**Applied Acoustics - 07/11/2023 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. . So, 100+F/2=103.

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

Top of Form

**Surname and Name**

A

B

C

D

E

F

**Matricula Signature**

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

* Impulsive sources like balloons, pistol shots, firecracker, clapping machine ensure a perfectly omnidirectional emission
* A dodecahedron loudspeaker ensures a reasonably omnidirectional emission
* A dodecahedron loudspeaker provides natively a very flat spectrum
* A dodecahedron loudspeaker requires digital equalisation for emitting a flat spectrum
* The MLS (Maximum Length Sequence) signal is immune from not linear distortion
* The TDS (chirp) signal is immune from not linear distortion
* The ESS (exponential sine sweep) signal is immune from not linear distortion

**2) In room acoustics, a single omnidirectional microphone allows for measuring:** (multiple answers allowed)

* The SPL
* The Reverberation Time
* The Clarity Index C50
* The Clarity Index C80
* The IACC (Inter Aural Cross Correlation)
* The Jlf (Lateral Fraction)
* The STI (Speech Transmission Index)

**3) What is the definition of "Modulation Transfer Function"?** (a single answer)

* It is the modulation of the frequency of tone transmitted through a PA system
* It is the fluctuation of the time of flight between source and receiver
* It is the time difference between the arrival of the sound on the two ears
* It is the reduction of SPL of the signal due to propagation in the room
* It is the reduction of the depth of amplitude modulation of a signal caused by noise and reverb
* It is the ratio between the amplitude modulation received by the microphone and the amplitude modulation emitted by the source

**4) After recording the decay of a stationary source, the SPL reduces from 80+F to 40+E dB in 2+D/5 seconds. Compute the reverberation time T20** (write number and measurement unit)

**5) The MLS signal is used for measuring the reverberation time in a room. What is the maximum duration of the impulse response which can be measured with an MLS signal of order 14+F at a sampling rate of 48 kHz?**

(write number and measurement unit)

**6) An exponential sine sweep is 4+F s long, followed by a silence of 2+E/2 s. After convolving the test signal with its matched inverse sweep, how long will be the raw signal, before extracting just the linear impulse response?** (write number and measurement unit)

**7) Compute the value of the apparent sound absorption coefficient α of a velvet curtain having an absorption coefficient a of 0.05+F/100 and a sound reduction index R of 3+E/4 dB.** (write number and measurement unit)

**8) 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)