MASTER OF BIOMEDICAL ENGG. FIRST YEAR SECOND SEM EXAMINATION 2018

Subject: MEDICAL IMAGING AND IMAGE PROCESSING

Time: 3 Hrs   **Fullmark's: 100**

Answer Question Number 1 and any seven from Question no. 2-9 and two from remaining

1. Answer any <u>four</u> of the following

   a) What is Bremsstrahlung?
   b) What is Nuclear Medicine?
   c) What is echocardiography?
   d) X-Ray Tube?
   e) What is PET?
   f) What is Thermography?

2. Write the basic principal of photo electric effect and Compton Effect. Discuss briefly about the different properties of X-Ray.   5 + 5

3. What is X-Ray computed tomography? Briefly discuss about a CT scanner with its diagram.   3 + 7

4. Suppose the incident X-ray intensity on water is 1 W/cm^2. Compute the intensity that emerges from a container of water 2 cm thick. The photon energy is 20 Key and the corresponding mass attenuation is 0.523 cm^2/g. suppose the incident X-Ray on bone is 1W/cm^2. Compare the energy emerging from bone with density of 1.2 g/cm^2 having the dimension of Thickness is 2cm, with the result 0.3513 W/cm^2 for T_{H2O}. At 20KV, the mass attenuation constant for bone is 2.51cm^3g.Discuss with diagram A Single Phase High voltage power supply for X-Ray machine   3+2+5

5. How three-phase power supply can be used for X-ray tube? Why Three Phase System is more efficient than the single phase for application in production of X-Ray?
                                                                          7 + 3

6. What are tissue contrast and its importance in medical imaging techniques? Draw the Block diagram of X-Equipment system used in Biomedical Field   5 + 5

7. With Diagram discuss the function of a collimator in X-Ray. Draw and discuss the function of X-Ray fluoroscopic system.   5 + 5

8. Discuss about the Ultrasonic Imaging system? Briefly discuss about the different modes of application of ultra sound in Bio-Medical Field.   5+5

9. What are the different plane is are consider for medical imaging techniques? Dis about the CT scanner with different generation.   4+6

10. What is the image processing and Image processor? Why these are required in medical field?   3+3+4

11. What is the difference between analog and digital image processing? Why digital Image Processing is essential in medical Image processing?   5+5

12. Write the Basic process with block diagram of Medical Image processing Techniques? Briefly discuss about the Image Enhancement, Edge detection, Image segmentation, Image compression and Image reconstruction in Image processing techniques.   5 + 5

13. Write the algorithm and MATLAB programming about point detection, line detection and edge detection and Image data compression in Image processing techniques.
                                                                2.5 x 4