

**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**APPLIED PHYSICS DEPARTMENT**

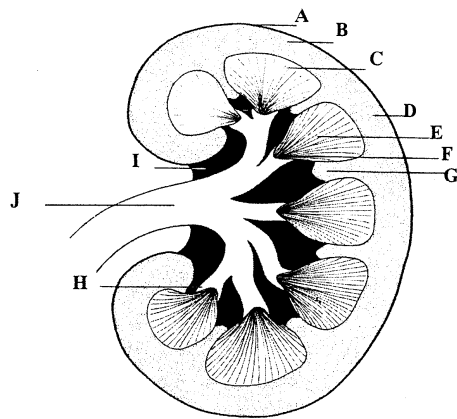
**SRA 2103 - THE ABDOMEN – URINARY SYSTEM**

*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) Describe the radiation protection measures which could be used during radiography of the abdomen. [5]
- (b) (i) What is haemodialysis? [2]  
(ii) Why do patients having haemodialysis often show bone demineralisation? [3]
- (c) Give the surface markings of the kidneys. [4]
- (d) Label the diagram below [5]



- (e) Explain the rationale for an intravenous urogram in hypertension. [3]
- (f) Describe the structure and importance of the juxtaglomerular apparatus. [3]
- (g) Explain how the urinary bladder is adapted for its storage function. [5]
- (h) Define the following pathological terms.
  - (i) albuminuria
  - (ii) glucosuria
  - (iii) ketosis
  - (iv) pyuria
  - (v) bilirubinuria [5]
- (i) Justify the choice of equipment required to carry out abdominal radiography. [5]

### SECTION B

- 2. With reference to intravenous urography:
  - (a) Describe ONE clinical indication for this examination. [2]
  - (b) List and justify the projections relating to your choice in (a). [4]
  - (c) For the contrast agent used, state the criteria which must be checked prior to its injection. [4]
  - (d) Discuss other methods of imaging the upper urinary tract. [8]
  - (e) Explain how a reduced glomerular filtration rate would affect this procedure. [2]
- 3. (a) With reference to pathology of the urinary system, define the following terms:
  - (i) duplex kidney
  - (ii) ectopic kidney
  - (iii) hydronephrosis
  - (iv) renal failure
  - (v) nephroblastoma [5]
- (b) State and explain an appropriate imaging modality to demonstrate the following:
  - (i) left renal calculus
  - (ii) renal cyst
  - (iii) ureteric reflux in a child
  - (iv) acute obstruction due to a ureteric calculus
  - (v) urethral obstruction [10]
- (c) Evaluate the role of conventional radiography in imaging of the urinary system. [5]

4. (a) Compare and contrast the male and female urethra [5]
- (b) Explain why a patient may have an indwelling catheter inserted. [1]
- (c) Describe the care of a patient with an indwelling catheter in the imaging or radiotherapy department. [5]
- (d) What is a micturating cystogram. [1]
- (e) Describe the micturating cystogram under the following headings:
- (i) preparation of the patient [2]
- (ii) the procedure [4]
- (iii) care of patient after the examination. [2]
- (d) Describe the structure of a nephron. [5]
5. (a) Describe the structure of a nephron. [5]
- (b) A young female patient is brought to the radiodiagnostic department on a trolley. She has sustained a crush injury to the abdomen and pelvis and has haematuria. It is decided by the casualty officer that this patient requires an urgent intravenous urogram to investigate the cause of haematuria.
- (i) State TWO possible causes of haematuria [2]
- (ii) Explain how and why this examination would differ from a routine intravenous urogram [7]
- (iii) Describe the care of the patient during these examinations. [4]
- (iv) State the value of two other imaging modalities that could be used to investigate haematuria. [2]
6. (a) With reference to plain radiography of the kidney ureters and bladder. Describe the routine projection under the following headings:
- (i) position of patient and film [3½]
- (ii) direction and centring of x-ray beam [1½]
- (a) Explain the evaluation criteria you would use for the resultant radiograph. [3]
- (c) Justify the exposure factors selected for this examination. [3]
- (d) Explain why in practice mA is used as the main parameter for varying radiographic density. [3]
- (e) Briefly explain the role of the kidney in calcium metabolism and erythropoiesis. [6]

- END EXAMINATION -