REVISED COURSE CURRICULUM FOR 4TH SEMESTER

(IC Manufacturing OF ENGINEERING COURSES)

W.E.F.2023-24

BOARD OF TECHNICAL EDUCATION

MUNI MAYA RAM

MARG PITAMPURA,

DELHI-110034

Second Year (4^{TH} Semester) Curriculum Structure for Diploma in Engineering course of

IC Manufacturing

STUDY SCHEME / CREDIT (SEMESTER – IV)

IC MANUFACTURING ENGINEERING

Sl.	Category of Course	Code No.	Course Title	Hours per week			Total contact hrs./ week	Credits	Internal Marks	External Marks
									Time	Time
				L	T	P			1:30 Hrs. (Each sessional)	3:00 Hrs.
1	Program Core Course	**23EC-PC202**	Microprocessor And Microcontroller	3	0	0	3	3	50	100
2	Program Core Course	**23EC-PC204**	Electronics Devices & Circuits -II	3	0	0	3	3	50	100
3	Program Core Course	**23IM-PC206**	Clean Room Technology	3	0	0	3	3	50	100
4	Program Core Course	**23EC-PC208**	Linear Integrated Circuits	3	0	0	3	3	50	100
5	Manda-Tory Course	**23AU-250**	Essence Of Indian Knowledge and Tradition	1	0	0	1	1	50	-
6	Program Core Course	**23EC-PC252**	Microprocessor And Microcontroller Laboratory	0	0	2	2	1	50	50
7	Program Core Course	**23EC-PC254**	Electronics Devices & Circuits-II Laboratory	0	0	2	2	1	50	50
9	Program Core Course	**23IM-PC256**	Introduction To VHDL Laboratory	0	0	2	2	1	50	50
8	Program Core Course	**23EC-PC258**	Linear Integrated Circuits Laboratory	0	0	2	2	1	50	50
10	Project	**23IM-PR-260**	Minor Project	0	0	4	4	2	50	100
	Total Credits							**19**	**500**	**700**
	Grand Total of Marks								**1200**	

***Summer Internship:** After 4th Semester, students shall undergo Summer Internship program of 4-6 weeks and its credit will be evaluated in the 5th Semester.

SEMESTER	:	**4TH IC MANUFACTURING ENGG.**
Course Code	:	**23EC-PC202**
Course Title	:	Microprocessor and Microcontroller
Number of Credits	:	3 (L:3, T:0, P:0)
Course Category	:	PC

Course Objective:

1. Understand the architecture of microprocessors and microcontroller
2. Understand the programming model of microprocessors and microcontrollers
3. Interface different external peripheral devices with microprocessors and microcontrollers
4. Analyse a problem and formulate appropriate computing solutions for processor or controller-based application.
5. Develop an assembly language program for specified application

Course Content:

UNIT – 1 :8085 Microprocessor architecture [6 Hrs.]
Organization of a microcomputer system and functions of its various blocks. Stored program concept. Harvard and Von Newman architecture. Microprocessors and Microcontrollers and their applications 8085 architecture- functional diagram and description, Register organization, memory organization, IO organization.

UNIT– 2: Instruction set and assembly language programming of 8085 [6 Hrs.]
Instruction formats. Types of instructions, Instruction set. Addressing modes, Simple programs involving various types of instructions, basic timing diagrams

UNIT– 3: Data Transfer methods [6 Hrs.]
Synchronous, Asynchronous and Interrupt driven data transfer. Interrupts of 8085 and their types. Servicing Interrupts, extending interrupts. Serial data transfer. Instructions related to Interrupts and serial transfer. Need for DMA. Implementing DMA in 8085 processor-based systems.

UNIT 4: 8051 microcontrollers architecture: [7 Hrs.]
8051 family of microcontrollers and its architecture, SFR, I/O ports and their functions, Memory organization, interfacing external memory, addressing modes, instruction set of 8051, Simple assembly language programs.

