B.Sc. Electronics

Syllabus

AFFILIATED COLLEGES

Program Code: 22M

2023 – 2024 Onwards

BHARATHIAR UNIVERSITY

(A State University, Accredited with "A++" Grade by NAAC,
Ranked 21st among Indian Universities by MHRD-NIRF)

Coimbatore - 641 046, Tamil Nadu, India

Program Educational Objectives (PEOs)	
The **B. Sc. Electronics** program describe accomplishments that graduates are expected to attain within five to seven years after graduation	
PEO1	Provide graduates with a strong foundation in Electronics domain and to enable them to devise and deliver efficient solutions to challenging problems in Electronics, Communications and allieddisciplines.
PEO2	Impart analytic and thinking skills to develop initiatives and innovative ideas for R&D, Industry and societalrequirements.
PEO3	Provide sound theoretical and practical knowledge of Electronics, managerial and entrepreneurial skills to enable students to contribute to the wellbeing of society with a global outlook.
PEO4	Inculcate qualities of teamwork as well as social, interpersonal and leadership skills and an ability to adapt to evolving professional environments in the domains of engineering and technology.
PEO5	Motivate graduates to become good human beings and responsible citizens for the overall welfare of the society.
PEO6	Develop attitude in lifelong learning, applying and adapting new ideas and technologies as their field evolves.
PEO7	To prepare graduates who will have knowledge, ability and courage to pursue higher studies and research.

Program Specific Outcomes (PSOs)	
After the successful completion of B.Sc. Electronics program, the students are expected to	
PSO1	Demonstrate proficiency in use of software and hardware required to practice electronics and communicationprofession.
PSO2	Graduates will be able to apply fundamentals of electronics in various domains of analog and digital systems
PSO3	Apprehend and analyse specific engineering problems of communication, electronic circuits, computer programming, embedded systems, VLSI design and semiconductor technology by applying the knowledge of basic sciences, engineering mathematics and engineering fundamentals.
PSO4	Ability to communicate effectively with excellent interpersonal skills and demonstrate the practice of professional ethics for societal benefit
PSO5	Graduates will be able to apply fundamentals of electronics in various domains of analog and digital systems.
PSO6	Use embedded system concepts for developing IoT applications

Program Outcomes (POs)	
On successful completion of the B. Sc. Electronics program	
PO1	**Engineering knowledge**: Apply the knowledge of mathematics, Science, Engineering fundamentals and an engineering specialization to the solution of complex engineering problems
PO2	**Problem analysis:** Identify, formulate, review research literature and analyse complex engineering problems reaching substantiated conclusion using principles of mathematics and Engineering sciences
PO3	**Design/Development of solutions:** Design solutions for complex Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal and environmental conditions.
PO4	**Conduct investigation of complex problems**: Use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and Sustainability:** Understand the impact of the professional engineering solution in societal and environmental contexts, and demonstrate the knowledge of and need fir sustainabledevelopment
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, an as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Life-Long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

BHARATHIAR UNIVERSITY: COIMBATORE 641 046

B. Sc. Electronics Curriculum (University Affiliated Colleges)

(For the students admitted during the academic year 2023 – 24 onwards)

Course Code	Title of the Course	Credits	Hours		Maximum Marks		
			Theory	Practical	CIA	ESE	TOTAL
	FIRST SEMESTER						
11T	Language –I	4	4	-	25	75	100
12E	English – I	4	4	-	25	75	100
13A	**Core Paper I :** Basic Electronics	4	6	-	25	75	100
--	**Core Practical I:** Basic Electronics Lab	-	-	4	-	-	-
--	**Core Practical II** : Semiconductor Devices Lab	-	-	4	-	-	-
1AA	**AlliedI** Mathematics–I	4	6	-	25	75	100
1FA	Environmental Studies *	2	2	-	-	50	50
	Total	18	T 22	L 08	100	350	450
	SECOND SEMESTER						
21T	Language – II	4	4	-	25	75	100
22E	English – II	2	4	-	25	25	50 @
23A	**Core Paper II :** Semiconductor Devices	4	6	-	25	75	100
23P	**Core Practical I:** Basic Electronics Lab	4	-	3	25	75	100
23Q	**Core Practical II:** Semiconductor Devices Lab	4	-	3	25	75	100
2AA	**Allied : II** Mathematics–II	4	6	-	25	75	100
2FB	Value Education-Human Rights *	2	2	-	-	50	50
2NM	**NAAN MUTHALVAN** Generic Name: Language Proficiency for Employability Course Name: Effective English	2	2	-	25	25	50 #
Swatch Bharat- Summer internship ***							
	Total	26	T 24	L 06	175	475	650

