# **­Applied Acoustics – 20 July 2018**

Name & Surname:

E

D

C

B

A

F

Matricula:

**Exercise 1 (tolerance +/- 5%)**

Inside a pipe with diameter of 80+E mm and 1+D/10 m long, with fully absorbing termination, a plane progressive wave is generated by a loudspeaker at other end of the pipe.

Moving the microphone along the pipe a constant value of SPL=90+F dB is found.

Compute the energy density inside the pipe and the total energy trapped inside it.

* Energegy Density J/m3 (5 points)
* Total Energy J (5 points)

**Exercise 2 (tolerance +/- 0.5 dB)**

R

S

B+10/1

10+A

An omnidirectional point source is located above a surface with an absorption coefficient α=0.3+F/20, at an height of B/10 +1 m. The Sound Power Level Lw is equal to 100+D dB.

A microphone is located at an horizontal distance of 10+A m, and at an height of C+5m above the partially-absorbing floor.

Determine the values of the SPL at the microphone of the direct sound, of the reflected sound and of the total SPL considering the two cases, when the reflected sound sums incoherently with the direct sound, and when the reflected sound sums coherently and perfectly in phase.

* Direct SPL dB (3 points)
* Reflected SPL dB (3 points)
* Total SPL (incoherent) dB (2 points)
* Total SPL (coherent) dB (2 points)

**Exercise 3 (tolerance +/- 0.5 dB)**

Inside a room having a in internal surface S equal to **500+EF** m2 we have a sound source, of known power level in each octave band. Also the average absorption coefficint α is known in each octave band. Compute the total wide-band sound pressure level (SPL) in dB, and the total SPL with “A” weighting in dB(A).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| freq. (Hz) | 125 | 250 | 500 | 1000 | 2000 | 4000 |
| LW (dB) | **84+F** | **80+E** | **75+D** | **70+C** | **70+B** | **70+A** |
| α | **0.05+F/50** | **0.1+E/50** | **0.1+D/40** | **0.1+C/40** | **0.2+B/30** | **0.3+A/30** |

* Total sound pressure level dB (5 points)
* Total A-weighted SPL dB(A) (5 points)