

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

APPLIED PHYSICS DEPARTMENT

SRA 2104 – AXIAL SKELETON

BSc HONOURS PART II: JANUARY 2004

DURATION: 3 HOURS

ANSWER **ALL** PARTS OF QUESTION 1 IN SECTION A AND ANY **THREE** QUESTIONS FROM SECTION B. SECTION A CARRIES 40 MARKS AND SECTION B 60 MARKS

SECTION A

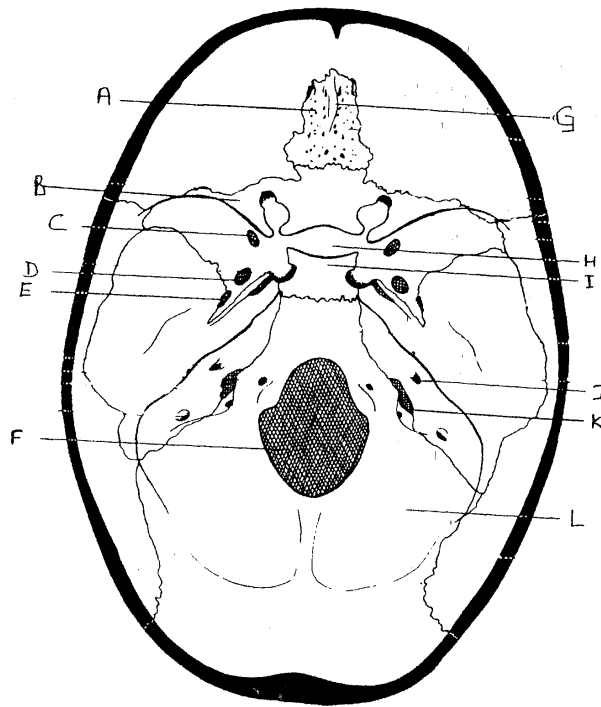
1. (a) Complete the following table:

SURFACE LANDMARK	VERTEBRAL LEVEL
1. Mastoid Process	
2. Thyroid Cartilage	
3. Suprasternal Notch	
4. Sternal angle	
5. Xiphisternal joint	
6. Lower costal margin	
7. Upper border of the iliac crest	
8. Anterior superior iliac spine	
9. Symphysis pubis	
10. Angle of the mandible	

[5]

- (b) Indicate direction of the central ray and centring points of the following:
- (i) Antero – posterior oblique of the right sacro iliac joint. [1]
 - (ii) Oblique sternum [1]
 - (iii) Antero-posterior oblique of the left ribs [1]
 - (iv) Right lateral oblique mandible [1]
- (c) (i) What is a gonad protective device? [1]
(ii) What is its minimum lead equivalent? [1]

- (d) (i) The diagram below is an internal view of the base of skull. Identify the structures labelled A to L, making sure that Right or Left is indicated where appropriate.

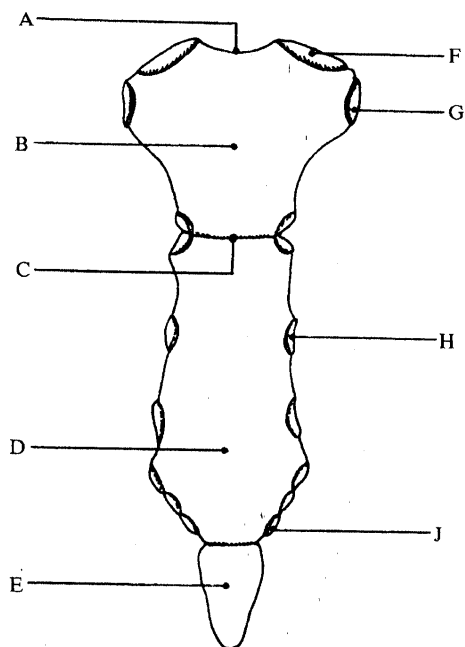


- (ii) What structures are transmitted through C, D, F and K? [6]
- (iii) What is the function of the structures labelled G and H? [4]
- (e) What is the difference between osteoarthritis and rheumatoid arthritis? [2]
- (f) (i) What is spondylolisthesis? [2]
- (ii) State a radiographic projection to demonstrate? [1]
- (iii) Describe its radiographic appearance. [2]

