# B H GARDI COLLEGE OF ENGINEERING & TECHNOLOGY

## GTU MID SEM TEST

**Subject: PHYSICS** **Date : 26.03.09**

**Total Marks: 40** **Sem/Branch: 2nd IT/COM**

**Student Id No._____** **Time: 08:30 to 10:00 am**

**Instructions: 1) Figures to the right indicate full marks.**
**2) Draw neat sketches whenever necessary.**
**3) Assume suitable data if required.**

**Q.1** Answer the following questions in short. **(Each two marks )** **(08)**

1. Define , (i) Echo, (ii) Reverberation
2. State the properties of ultrasonic waves.
3. State the seven crystal system.
4. What is voltage regulation ? Explain how Zener diode is useful in voltage regulation.

**Q.2** Answer the following questions as it requires.

a. State the factors affecting the acoustic of the building. **(2)**

b. Define reverberation time, also explain how the reverberation time of hall is affected by (a) Size, (b) Nature of its wall surface, (c) Audience. **(3)**

c. The volume of a room is 1200 $m^3$. The wall area of the room is 220 $m^2$, the floor area is 120 $m^2$ and ceiling area is 120 $m^2$. The sound absorption coefficient (i) for wall is 0.03 , (ii) for the ceiling is 0.80, (iii) for the floor is 0.06. Calculate the average sound absorption coefficient and the reverberation time. **(3)**

**OR**

a. Distinguish between different types of wave according to the medium with suitable examples. **(2)**

b. Define ,(i) Amplitude, (ii) Frequency, (iii) Wavelength. **(3)**

c. For an empty hall of size 20 x 15 x 10 $m^3$. The reverberation time is 3.5 sec. Calculate the average absorption co-efficient of the hall. What area of the wall should be covered by the curtain so as to reduce the reverberation time to 2.5 sec. The absorption coefficient for curtain cloth is 0.5. **(3)**

**Q.3** Answer the following questions as it requires.

a. Explain the function of Sonar in detail. . **(2)**

b. Write a short note ( including principle, construction, diagram and working ) on Magnetostriction method of ultrasonic wave production. **(3)**

c. Calculate the natural frequency of 40 mm length of a pure iron rod. Given that the density of pure iron is $7.25 \times 10^3$ kg $m^{-3}$ and Young's modulus is $115 \times 10^9$ $Nm^{-2}$. **(3)**

**OR**

a. Define (i) Cavitation (ii) Piezo electric effect. . **(2)**

b. Describe Piezo-Electric method of ultra sonic wave generation with its principle, construction, diagram and working **(3)**

c. An ultrasonic sonic source of 0.05 MHz sends down a pulse towards the seabed which returns after 0.60 sec. Assume velocity of sound in sea water is 1600 m/s. Calculate the depth of sea and the wavelength of the pulse. **(3)**

**Q.4** Answer the following questions as it requires.

a. What are primitive and non-primitive cells ? Give examples of each. **(2)**

b. Derive Bragg's law of X-ray diffraction. **(3)**

c. Calculate the glancing angle of the cube (1,0,0) of rock salt ( a = 2.814 $A^o$) corresponding to $2^{nd}$ order diffraction maximum for the X-rays of wave length 0.714 $A^o$ . **(3)**

**OR**

a. Classify the solids on the basis of bonding between atoms/ molecules with suitable examples. **(2)**

b. Calculate number of atoms per unit cell , the atomic radius, and the packing factor (packing density), of FCC structures. **(3)**

c. Draw the planes in FCC structure , given planes are (1,0,1), (2,1,1), (1,3,2). **(3)**

**Q.5** Answer the following questions as it requires.

a. Define intrinsic and extrinsic semiconductor. **(2)**

b. Explain conductor, semiconductor and insulator with the help of energy band diagrams. **(3)**

c. What is varactor diode ? Explain working and characteristics of the varactor diode. **(3)**

**OR**

a. Define , conductivity and resistivity. Give their S.I units. **(2)**

b. Wirte principle, construction, working , symbol, advantage and disadvantage of LED. **(3)**

c. Write short note on N and P type semiconductors. **(3)**

***Best Of Luck***