Vidya Pratishthan's Kamalnayan Bajaj Institute of Engineering and Technology, Baramati.

Faculty of Science and Technology

Board of Studies
Electronics and Telecommunication Engineering

Syllabus

Exit Courses
Electronics and Telecommunication Engineering

(w.e.f. AY: 2023-24)

Exit Course Syllabus: First Year (F.Y. B. Tech.) Electronics and Telecommunication Engineering															
Certificate course in Electronic Circuit Design															
w.e.f. AY:2023-2024															
Course Code	Courses Name	Teaching Scheme			Examination Scheme and Marks							Credits			
		TH	PR	TUT	Activity	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
EET23101	Skill Based Courses (Online/Offline)	--	4	--	10	--	--	20	--	30	--	--	2	--	--
EET23102	Work Based Voc. Course (Online/Offline)	--	4	--	10	--	--	20	--	30	--	--	2	--	--
EET23103	Internship / Apprenticeship	--	25	--	50	--	--	50	--	30	--	--	4	--	--
Total		**--**	**33**	**--**	**70**	**--**	**--**	**90**		**90**	**--**	**--**	**8**	**--**	**--**

Skill Based Courses (Online/Offline)		Work Based Voc. Course (Online/Offline)	
EET23101 - A	Analog Electronic Circuits	EET23102	Introduction to Electronics Software's (Offline)
EET23101 - B	Digital Systems		

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Subject: Analog Electronic Circuits (EET23101 – A)		
Teaching Scheme: **TH : --** **PR : 04 Hrs./week**	**Credits: 02**	**Examination Scheme** **Course Activity : 10 Marks** **In - Semester : 20 Marks** **End - Semester : 40 Marks**

Course Objectives

1. To brief about Semiconductor devices JFET & MOSFET, its characteristics, parameters and applications.
2. To discuss MOSFET DC and AC Configurations and its analysis.
3. To explain various MOSFET Circuits.
4. To introduce concepts of feedbacks in amplifiers & oscillators.
5. To impart skills to evaluate the performance of voltage regulator and SMPS Circuits

Course Outcomes: Students will be able to

1. Compare the characteristics and parameters of JFET towards its applications.
2. Compare the characteristics and parameters of MOSFET towards its DC circuits.
3. Interpret, apply & evaluate MOSFET AC circuits.
4. Explain various MOSFET circuits and their applications.
5. Explain MOSFET amplifiers with and without feedback & MOSFET oscillators, for given specifications.
6. Analyze the performance of linear and switching voltage regulators towards applications in regulated power supplies.

UNIT I: Junction Field Effect Transistor (JFET) (6 hrs.)

Introduction to JFET, Types, Construction, Operation, Static Characteristics, Pinch off voltage JFET Volt-Ampere characteristics, JFET Configurations (Common Source/Common Drain/Common Gate) and their Comparison. Self-Biasing circuit of JFET, Small signal mode of JFET, JFET as an amplifier & its analysis (Common Source). Frequency response of Common Source JFET amplifier.

UNIT II: Metal Oxide Semiconductor FET (MOSFET) & its DC Analysis (6 hrs.)

MOSFET operation, Construction of n-channel E-MOSFET, E-MOSFET characteristics & parameters, non-ideal voltage current characteristics i.e. Finite output resistance, body effect, sub threshold conduction, breakdown effects and temperature effects, MOSFET DC Analysis.

UNIT III: MOSFET AC circuit Analysis (6 hrs.)

MOSFET Common Source amplifier circuit, Load Line & Modes of operation, Small signal model of MOSFET and its parameters, Analysis of Common Source amplifier circuit. Introduction to Bi-CMOS technology, MOSFET internal capacitances and high frequency model.

UNIT IV: MOSFET Circuits (6 hrs.)

MOSFET as switch, diode/active resistor, Current sink and Current source circuits, current mirror circuits, Voltage references, Basic principle of band gap reference, CMOS Inverter as amplifier: Active load, Current source and Push pull configurations.

UNIT V- Feedback amplifiers & Oscillators (6 hrs.)

Feedback Amplifiers: Four types of amplifiers. Feedback topologies. Effect of feedback on terminal characteristics of amplifiers. Examples of voltage series and Current series FET feedback amplifiers and their analysis.

