**Applied Acoustics - 04/10/2022 In-class test - Lecturer: Angelo Farina**

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

If you do not have yet a matricula number use your date of birth: DDMMYY.

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.



**Surname and Name**



**Matricula signature**

1. **Check the sentences you think are always TRUE**  *(multiple answers allowed)*

* A sound source generates pressure on its vibrating surface
* A sound source generates particle velocity on its vibrating surface
* Close to an hard wall there is a lot o sound pressure
* Close to an hard wall there is a lot of particle velocity
* The ratio between sound pressure and particle velocity is always equal to ρ⋅c
* The sound intensity level is always smaller or equal of the energy density level (Li ≤ Ld)

**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

**3) 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

**4) Compute the (incoherent) sum of the sound pressure level**

**of 80+E and 80+D dB**  (write number and measurement unit)



**5) The SPL of a fan is 88+F dB at 63 Hz. Compute the SPL in dB(A)** (write number and measurement unit)



**6) A sound source is producing an SPL=50+F dB(A). A second sound source is switched on, and the total SPL becomes equal to = 63+D dB(A). Compute the SPL of the second source alone.**

(write number and measurement unit)



**7) The A-weighted octave-band spectrum of a fan is given here below (values in dBA).**

**Compute the total wide-band SPL in dB(A)**  (write number and measurement unit)

| 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | Total - dB(A) |
| --- | --- | --- | --- | --- | --- | --- |
| 80+A | 75+B | 73+C | 70+D | 70+E | 70+F |  |

**8) A plane progressive wave is propagating in air, with a SPL=80+E dB. Compute the values of sound pressure, particle velocity, sound intensity, sound energy density** (write number and measurement unit for p, v, I, D)



