Quiz1593 phys. (5 marks) 2nd term - 07/06/1444 H

Answer All Questions : time :5 hours.

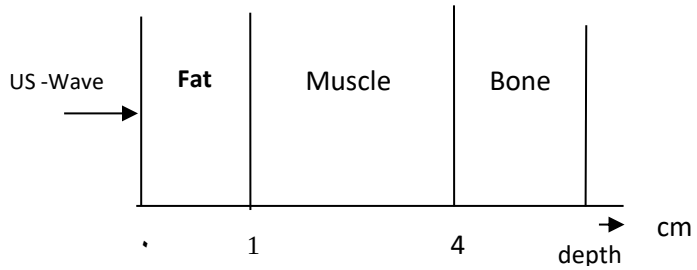
Q1: 2 marks .

Suppose that a flat bone is covered by 3.0 cm of muscle, which in turn is under 1.0 cm of fat .If a 1MHz ultrasound beam of time average density 0.06 W/cm^2 is directed toward the bone , what will be the intensity reaching the bone ?

Attenuation coefficient at 1 MHz for fat = 0.63 dB/cm,

Attenuation coefficient at 1 MHz for muscle =1.2 dB/cm .

Fraction of intensity transmitted at fat/muscle interface = 0.99



Hint to start :Assume initial US-wave intensity = I_1 ,then find fraction remaining intensity after passing fat region (see Absorrption and decibel scale p.12on textbook).

Q2: 2 marks .

The Doppler shift formula used in sound can be written as :

$$\Delta f = \frac{fv}{c}$$

a- What are the quantities in the above formula ?
b- What assumption is given to obtain the above formula ?
c- Derive the above formula .

Q3: 1mark

Explain briefly giving diagrams a Piezoelectric transducer.