SYLLABUS

SEMESTER-3

CINEMA TECH-1

DIGITAL VIDEO TECHNOLOGY

Credits-3

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1. Digital Video

- **Digital Video Systems:** Camera and Recorder basics, Sensor, CCD and CMOS, Pixels (the photo-sites), Video frame, VTR, Camcorder, DSLR and HDSLR cameras, LCD monitor, Analog vs. Digital, Obsolescence of NTSC and PAL
- **Video format:** Number of Pixels, SD, HD, Raster, Digital Cinema Projection (2K,4K,Quad HD), Frame rate, Shape of the picture (aspect ratio), 4:3 and 16:9; Recording medium and broadcast standard, Video capture, transmission and reproduction, Progressive and Interlace scanning, Computer video format

2. Color

- **Human Color vision:** Rods and Cones-Individual cones for sensing each primary color, Behavior of CCD and CMOS sensors, Color analysis, Video quality and color in Digital Video camera and Digital cinema cameras
- **Color in Video:** Composite and Component signal, Luminance and Chrominance signal, Two color-based signal (chrominance or color difference signal), RGB separate Color signal (4:4:4), Compression, Coding and Decoding

3. Image Quality

- **High-end and Low-end:** Digital Cinema, Broadcast, Professional / Industrial, Prosumer / Consumer quality, Data rate vs. Compression, Option for compression, HDMI and HD-SDI output,
- **Comparison of video formats:** High-end vs. Low-end, Standard Definition vs. High Definition, Various High Definition formats, Bit depth, DSLR or HDSLR camera format, Digital Cinema Camera

- **Recording and Storing of Data:** Memory card, Hard Drive and Discs, Flash Memory card types: *CF (Compact Flash), SD (Secure Digital), SDHC (SD High Capacity), SxS (Sony's Memory Stick),*Read/Write speed of the Cards, Hard Disc Drive and Solid State Drive, DVD
- **Time Code:** What is time Code? Various forms of synchronization: Genlock, Word clock, Time Code; SMPTE time code - LTC and VITC, Time code Generator, Time code Reader, Jam Sync

4. Digital Audio
    - **Analogue vs. Digital:** Concepts, Amplitude and frequency; Samples, Resolution; Differences and Characteristics, Advantages and disadvantages
    - **Recording and playback:** Electrical audio signal- Quantization-Pulse code Modulation (PCM), AD convertor, Storing Digital Samples of audio waves, DAC, Bit Depth & Sample rate,
    - **Data Compression:** Lossy data compression (MP3, AAC)and Loss less data compression (FLAC & AIFF)
5. Audio Quality
    - **Analog vs. Digital quality:** Capture and reproduction of frequency, Band width (frequency range),Nyquist frequency, and human reception range, magnetic noise, Vulnerability and longevity, Media Portability and Reproducibility
    - **Reinforcement and Distribution:** Modern Portable Digital mixers, Latency (signal processing delay), Noise floor

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Reference Books:

1. Video Production hand Book; By Gerald Millerson, Jim Owens
2. The Filmmaker's Hand Book: By Steven Ascher & Edward Pincus
3. The Digital Film making Hand Book: By Sonja Schenk, Ben Long
4. Digital Signal Processing hand Book: By Vijay K. Madisetty