THIRD SEMESTER							
31T	Language – III	4	4	-	25	75	100
32E	English – III	4	4	-	25	75	100
33A	**Core Paper III :** Digital Principles and Applications	4	4	-	25	75	100
33B	**Core Paper IV:**Electronic Circuits	4	4	-	25	75	100
3AD	**Allied : III** Object Oriented Programming using C++	3	3	-	20	55	75
3ZA	**Skill Based Subject : I** BioMedical Instrumentation	3	3	-	20	55	75
--	**Core Practical : III** Digital Electronics and Linear IC's Lab - III	-	-	3	-	-	-
--	**Core Practical : IV** Electronics Circuits and Communication Lab - IV	-	-	3	-	-	-
3FB/ 3FC	Tamil **/ Advanced Tamil*(OR) Non-major elective - I (Yoga for Human excellence * Womens Rights*)	2	2	-	-	50	50
	Total	24	T 24	Lab- 06	140	460	600
FOURTH SEMESTER							
41T	Language – IV	4	4	-	25	75	100
42E	English – IV	4	4	-	25	75	100
43A	**Core Paper V:** IC's and Instrumentation	4	5	-	25	75	100
4AD	**Allied : IV** Python Programming	4	5		25	75	100

4NM	**Skill Based Subject :II** **NAAN MUDHALVAN** **CourseGenericName :** Digital skills for Employability **Course Name:** Office Fundamentals	2	2	-	25	*25*	50#
43P	**Core Practical: III** Digital Electronics and Linear IC's Lab	3	-	3	30	45	75
43Q	**Core Practical: IV** Electronics Circuits and Communication Lab -IV	3	-	3	30	45	75
43R	**ALLIED Practical: V** Computer Programming Lab	2	-	2	20	30	50
4FB/ 4FE	Tamil**/Advanced Tamil * (OR)Non-major elective-II(General Awareness *)	2	2	-	-	50	50
Total		28	T 22	Lab 08	205	495	700
FIFTH SEMESTER							
53A	**Core Paper VI**: 8051 Microcontroller and its Applications	4	5	-	25	75	100
53B	**Core Paper VII:** Internet of Things	4	5	-	25	75	100
5EA/ 5EB/ 5EC/ 5ED **5ED**	**Elective I**	3	4		20	55	75
5EE/ 5EF/ 5EG/ 5EH	**Elective II**	3	4		20	55	75
--	**Core Practical VI:** Internet of Things System Design Lab	-	-	3	-	-	-

--	**Core Practical VII:** Industrial and Power Electronics Lab	-	-	3	-	-	-
--	**Core Practical VIII** : Microcontroller Lab	-	-	3	-	-	-
5ZC	**Skill based subject – III** Visual Programming	3	3		20	55	75
Total		17	Theory 21	Lab 09	110	315	425
SIXTH SEMESTER							
63A	**Core Paper VIII:** Design with PIC Microcontroller	4	6		25	75	100
6EI/ 6EJ/ 6EK/ 6EL	**Elective III**	3	6		20	55	75
63P	**Core PracticalVI**: Internet of Things System Design Lab	4	-	3	25	75	100
63Q	**Core Practical VII:** Industrial and Power Electronics Lab	4	-	3	25	75	100
63R	**Core PracticalVIII**: 8051 MicrocontrollerLab	4	-	3	25	75	100
67V	**PROJECT**	2	2	-		50	50*
6ZP	**Skill based Subject – IV** Practical Visual Programming	2	-	3	20	30	50
67A	Extension Activities **	2	2	-	50	-	50
6NM	**NAAN MUDHALVAN** SALES FORCE	2	2	-	25	25	50#
	Total	27	Theory 18	Lab 12	215	460	675
	GrandTotal	**140**					**3500**

