**Applied Acoustics – Test 1/2020 In-class test - Lecturer: Angelo Farina**

Note: some input date are based on the 6 digits of Matricula number, assigned to the 6 letters A B C D E F.

If for example the matricula is 123456, it means that A=1, B=2, C=3, etc. .

Furthermore CD=34 (NOT 3x4), DE =45, EF =56.

Top of Form

**Surname and Name**

F

E

D

C

B

A

**Matricula**

**1) Why the formula for converting a physical quantity in dB has an initial factor of 10 in some cases, and an initial factor of 20 in some other cases? For example: Lp=20\*log10(p/p0) and Li = 10\*log10(I/I0).**

*one answer only: 1 point if correct, -1 point if wrong, 0 point if "no answer"*

* Because the decibel scale uses base-10 logarithms, which are not correct for field quantities such as sound pressure p, which should employ base-2 logarithms
* Because the decibel scale in an energetic scale, and field quantities such as p and v must be squared for becoming proportional to potential and kinetic energy, respectively
* Because the decibel is a sub-multiple of the bel (actually 1/10 of a bel)
* It is just matter of tradition, the decibel scale has no physical meaning, and is deprecated. The correct scale should employ Nepers, not decibels.
* We use a factor of 10 for field quantities and a factor of 20 for energetic quantities
* I do not know (no answer)

**2) What's the reason for employing an A-weighting filter when measuring the SPL?**

*one answer only: 1 point if correct, -1 point if wrong, 0 point if "no answer"*

* For removing unwanted low-frequency noise (wind on the microphone, etc.)
* For increasing the signal-to-noise ratio
* For measuring values which are more significant for describing the human perception than what would be measured without any weighting
* For complying to laws and regulations which mandate the usage of A-weighting even in cases where other weighting curves would be more significant for emulating the human perception
* Nowadays A-weighting is considered obsolete and no one is employing such an old filter anymore
* I do not know (no answer)

**3) Select only the correct statements:**

*multiple answers allowed: for each answer, 1 point if correct, -1 point if wrong, 0 point if "not selected"*

* The sound radiated by a point source creates spherical waves
* The sound radiated by a line source creates spherical waves
* In a spherical wave the SPL diminishes by 6 dB at each doubling of the distance from the source
* In a spherical wave the SPL diminishes by 3 dB at each doubling of the distance from the source
* In a cylindrical wave the SPL diminishes by 6 dB at each doubling of the distance from the source
* In a cylindrical wave the SPL diminishes by 3 dB at each doubling of the distance from the source

**4) Which kind of signal is generated by a standard microphone calibrator?**

*multiple answers allowed: for each answer, 1 point if correct, -1 point if wrong, 0 point if "not selected"*

* A sound pressure having an RMS value of 1.0 Pa at 1 kHz
* A sound pressure level of 94 dB
* A sound pressure level of 94 dB(A)
* A sound pressure level of 94 dB(C)
* A particle velocity level of 94 dB
* A sound intensity level of 94 dB

**5) An omnidirectional point source is located outdoors, placed over a sound absorbing floor. Measurements are made at a distance of 10+F m, and the resulting SPL is Lp1=80+E dB(A). Estimate the sound pressure level Lp2 which would be measured at a distance of 30+D m from the sound source.**

*write number and measurement unit*

**6) A long barrier is placed at the distance of the first measurement point of previous exercise. It has an effective height of 2+F/4 m. Compute the SPL reduction ΔL at the second measurement point, assuming that the frequency is 300+E\*10 Hz**.

*write number and measurement unit*

**7) An infinitely long line source is located outdoors, placed over a sound absorbing floor. Measurements are made at a distance of 10+F m, and the resulting average SPL is Lp1=80+E dB(A). Estimate the sound pressure level Lp2 which would be measured at a distance of 30+D m from the sound source.**

*write number and measurement unit*

**8) A long barrier is placed at the distance of the first measurement point of previous exercise. It has an effective height of 2+F/4 m. Compute the SPL reduction ΔL at the second measurement point, assuming that the frequency is 1000+E\*100 Hz.**

*write number and measurement unit*