Indian Institute of Technology, Kharagpur

Centre for Educational Technology

**Mid Semester Examination 2015 (Spring)**

**Subject: Audio System Engineering Subject Code: ET60006**

Time: 2:00 Hours Full Marks 5x2+5x4=30

***Answer all the questions***

***PART-A***

1. Two liquids are separated using a very thin solid membrane. If a sound source is producing a sound in the 1st liquid what will be the effect of the solid membrane in case of transmission of sound from one liquid to other.
2. An acoustic signal is reflected from a surface that is ***70%*** absorptive. The reflected signal will drop by how many *dB*.
3. The ambient noise level is ***60dB*** and sound systems generate SPL of ***110dB*** at ***4ft***. How far the sound will travel before it submerged with noise.
4. A ***100W*** amplifier has ***64 dBm*** gain. What should be the input signal power to drive the amplifier in full power?
5. Write the name of ***three*** Perceptual Dimensions of sound.

***PART-B***

1. If the input voltage of a loud speaker is raised by ***30%*** how many *dB* will be increase the acoustic pressure. Let initial sound pressure level of the loud speaker is ***6dB (Pref = 20μPa)***. If a person hard the sound ***10 m*** apart from the loud speaker what will be the intensity of the sound. Where the specific acoustic impedance of the medium ***z = 400 RAYL***. [2+2]
2. A mass of ***0.5 kg*** hangs on a spring. The stiffness of the spring is ***100N/m*** and the mechanical resistance is ***1.4kg/s***. The force (N) driving the system is ***f = 2cos5t***. (a) What will be the steady-state values of the speed amplitude and average power dissipation? (b) Find the value of phase angle between speed and force and resonance frequency. [ 2+2]
3. Given a small source of spherical waves in air, at a radial distance *r* the pressure amplitude and particle speed of a ***100Hz*** sound are ***2Pa*** and ***0.01m/s*** respectively. Find the value of r. where density of air ***ρ0=1.21kg/m3*** and speed of sound in air ***c=343m/s***. If the distance from the source r is corresponding to a considerable number of wavelength what will happen? [3+1]
4. Draw the equivalent electrical circuit of the Mechanical system given in **Fig.1** and drive the expression of mechanical impedance. [2+2]

m

Rm

S2

S1

F

Figure-1

1. A plan wave is reflected from the ocean floor at normal incidence with a level ***20dB*** below that of the incident wave. Calculate the possible value of the specific acoustic impedance of the ocean floor. Where the specific acoustic impedance of ocean water is ***1.48x106 Pa.s/m***. [4]