***** No Continuous Internal Assessment (CIA) . Only University Examinations

****** No University Examinations. Only Continuous Internal Assessment (CIA).
@ University semester examination will be conducted for 50 marks(As per the existing pattern of examination) and the marks will be converted to 25 marks
# Naan Mudhalvan Course :CEE will be assessed byIndustry for 25 marks and CIA will be done by the course teacher.
For Project 50 *****split up into (30***** marks for report and viva-voce 20***** marks)

 @ *English II- University semester examination will be conducted for 50 marks (As per existing pattern of Examination) and it will be converted for 25 marks.*

***** Swachh Bharat Summer internship- extra 2 credits would be given. It is mandatory**

List of Elective papers (Colleges can choose any one of the paper as electives)		
Elective – I	**A**	PCB Design and Fabrication
	B	Advanced Communication Systems
	C	Artificial Intelligence
	D	Advanced Computer Architecture
Elective – II	**E**	Arduino with Sensors
	F	Microwave and Fiber Optic Communication
	G	Automotive Electronics
	H	Satellite Communications
Elective – III	**I**	Industrial and Power Electronics
	J	Robotics
	K	Programmable Logic Controllers
	L	VLSI Design

Government of Tamil Nadu " NAAN MUDHALVAN SCHEME" www. naanmudhalvan.tn.gov.in List of Course for each semester	
Semester	**Name of The Courses**
II	**Effective English**
IV	**Digital Skills For Employability**
VI	**Emerging Technology For Employability III**

NAAN MUDHALVAN SCHEME SYLLABUS

http://kb.naanmudhalvan.in/Bharathiar_University_(BU)

First Semester

Course code	13A	BASIC ELECTRONICS	L	T	P	C
Core /Elective / Supportive:		Core Paper I	5			4
Pre-requisite		Higher secondary physics	Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:

- ❖ To become familiar with fundamentals of electronic components
- ❖ To learn to use common electronic components
- ❖ To design electronic circuits to perform realistic tasks

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the basic electronic components	K2
2	Understand the basic electronic components	K2
3	Differentiate and demonstrate the voltage and current source.	K3
4	Apply the electronic components in network theorems.	K3
5	Put into practice and use the electronic components	K4

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit:1	RESISTORS & INDUCTORS	15hours

Types of Resistors: Fixed, Variable - Brief mention of their Construction and Characteristics - Color Coding of Resistors - Connecting Resistors in Series and Parallel
Types of Inductors: Fixed, Variable- Self and Mutual Inductance-Faraday's Law and Lenz'sLaw Of Electromagnetic Induction-Energy Stored In An Inductor-Inductance In Series And Parallel- Testing of Resistance and Inductance using Multimeter.

Unit:2	CAPACITORS	15hours

Principles of Capacitance-Parallel PlateCapacitor-Permittivity-Definition of Dielectric Constant - Dielectric Strength-Energy Stored in a Capacitor-Types of Capacitors: Air, Paper, Mica, Teflon, Ceramic, Plastic and Electrolytic: Construction and Application- Connecting Capacitors in Series and Parallel - Factors Governing the Value of Capacitors- Testing of Capacitors Using Millimeters.

Unit:3	ELECTRICAL ELEMENTS AND CIRCUITS	15hours

Potential Difference- Electric Current-Electromotive Force - Ohms Law- Kirchoff'sLaw - Kirchoff'sCurrent Law-Analysis of Resistance in Series Circuits, Parallel Circuits and Series Parallel Circuits-Concept of Voltage Source and Current Source-Voltage Source in Series and Current Source in Parallel-Simple Problems in DC Circuits.

Unit:4	NETWORK THEOREMS	15 hours

Superposition Theorem - Thevenin Theorem-Thevenizin Circuit with Two Voltage Sources - Bridge Circuit - Norton's Theorem - Thevenin to Norton Conversion - Conversion of Voltage and Current Sources - Millman's Theorem - Star and Delta Conversion-Maximum Power Transfer Theorem - Simple Problems in DC Circuits.