Oscillators: Barkhausen criterion, stability with feedback. General form of LC oscillator. FET RC Phase Shift oscillator, Wein bridge oscillator, Hartley and Colpitts oscillators.

UNIT VI- Voltage Regulator & Switched Mode Power Supply (SMPS) (6 hrs.)

Voltage Regulator: Block diagram of an adjustable three terminal positive and negative regulators (317,337), Typical connection diagram, current boosting. Low drop out voltage regulators.

Switched Mode Power Supply (SMPS): Introduction to Switch Mode Power supply (SMPS), Block diagram of SMPS, Types of SMPS. Comparison of Linear Power supply and SMPS.

Text Books:

1. Millman Halkias, "Integrated Electronics-Analog and Digital Circuits and Systems", Tata McGraw Hill, 2000.
2. Donald Neaman, "Electronic Circuit Analysis and Design",3rd Edition, Tata McGraw Hill
3. David A.Bell,"ElectronicDevicesandCircuits",5th Edition, Oxford press

Reference Books:

1. R. L. Boylstad, L. Nashlesky, "Electronic Devices and circuits Theory", 9th Edition, Prentice Hall of India, 2006.
2. Phillip E. Allen, Douglas R. Holberg, "CMOS Analog Circuit Design", Second Edition, Oxford.
3. K. R. Botkar, "Integrated Circuits", 5th Edition, Khanna Publication.

E- Books / E- Learning References:

1. NPTEL Course **"Analog Electronic Circuits"**
https://nptel.ac.in/courses/108/105/108105158/

2. NPTEL Course on **"Analog Circuits"**

https://nptel.ac.in/courses/108/101/108101094/

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Subject: Digital Systems (EET23101 – B)		
Teaching Scheme: **TH : --** **PR : 04 Hrs./week**	**Credits: 02**	**Examination Scheme** **Course Activity : 10 Marks** **In - Semester : 20 Marks** **End - Semester : 40 Marks**

Course Objectives

1. To introduce the fundamental concepts associated with logic families.
2. To analyze logic processes and implement logical operations using combinational logic circuits.
3. To study the sequential logic circuits design both in synchronous and Asynchronous modes.
4. To study fundamentals of VLSI.

Course Outcomes: Students will be able to

CO1: Illustrate the digital logic families.
CO2: Apply the concept of combinational logic design for implementing combinational circuits.
CO3: Construct design steps for simple combinational circuits.
CO4: Compare and convert different flip flops.
CO5: Design synchronous and asynchronous sequential logic circuits.
CO6: Simulate combinational and sequential circuits using HDL.

UNIT I: Introduction To Digital Electronics (7 hrs.)

Digital Logic families: Introduction, Specification terminology: Fan out, Unit load, Current and voltage parameters; TTL, ECL, MOS, CMOS logic families and their comparison, Tristate Logic. CMOS logic: CMOS inverter, NAND, NOR gates, unconnected inputs, wired logic, open drain output.

Signed Binary number representation and Arithmetic: Sign Magnitude, 1"s complement & 2"s complement representation, unsigned Binary arithmetic (addition, subtraction, multiplication,
and division), subtraction using 2"s complement

UNIT II: Combinational Logic Design (7 hrs.)

Definition of combinational logic, canonical forms, Standard representations for logic functions, k-map representation of logic functions (SOP and POS forms), minimization of logical functions for min-terms and max-terms (upto 4 variables), don't care conditions, Design Examples: Arithmetic Circuits, BCD to 7 segment decoder, Code converters.

UNIT III: Combinational Circuits (5 hrs.)

Design using SSI chips: Code converters, Half- Adder, Full Adder, Half Subtractor, Full Subtractor, n bit Binary adder.

Introduction to MSI chips: Multiplexer (IC 74153), Demultiplexer (IC 74138), Decoder (74238), Binary adder (IC 7483)

Design using MSI chips: BCD adder & subtractor using IC 7483, Implementation of logic Functions using IC 74153 & 74138.

UNIT IV: Sequential Logic Design (7 hrs.)

Introduction to sequential circuits: Difference between combinational circuits and sequential circuits; Memory element-latch & Flip-Flop.

Flip- Flops: Logic diagram, truth table & excitation table of SR, JK, D, T flip flops; Conversion from one FF to another , Study of flip flops with regard to asynchronous and synchronous, Preset & Clear, Master Slave configuration ; Study of 7474, 7476 flip flop ICs.

