

# GUJARAT TECHNOLOGICAL UNIVERSITY

## B. E. SEMESTER: VI

### Electronics Engineering/Electronics & Communication Engineering/Electronics & Telecommunication

Subject Name: **Audio-Video Systems**

Subject Code: **161002**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
4	0	2	6	70	30	50

Sr. No	Course Content	Total Hrs.
1.	<b>Sound Fundamentals :</b> The Physics of Sound, Sound and the Ear, The Cochlea, Mental Processes, Level and Loudness, Pitch, Frequency Response and Linearity, Audio Level Metering, The Decibel in Acoustics, Acoustic Intensity Level, Acoustic Power Level, Acoustic Pressure Level, Inverse Square Law, The VU and the Volume Indicator Instrument, The Phon, Velocity of Sound, Reflection and Refraction, Absorption, Root Mean Square Measurements, selection of sound absorbing materials. Architectural Acoustics.	6
2.	<b>Sound Amplification:</b> Preamplifiers Requirements, Signal Voltage and Impedance Levels, Preamplifier Stages, Voltage Amplifier Design, Constant-Current Sources and Current Mirrors, Performance Standards, Power Amplifier Classes, Thermal Dissipation Limits, Single-Ended Versus Push-Pull Operation, Switching Amplifiers, Amplifier Grounding, Cross Over Network. Audio Terminations Line-in/out, Aux-in/out, Mic In.	5
3.	<b>Digital Audio :</b> Digital Audio Fundamentals, Sampling and Quantizing, PCM, Audio Compression, Disk-Based Recording, Rotary Head Digital Recorders, Digital Audio Broadcasting, Digital Filtering, Stereophony and Multi-channel Sound.	4

4.	<p><b>Audio Devices and Applications:</b></p> <p>Microphone Sensitivity, Nature of Response and Directional Characteristics, Measurement Microphones, Various Types of Microphones, Various Types of Loudspeakers, Characteristic Impedance of Loud Speakers, Headphone Types, The basics of Magnetic Recording, Sound Cards, Sound Mixers, PA Systems &amp; Installations, Digital Consoles.</p>	4
5.	<p><b>Introduction to Video Signals:</b></p> <p>Video signal dimensions, Horizontal sync composition, Vertical sync details, Function of vertical pulse train, Scanning sequence details, Geometric form and aspect ratio, Image continuity, No. of scanning lines, Interlaced scanning, Resolution, Brightness, Contrast, Picture transmission, TV transmitter, TV receiver, Synchronization, Receiver controls. Perception of brightness and colour, Additive and subtractive colour mixing, Video signals for colour transmission, Luminance signal (Y), Compatibility, Colour-difference signals, encoding of colour difference signals, Formation of chrominance signal</p>	7
6.	<p><b>Television Signal Transmission &amp; Propagation :</b></p> <p>Picture Signal transmission, Positive and negative modulation, Vestigial sideband transmission, Standard channel BW, Television transmitter, TV Signal propagation, Interference suffered by TV channels. TV broadcast channels for terrestrial transmission.</p>	7
7.	<p><b>Television Receiver :</b></p> <p>RF Tuner, IF Subsystem, Video amplifier, Sound section, Sync separation and processing, Deflection circuits, Scanning Currents in the yoke, DC power supplies. Electronic tuners, IF Subsystem, Y Signal channel, Chroma decoder, Separation of U and V colour phasors, Synchronous demodulators, Sub carrier generation and control, Matrixing for drive circuits.</p> <p>Receiver Servicing, Video pattern generator, Sweep &amp; Marker generator, Colour TV Pattern Generator, Vectroscope.</p>	8
8.	<p><b>Digital Video &amp; Standards :</b></p> <p>Digitizing Video, Chroma Subsampling, Basics of Video Compression (MPEG-x, H.26x), Digital VTR, Non-Linear Editing, 4:3 Vs 16:9 for Digital Video.</p>	3
9.	<p><b>Advances in TV Technology :</b></p> <p>HDTV, Display Technologies (CRT, LCD, Plasma, LED, Projection), Video Interfaces (Composite, Component, S-Video, DV, SDI, HDMI, DVI),</p>	6

10.	<b>Television Systems and Standards :</b>  NTSC Colour System, PAL Colour System, French Colour TV System, ATSC, ISDB-T & DTMB, Overview of DVB-T, DVB-S, DVB-C & DVB-IP, DVB-H, Cable Television Network	2
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### **Text Books:**

1. Audio Video Systems Principles Practices and Troubleshooting, by Bali & Bali, Khanna Publishing Company.
2. Audio Engineering, Know it all series, Newnes Press, ISBN 978-1-85617-526-5

### **Reference Books:**

1. Modern Television Practice by R.R. Gulati.
2. Audio Video Systems by R.G. Gupta, Technical Education.
3. Essential Guide to Digital Video by John Watkinson, Snell & Wilcox Inc Publication.
4. Guide To Compression By John Watkinson, Snell & Wilcox Inc Publication

### **List of Suggested Practical Assignments:**

1. Study of PA Systems and its components.
2. Study of Audio Metering Tools like DB Meter, Audio Metering Software.
3. Study of Effects Processors.
4. Measuring Direction Pattern of Microphones.
5. Measuring Direction Pattern of Loudspeakers.
6. Design of an Auditorium considering the selection of various sound absorbing materials
7. Digitizing Sound Signal and Editing it using Computer Software.
8. Study of Pattern Generator.
9. Study of Vectroscope.
10. Tracking of Block schematic for Color TV.
11. Study and Analysis of Composite Video Signal using CRO, Vectroscope, Pattern Generator and Spectrum Analyzer.
12. Voltage and Waveform Analysis for Color TV.
13. Digitizing Video Signal using Computer Software and editing video.
14. Study of Direct to Home system.
15. Frequency Response of microphones
16. Frequency Response of loudspeakers
17. Design and Frequency Response of Cross- over network.
18. Simulation of Video Compressing Technique.
19. Study of CD/DVD/MP3 Player.
20. Study of Digital TV.
21. Study of High Definition TV.
22. Study of Digital Satellite Radio.
23. Study of Cable TV System.
24. Visit to a Cable TV Operator/TV/Radio stations
25. Any other practicals relevant to the course content.