Unit:5	AC CIRCUITS	15hours

IntroductionToSinusoidalWave-RMSValue-AverageValue-ACCircuitswithResistance-Circuits with XL Alone – Circuits with XC Alone - Series Reactance And Resistance - Parallel Reactance and Resistance - Series Parallel Reactance and Resistance – Real Power -Series

Resonant Circuit – Parallel Resonant Circuit - Q Factor - Passive Filters: Low Pass Filters, High Pass Filters, Band Pass Filters, Band Rejection Filters		
	Total Lecture hours	**75 hours**
Text Book(s)		
1	S.Salivahanan, N.Suresh Kumar, A.Vallavaraj **"ELECTRONIC DEVICES AND CIRCUITS"**-	
2	B.V.NarayanaRao—**PRINCIPLES OFELECTRONICS**‖, WileyEasternLimited, 1992	
Reference Books		
1	B.L.Theraja, **"BASIC ELECTRONICS-SOLID STATE DEVICES",**S.Chand Company	
2	BernardGrob **"BASIC ELECTRONICS"**-Tata McGraw-Hill Publishing Company Limited, 9thEdition.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://nptel.ac.in/courses/108/104/108104139/	
2	https://nptel.ac.in/courses/108/101/108101091/	
3	https://www.youtube.com/playlist?list=PLFF553CED56CDE25D	
4	https://www.youtube.com/watch?v=w8Dq8blTmSA	
Course Designed By: K.Manikantan, Assistant Professor, Government Arts College, Ooty.& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.		

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	L	L	L	L	M	S	M
CO2	L	L	L	L	L	M	M	S	M	S
CO3	M	M	S	L	M	S	L	L	M	M
CO4	M	L	L	L	L	S	L	L	M	S
CO5	L	M	S	S	M	L	L	L	M	M

*S-Strong; M-Medium; L-Low

Course code	23P	BASIC ELECTRONICS LAB	L	T	P	C
Core /Elective / Supportive:		Core Practical I			3	4
Pre-requisite		Basic Electronics theory	Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:

- ❖ To understand the fundamental principles ofcircuit theory
- ❖ To make use of circuit laws and theorems and measuring thecircuit parameters.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Apply the concept of basic circuit and theorems	K3
2	Simplify the circuits using series and parallel equivalents and using Thevenin's and Norton's equivalent circuits.	K3
3	Design resonance circuits.	K4
4	Use the oscilloscope for the display and measurements of signals.	K2
5	Analyze Various Theorems with different resistance values	K4

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

	BASIC ELECTRONICS LAB	90 Hours

(Any 16 Experiments)

1. Study of Multimeter – Checking of Components
2. Measurement of Amplitude, Frequency & Phase Difference using CRO
3. Verification of Ohm's Law
4. Voltage sources in Series, Parallel and Series–Parallel
5. Resistance in Series, Parallel and Series–Parallel
6. Voltage and Current Dividers
7. Verification of Kirchhoff's Law
8. Wheatstone Bridge
9. Verification of Norton's Theorem
10. Verification of Thevenin's Theorem
11. Verification of Millman's Theorem
12. Verification of Superposition Theorem
13. LCR Bridge
14. Series Resonance Circuit
15. Parallel Resonance Circuit
16. Transient Response of RC Circuit
17. Transient Response of RL Circuit
18. Capacitors & Inductors in Series &Parallel
19. Frequency Response of R, L&C
20. Low Pass Filter & High Pass Filter
21. Band pass and Band Rejection Filter
22. Verification of Maximum Power Transfer Theorem
23. Measurement of resistance and capacitance in series and parallel

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/122/106/122106025/
2	https://nptel.ac.in/courses/122/106/122106026/

Course Designed By: K.Manikantan, Assistant Professor, Government Arts College, Ooty.&
Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	M	L	L	L	L	M	S	M
CO3	L	M	M	M	L	M	L	S	M	L
CO3	M	L	S	L	L	S	L	L	L	M
CO4	M	M	L	L	L	S	M	L	M	L
CO5	L	M	S	M	M	M	L	L	M	M

