**Applied Acoustics - 05/12/2014 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).

**Warning: On-line compilation of this form warrants TWO additional score points.**

Top of Form

**Surname and Name   
+ signature**

F

E

D

C

B

A

**Matricula**

1) An A/D converter has a quantization of 12+F bits. How large is its dynamic range?

*write number and measurement unit*

2) An A/D converter operates with a sampling rate of 48 kHz. The signal being applied at its input contains a pure tone at 35+E kHz. At which frequency the aliased spurious peak will appear?

*write number and measurement unit*

3) Answer True or False to the following statements (0.5 points each)

*Be aware that the online questions are shiffled with regard to the paper sheet*

|  |  |  |
| --- | --- | --- |
| **Statement** | **True** | **False** |
| A stereo recording can only be done employing two microphones |  |  |
| The angle between the microphones must be the same as the angle between the loudspeakers |  |  |
| Coincident stereo or multichannel recordings are fully mono compatible |  |  |
| A Soundfield microphone has 4 output connectors |  |  |
| An Eigenmike contains 20 capsules |  |  |
| If the ouputs W and X of a Soundfield microphone are summed with the same gain, the resulting virtual microphone is a cardioid |  |  |
| If the sound is coming from Azimuh=45°, elevation=0°, the same signal will be captured on 3 channels W, X, Y of a Soundfield microphone, whilst Z will be silent. |  |  |
| The virtual cardioid microphone obtained by an Eigenmike through 3DVMS can be up to order 6 |  |  |

4) The outputs of an Eigenmike are processed for deriving spherical harmonics signals (HOA) up to order N=INT(1+D/2.5): how many channels are obtained?

*write number*

5) What is the maximum Ambisonics order obtained by a spherical microphone array equipped with 10+F\*3 capsules?

*write number*

6) What is the spatial aliasing limit frequency for a WFS loudspeaker array with an inter-speaker distance Δx=10+F cm ?

*write number and measurement unit*

7) What is the optimal number of loudspeakers for an horizontal-only HOA rig operating at order N=INT(1+E/2.5)?

*write number*