UNIT V- Sequential Circuits (6 hrs.)

Application of flip-flops: Counters- asynchronous, synchronous and modulo n counters, study of 7490 modulus N counter ICs & their applications to implement mod counters; Registers- shift register types (SISO, SIPO, PISO &PIPO) & applications.

UNIT VI- Introduction to HDL (6 hrs.)

Library, Entity, Architecture, Modeling styles, Data objects, Concurrent and sequential statements, Design examples using HDL for basic combinational and sequential circuits.

Text Books:

1. R.P. Jain, "Modern Digital Electronics", Tata McGraw Hill Publication, 3 rd Edition.
2. Thomas Floyd, "Digital Electronics", 11th Edition.
3. M. Morris Mano, "Digital Logic and Computer Design", Prentice Hall of India, 4 th Edition.
4. Taub and Schilling, "Digital Principles and Applications," TMH
5. J. Bhaskar, "A VHDL primer "Prentice-Hall of India, 3rd Edition.

Reference Books:

1. Anand Kumar, "Fundamentals of Digital Circuits", Prentice Hall of India, 1 st Edition.
2. J. F. Wakerly, "Digital Design- Principles and Practices," Pearson, 3 rd Edition.
3. M. M. Mano, "Digital Design," Prentice Hall India.

E- Books / E- Learning References:

1. NPTEL Course on "Digital Circuits" Link of the Course: https://nptel.ac.in/courses/108/105/

2.NPTEL Course on ""Digital Circuits & Systems"" Link of the Course: https://nptel.ac.in/courses/117/106/117106086/

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Subject: Introduction to Electronics Software's (EET23102)		
Teaching Scheme: **TH : --** **PR : 04 Hrs./week**	**Credits: 02**	**Examination Scheme** **Course Activity : 10 Marks** **Term work : 20 Marks** **Oral Exam : 40 Marks**

Prior knowledge of

- Electronic devices and Digital systems design

Is essential

Course Objectives:

1. To introduce students to various hardware & software tools used for circuit simulation and PCB design.
2. To make students acquainted with the electronics, including reading and implementation of schematics.
3. To develop practical skills required for designing electronics projects.

Course Outcomes: After completion of this course, students will be able to,

CO1: Identify electronic components symbols & footprints
CO2: Demonstrate a PCB schematic of an analog / digital circuit.
CO3: Apply practical knowledge and skills by the development of electrical & electronics systems using suitable tools.

Syllabus

Unit 1: Overview of Electronic Circuit Simulation and Layout Software (10 Hrs)

Basics of circuit simulation, Overview of various open-source and commercial EDA tools for circuit design, simulation and PCB design, Demonstration of Analog and Digital Circuit Simulation

Activity Assignment 1:

➢ Implementing a circuit in the EDA tool (Voltage dividers, Op-Amp, Timer circuits, etc.)
➢ PSpice tools and working
➢ Simulation of analog and digital circuits

Unit 2: Introduction to PCB Design software (10 Hrs)

Schematic Entry, Netlist Creation, working with component libraries, Design of Boards, Layout of Parts, Optimizing Parts Placements, Pads and Vi a, Manual and Auto Routing, Handling Multiple Layers, Gerber files, Gerber View

Activity Assignment 2:

➢ Implementing PCB Layout in PCB Design tool (Power supply, Inverter, Microcontroller based circuit, etc.)
➢ Fabrication of PCB

➢ Assembling components and Soldering on PCB.

Unit 3: Exploring MATLAB software for Design of Electronics Systems (6 Hrs)

Write simple program scripts and functions in MATLAB, Use MATLAB for applications in electrical & electronics engineering, collect data and analyze basic electronic sensors and circuits, analyze signals and explore algorithms.

Activity Assignment 3:

➢ Implementing MATLAB scripts and functions

➢ Developing a Simulink model (RC and RLC Circuits, Filter Circuits, Wien Bridge Oscillator, etc.)

