**Applied Acoustics - 16/11/2021 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.

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**Surname and Name**

F

E

D

C

B

A

**Matricula**

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

* An omni impulse response characterises the temporal effects related to sound propagation in a room: travel time, echoes, reverb, etc,
* An omni impulse response characterises the spectral effects related to sound propagation in a room: frequency response, resonances and antiresonances, etc.
* An omni impulse response characterises the spatial effects related to sound propagation in a room: direction of arrival (source localisation), envelopment, etc.
* For evaluating the envelopment it is necessary to measure a binaural impulse response
* It is possible to convert an Ambisonics (B-format) impulse response into a binaural one
* It is possible to convert a binaural impulse response into an Ambisonics (B-format) one

**The reverberant field of a room is reduced at half of its original energy, by adding sound absorbing materials, whilst the direct sound and early reflections are unchanged. Which of the following effects are true?**
(multiple answers allowed)

* The total SPL reduces by 3 dB
* The Clarity Index C50 does not change
* The Clarity Index C50 increases by 3 dB
* The Clarity Index C50 increases by 6 dB
* The reverberation time does not change
* The reverberation time becomes half of the original one

**What is the definition of "sound reduction index R"?** (a single answer)

* It is the reduction of the sound intensity of a wave travelling through a wall, in dB
* It is the difference between the SPL at the receiver before and after installing a noise barrier
* It is the difference between the SPL measured on the two sides of a partition (L1-L2)
* It is the reduction in sound pressure level caused by a soundproofing treatment of a room, adding absorbing panels
* It is the reciprocal of the transmission coefficient t, expressed in dB
* It is the apparent sound absorption coefficient α, expressed in dB

**In a large room, the first reflection occurs 50+F ms after the direct sound and is followed by the reverberant tail. Compute the value of clarity C50 at the critical distance.** (write number and measurement unit)

**In a fan-shaped open-air Greek theater the measured impulse response shows just 2 reflections after the direct sound. The first has a delay of 10+F ms and an amplitude of 3+E/10 dB lower than the direct sound, and the second has a delay 40+D\*3 ms and an amplitude of 6+C/4 dB below the direct sound. Compute the value of the center time ts.** (write number and measurement unit)

**An exponential sine sweep is 4+F s long. After convolving the test signal with its matched inverse sweep, an almost perfect Dirac's Delta function is obtained. If the sampling rate was 48 kHz, at which sample number (counting from 0) do you expect to find the peak of the impulse?** (write number and measurement unit)

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**Estimate the Sound Reduction Index R of a wall weighting 400+EF kg, having a surface of 7+E m² at the frequency of 300+D\*10 Hz.** (write number and measurement unit)

**A curtain has a=0.3+F/100 and t=0.3+E/100 and is placed in front of an open window.**

**Compute the value of its apparent sound absorption coefficient α.** (write number and measurement unit)