UNIT- 5 :8051 Real Time Control: [6 Hrs.]
8051 timer/counter and its various modes of operation. Serial data transfer and its modes. Interrupt handling.

UNIT- 6: Interfacing External Devices: [6 Hrs.]
8255 PPI, various modes of operation., interfacing Seven Segment Display, key board, ADC and DAC with 8085 through PPI. Interfacing 8255 with 8051 microcontrollers.
Interfacing 8051 directly with 4x4 matrix keyboard, LEDs, ADC and DAC. Control speed of DC motor using PWM technique. Stepper motor interfacing.

Reference Books:

S.No.	TitleofBook	Author	Publication
1	Microprocessor Architecture, Programming, and Applications with the 8085	R. Gaonkar	Prentice Hall
2	The 8085 Microprocessor: Architecture, Programming and Interfacing	Kumar, K. U., &Umashankar, B. S	Pearson
3	The 8051 Micro Controller and EmbeddedSystems	Muhammad Ali Mazidi& Janice GilliMazidi, R.D.Kinely	PHI Pearson Education, 5th Indianreprint
4	Microprocessorand Microcontrollers	Krishna Kant	Eastern Company Edition, PrenticeHall of India, New Delhi

Lectures:

1. https://www.brainspire.com/blog/what-is-a-microprocessor-and-how-does-it-work
2. https://www.tutorialspoint.com/microprocessor/microcontrollers_overview.htm
3. https://www.allaboutcircuits.com/technical-articles/what-is-a-microcontroller-introduction-component-characteristics-component/

Course Outcomes:

1. Demonstrate the types of power generation
2. Maintain the optimized working of the power plants
3. Apply safe practices in power plants
4. Explain various transmission and distribution systems.
5. Analyze and apply power factor improvement
6. Select the adequate mix of power generation based on economic operation

SEMESTER	:	**4TH IC MANUFACTURING ENGG.**
Course Code	:	**23EC-PC252**
Course Title	:	Microprocessor and Microcontroller Practical
NumberofCredits	:	1 (L:0, T:0, P:2)
Course Category	:	PC

List of Practical (Perform any Eight practical):

8085 based Practical:

1. Write a program to add/subtract two 8-bit numbers (Assume data is in memory)
2. Write a program to add/subtract two 16-bit numbers and store result
3. Write a program to multiply two 8-bit numbers and store 16-bit result
4. Write a program to divide two 8-bit numbers and store quotient and remainder
5. Write a program to display a decimal value in a seven-segment display.
6. Write a program to read ADC and store digital value in memory

8051 based Practical:

1. Write a 8051 program to add/subtract two 8 bit numbers
2. Write a program to read keyboard and display the key in seven segment display
3. Write a program to read ADC output and display digital value in LEDs
4. Write a program to generate square wave using DAC
5. Write a program to vary speed of a DC motor using PWM
6. Write a program to rotate stepper motor clock wise and counter clock wise

SEMESTER	:	**4TH IC MANUFACTURING ENGG.**
Course Code	:	**23EC-PC204**
Course Title	:	Electronic Devices and Circuits-II
NumberofCredits	:	3 (L:3, T:0, P:0)
Course Category	:	PC

Course Objectives:

This coursewill enable the students to understand the applications of various electronic components such as Wave shaping circuit, Multistage Transistor Amplifier, Feedback amplifier, Power Amplifiers, Sinusoidal Oscillators and Regulated power supplies. Practical exercises of this course would enable the students to understand the concepts they study in theory.

Course Content:

1. Wave shaping Circuits [6 Hrs.]

General idea about different wave shapes; Transient phenomena in R-C and R-L circuits; R-C and R-L differentiating and integrating circuits; Clipping circuits; Diode clippers- series and shunt biased type; Double clipper circuits; Zener diode clipper circuits; Use of transistors for clipping and clamping circuits; Diode clamping circuit for clamping to negative peak, positive peak or any other level for different input waveforms.