➢ Simulation and Analysis of circuits in MATLAB

Reference:

1. Farid N. Nazm, Circuit Simulation, Wiley, 1st edition
2. Bossart, Printed Circuit Boards: Design and Technology, Tata McGraw Hill, 1st edition
3. Rajkumar Bansal, MATLAB and its Applications in Engineering Pearson Publishers, 2nd edition
4. Franco, Design with Operational Amplifiers & Analog Integrated Circuits, Tata McGraw Hill, 3rd edition
5. Horowitz & Hill, The Art of Electronics; Cambridge University Press, 3rd edition
6. Mitzner.K, Complete PCB Design Using Orcad Capture and Layout, Elsevier/ Newnes, 1st edition
7. Félix E. Guerrero-Castro and Ofelia Cervantes-Villagomez, Advanced Circuit Simulation Using Multisim Workbench, Morgan & Claypool Publishers, 1st edition
8. R. L. Boylstad, L. Nashlesky, Electronic Devices and circuits Theory, Prentice Hall of India, 9th edition
9. Dr. R. S. Sedha, Digital Electronics, S. Chand Publications, 3rd edition

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Subject: Internship / Apprenticeship (EET23103)		
Teaching Scheme: **TH : --** **PR : 25 Hrs./week**	**Credits: 04**	**Examination Scheme** **Course Activity : 50 Marks** **Term work : 50 Marks** **Oral Exam : 30 Marks**

Course Objective:

1. Expose Students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
2. Provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job.
3. Expose students to the engineer's responsibilities and professional ethics from social, economic and administrative view.
4. Familiarize with various materials, processes, products and their applications along with relevant aspects of quality control.
5. Understand the psychology of the workers and their habits, attitudes and approach to problem solving.

Course Outcomes: After completion of this course, students will be able to,

CO1: To develop professional competence through internship.
CO2: To apply academic knowledge in a personal and professional environment.
CO3: To build the professional network and expose students to future employees.
CO4: Apply professional and societal ethics in their day-to-day life.

Guidelines to the students:

Any absenteeism by students during their internship should be informed immediately to the mentor/reportingmanager and the HOD. No special considerations will be accepted. Student cannot take leave fest activities. The monthly attendance should be duly submitted to the HOD by the student.

Internship Diary / Internship Workbook:

Student must maintain Internship Diary/ Internship Workbook. The main purpose of maintaining diary/workbook is to cultivate the habit of documenting. The student should record in the daily training diary account of the observations, impressions, information gathered and suggestions given, if any. The training diary/workbook should be signed after every day by the supervisor/ in charge of the section where the student has been working.

Internship Diary/workbook and Internship Report should be submitted by the student along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. Internship

Diary / workbook may be evaluated on the basis of the following criteria:

- Proper and timely documented entries.
- Adequacy & quality of information recorded
- Data recorded.
- Thought process and recording techniques used.
- Organization of the information.

Internship Report:

The report shall be presented covering following recommended fields but limited to:

- Title/Cover Page
- Internship completion certificate.
- Internship Place Details- Company background-organization and activities/Scope and object of thestudy / personal observation.
- Index/Table of Contents
- Introduction
- Title/Problem statement/objectives
- Motivation/Scope and rationale of the study
- Methodological details
- Results / Analysis /inferences and conclusion
- Suggestions / Recommendations for improvement to industry, if any
- Attendance Record
- List of reference (Library books, magazines and other sources)

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Exit Course Syllabus: Second Year (S.Y. B. Tech.) Electronics and Telecommunication Engineering															
Diploma in Electronics Hardware design															
w.e.f. AY:2023-2024															
Course Code	Courses Name	Teaching Scheme			Examination Scheme and Marks							Credits			
		TH	PR	TUT	Activity	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
EETE23201	Skill Based Courses (Online/Offline)	--	4	--	10	--	--	20	--	30	--	--	2	--	--
EME23202	Mini Project	--	4	--	10	--	--	20	--	30	--	--	2	--	--
EME23203	Internship	--	25	--	50	--	--	50	--	30	--	--	4	--	--
	Total	--	**33**	--	**70**	--	--	**90**	--	**90**	--	--	**8**	--	--

Skill Based Courses (Online/Offline)	
EET23201 – A	Advanced Microcontroller (Offline)

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Subject: Advanced Microcontroller – (EET23301) - T.Y. B. Tech Exit		
Teaching Scheme: **PR: 04 Hrs/Week**	**Credits:02**	**Examination Scheme:** **Course Activity: 10 Marks** **Term Work: 20 Marks** **Oral Exam: 30 Marks**

Course Objective:

1. To make students understand architecture and applications of ARM processors in embedded systems.
2. To make students aware of ARM7 based microcontroller architectures and its features.
3. To explore students with interfacing of real world input and output devices.

Course Outcomes: On completion of the internship, learner will be able to –

CO1: Compare the different ARM processors.

CO2: Illustrate the features of ARM based microcontrollers.

CO3: Develop embedded systems using basic peripherals.

CO4: Build embedded systems with advanced peripherals.

UNIT NO.01: INTRODUCTION TO ARM PROCESSORS AND ITS VERSIONS

ARM7, ARM9 & ARM11 features, advantages & suitability in embedded application ARM7 registers, CPSR, SPSR, ARM and RISC design philosophy, ARM7 data flow model, programmer's model, modes of operations

UNIT NO.02: ARM7 BASED MICROCONTROLLER LPC2148

Features, Architecture (Block Diagram and Its Description), System Control Block (PLL and VPB divider), Memory Map, GPIO, Pin Connect Block, Timer, simple LPC2148 GPIO Programming examples using timers of LPC2148 to generate delay

UNIT NO.03: ARM REAL WORLD INTERFACING PART I

Interrupt structure of LPC2148, Interfacing with LED, LCD, GLCD, KEYPAD, simple LPC2148 USART Programming, on-chip ADC, Waveform generation using DAC All programs in embedded C.

UNIT NO.04: ARM REAL WORLD INTERFACING PART II

GSM, GPS module interfacing, Study of protocols I2C, SPI, EEPROM with I2C, All programs in embedded C. Introduction to ARM cortex series, CORTEX A, R, M processors, Firmware development using CMSIS Standard.

Text Books:

1. Andrew Sloss, Dominic Symes, Chris Wright, ARM System Developer's Guide – Designing and Optimizing System Software||, 1st edition, ELSEVIER, 2004.

References:

1. Steve Furber, ARM System on Chip Architecture, 2nd edition, Addison-Wesley, March 2000.
2. LPC 214x User manual (UM10139) :- www.nxp.com
3. ARM architecture reference manual : - www.arm.com

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Subject: Mini Project – (EET23202) - S.Y. B. Tech Exit		
Teaching Scheme: **PR: 04 Hrs/Week**	**Credits:02**	**Examination Scheme:** **Course Activity: 10 Marks** **Term Work: 20 Marks** **Oral Exam: 30 Marks**

Course Objective:

1. To understand the —Product Development Process including budgeting through Mini Project.
2. To plan for various activities of the project and distribute the work amongst team members.
3. To develop student's abilities to transmit technical information clearly and test the same by delivery ofSeminar based on the Mini Project.
4. To understand the importance of document design by compiling Technical Report on the Mini Projectwork carried out.

Course Outcomes: On completion of the internship, learner will be able to –

CO1: Understand, plan and execute a Mini Project with team.

CO2: Implement Designing (Modelling), Manufacturing, testing, and troubleshooting etc.

CO3: Prepare a technical report based on the Mini project.

CO 4: Deliver technical seminar based on the Mini Project work carried out.

A: Execution of Mini Project

- Project designs ideas can be necessarily adapted from recent issues of electronic design magazines Application notes from well known device manufacturers may also be referred.
- Use of Hardware devices/components is mandatory.
- Layout versus schematic verification is mandatory.
- Bare board test report shall be generated.
- Assembly of components and enclosure design is mandatory.

B: Selection: Domains for projects may be from the following, but not limited to:

- Instrumentation and Control Systems
- Electronic Communication Systems

- Biomedical Electronics
- Power Electronics
- Audio, Video Systems
- Embedded Systems
- Mechatronic Systems
- Microcontroller based projects should preferably use Microchip PIC controllers / ATmega controller / AVR microcontrollers / Ardino / Raspberry Pi.

Report writing: A project report with following contents shall be prepared:

1. Title
2. Specifications
3. Block Diagram
4. Circuit Diagram
5. Selection of components, calculations
6. Simulation Results
7. PCB Art work
8. Testing Procedures
9. Enclosure Design
10. Test Results & Conclusion
11. References

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Subject: Internship / Apprenticeship (EET23203)- S.Y. B. Tech Exit		
Teaching Scheme: **TH : --** **PR : 25 Hrs./week**	**Credits: 04**	**Examination Scheme** **Course Activity : 50 Marks** **Term work : 50 Marks** **Oral Exam : 30 Marks**

Course Objective:

1. Expose Students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
2. Provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job.
3. Expose students to the engineer's responsibilities and professional ethics from social, economic and administrative view.
4. Familiarize with various materials, processes, products and their applications along with relevant aspects of quality control.
5. Understand the psychology of the workers and their habits, attitudes and approach to problem solving.

