

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

APPLIED PHYSICS DEPARTMENT

EXAMINATION

SRA 3101 – RADIOGRAPHIC IMAGING II

BSc HONOURS PART III: DECEMBER 2005

DURATION: 3 HOURS

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

SECTION A

1. (a) With reference to automatic processing, discuss features of a film that make it suitable for automatic processing. [5]
- (b) (i) Explain why for safelight testing in the darkroom a film is first given a "flush exposure." [2]
- (ii) Describe a test to determine the safe film handling time in a darkroom. [4]
- (c) Explain how the venturi principle is utilised in film processing. [4]
- (d) Justify the need for accurate film identification and how best this can be achieved in radiography. [5]
- (e) Define the term visual acuity and evaluate its significance in image viewing. [5]
- (f) Briefly outline the factors affecting the perceptibility of an image. [5]
- (g) Explain how doing an abdomen on a big patient posterior anterior rather than antero posterior would influence image quality [5]
- (h) Explain how following image intensification in an image intensifier, a digital image is produced [5]

SECTION B

2. (a) Identify the main factors in processing that affect the final image quality. [5]
- (b) Critically evaluate how these factors are incorporated in the design of a modern processor to ensure optimum image quality. [15]
3. (a) On a plain radiograph of the abdomen, apart from the kidneys, individual tissues are not normally distinguishable. Images of the bowel and ribs can also obscure other information. Use the table below to explain why this is so. [10]

	Physical density	Electron density	Atomic No.	Photoelectric absorption coefficient	Compton scatter coefficient
	$P(\text{gcm}^{-3})$	$e \text{ g}^{-1}$	Z	T	σ
Soft tissues	1.00	3.34	7.42	408.5	3.34
Fatty tissues	0.91	3.48	5.92	188.8	3.167
Air filled structures	0.00129	3.01	7.64	0.575	0.003888
Bony structures	1.85	3.00	13.8	4862	5.55

- (b) Discuss the interrelationship between sharpness, contrast and noise in image quality. [10]
4. The advent of digital technology has rendered the individual patient's film packets and departmental film archive unnecessary. Discuss this statement [20]
5. (a) Discuss the role of radiographers should play in silver conservation [5]
- (b) Mpilo Hospital wishes to recover silver from used fixer on site. Evaluate 2 available options that could be used for this department and recommend one method for them. [15]
6. A new 5 roomed imaging department offering the following modalities: general radiography, computed tomography, ultrasound, fluoroscopy and an accident and emergency room is to be set up. Justify the design and constructing of appropriate processing facilities for this department. [20]