*S-Strong; M-Medium; L-Low

Course code	23Q	SEMICONDUCTOR DEVICES LAB	L	T	P	C
Core /Elective / Supportive:		Core Practical II			3	4
Pre-requisite:		Higher secondary physics	Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:

- ❖ To understand and experiment the basic parameters ofelectronicdevices.
- ❖ To construct few applications usingsemiconductordevices.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Experiment the fundamental operations of the main semiconductor electronic devices.	K3
2	Design and construct electronic circuits using semiconductor devices.	K3
3	Understand the transistor characteristics	K2
4	Understand the characteristics of LDR and solar cell	K2
5	Apply Various transistor characteristics in applications.	K3

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

UNIT I	SEMICONDUCTOR DEVICES LAB	90 Hours

(Any 16 Experiments)

1. Band Gap Energy of Silicon /Germanium Diode
2. V-I Characteristics ofJunction Diode
3. V-I Characteristics ofZener Diode
4. Transistor Characteristics ofCE Configuration
5. Transistor Characteristics ofCB Configuration
6. Transistor Characteristics ofCC Configuration
7. Clipping Circuits
8. Clamping Circuits
9. Measurement of Stability Factor ofFixed Bias
10. Measurement of Stability Factor ofSelf Bias
11. V-I Characteristicsof JFET
12. V-I Characteristicsof UJT
13. UJTas Oscillator
14. Characteristics ofSolar Cell
15. Study of IR(Tx&Rx)
16. Study of LED and 7Segment display
17. Temperature Co-efficient of Junction Diode
18. Zener as a Voltage regulator
19. ON / OFF control of relay using Opto–Couplers
20. Characteristicsof SCR
21. TRIAC Characteristics

Course Designed By: K.Manikantan, Assistant Professor, Government Arts College, Ooty.&
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Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	M	L	L	L	L	M	S	M
CO3	L	M	M	M	L	M	L	S	M	L
CO3	M	L	S	L	L	S	L	L	L	M
CO4	M	M	L	L	L	S	M	L	M	L
CO5	L	M	S	M	M	M	L	L	M	M

*S-Strong; M-Medium; L-Low

Second Semester

Course code	23A	SEMICONDUCTOR DEVICES	L	T	P	C
Core /Elective / Supportive:		Core Paper II:	5			4
Pre-requisite		Higher secondary physics	Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:

- ❖ To enable the students to understand and gain the knowledge onsemiconductor devices.
- ❖ To acquaint the students with construction, theory and characteristics ofthe electronic

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Explain the structure of the basic electronic devices	K1
2	Understand the characteristics and operations of special diodes	K2
3	Understand the characteristics and operations of transistors	K2
4	Understand the characteristics and operations of FET and UJT	K2
5	Use the special diodes for various applications	K3

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyse; **K5** - Evaluate; **K6** - Create

Unit:1	PN JUNCTION DIODE	15hours

Energy Band Structure and Conduction in Insulator - Semiconductor, Conductor - Intrinsic and Extrinsic Semiconductor – Doping – P Type – N Type Semiconductor - Formation of PN Junction Diode - Forward Bias - Reverse Bias Condition – Characteristics - Clipping and Clamping.

Unit:2	SPECIAL DIODES	15hours

Zener Diode - VI Characteristics – Breakdown - Backward Diode – Varactor Diode - Step RecoveryDiode-PointContactDiode-ShcottkeyDiode-TunnelDiode-GunnDiode-ImpattDiode - PIN Diode - PNPN Diode

Unit:3	BJT	15hours

Introduction To Bipolar Junction Transistor – Construction - Transistor Biasing - Operation of NPN and PNP Transistor - CB, CE &CC Configuration - Bias Stability - Load Line - Method of Biasing: Fixed Bias - Collector to Base Bias - Voltage Divider Bias – Bias Compensation -Thermal Runaway - HeatSink