Course Outcomes: On completion of the internship, learner will be able to –

CO1: To develop professional competence through internship.
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Guidelines to the students:

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Internship Diary / Internship Workbook:

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industry to the Institute immediately after the completion of the training. Internship Diary / workbook may be evaluated on the basis of the following criteria:

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Internship Report:

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Exit Course Syllabus: Third Year (T.Y. B. Tech.) Electronics and Telecommunication Engineering															
B. Voc in Signal Processing															
w.e.f. AY:2023-2024															
Course Code	Courses Name	Teaching Scheme			Examination Scheme and Marks							Credits			
		TH	PR	TUT	Activity	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
EETE23301	Skill Based Courses (Online/ Offline)	--	4	--	10	--	--	20	--	30	--	--	2	--	--
EME23302	Mini Project	--	4	--	10	--	--	20	--	30	--	--	2	--	--
EME23303	Internship	--	25	--	50	--	--	50	--	30	--	--	4	--	--
Total		--	33	--	**70**	--	--	**90**	--	--	--	--	**8**	--	--

Skill Based Courses (Online/Offline)	
EET23301 - A	Digital Image Processing
EET23301 - B	Audio Video Engineering

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Subject: Digital Image Processing – (EET23301-A) - T.Y. B. Tech Exit		
Teaching Scheme: **PR: 04 Hrs/Week**	**Credits:02**	**Examination Scheme:** **Course Activity: 10 Marks** **Term Work: 20 Marks** **Oral Exam: 30 Marks**

Course Objective:

1. To become familiar with digital image fundamentals.
2. To get exposed to simple image enhancement techniques in Spatial and Frequency domain.
3. To study the image segmentation and representation techniques.
4. To become familiar with image compression methods.
5. To learn concepts of degradation function and restoration techniques.
6. To understand the Object Recognition.

Course Outcomes: On completion of the internship, learner will be able to –

CO1: Apply knowledge of mathematics for image understanding and analysis.
CO2: Implement spatial domain image operations.
CO3: Design and realize various algorithms for image segmentation.
CO4: Design and realize various algorithms for image Compression.
CO5: Apply restoration to remove noise in the image.
CO6: Describe the object recognition system.

UNIT NO.01: DIP Fundamentals (8 Hrs)

Fundamental steps of Image Processing, components of IP, Image formation, image sampling and quantization, image types, Image histogram Color Fundamentals, Color Models, pixel connectivity, Pseudo color image processing.

UNIT NO.02: Image Enhancement in Spatial Domain (7 Hrs)

Image enhancement in spatial domain, Basic gray level transformation, histogram processing, enhancement using arithmetic and logic operations, basic spatial filtering, smoothing and sharpening spatial filters, Intensity transformation, contrast stretching, histogram equalization.

UNIT NO.03: Image Segmentation (6 Hrs)

Point, line and edge detection, Thresholding, Regions Based segmentation, Edge linking and boundary detection, Hough transform.

UNIT NO.04: Image Compression (7 Hrs)

Fundamentals of redundancies, Basic Compression Methods: Huffman coding, Concept of

Discrete Cosine Transform , JPEG Compression standard, Y CB CR transformation, Introduction to MPEG standard ,Motion estimation, compensation, Introduction to video compression.

UNIT NO.05: Image Restoration (7 Hrs)

A model of the image degradation/restoration process, noise models, restoration in the presence of noise–only spatial filtering, Weiner filtering, constrained least squares filtering, geometric transforms; Introduction to the Fourier transform and the frequency domain, estimating the degradation function.

UNIT NO.06: Object Recognition (7 Hrs)

Object Recognition- patterns and pattern classes, recognition based on decision theoretic methods, structural methods.

Case studies: **Character recognition, Content based image retrieval, image classification, Introduction to Deep learning using CNN.**

Text Books:

1. Gonzalez & Woods, "Digital Image Processing", Pearson Education, 3rd Edition, 2008
2. S Sridhar, "Digital Image Processing", Oxford University Press, 2nd Edition.

