# **Applied Acoustics – exam of 13/02/2015**

Surname & name:

D

A

F

E

C

B

Matricula: Degree:

**Exercise 1 (tolerance +/- 0.5 dB)**

Two loudspeakers emit exactly the same signal, a sine sweep ranging between 100 and 10000 Hz. The receiver is at a distance of 10 m from the first one, and 11+F m from the second one, in free field. The acoustical power of each loudspeaker is 0.1 W.

Compute:

Lp1 of first loudspeaker dB (4 points)

Lp2 of second loudspeaker dB (4 points)

Lpmax when both loudspeakers operate simultaneously dB (3 points)

Lpmin when both loudspeakers operate simultaneously dB (3 points)

**On the back of this sheet, draw a qualitative chart of the spectrum of the sound received when the two loudspeakers operate simultaneously, showing Lpmax and Lpmin (-3 points if missing)**

**Exercise 2 (tolerance +/- 0.5 dB, +/- 5%)**

A reverberant room with a volume V=200+EF m³ has a reverberation time T20,1 = 6+F/10 s. A surface of 10+D m2 of absorbing material is inserted, causing the reverberation time to reduce to T20,2 = 2+D/10 s. Compute the absorption coefficient Sabine of the material and the reduction of the reverberant sound pressure level caused by the baffles.

Sabine (5 points)

Reduction of reverberant level dB (5 points)

**Exercise 3 (tolerance +/- 0.5 dB, +/- 1%)**

Compute the value of Clarity (C50) in a classroom, at the distance of 5+F m from the source, knowing that the room volume is 500+EF m3, the reverberation time is 0.5+E/20 s, the source is omnidirectional and has a sound power level of 80+D dB, and only 2 early reflections arrive in the first 50 ms after the direct sound, with a total energy (of the two reflections) equal to the direct sound, whilst all the other reflections arrive after the boundary of 50 ms.

C50 dB (6 points)

TOTAL of written questions POINTS:

## Oral Question

Topic: Points:

**Final score Points:**