Unit:4	FET AND UJT	15hours

Introduction to FET - Construction and Operation of N-Channel JFET - Drain Characteristics-Comparison of JFET &BJT - Introduction to MOSFET - Enhancement MOSFET – Depletion MOSFET - FET as a Voltage Variable Resistor(VVR) - Introduction to UJT – Characteristics – UJT as Relaxation Oscillator - Introduction to PUT – SCR – TRIAC-DIAC

Unit:5	OPTOELECTROIC DEVICES	15hours

Principles, Operation And Characteristics Of Opto Electronic Devices: LDR – Photo Diode - Photo Transistor – Photo Voltaic Cell – Solar Cell – Photo Emissive Sensors – Vacuum Photo Tube– Gap Filled Photo Tube – Photo Multiplexer – LED – IR Emitter – LCD –Optocouplers

	Total Lecture hours	75 hours

Text Book(s)	
1	S. Salivahanan, N. Suresh Kumar, A. Vallavaraj, **"ELECTRONICS DEVICES AND CIRCUITS",** Tata McGraw Hill Publishing Company Limited, New Delhi, 8th edition.
2	B. L. Theraja, **"BASIC ELECTRONICS – SOLID STATE DEVICES"**, S.Chand&Company Ltd. 2000
Reference Books	
1	S.L. Kakani,K. C. BhanDai**—ATEXTBOOKOFELECTRONICS**
2	BernardGrob**"BASIC ELECTRONICS"**-Tata McGraw-Hill Publishing Company Limited,
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/108/108/108108122/
2	https://nptel.ac.in/courses/108/108/108108112/
3	https://nptel.ac.in/courses/115/102/115102103/
Course Designed By: K.Manikantan, Assistant Professor, Government Arts College, Ooty.& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.	

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	L	M	L	M	M	M	S	M
CO2	L	L	L	L	L	M	M	M	L	L
CO3	L	M	L	L	S	M	L	L	M	M
CO4	L	M	M	L	L	S	M	L	M	S
CO5	M	L	L	M	L	M	M	L	M	M

*S-Strong; M-Medium; L-Low

Third Semester

Course code	33A	DIGITAL PRINCIPLES AND APPLICATIONS	L	T	P	C
Core /Elective / Supportive:		Core Paper III	3			4
Pre-requisite:		Basic Physics	Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:

- To acquire the basic knowledge of Number system, Digital logic circuits and itsapplication
- To outline the formal procedures for the analysis and design ofcombinational and sequentialcircuits
- To learn the concepts of A/D, D/A conversions and theirtypes

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the basics of Number system and gates	K2
2	Realize the operation of various logic gates and analyzing the outputs	K1
3	Analyze and design the combinational logic circuits	K4
4	Analyze and design the Sequential logic circuits	K4
5	Design various synchronous and asynchronous sequential circuits	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit:1	NUMBER SYSTEMANDCODES	12hours

Decimal, Binary, Octal and Hexa Decimal Numbers – Conversion – Floating Point Representation – Binary Addition, Subtraction and Multiplication – 1's and 2's Compliments - Binary Coded Decimal (BCD) – Weighted Codes and Non-weighted Codes – Excess Three – Grey Code – Error Detection Codes – Hamming Codes – ASCII Codes .

Unit:2	BOOLEAN ALGEBRA AND LOGIC GATES	12hours

Boolean logic operations – Boolean functions – Truth Tables – Basic Laws – DeMorgans Theorem – Sum of Products and Products of Sums – Karnaugh map – Logic Gates – OR, AND, NOT, NAND, NOR, EX-OR and EX-NOR Gates – Code Conversion – VHDL Coding for Logic Gates

Unit:3	COMBINATIONALLOGICCIRCUITS	12hours

Half Adder – Full Adder – Half Sub tractor – Full Sub tractor – Parallel Binary Adder – 4 bit Binary Adder / Subtractor – BCD adder – Multiplexer – Demultiplexer – Decoders – Encoders – Parity Generators / Checkers – Magnitude Comparators .

