**Applied Acoustics - 25/10/2021 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.

Top of Form

**Surname and Name**

F

E

D

C

B

A

**Matricula**

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

* In free field the sound pressure level decreases by 6 dB when the distance from the source is doubled
* In free field the sound pressure level decreases by 3 dB when the distance from the source is doubled
* In free field the sound pressure level decreases with distance according to a law which depends on the shape and size of the sound source
* The SPL produced by a linear sound source decreases with distance more slowly than the SPL produced by a point source
* The attenuation produced by an obstacle is frequency-independent, being governed only by its geometry
* The attenuation produced by an obstacle is frequency-dependent, it depends strongly on the ratio between the size of the obstacle and the wavelength

**The reverberation time of a room is reduced at half, by adding sound absorbing materials.**

**Which of the following effects are true?**  (multiple answers allowed)

* The SPL of the reverberant field reduces by 6 dB
* The SPL of the reverberant field reduces by 3 dB
* The equivalent absorption area A doubles
* The equivalent absorption area A quadruplicates
* The critical distance doubles
* The critical distance increases by a factor of 1.41

**What is the meaning of "proximity effect"?** (a single answer)

* It is the effect typical of the near field, where the reverberant field is negligible, hence the sound pressure level decays by 6 dB/doubling distance
* It is the "pop" effect caused by the air flow emitted by the mouth and hitting a microphone, and which is avoided with an "anti pop" filter placed in front of the microphone.
* It is the phase shift between pressure and particle velocity, which occurs close to a point source
* It is the boost of the particle velocity level, which grows much more than the sound pressure level when going close to a sound source
* It is the boost of the low frequency signal produced by a directive microphone placed close to a point source
* It is the boost of the low frequency signal produced by an omnidirectional microphone placed close to a point source

**Compute the SPL produced by an omnidirectional point source, having a power level Lw=100+F dB, placed just above a reflecting surface, at a distance of 10+E m.** (write number and measurement unit)

**Compute the SPL produced by an linear, incoherent point source, having a specific power level Lw'=80+F dB/m, placed just above a reflecting surface, at a distance of 10+E m.** (write number and measurement unit)

**Compute the SPL produced by an omnidirectional point source, having a power level Lw=100+F dB, placed over the reflecting floor inside a large room having a volume V=200+EF m3 and a reverberation time T20=1+D/10 s, at a receiver located at a distance of 1+E/3 m.**  (write number and measurement unit)

**Compute the critical distance in the case of the previous exercise.** (write number and measurement unit)

<<< FOLLOWS ON BACK >>>

**The spectrum of the A-weighted power level Lwa of an omnidirectional point source is given here below in dB(A). The receiver is at a distance of 10+F meters. The reflection on the ground is negligible (highly absorbing soil, thick grass). Compute the attenuation in dB(A) produced by a noise screen inserted in the mid point between source and receiver, and having an effective height of 3+E/5 m.**  (write number and measurement unit)

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