

Department of Technical Education
DIPLOMA COURSE IN ELECTRONICS AND COMMUNICATION
ENGINEERING

Fourth Semester

Subject: Audio and Video Systems

Contact Hrs/Week:4

Contact Hrs/Sem: 64

GENERAL EDUCATIONAL OBJECTIVES:-

1. Understanding the concept of audio engineering
2. Understand the concept of recording and reproduction
3. Understand the working of microphones and loudspeakers
4. Understand the working of Monochrome TV principles
5. Understand the working of Color TV principles and standards
6. To know the principles of HDTV
7. To understand the operation of Remote control and stereo multiplexing
8. To know about Audio- Video formats.

Contents	No. of Hrs
UNIT-1	19
Acoustics	04
Microphones and Loud speakers	10
Magnetic recording	05
UNIT-2	20
Video disc recording	06
Monochrome TV	10
Remote controls	04
UNIT-3	21
Color Television standards and systems	10
Stereo multiplexing	03
HDTV	08
Tests	04
Total	64

DETAILS OF CONTENTS

1. Acoustics

Define of sound, noise, differentiate between sound and noise, discuss audio and audible frequency range, Explain reflection of sound, reverberation, absorption, listening room, living room and dead room characteristics and the characteristics of Absorbent materials.

2 Microphones and Loud speakers

Recording and reproduction chain, Microphones and its characteristics, different types of microphones, ideal loud speaker and its characteristics, different types of loud speakers, loud speaker impedance, resonance, low frequency speakers, high frequency speakers, Hi-Fi systems, multi speaker system, mention their advantages, importance of cross-over networks.

3. Magnetic recording

Erase head, record head and playback head and biasing systems for both erase and record heads, characteristics of magnetic tapes and different tape formats- 35mm, 16mm, 1/4 ", 1/8", non-sync and sync recording and echo, equalizers and filters. Noise reduction using Dolby.

4 Video disc recording and playback

Optical recording mediums- tellurium – selenium alloy organic compound, magneto optical materials, video disc formats- laser vision, selecta vision, video high density, recording, playback , video disc mastering and replication

5 Monochrome Television

The elements of a TV system, scanning process and scanning methods, aspect ratio, persistence of vision and flicker, vertical resolution, picture resolution, Kell factor, horizontal resolution and video bandwidth, interlaced scanning, video signal, control pulses and composite video signal, VSB transmission, monochrome TV transmitter and receiver.

6 Color Television standards and systems

Dispersion and recombination of light, primary and secondary colors and attributes of color, Luminance signal and chrominance signal, color picture tube, color TV cameras- plumbicon, Color TV systems, compatibility and considerations, NTSC, PAL and SECAM, CCIR-B standards, block diagram of Color TV transmitter and receiver.

7 Remote Controls

Ultrasonic transducers, frequency signal encoding, PPM encoding and encoding by time-ratio discrimination, remote control transmitter circuit, ultrasonic transmitter circuit, trouble shooting of remote control systems.

8 Stereo multiplexing

Objectives, sum of difference of signals, stereo multiplexing. Modulation signal, demodulating the L-R signal.

9. High Definition TV

Need for HDTV- draw backs of present analog TV, picture resolution considerations- picture resolution in the vertical resolution and in the horizontal direction, features of HDTV proposals, Grand alliance and other HDTV standards, HDTV signal coding and compression- major considerations, sub-sampling technique, intra field splash inter frame DPCM, DCT coding, motion compensated (MC) hybrid DCT coding method, HDTV signal recording technology- HDTV camera and CCDs, Digital video tape recorders, Digital disc recording, super high definition (SHD) still/ moving image recording, Comparative assessment of Optical film and HDTV as imaging medium for video post production system, different formats used in video transmission.

SPECIFIC INSTRUCTIONAL OBJECTIVES:-

1. Acoustics

- 1.1 Definition of sound, noise, difference between sound and noise
- 1.2 Discuss audio and audible frequency range.
- 1.3 Explain reflection of sound, reverberation, absorption
- 1.4 Explain listening room, living room and dead room characteristics
- 1.5 . Explain the characteristics of Absorbent materials.

2 Microphones and Loud speakers

- 2.1 Explain Block diagram of recording and reproduction chain
- 2.2 Microphones- Explain the characteristics – output level, output impedance, frequency response, directivity with simple problems
- 2.3 Explain the different types of microphones with principle of operation and applications- carbon microphone, crystal microphone, moving coil microphone, capacitive microphone, electret microphone, gun microphone, lavalier microphone, tie clip microphone and wireless microphone.

