**Applied Acoustics - 15/11/2019 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 for example the matricula is 123456, it means that A=1, B=2, C=3, etc. . Furthermore CD=34 (NOT 3x4).

Top of Form

**Surname and Name**

F

E

D

C

B

A

**Matricula Signature**

**1) What is the definition of Modulation Transfer Function ?** *(one answer only)*

* The reduction of modulation due to noise and echoes
* The ratio between the initial modulation and the modulation of the received sound
* The ratio between modulation of the received sound and the initial modulation
* The signal to noise ratio for a given modulation frequency
* The value of STI for a given octave band

**2) An exponential sine sweep is convolved with the time reversal of itself (instead of using its matched, amplitude-modulated inverse filter). What will be the spectral slope of the resulting impulse signal, as shown by an FFT analysis?** *(one answer only)*

* 0 dB/octave - flat (white)
* -3 dB/octave (pink)
* -6 dB/octave (brown)
* -9 dB/octave
* -12 dB/octave

**3) What are the benefits of a clapping machine instead of other impulsive sources (such as balloons, pistols, firecracker, loudspeaker, etc.) ?** *(multiple answers)*

* Low cost
* Almost perfectly flat spectrum
* Highly reproducible
* Large acoustical power
* Omnidirectional

**4) Select only the CORRECT facts** *(multiple answers)*

* Usually a good sound absorbing material is also a good sound insulating material
* A sound absorber is light, soft and porous, instead a sound insulating panel is heavy, rigid and airtight
* **a**, **r** and **t** are commonly employed coefficients, usually found on the data sheet of every material
* α is the coefficient usually declared by the manufacturer for a sound absorbing material
* In case of discrete objects, such as suspended baffles or seats, instead of providing the value of α, the manufacturer usually provides directly the value of A, in m².

**5) In a noiseless classroom, the value of the MTF (Modulation Transfer Function) is equal to 0.5+F/20. Recompute the value of MTF when noise is added, with a Signal/Noise ratio of 5+E dB**

*(write number and measurement unit)*

**6) In a room, with a volume V=150+EF m³, and with an initial reverberation time of 3+E s, a total surface of 100+DE m² of sound absorbing panels is inserted, having an absorption coefficient α = 0.5+F/50. Compute the reverberant sound level reduction ΔL=L1-L2 caused by the increase of sound absorption.**

*(write number and measurement unit)*

**7) A vibrating panel is made of wood (having a density of 700+F\*10 kg/m³), a thickness of 3+E/5 mm, and is mounted with a rear air gap of 50+D mm in front of a rigid wall. Compute the frequency of maximum absorption.**

*(write number and measurement unit)*

**8) A perforated rigid panel operates as a number of Helmoltz resonators. It has a thickness of 3+E/5 mm, and each squared meter carries a total of 100+F\*20 holes, each with a diameter of 2+D/10 mm. The rear air gap is 50+D mm in front of a rigid wall. Compute the frequency of maximum absorption.**

*(write number and measurement unit)*