2. Multistage Transistor Amplifier [6 Hrs.]

Need of multistage amplifier; different coupling schemes and their working; brief mention of application of every type of coupling; working of R-C coupled and transformer coupled multistage amplifier; approximate calculation of voltage gain of two stage R-C coupled amplifier; frequency response for R-C coupled amplifier; transformer-coupled transistor amplifier – operation, advantages and disadvantages- Direct-coupled amplifier and its limitation; differential amplifier and its working; Band-pass characteristics of cascaded amplifiers

3. Power Amplifiers [8 Hrs.]

Difference between voltage and power amplifiers; importance of impedance matching in power amplifiers; collector efficiency of power amplifiers; typical single-ended power amplifier and its working; graphical method of calculation of output power; heat dissipation curve and importance of heat sinks; Class-A, Class-B and Class-C power amplifier; collector efficiency in class A,B and C amplifiers (without derivations); working principles of push- pull amplifier circuit and its advantages over single-ended power amplifier, harmonic distortion in power amplifiers and determination of harmonic distortion; crossover distortion in Class B operation and its reduction; different driver stages for push pull amplifier circuit; working principle of complementary symmetry push-pull circuit and its advantages.

4. Feedback in Amplifiers [6 Hrs.]

Transistor Concept of feedback; positive and negative feedback; types of negative feedback; effect of feedback on input impedance, output impedance, distortion, bandwidth and gain; typical feedback circuits - RC coupled amplifier with and without emitter bypass capacitor; Emitter follower and its application, simple mathematical analysis for voltage gain and input and output impedance of above circuits.

5. Sinusoidal Oscillators [6 Hrs.]

Positive feedback and generation of oscillations; Tank circuit for generation of oscillations; RC phase shift oscillator, Hartley oscillator, Colpitts oscillator, ,Wein bridge oscillator and Crystal oscillator and their working principles (no mathematical derivation), Operational amplifier as Wein Bridge Oscillator and phase shift oscillator.

6. Regulated Power Supply [7Hrs.]

Concept of regulation; Performance parameters of regulated power supplies;Series and Shunt regulators using transistors and OP-Amp; Three terminal voltage regulator ICs 78XX family(positive, negative and variable applications; Concepts of foldback limiting, short circuit and overload protection, current boosting in 78XX series, Basic working principle of switched mode power supply (SMPS); Floating and grounded power supplies; Multiple output power supply; Brief idea of CVT, UPS and dual track in in power supply.

Text Books:

1. Integrated Electronics Analog Digital Circuits, Jacob Millman and D. Halkias, McGraw Hill.
2. Electronic Devices and Circuits Theory, Boylsted, Prentice Hall Publications.
3. Electronic Devices and Circuits, S.Salivahanan,N.Sureshkumar, McGraw Hill.
4. Electronic Devices and Circuits,Balbirkumar ,shailb.jain, PHI PrivatedLimted, Delhi.

Books:

1. Bhargava, Kulshreshtha& Gupta – “Basic Electronics & Linear Circuits” – Tata McGraw-Hill.
2. Melvino, A. P. – “Electronic Principles” – Tata McGraw-Hill.
3. Millman&Halkias, “Integrated Electronics”, McGraw Hill Publications, 1992.
4. Boylestad&Nashlesky; “Electronic Devices & Circuit Theory”, PHI, 10th Edition
5. Electronic Devices and Circuits; K.Lal Kishore B.S Publications
6. Electronic Devices and Circuits; G.S.N. Raju, I.K. International Publications, New Delhi, 2006.
7. Electronic Devices and Circuits; Godse, U.A Bakshi, Technical Publications
8. Electronic Devices and Circuits K.S. Srinivasan Anurdha Agencies

Course Outcomes:

After Completion of the course the student will be able to:

1. Understand transient phenomena R-C, R-L. and understand working of clipper and clamper.
2. Explain different type of coupling schemes for multistage transistor amplifier
3. Explain working of different types of power amplifier and their applications.
4. Explain of different type of feedback circuit and effect of feedback on circuit.
5. Explain the working principle of different types of oscillators and applications of various types of oscillators

SEMESTER	:	**4TH IC MANUFACTURING ENGG.**
Course Code	:	**23EC-PC254**
Course Title	:	Electronic Devices and Circuits-II Practical
Number of Credits	:	1 (L:0, T:0, P:2)
Course Category	:	PC

Course Objectives:

This coursewill enable the students to understand the applications of various electronic components such as Wave shaping circuit, Multistage Transistor Amplifier, Feedback amplifier, Power Amplifiers, Sinusoidal Oscillators and Regulated power supplies. Practical exercises of this course would enable the students to understand the concepts they study in theory.

List of Practical (Perform any Eight practical):

1. Plot the output waveforms of R-C differentiating circuits for square wave input for various time constants.
2. Plot the output waveforms of R-C integrating circuits for square wave input for various time constants.
3. Construct biased and unbiased series and shunt clipping circuits for positive and negative peak clipping of a sine wave using switching
4. Two stage R.C. Coupled Amplifier- to measure the overall gain of two stages at 1 KHZ and compare it with the gain of 1st stage. Observe the loading effect of second stage on the first stage.
5. For a class-A power amplifier, measure the optimum load, maximum undistorted power (by giving maximum allowable signal), collector efficiency and percentage distortion factor.
6. For a push-pull amplifier, measure the optimum load, maximum undistorted power (by giving maximum allowable signal), collector efficiency and percentage distortion factor.
7. For an Emitter follower circuit, measure the voltage gain and plot the frequency response curve.
8. Construct Hartley and Colpitts oscillator circuits and measure the frequency and amplitude of oscillations.
9. Construct a Wein bridge oscillator circuit and measure the resonant frequency and amplitude of oscillations.
10. To Study of NI ELVIS II
11. To study the MULTISIM

Open-source software and website address:

1. https://www.vlab.co.in
2. http://www.electroschematics.com
3. https://www.ni.com/en-in/support/model.ni-elvis-ii.html

SEMESTER	:	**4TH IC MANUFACTURING ENGG.**
CourseCode	:	**23IM-PC202**
CourseTitle	:	CleanRoomTechnologies
Numberof Credits	:	3 (L:3,T:0P:0)
CourseCategory	:	PC

OBJECTIVE:

1.To provides a framework for cleanroom management, protocol standards, specifications, and processes for Microelectronics/Semiconductors. Feature sizes in semiconductors are smaller than many molecules, and controlling the concentration of particles pushes these cleanrooms to limits of cleanroom technology.

2.To learn about A cleanroom which is having a controlled environment where products are packed, manufactured, and assembled. The room eliminates sub-micron airborne contamination generated from people, processes, facilities and equipment. The higher the level of cleanliness, the lower the likeliness of particles or microbes damaging or corrupting production processes by tainting sterile and non-sterile products.

Unit1 **[10 Hrs.]**

CLEAN ROOM TECHNOLOGY INTRODUCTION: Background information, need for clean room, Natureand origin of contamination and its classification, Controlling contamination, Air cleanliness classes and standards, Conventional flow clean rooms, Laminar flow clean room, Laminar flow work station, clean room environment

Unit2 **[8 Hrs.]**

ELEMENTS OF THE CLEAN ROOM: Air Filtration and Circulation, High efficiency particulate air filters,Ultra-low penetration air filter, Chemical contamination control, Air flow, clean room classification, room pressure.

Unit3

CLEAN ROOM ENVIRONMENT: **[10 Hrs.]**

Clean room monitoring, Pressure monitoring, Temperature distribution, Humidity measurement, Particulate monitoring, Selection of sample, Particulate matter counting techniques, Effect of static charge, Liquid borne contamination, Monitoring Questionaries.

