motion facilitates inter-fragmentary compression, which often results in primary bone healing. However, TBW may be technically challenging and may fail, especially when the relevant basic surgical principles are not adhered to.

References:

Answer 6

(1 mark)

a) Bone scan / Bone scintigraphy.

b) A nuclear medicine imaging technique which detects abnormalities in bone metabolism. A radioactive dye is used, which is absorbed into the hydroxyapatite matrix, which occurs at areas of excessive osteoblastic activity. Hence, areas of excessive osteoblastic activity, light up on the scan. (2 marks)

c) The Triphasic Bone Scan has 3 phases: the Pool phase, the Flow phase and the Delayed (bone) phase. (3 marks)

d) 99mTc Technetium-MDP (1 mark)

e) i. Bone forming tumours.

ii. Osteomyelitis.

iii. Fracture healing. (3 marks)

Description 6

A metabolic bone scan is a modality of imaging abnormalities in bone. However, unlike the computed tomography (CT) scans and magnetic resolution imaging (MRI) which study anatomical abnormalities in structure, the bone scan studies abnormalities in metabolism and turnover of bone. The triphasic bone scan employs a tracer such as methylene diphosphonate (MDP), which is labelled with radioactive 99mtechnetium (99mTc). The MDP is absorbed into the matrix of newly forming bones. As the MDP is labelled with technetium, the scan will reveal increased radioactivity at areas of increased bone formation. As bone formation is seen in conditions such as fracture healing, osteomyelitis and bone-forming tumours, such lesions will appear as a ‘hot spots’ on the delayed (bone) phase of the bone scan. For this reason, the bone scan is a sensitive modality of investigation for bone abnormalities but lacks specificity. Specificity can be enhanced by the use of gallium-67 or indium-111 labelled white cell scans. Bone scans are often ‘false-negative’ on tumours such as multiple myeloma, due to lack of osteoblastic activity. Hence, in non-bone forming tumours, a bone scan is often not useful.

References: