

Sem VI (Rev)  
Regular - May '10

MIT

BI

Con. 3738-10.

MEDICAL IMAGING - I  
(REVISED COURSE)

AN-4507

(3 Hours)

[ Total Marks : 100

- N.B. (1) Question No. 1 is compulsory.  
(2) Attempt any four questions from remaining six questions.  
(3) Figures to the right indicate full marks.

1. (a) Explain the role of the following parts of a X-ray system for getting good quality X-ray images. 15

- (i) Rotating anode
- (ii) Grids
- (iii) Collimators 29x
- (iv) Filters
- (v) Contrast Agents.

$$\lambda_{\min} = \frac{124}{kVp}$$

(b) What is the shortest wavelength produced in an X-ray tube when the potential difference across the tube is 128 KVP. 5  
( $h = 6.6 \times 10^{-34}$  Js,  $C = 3 \times 10^8$  m/sec,  $e = 1.6 \times 10^{-19}$  C).

2. Explain the various types of Real Time Ultrasound Scanners and explain the method of focussing and steering. 20

3. (a) Explain with the help of a block diagram the basic principle of Digital Subtraction Angiography (DSA). 10

(b) With the help of a block diagram explain the Digital Mammography system. 10

4. (a) Explain Doppler shift. State its clinical applications. Explain Pulsed doppler system used in blood flow measurements. 15

(b) Calculate the Doppler shift encountered by Doppler Ultrasonic Blood flow meter that has operating frequency of 6MHz, blood velocity of 15 cm/sec., transducer angle of  $45^\circ$  and acoustic velocity of 1540 m/sec. 5

5. (a) Explain the filament circuit and high voltage circuit of X-ray generator. 10

(b) Explain the need for Digital Radiography. Describe the various parts of digital radiography system with the help of block diagram. 10

6. (a) Explain Fluoroscopy imaging and state its medical application. Explain an X-ray image intensifier tube. 10

(b) Explain the different parts of a thermographic system with the help of a block diagram. 10

7. Write short notes any four :- 20

- (a) Characteristic radiation (64)
- (b) Saturation voltage (18)
- (c) X-ray film processing
- (d) Radiation protection methods
- (e) Applications of Endoscopy.

$$\Delta V = \frac{2V_0 \cos \theta}{V}$$

$$\Delta V = \frac{2(6M)(0.15) \cos 45^\circ}{1540}$$

$$V = 6MHz$$

$$\theta = 45^\circ$$

$$S = 1500 \text{ m/s}$$

$$V = \text{constant} = 340 \text{ m/s}$$

$$\Delta V = 826.4 \text{ Hz} \approx 830 \text{ Hz}$$

0.707