References:

1. Jain Anil K., "Fundamentals Digital Image Processing", Prentice Hall India, 4th Edition.
2. Milan Sonka, Vaclav Hlávav, Roger Boyle, "Image Processing, Analysis and Machine Vision", Thomson Learning, 2nd Edition., 2001
3. Pratt W.K, "Digital Image Processing", John Wiley & Sons, 3rd Edition, 2007
4. Jayaraman. S, Veerakumar. T, "Digital Image Processing", McGraw Hill Education, 2nd Edition.

MOOC / NPTEL Courses:

1. NPTEL Course **"Digital Image Processing"**
Link of the Course: https://nptel.ac.in/courses/117/105/117105079/

2. NPTEL Course **"Digital Image Processing"**
Link of the Course: https://nptel.ac.in/courses/106/105/106105032/

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Subject: Audio Video Engineering – (EET23301-B) - T.Y. B. Tech Exit		
Teaching Scheme: **PR: 04 Hrs/Week**	**Credits:02**	**Examination Scheme:** **Course Activity: 10 Marks** **Term Work: 20 Marks** **Oral Exam: 30 Marks**

Course Objective:

1. After learning AVE course, students will get benefit to learn and understand the working of real life video system and the different elements of video system plus the encoding/decoding techniques.
2. The learners will be groomed up to understand different channel allocations, difference between various systems present in this world, their transmission and reception techniques.
3. Students will get insight on functioning of individual blocks, different standards of compression and they will be acquainted with different types of analog, digital TV and HDTV systems.
4. The students will get overview of fundamentals of Audio systems and basics Acoustics.

Course Outcomes: On completion of the course, learner will be able to –

CO1: To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver, Picture Tubes and Television Camera Tubes.

CO2: To study the various Colour Television systems with a greater emphasis on television standards.

CO3: To study the advanced topics in Digital Television and High Definition Television.

CO4: To study audio recording systems such CD/DVD recording, Audio Standards, and Acoustics principles.

UNIT NO.01: Fundamentals of Colour Television (8 Hrs)

Color TV systems, fundamentals, mixing of colours, colour perception, chromaticity diagram. NTSC, PAL, SECAM systems, colour TV transmitter, (high level, low level), colour TV receivers, remote control. Fault finding and servicing equipments like Wobbuloscope, TV Pattern Generator, and Field Strength meter.

UNIT NO.02: Digital TV and Display Devices (6 Hrs)

Introduction to Digital TV, Digital TV signals and parameters, Digital TV Transmitters, MAC signals, advanced MAC signal transmission, Digital TV receivers, Basic principles of Digital Video compression techniques, MPEG Standards. Digital TV recording techniques, Display devices: LED, LCD, TFT, Plasma.

UNIT NO.03: HDTV (6 Hrs)

HDTV standards and systems, HDTV transmitter and receiver/encoder, Digital TV satellite Systems, video on demand, CCTV, CATV, direct to home TV, set top box with recording facility, conditional access system (CAS), 3D TV systems, Digital broadcasting, case study (Cricket match, Marathon, Football match).

UNIT NO.04: Advanced TV Systems (8 Hrs)

IP Audio and Video, IPTV systems, Mobile TV, Video transmission in 3G mobile System, IPod (MPEG4 Video player), Digital Video Recorders, Personal Video Recorders, Wi-Fi Audio / Video Transmitter and Receivers. Video Projectors, HD Video projectors, Video Intercom systems/ Video door phones.

UNIT NO.05: Fundamentals of Audio-Video Recording (6 Hrs)

Methods of sound recording & reproduction, optical recording, CD recording, audio standards.
Digital Sound Recording, CD/ DVD player, MP3 player, Blue Ray DVD Players, MPEG, MP3 Player.

UNIT NO.06: Fundamentals of Acoustics (6 Hrs)

Studio acoustics & reverberation, P.A. system for auditorium, acoustic chambers, Cordless microphone system, special types of speakers & microphones, Digital Radio Receiver Satellite radio reception.