Unit:4	SEQUENTIALLOGICCIRCUITS	12hours

Flip Flops – RS, Clocked RS, JK, JK Master Slave, D and T Flip Flops – Shift Registers and its Types – Ring Counters – Ripple Counters – Synchronous Counter – Up Down counter – Mod-3, Mod-5 Counters – Decade Counter – Applications

Unit:5	**D/A AND A/D CONVERTERS**	**12 hours**
Digital to Analog Converters: Resistive Divider Type - Ladder Type – Accuracy and Resolution - Analog to Digital Converters: Counter – Ramp Type – simultaneous Conversion – Dual Slope Type – Accuracy and Resolution.		
	Total Lecture hours	**60 hours**
Text Book(s)		
1	Malvino & Leech, **—Digital Principles and Applications”**, Tata McGrawHill Edition V, 2002.	
2	M.Morris Mano ,‖**Digital Logic and Computer Design”**, PHI 2005.	
Reference Books		
1	Floyd and Jain, **Digital Fundamentals,** Prentice Hall2010	
2	M. Morris Mano Charles Kime, **Digital Logic and Computer Design Fundamentals**, Pearson Education Limited, 2014	
Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]		
1	https://soaneemrana.org/onewebmedia/DIGITAL%20PRINCIPLES%20AND%20APPLICATION%20BY%20LEACH%20&%20MALVINO.pdfE book, Malvino & Leech, **—DIGITALPRINCIPLESANDAPPLICATIONS**, TataMcGrawHillEditionXI,2011	
2	https://nptel.ac.in/courses/117/106/117106086/Introduction to digital circuits	
Course Designed By: Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur & S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	S	M	M	M	S	L	L	S
CO2	S	S	S	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	S	S	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	S	L	M	M	S	S

*S-Strong; M-Medium; L-Low

Course Code	33B	ELECTRONIC CIRCUITS	L	T	P	C
Core /Elective / Supportive:	Core paper IV		3			4
Pre-Requisite:	Basic Physics		Syllabus Version		2023-24	

Course Objectives:

The Main Objectives of this course are to:

- To enable the students to understand and gain the knowledge on power supplies, amplifiersandoscillators.
- To acquaint the students with construction, theory andcharacteristicsof the electronic amplifier circuits and types ofmultivibrators.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	understand the concepts of Rectifiers and regulators	K2
2	Study about Small signal amplifiers	K1
3	analyse the functions of power amplifiers	K4
4	analyse the performance of negative as well as positive feedback circuits	K4
5	design oscillators and Multivibrators	K6

K1:Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create

Unit:1	RECTIFIERS AND REGULATORS	12 hours

Half wave, Full waves and bridge Rectifiers – Calculation of RMS Value – Average Value – Ripple Factor – Efficiency – Transformer Utility Factor – Peak Inverse Voltage – Inductor Filter – Capacitor Filter – LC Filter – Pi Filter - Voltage Doubler – Voltage Regulator – Zener Diode Shunt Regulator – Transistor Shunt and Series Regulator– Construction of DC Power Supply.

Unit:2	SMALL SIGNAL AMPLIFIERS	12 hours

CE, CB, CC amplifiers – Calculation of I/P Resistance, O/P Resistance – Current Gain - Voltage Gain – Power Gain – Single Stage Transistor Amplifier – DC and AC load line – RC Coupled Amplifier – Gain Frequency Response – Bandwidth – Transformer Coupled Amplifier –FET Amplifier.

Unit:3	POWER AMPLIFIERS	12 hours

Operation and Graphical Representation of Class A, Class B, Class C and Class AB Amplifiers – Maximum Collector Efficiency of Class A Power Amplifier – Collector Dissipation Curve – Harmonic Distortion – Class B Push Pull Amplifier – Complementary Symmetry Push Pull Amplifier.

Unit:4	FEEDBACK AMPLIFIERS	12 hours

Basic concepts of feedback – Positive Feedback – Negative Feedback – Effects of Negative Feedback on Gain, Bandwidth and Distortion – Noise – Voltage Series Feedback - Voltage Shunt Feedback – Current Series Feedback – Current Shunt Feedback.

