**Applied Acoustics - 20/12/2019 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 EF=56 (NOT 5x6).

Top of Form

**Surname and Name**

F

E

D

C

B

A

**Matricula signature**

**1) A mono signal is sampled at 96 kHz without employing an antialiasing filter. A pure tone is captured by the microphone, having a frequency of 50+F\*2 kHz. At which frequency will this tone appear in the spectrum of the digitally-sampled sound?**

*Write number and measurement unit (with a space in between and no other spaces)*

**2) A signal is sampled at 96 kHz, and an FFT spectrum analysis is performed, employing signal blocks which are long 2^(E+4) samples. Compute the spectral resolution of the resulting spectrum**

*Write number and measurement unit (with a space in between and no other spaces)*

**3) The impulse response of a loudspeaker is long 2000+F\*100 samples, and its inverse filter is long 4000+E\*100 samples. For verifying the accuracy of the inverse filter, the IR is convolved with the filter. Compute the length of the result.**

*Write number and measurement unit (with a space in between and no other spaces)*

**4) Inside a standing wave tube, the ratio between the maximum and minimum values of sound pressure is equal to 2+F/4. Compute the value of the absorption coefficient α of the sample placed at the end of the tube.**

*Write number and measurement unit (with a space in between and no other spaces)*

**5) A velocity microphone (a.k.a. “figure of 8”) is placed in front a sound source, radiating a stationary signal. Initially the mike points to the source, then the mike is rotated by an angle of 30+F\*5 degrees. Compute the level decrease.**

*Write number and measurement unit (with a space in between and no other spaces)*

**6) A WFS line array is composed of 10+F loudspeakers, which are processed in such a way to provide exactly identical sound pressure signals (both as magnitude and phase) at a given focusing point. How much level boost does the SPL gets in that point when using all the loudspeakers, instead of when using just one?**

*Write number and measurement unit (with a space in between and no other spaces)*

**7) What is the minimum number of microphone capsules for capturing a complete 1st order Ambisonics soundtrack?** *(one answer only)*

* 1 capsule
* 2 capsules
* 3 capsules
* 4 capsules
* 6 capsules
* 8 capsules

**8) Select all propositions you think are TRUE**  *(multiple answers)*

* A stereo ORTF recording is optimal for listening over a pair of loudspeakers
* Surround 5.1 soundtracks are usually obtained by an Ambisonics microphone
* Surround 5.1 soundtracks are usually created in studio by panning several mono sources
* Binaural reproduction with head-tracking on headphones requires a binaural dummy head recording
* Binaural reproduction with head-tracking on headphones requires a Soundfield B-format recording
* A WFS loudspeaker array provides complete 3D sound field reconstruction over a large listening area