- (g) Describe the criteria by which you would evaluate the technical quality of lateral radiograph of the skull. [5]
- (h) (i) Describe one projection of the paranasal sinuses to include:
- Patient position. [3]
- Direction and centring of the x-ray beam. [1]
- (ii) The nasolacrimal duct opens into the nasal cavity. Where is this opening located? [$\frac{1}{2}$]
- (iii) Name one skull bone, not related to these sinuses which also contains air Cavities. [$\frac{1}{2}$]

SECTION B

2. (a) With reference to the diagram below of the sternum (note I omitted):



- (i) name the parts labelled A, B, C, D, E; [2½]
 (ii) with what does the sternum articulate at F, G, H, J? [2]
 (iii) name the major muscles inserted at A and E. [1]
- (b) List FIVE posterior relations of the sternum. [2½]
- (c) State TWO reasons why the sternum is commonly chosen as a site for bone marrow biopsy. [2]
- (d) Describe one projection which may be taken to demonstrate the sternum using the following headings
- (i) position of patient and film. [3½]
 (ii) direction and centering of the x-ray beam. [½]

- (e) Describe a projection to demonstrate a fracture at the axillary part of the left ribs. [5]
3. An adult male patient is referred to the diagnostic imaging department following a fall from a horse. Head and neck injuries are expected.
- (a) Describe TWO specific bony injuries which should be excluded. [3]
- (b) List and justify the initial projections which should be taken. [4]
- (c) Describe ONE projection from each of the areas listed in (b), using the following headings:
- (i) position of patient and film; [7]
- (ii) direction and centring of the x-ray beam. [3]
- (d) Describe the observations made of the patient during this examination. [3]
4. A twenty-year-old female is referred for a follow up examination of the lumbar spine and lumbo-sacral junction. Explain why:
- (a) previous request cards, reports and radiographs should be available before commencing the examination; [4]
- (b) the patient's hips and knees are flexed for both projections of the lumbar spine; [2]
- (c) the X-ray beam is angled cranially for the antero-posterior projection of lumbo-sacral region; [1]
- (d) the X-ray beam is collimated; [2]
- (e) the examination of this patient may have to be deferred; [2]
- (f) for the lateral projections, lead rubber may be placed on the table close to the patient's back? [2]
- (g) Describe the typical radiographic appearance of a prolapsed intervertebral disc on a lateral projection of the spine. [2]
- (h) With reference to Thoracic Spine Imaging Explain: (using free exposure selection)
- (i) the choice of kilovoltage in the antero-posterior projection. [$1\frac{1}{2}$]
- (ii) the choice of exposure time in the lateral projection. [$1\frac{1}{2}$]
- (iii) the possible use of graduated screens. [2]

5. (a) With reference to radiography of the skull.
- (i) Explain why an occipitofrontal (OF) projection would be preferred to a fronto-occipital (FO) [2]
 - (ii) How would you ensure that the media sagittal plane is perpendicular to the film. [2]
 - (iii) What is the advantage of tube angulation for the OF 20° over OF straight? [2]
 - (iv) When would a straight OF/FO projection be done (that is without tube angulation) [2]
 - (v) What would be the indication for doing a Townes Projection (FO 30°) [2]
- (b) Describe the occipito-frontal 20° projection of the skull under following headings:
- (i) position of patient and film. [3]
 - (ii) direction and centring of the x-ray beam. [2]
- (c) What criteria would you use to evaluate the above radiograph? [5]
6. (a) Evaluate the role of imaging modalities in imaging of the axial skeleton. [15]
- (b) Describe one radiographic projection to demonstrate the zygomatic arches. [5]

- END OF EXAMINATION -