Student Exam Number_____

GANPAT UNIVERSITY

B.Tech. Semester VI (BM&I),Regular Examination April-June 2016.

2BM601: Biomedical Imaging and Radiology

Time:- 3 Hours **Marks:- 70**

Instructions:

1. **Answer to the each sections must be written in separate answer books.**
2. **Figure to the right indicate marks.**
3. **Conventional terms / notations are used.**
4. **All the questions are compulsory.**
5. **Assume necessary data if required**

SECTION-I

Q.1

A. Calculate the approximate intensity HVT in soft tissue for 3 MHZ and 10 MHZ ultrasound beam. Attenuation coefficient =0.5 db per cm per MHZ, given that 50% intensity reduction corresponds to 3 db. 7

B. Give the difference between absorption, attenuation and scattering. 5

OR

Q.1

A. A 8 MHZ beam of Ultrasound travels from soft tissue into fat. Calculate the wavelength in each medium and percentage wavelength change. For soft tissue speed of sound is 1540 m/s and for fat it is 1450 m/s. 4

B. Explain the basic theory of ultrasound. 4

C. Calculate the remaining intensity of 100mW U/S pulse that loose 40 dB while travelling through tissue. 4

Q.2

A. For a beam with a 2 khz pulse repetition frequency. what is the corresponding PRP and maximum range? speed of sound in soft tissue =1540 m/s. 5

B. Write short note on Ultrasound probes. 6

OR

Q.2

A. Write short note on B mode scan. 6

B. Explain Doppler effect using an example. 5

Q.3

A. Give the difference between pulsed and continuous wave of ultrasound. 4

B. Derive wave equations for plane waves and spherical waves and also give their general solution. 4

C. Explain pulse echo imaging with necessary figures. 4

SECTION II

Q.4

A. Explain in detail the production of X-rays. 6

B. Explain in detail X-ray filtrations. 6

OR

Q.4

A.

i) What is HVL? 2

ii) What is x-ray and what are gamma rays? 2

iii) Give the names of types or products of an ionizing radiation. 2

B.

i) What is the difference between ionizing and non-ionizing radiation. 3

ii) Give the basic types of fluoroscopy equipment 3

Q.5

A. Explain in detail discrete X-ray spectrum and continuous X-ray spectrum. 6

B. Explain in detail characteristic radiation. 5

OR

Q.5

A. Describe the factors affecting the size and relative position of the X-ray emission spectrum. 6

B. Write a short note on digital subtraction angiography. 5

Q.6

A. Explain in detail the factors affecting x-ray quality. 6

B. Explain in detail the importance of image intensifier tube in detail. 6

END OF PAPER