- 2.4 Loud speakers- Mention the characteristics of ideal loud speaker.
- 2.5 Explain the different types of loud speakers-
, dynamic loud speaker, permanent magnet loud speaker,
- 2.7 Explain loud speaker impedance,.
- 2.8 Explain low frequency speakers- Woofers, midrange and extended range speakers.
- 2.9 Explain high frequency speakers- tweeters.
- 2.10 Explain the block diagram of Hi-Fidelity systems.
- 2.11 Explain multi speaker system, mention their advantages.
- 2.12 Explain the importance of cross-over networks.

3. Magnetic recording

- 3.1 Explain erase head, record head and playback head and
Biasing systems for both erase and record heads
- 3.2 Explain the characteristics of magnetic tapes and different tape formats-
35mm, 16mm, 1/4 “, 1/8”.
- 3.3 Explain non-sync and sync recording..
- 3.4 Explain the function of equalizers and filters. – list their types.
- 3.5 Noise reduction systems using Dolby.

4 Video disc recording .

- 4.1 Explain optical recording mediums- tellurium – selenium alloy organic
compound, magneto optical materials
- 4.2 Explain video disc formats- laser vision, selecta vision, video high density
–their comparison.
- 4.3 Explain Recording, playback , disc mastering and replication with block
diagrams.

5. Monochrome Television

- 5.1 Explain the elements of a TV system
- 5.2 Explain scanning process and scanning methods
- 5.3 Explain aspect ratio, persistence of vision and flicker
- 5.4 Explain picture resolution ,vertical resolution, horizontal resolution , kell
factor and video bandwidth.
- 5.5 Explain interlaced scanning.
- 5.6 Explain video signal, control pulses and composite video signal.
- 5.7 Explain VSB transmission.
- 5.8 Explain block diagram of monochrome TV transmitter and receiver.

6 Color Television standards and systems

- 6.1 Explain dispersion and recombination of light.
- 6.2 Explain primary and secondary colors and attributes of color.
- 6.3 Explain Luminance signal and chrominance signal.
- 6.4 Explain color picture tube

- 6.5 Explain color TV camera- Image orthicon.
- 6.6 Explain Color TV systems, compatibility and considerations
- 6.7 Explain NTSC, PAL and SECAM
- 6.8 Explain CCIR-B standards
- 6.9 Explain the block diagram of Color TV transmitter and receiver.

7 Remote Controls

- 7.1 Explain ultrasonic transducers, frequency signal encoding, PPM encoding and encoding by time-ratio discrimination
- 7.2 Explain remote control transmitter circuit.
- 7.3 Explain ultrasonic transmitter circuit
- 7.4 Discuss trouble shooting of remote control systems.

8 Stereo multiplexing

- 8.1 Explain the objectives.
- 8.2 Explain sum of difference of signals, stereo multiplexing. Modulation signal
- 8.3 Explain demodulating the L-R signal.

9. High Definition TV

- 9.1 Explain the need for HDTV- draw backs of present analog TV
- 9.2 Explain picture resolution considerations- picture resolution in the vertical resolution and in the horizontal direction.
- 9.3 Explain the features of HDTV proposals.
- 9.4 Explain Grand alliance and other HDTV standards with recent trends.
- 9.5 Explain HDTV signal coding and compression- major considerations, sub-sampling technique, intra field splash inter frame DPCM, DCT coding, motion compensated (MC) hybrid DCT coding method.
- 9.6 Explain HDTV signal recording technology- HDTV camera and CCDs, Digital video tape recorders, Digital disc recording, super high definition (SHD) still/ moving image recording.
- 9.7 Introduction to interactive TV

TEXT BOOKS:

1. **Consumer Electronics- S P Bali - Pearson-Prentice Hall**
2. **Digital communications – 2nd revised Edition V K Khanna – S Chand Publishers**

REFERENCE BOOKS :-

1. **Audio & Video Systems By- K Shashidhar, Sapna Publications**
2. **Television Engineering – R R Gulati- TMH**
3. **Color Television – R R Gulati – TMH**
4. **Television Engineering- Dhake-**
5. **Audio & Video systems – Ajay Sharma- Dhanpath Roy & sons**
6. **Audio cyclopedia-**
7. **Modern Recording Systems- 6th Edition-David MilesHuber & Robert E Rumstien**

Department of Technical Education

MODEL QUESTION PAPER

Subject: Audio and Video Systems

TIME :3 HRS

MAX.MARKS :100

Note: 1)Section A is compulsory.

2) Answer any two main questions from each of the remaining

Sections

SECTION: I

1 a **Fill in the blanks with suitable words**

5X1

(i)

(ii)

(iii)

(iv)

(v)

b

5

SECTION: II

2 a

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3 a

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SECTION: III

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7 a
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SECTION: IV

8 a
 b
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9 a
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10 a
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