Text Books:

1. Television and video Engineering, A. M. Dhake, TMH Publication.
2. Video Demisified, Kelth jack, Penram International Publication.
3. Audio Video Systems, R.G. Gupta, TMH Publication

References:

1. S. P. Bali, "Color TV Theory and Practice".
2. Bernard Grobb, Charles E, "Basic TV and Video Systems".

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Subject: Mini Project – (EET23302) - T.Y. B. Tech Exit		
Teaching Scheme: **PR: 04 Hrs/Week**	**Credits:02**	**Examination Scheme:** **Course Activity: 10 Marks** **Term Work: 20 Marks** **Oral Exam: 30 Marks**

Course Objective:

1. To understand the —Product Development Process including budgeting through Mini Project.
2. To plan for various activities of the project and distribute the work amongst team members.
3. To develop student's abilities to transmit technical information clearly and test the same by delivery ofSeminar based on the Mini Project.
4. To understand the importance of document design by compiling Technical Report on the Mini Projectwork carried out.

Course Outcomes: On completion of the internship, learner will be able to –

CO1: Understand, plan and execute a Mini Project with team.

CO2: Implement Designing (Modelling), Manufacturing, testing, and troubleshooting etc.

CO3: Prepare a technical report based on the Mini project.

CO 4: Deliver technical seminar based on the Mini Project work carried out.

A: Execution of Mini Project

- Project designs ideas can be necessarily adapted from recent issues of electronic design magazines Application notes from well known device manufacturers may also be referred.
- Use of Hardware devices/components is mandatory.
- Layout versus schematic verification is mandatory.
- Bare board test report shall be generated.
- Assembly of components and enclosure design is mandatory.

B: Selection: Domains for projects may be from the following, but not limited to:

- Instrumentation and Control Systems
- Electronic Communication Systems
- Biomedical Electronics

- Power Electronics
- Audio, Video Systems
- Embedded Systems
- Mechatronic Systems
- Microcontroller based projects should preferably use Microchip PIC controllers / ATmega controller / AVR microcontrollers / Ardino / Raspberry Pi.

Report writing: A project report with following contents shall be prepared:

1. Title
2. Specifications
3. Block Diagram
4. Circuit Diagram
5. Selection of components, calculations
6. Simulation Results
7. PCB Art work
8. Testing Procedures
9. Enclosure Design
10. Test Results & Conclusion
11. References

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Subject: Internship / Apprenticeship (EET23303)- T.Y. B. Tech Exit		
Teaching Scheme: **TH : --** **PR : 25 Hrs./week**	**Credits: 04**	**Examination Scheme** **Course Activity : 50 Marks** **Term work : 50 Marks** **Oral Exam : 30 Marks**

Course Objective:

1. Expose Students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
2. Provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job.
3. Expose students to the engineer's responsibilities and professional ethics from social, economic and administrative view.
4. Familiarize with various materials, processes, products and their applications along with relevant aspects of quality control.
5. Understand the psychology of the workers and their habits, attitudes and approach to problem solving.

Course Outcomes: On completion of the internship, learner will be able to –

CO1: To develop professional competence through internship.

CO2: To apply academic knowledge in a personal and professional environment.

CO3: To build the professional network and expose students to future employees.

CO4: Apply professional and societal ethics in their day-to-day life.

Guidelines to the students:

Any absenteeism by students during their internship should be informed immediately to the mentor/reportingmanager and the HOD. No special considerations will be accepted. Student cannot take leave fest activities. The monthly attendance should be duly submitted to the HOD by the student.

Internship Diary / Internship Workbook:

Student must maintain Internship Diary/ Internship Workbook. The main purpose of maintaining diary/workbook is to cultivate the habit of documenting. The student should record in the daily training diary account of the observations, impressions, information gathered and suggestions given, if any. The training diary/workbook should be signed after every day by the supervisor/ in charge of the section where the student has been working.

Internship Diary/workbook and Internship Report should be submitted by the student along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. Internship Diary / workbook may be evaluated on the basis of the following criteria:

- Proper and timely documented entries.
- Adequacy & quality of information recorded
- Data recorded.
- Thought process and recording techniques used.
- Organization of the information.

Internship Report:

The report shall be presented covering following recommended fields but limited to:

- Title/Cover Page
- Internship completion certificate.
- Internship Place Details- Company background-organization and activities/Scope and object of thestudy / personal observation.
- Index/Table of Contents
- Introduction
- Title/Problem statement/objectives
- Motivation/Scope and rationale of the study
- Methodological details
- Results / Analysis /inferences and conclusion
- Suggestions / Recommendations for improvement to industry, if any
- Attendance Record
- List of reference (Library books, magazines and other sources)

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