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| **Audio-Visual Systems I (2 hrs/week)** |

***Chapter 1:* *Sound properties (4 h)***

1. Mechanical properties of sound:

1.1. Vibration and displacement velocity of the particles.

1.2. Sound frequency.

1.3. Sound velocity.

1.4. Sonar wave forms.

1.5. Acoustic power of loudspeakers and musical instruments.

1.6. Band width.

2. Sound characteristics and audible frequency range:

2.1. Pitch.

2.2. Loudness.

2.3. Timbre (sound quality).

2.4. Noise analysis.

3. Music and speech.

***Chapter 2: The microphone (8h)***

1. Role of the microphone.

2. Main characteristics of a microphone:

2.1 Directivity: Omni-directional, uni-directional, bi-directional.

2.5 Frequency response.

2.6 Impedance.

2.7 Sensitivity.

3. Types of microphones:

3.1. Electrostatic microphone.

3.2. Electrodynamic microphone.

3.3. Piezo-electric microphone.

3.4. Emitter microphone.

3.5. Ribbon microphone.

For each one: characteristics, composition, principle of operation, advantages and disadvantages, efficiency and domain of use.

***Chapter 3: The loudspeaker (4 h)***

1. Role of the loudspeaker

2. Main characteristics of a loudspeaker.

3. Types of loudspeakers:

3.1 Electrodynamic loudspeaker.

3.2 Electrostatic loudspeaker.

3.3 Piezo-electric loudspeaker.

For each one: characteristics, composition, principle of operation, advantages and disadvantages, efficiency, directivity and domain of use.

***Chapter 4: Sound reproduction (2h)***

1. Mono reproduction.

1.1. Principle.

* 1. .Speaker arrangement in a single channel system.

2. Stereo reproduction.

2.1. Principle.

2.2. Speaker arrangement in a two-channel system.

3. Quadraphonic reproduction.

3.1. Principle.

3.2. Speaker arrangement in a four-channel system.

3.3. Ping pong effect.

***Chapter 5: Acoustics in Architecture (2 h)***

5.1. Hearing.

5.2. Regulation.

5.3. Protection against noise.

5.4. Reverberation time.

5.5. Acoustic processing of halls.

***Chapter 7:* *Compact disc player (4h)***

* 1. Compact disc player:

7.1.1. Constitution.

7.1.2. The size and format of the disc.

* 1. .Principle of recording:

7.2.1. Block diagram of recording and function of each block.

7.3. Sampling:

7.3.1. Principle.

7.3.2. Waveforms.

7.4. Analog to digital converter:

7.4.1. Role.

7.4.2. Voltage to frequency converter:

7.4.2.1. Circuit.

7.4.2.2. Principle of operation.

7.4.3.3. Waveforms at the input and the output.

7.5. Digital to analog converter:

7.5.1. Role.

7.5.2. Binary weighted resistors (DAC).

7.5.2.1. Circuit.

7.5.2.2. Principle of operation.

7.5.2.3. Waveforms at the input and the output.

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7.6. The compact disc block diagram and the role of each block:

7.6.1. The main components of the CD block diagram:

7.6.1.1. Power supply.

7.6.1.2. CD running assembly.

7.6.1.3. Servo electronics: photodiode signal processor, radial

error processor, control processor.

7.6.1.4. Electronics decoder.