NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

APPLIED PHYSICS DEPARTMENT

RADIOGRAPHIC IMAGING II - SRA 3101

EXAMINATION

BSc HONOURS PART III : DECEMBER 2004 *DURATION : 3 HOURS*

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

SECTION A

1. (a) Differentiate between the terms Sulphurization and Sulphiding. [3]

(b) With reference to electrolytic silver recovery, define the term "current density" [1]

(c) An antero - posterior projection of the abdomen is taken on a patient in the supine position. Explain how the use of a tissue displacement band would influence the resultant radiographic image contrast. [3]

(d) Explain the term "photoflourography" [2]

(e) Explain why a film with a negative average gradient is required for image duplication. [2]

(f) Differentiate the terms "resolution" and "definition". [2]

(g) Explain why the radiographer should assume responsibility for identifying radiographs. [3]

(h) State two factors which should always remain constant to ensure comparative film viewing. [2]

(i) The following exposure factors are used to produce an antero-posterior projection of lumbar spine using a floating table top and a ceiling suspended tube.

KV_p	mA	Time(s)	F.F.D	Grid Ratio
70	200	0.5	90cm	10:1

The resultant radiograph shows an unacceptable degree of magnification and the radiographer decides to repeat the projection using a focus to film distance (FFD)

of 120cm. Keeping all other factors constant, calculate the new exposure time required in order to obtain an image of similar density. [3]

(j) Explain how the selection of exposure factors affects density and contrast of the radiographic image. [5]

(k) What are the practical implications of the following attempts to reduce unsharpness in the radiographic image:

(i) use of smallest possible focus ?
(ii) using high definition screens ? [4]

(l) Outline *two* advantages of daylight processing systems over the conventional darkroom. [2]

(m) (i) What is the function of a heat exchanger in an automatic film processor? [1]

(ii) Explain briefly how it works. [3]

(n) Explain how the intensification of the image is achieved in an image intensifier tube. [4]

SECTION B

2. (a) With reference to darkroom design and construction, describe the requirements using the following headings:

(i) radiation protection,
(ii) floors,
(iii) walls and ceilings,
(iv) ventilation,
(v) illumination. [5]

(b) A new imaging facility with various imaging modalities to include CT, MRI, Ultrasound, DSA and general radiography rooms is to be set up. Justify the processing facilities you would recommend for such a set up. [15]

3. (a) Discuss the design features of a modern automatic processor which help conserve resources. [10]

(b) Films emerging from an automatic processor exhibit an increase in overall density: outline *five* possible causes. [5]

(c) Explain a safe working procedure for the manual preparation of a working strength developer solution. [5]

4. (a) It is a requirement that radiographs and other medical images be retained for a specific period of time by hospitals. Evaluate the available options for storage and retrieval. [15]

(b) Describe *two* methods by which patient information can be permanently printed onto a radiograph. [4]

(c) Give *two* desirable features of an illuminator for viewing radiographs. [1]

5. (a) Image quality is a compromise between sharpness, contrast and noise. Discuss the above statement. [15]

(b) (i) Explain what is meant by the term "image distortion". [2]

(ii) State how distortion may be minimised in routine radiography. [2]

(iii) Give one example of a radiographic projection where distortion

(a) is used to advantage
(b) is a disadvantage [1]

6. (a) Explain why silver recovery and conservation is practiced in diagnostic imaging departments. [5]

(b) Compare the relative merits of different methods available for the recovery of silver from used fixer in the department. [10]

(c) Explain why the concentration of silver in the fixer effluent leaving an automatic processor may vary. [5]

END OF EXAMINATION