BIOE 507 Questions (Ultrasound lectures – Week of Feb 9th) Due 02/16/21

1. What was UIUC’s contribution to Ultrasound in the early days – where was the first experiment conducted (which Building?)..

William J. Fry and his brother Frank made many specially built high-intensity ultrasound exposure equipment to promote the research of effect of ultrasound on different kinds of animal tissues. The results of their study initialized the entire field of study, the medical application of ultrasound for therapeutic purposes. They established their laboratory in a steam tunnel under Electrical Engineering Building at UIUC.

1. What are the different types of Ultrasound probes discussed and state their application (203 sentence per probe)
2. What is piezoelectric effect in the context of ultrasound – explain the basics of ultrasound compression – when does this happen. What is rarefraction – when does this happen – in the context of ultrasound.
3. What are 3 main modes of Ultrasound propagation in tissues – define in 1-2 sentences.
4. What is Acoustic impedance – what is impedance matching and why is it important in ultrasound signal propagation.
5. Explain the scattering equation – define the terms and state its importance.
6. What is Pulse-echo – how is an image acquired by Pulse echo
   1. Define Pulse Repetition frequency
   2. Define the concept of depth in Ultrasound and hos is this obtained. What is the relationship between frame-rate and depth for a speed of sound in soft tissue.
7. What is B-Mode imaging
8. Define the principle of Doppler effect – how can this be used to measure the velocity of blood flow