ASSIGNMENT 3

ULTRASONIC AND NON DESTRUCTIVE TESTING (NDT)

1. Write down various applications of ultrasonic waves.
2. Describe production of ultrasonic waves by magnetostriction method. Give its advantages and limitations.
3. What do you understand by NDT. Give names of few NDT methods.
4. Describe acoustic diffraction method to determine the speed of sound in liquid with suitable diagram.
5. Write down various applications of ultrasonic waves.
6. Define piezoelectric effect and explain in detail piezoelectric ultrasonic generator with necessary circuit diagram. Also mention its merit and demerit.
7. Define Magnetostriction effect and draw the neat and clean circuit diagram of Magnetostriction ultrasonic generator.
8. Differentiate Destructive and Non-destructive testing methods.
9. What is Ultrasound? List various methods of detecting ultrasonic waves.
10. Explain in brief SONAR and its application.
11. Illustrate various aspect associated with Acoustic of building.
12. Write down various advantage and disadvantage of NDT.
13. Calculate the frequency to which a piezo electrical oscillator circuit should be tuned so that a piezo electrical crystal of 0.1cm thickness vibrates in its fundamental mode to generate ultrasonic waves. (Young`s modulus and density of the materials of crystal are 80GPa and 2654 Kg/m3).
14. Explain: Non Destructive Testing.
15. Define Ultrasonic waves with necessary properties.
16. Explain Kundt`s tubes method for the detection of Ultrasonic Sound.
17. Calculate the natural frequency of 50 mm length of a pure iron rod. Given that Young's modulus of iron = 11.5×10^{10} N/m^2 and density of pure iron = 7.25×10^{3} kg/m^3 . Can you use it in a magentostriction oscillator to produce ultrasonic waves?

18. A Nikel rod having 5 cm length is vibrating at resonance. Calculate the fundamental frequency of vibration for which ultrasonic waves are generated. Given that Young's modulus of Nikel = 2.14×10^{11} N/m^2 , density of Nikel = 8.908×10^{3} kg/m^3 .
19. An ultrasonic source of 150 KHz sends down a pulse towards the seabed, which returns after 0.82 s. The velocity of ultrasound in sea water is 1700 m/s. Calculate the depth of sea and wavelength of pulse
20. Calculate length of an iron rod which can be used to produce ultrasound of frequency 22 kHz. Given that Young's Modulus and density of iron is 10^{10} N/m2×11.6 10^{3}×and 7.25 kg/m3, respectively.
21. In the acoustic grating experiment, the wavelength of light transmitted through a liquid is 650 nm. The 1st order angle of diffraction is 0.152°. Calculate the velocity of ultrasound in the liquid. The frequency of the ultrasound is 2.5 MHz.