Unit4 **[5Hrs.]**

CLEAN ROOM TECHNIQUES: Cleanroom Contamination Control Processes, pure water, precision cleaning method, detection and evolution methods for effective removal of contamination, Contamination monitoring system, clean room packaging.

Unit5 **[6 hrs.]**

CLEANROOM OPERATION: Factors affecting clean room operation, clean room certification, clean room personnel selection criteria, Personnel control procedure. Clean Equipment Design Rules and the SMIF Isolation Concept, Cleanroom Qualification and validation, User requirements, quality management, Cleanroom Quality management by DesignmethodologyandtoolsCleanroomMonitoringMeasurementtechniquesfortheonline monitoring of cleanrooms Regulations and audits Standards and legal regulations

References:

S.No.	TitleofBook	Author	Publication
1.	ParticleControlfor Semiconductor Manufacturing	Donovan,R.P	CRC press
2.	Cleanroomdesign	WWhyte	JOHNWILEY
3.	IntroductiontoContaminationControland Cleanroom Technology	MattsRamstorp	Wiley
4.	Clean Room and Work Station Requirements, Controlled Environment.	Anon	Federal Standard

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SEMESTER	:	**4TH IC MANUFACTURING ENGG.**
Course Code	:	**23EC-PC208**
Course Title	:	Linear Integrated Circuits
NumberofCredits	:	3 (L: 3,T: 0,P:0)
CourseCategory	:	PC

UNIT I: INTRODUCTION TO INTEGRATED CIRCUITS:

Integrated circuit - Classification of IC - Advantages of IC over discrete components –Types of IC Packages. Manufacturing process of monolithic IC

UNIT II: INTRODUCTION TO OPERATIONAL AMPLIFIERS

Operational amplifier IC 741, Schematic symbol for opamp – pin diagram of IC 741 –Block diagram of an opamp – Characteristics of an Ideal opamp - Simple Equivalent circuit of an opamp – virtual ground – opamp parameters: CMRR, Slew rate, bandwidth, PSRR, Basic linear circuits- Inverting Amplifier, Non-Inverting amplifier – Differential amplifier

UNIT III: OPAMP APPLICATIONS

Summing amplifier- Multiplier – Divider – Voltage follower – comparator – zero crossing detector - Integrator – Differentiator – Voltage to current converter – current to voltage converter – Instrumentation amplifier Waveform generators – square wave, triangular wave, sine wave, saw tooth wave generators

UNIT IV: PLL AND ITS APPLICATIONS

Basic principles of PLL and its block schematic. PLL Parameters: Lock range and capture range. Basic blocks of PLL: Phase detector, LPF, VCO.
Monolithic VCO 566 basic Pin diagram and Block diagram.
Monolithic PLL 565: Pin diagram - Functional Block diagram of PLL IC 565, Applications of PLL – frequency translation – frequency multiplication

UNIT V: D/A AND A/D CONVERTERS

Analog and Digital Data Conversions, D/A converter – specifications - weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode, R2R Ladder types switches for D/A converters, high speed sample-and-hold circuits, A/D Converters specifications - Flash type - Successive Approximation type - Single Slope type – Dual Slope type - A/D Converter using Voltage-to-Time Conversion

UNIT VI: SPECIAL FUNCTION ICs:

IC 555 Timer – pin diagram of IC 555 – Functional Block diagram of IC555 – Applications – A stable multi vibrator – mono stable multi vibrator – Schmitt trigger.
IC voltage regulators – linear fixed voltage regulator – Positive voltage regulator using IC 78xx, negative voltage regulator using IC 79xx General purpose regulator using LM 723.

References:

S. No.	Title of Book	Author	Publication
1.	Design with operational amplifiers and analog integrated circuits, 3rd Edition	Sergio Franco	Tata McGraw-Hill, 2007
2.	Linear Integrated Circuits,	D.Roy Choudhry, Shail Jain	New Age International Pvt. Ltd
3.	System design using Inte- grated Circuits	B.S.Sonde	New Age Pub, 2nd Edition, 2001
4.	Analysis and Design of Ana- log Integrated Circuits	Gray and Meyer	Wiley International, 2005.
5.	OP-AMP and Linear ICs	RamakantA.Gayakwad	Prentice Hall / Pearson Education, 4th Edition, 2001
6.	Operational Amplifier and Linear Integrated Circuits	K Lal Kishore	Pearson Education, 2006

Course Outcome:

1. Design of various circuits using ICs such LM358, 741, 555, 565, 78XX, 79XX and 723.
2. Use Op-amp in linear electronic circuits.
3. Use various configurations of Op-amp for different applications
4. Troubleshoot boards having these ICs
5. Design various types of circuits using 555 timer IC for numerous applications.

SEMESTER	:	**4TH IC MANUFACTURING ENGG.**
Course Code	:	**23EC-PC258**
Course Title	:	Linear Integrated CircuitsLaboratory
NumberofCredits	:	1 (L:0,T:0,P: 2)
CourseCategory	:	PC

Practical/Laboratory Content (Perform at least 10 experiments):

1. Design inverting and non-inverting amplifier using OPAMP IC on breadboard and test the circuit using function generator and CRO.

2. Design summer, multiplier and divider circuit using OPAMP IC on breadboard and test the circuit using function generator and CRO.

3. Design Square wave and triangular wave generator using OPAMP IC on breadboard and test the circuit using function generator and CRO.

4. Design integrator and differentiator circuit using OPAMP IC on breadboard and test the circuit using function generator and CRO.

5. Design sine wave oscillator circuit using OPAMP IC on breadboard and test the circuit using function generator and CRO.

6. Design frequency synthesizer using PLL IC on breadboard and test the circuit CRO.

7. Design the Monostablemultivibrator circuit using 555 timer IC on breadboard and test using CRO

8. Design the Astable and Bitable multivibrator circuit using 555 timer IC on breadboard and test using CRO

9. Design Pulse width modulator circuit using 555 timer IC on breadboard and test using CRO

10. Design fixed positive and negative voltage regulator using LM 78XX and LM 79XX IC on breadboard and test for various load current.

11. Design variable voltage regulator using LM 723 IC on breadboard and test for various load current.

12. Design weighted resistor type DAC on breadboard.

13. Design R-2R ladder resistor type DAC on breadboard

14. Perform Analog to Digital conversion and vice versa using ADC/DAC trainer kit having monolithic ADC and DAC IC.

SEMESTER	:	**4TH IC MANUFACTURING ENGG.**
Course Code	:	**23AU-250**
Course Title	:	Essence of Indian Knowledge and Tradition
NumberofCredits	:	1 (L:1,T:0,P: 0)
CourseCategory	:	Mandatory course

Course Objectives

To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system

UNIT-I: Introduction to traditional knowledge

Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

Unit-II: Protection of traditional knowledge

The need for protecting traditional knowledge Significance of TK Protection, the value of TKin the global economy, Role of Government to harness TK.

Unit-III: Legal framework and Traditional Knowledge

A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmers Rights Act, 2001 (PPVFR Act)

B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indications act 2003.

Unit-IV: Traditional knowledge and intellectual property

Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

Unit-V: Traditional knowledge in different sectors

Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Course Outcomes

1. Understand the concept of Traditional knowledge and its importance.
2. Know the need and importance of protecting traditional knowledge.
3. Know the various enactments related to the protection of traditional knowledge.
4. Understand the concepts of Intellectual property to protect the traditional knowledge.
5. Understand the traditional knowledge in different sectors.

Text Books:

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, PratibhaPrakashan 2012.

References:

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
2. "Knowledge Traditions and Practices of India" Kapil Kapoor, Michel Danino

E-resources:

1. https://www.youtube.com/watch?v=LZP1StpYEPM
2. http://nptel.ac.in/courses/121106003

SEMESTER	:	**4TH IC MANUFACTURING ENGG.**
COURSE CODE	:	**23IM-PC256**
COURSE TITLE	:	INTRODUCTION TO VHDL, Laboratory
NUMBER OF CREDITS	:	1 (L:0 ,T:0,P:2)
COURSE CATEGORY	:	PC

CourseObjectives:

Very High-Speed Integrated Circuit Hardware Description Language (VHDL) is a description language used to describe hardware. It is utilized in electronic design automation to express mixed-signal and digital systems, such as ICs (integrated circuits) and FPGA (field-programmable gate arrays). VHDL allows designers to describe the behaviour and structure of digital circuits, making it a powerful tool for designing complex and sophisticated hardware systems.

CourseContent:

List of Practical:

1. Install a VHDL Simulator and editor for free.

2. VHDL Basics: HDL, Behavioural Modelling, Structural Modelling, RTL Synthesis, Process, Typical Synthesis and Simulation Flow, Basic Rules of VHDL.

3. VHDL Design:
   a) Entity Declaration, Entity: port declaration, Entity: Generic declaration, Architecture, Configuration,
   b) Write a VHDL program putting together all mentioned design units.
   c) Packages
   d) Package Example
   e) Libraries: Work, IEEE
   f) Example
   g) Architectural Modelling fundamentals: Constant, Signals, Signal Assignments, Operators,
   h) Processes, Variables, Sequential Statement, user defined types.

3. **Experiments:**
   1. 1: Write VHDL code for realize all logic gates.
   2. 2: Write a VHDL program for the following combinational designs and realize.
      a. Half Adder circuit
      b. Half Subtractor
   3. 4. Write a VHDL code to describe the functions of full adder using different modeling styles

References:

1. https://support.xilinx.com/s/article/76459
2. Practical Digital Design: Reidenbach, Bruce 2022; An Introduction to VHDL West Lafayette, IN: Purdue University Press
3. A VHDL Primer: JayaramBhasker; P T R Prentice Hall Englewood Cliffs, New Jersey

Course Outcomes:

1. This course will help to understand the fundamental principles of the HDL language. Students able to install the VHDL simulator and code editor and will write and run VHDL program.
2. Student will learn the core features of the VHDL language and also will learn how to operate the most important tool namely the VHDL simulator.

SEMESTER	:	**4TH IC MANUFACTURING ENGG.**
COURSE CODE	:	**23IM-PR-260**
COURSE TITLE	:	MINOR PROJECT
NUMBER OF CREDITS	:	2 (L:0, T:0,P:4)
COURSE CATEGORY	:	PROJECT

Course objectives:

The objective of the minor project is to provide an opportunity for students to undertake short research training outside the classroom to solve real-world issues in the form of project.

Course content:

Minor project work aims at exposing the students to the various industries dealing with electronics components, devices, circuitry and microprocessors. They are expected to learn about the construction, manufacturing and working environment of different Electronic Engineering field.

It is expected from them to get acquitted with industrial environment at the shop floor and acquire desired attitudes.

For this purpose, student during middle of course is required to be sent for a designated period in different industries were production/servicing/installation of microprocessor-based systems is going on.

Depending on the interest of students they are sent to:

1. Communication stations.

2. Various microprocessor-oriented industries.

3. Telephone/Telegraph stations.

4. Microprocessor based control system industries.

5. Medical electronics industries.

6. Repair and maintenance work shops.

As a minor project activity each student is supposed to study the operations at sight and prepare a detail project report of the observations/processes/activities by him/her. These students should be guided by respective subject teachers. Each teacher may guide a group of 4 to 5 students.

The teachers along with field supervisors/engineers will conduct performance assessment of students.

Criteria for assessment will be as follows:

Criteria Weightage

a) Attendance and Punctuality. 10%

b) Initiative in performing tasks/clearing new things 15%

c) Relation with people 15%

d) Report writing & seminar 25%

e) Projects working Model 30%