Unit:5	**OSCILLATORS AND MULTIVIBRATORS**	**12 hours**
Barkhausen Criterion – Hartley Oscillator – Colpitts Oscillator – Phase Shift Oscillator – Wein Bridge Oscillators –Peizo Electric Crystal and its Effects – Crystal Oscillator - Astable Multivibrator – Monostable multivibrator – Schmitt Trigger		
	Total Lecture hours	**60 hours**

Text Book(s)	
1	S.K.Sahdev,‖**ElectronicPrinciples"**,DhanpatRai&Co(P)Ltd,2ndEdition, 1998
2	B.L.Theraja, **"Basic Electronics"**, Chand Company Ltd, 2000.
Reference Books	
1	V.K.Metha, Rohit Metha, **—Principles ofElectronics"** S Chand, 2006 .
2	B.Sasikala, C.Poornachandra,‖**Electronic Devices and Circuits"**, Scitech 2003.
Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]	
1	http://www.ee.iitm.ac.in/~ani/2012/ec5135/lectures.htmlLecture Notes
2	https://nptel.ac.in/courses/108/102/108102097/#Introduction to Electronic circuits NPTEL.
3	https://nptel.ac.in/courses/108/102/108102095/Analog Electronic circuits NPTEL.
Course Designed By: Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur & Mr. S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.	

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	M	M	M	M	S	M	M	S
CO2	S	M	M	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	L	M	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	M	L	M	M	S	M

*S-Strong; M-Medium; L-Low

Course Code	3AD	OBJECT ORIENTED PROGRAMMING USING C++	L	T	P	C
Core /Elective / Supportive:	ALLIED PAPER III		3			3
Pre-Requisite:	Computer Fundamentals		Syllabus Version		2023-24	

Course Objectives:

The Main Objectives of this course are to;

- ❖ This subject deals with the programming concepts of Object Oriented Programming using C++.
- ❖ To develop a skills on using MS word, MS Excel, Power Point andMSAccess

Expected Course Outcomes:

On successful completion of this subject the students should have :Writing programming ability on OOPS concepts like Encapsulation, Data abstraction, Inheritance, Polymorphism and Exception handling etc.,

1	Recognize and understand Basic of Computer	K2
2	Use and Practice of Word Processing	K3
3	Use and Practice of MS Excel	K3
4	Knowledge to Make Small Presentation	K6
5	Use and Practice of MS Access	K3

K1:Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create

Unit:1		**9 hours**

Introduction to C++ - Key Concepts of OOP – Advantages – OO Languages – I/O in C++ - C++ Declarations - Control Structures – Decision Making Statements – If…Else – Jump – GOTO – Break – Continue – Switch Case Statements – Loops in C++ - Functions in C++, In line Functions – Function Overloading.

Unit:2		**9 hours**

Class and Objects: Declaring objects – Defining member functions – Static member variables and functions – Array of objects – Friend functions – Overloading member functions Bit fields and Class – Characteristics – Calling constructor and Destructors – Constructor and Destructor with static member.

Unit:3		**9 hours**

Operator Overloading: Overloading unary, Binary operators – Overloading friend functions – Type conversion - Inheritance: Types of inheritance: Single, Multilevel, Multiple, Hierarchical, Hybrid and Multi path inheritance – Virtual Base classes – Abstract Classes

Unit:4		**9 hours**

Pointers: Declaration – Pointer to class, object – THIS pointer – Pointer to derived classes and base classes – Arrays – Characteristics – Arrays of classes – Memory models – New and delete operators – Dynamic objects – Binding, Polymorphisms and Virtual functions.

Unit:5		**9 hours**
Files: File stream classes – File Modes – Sequential read/write operations – Binary and ASCII files – Random access operation – Templates – Exception handling – Strings – String attributes – Miscellaneous functions		
	Total Lecture hours	**45 hours**
Text Book(s)		
1	Ashok N Kamthane: Object Oriented Programming with ANSI and Turbo C++, Pearson Education Publ., 2003.	
Reference Books		
1	E. Balagurusamy: Object Oriented Programming with C++, TMH Pub., 1998.	
2	Maria Litvin and Gary Litvin: C++ for you++, Vikas Publ, 2002	
3	John R Hubbard: Programming with C++, TMH Publ. II Edition, 2002	
Course Designed By: Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur & Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.		

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	M	M	M	M	S	M	M	S
CO2	S	M	M	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	L	M	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	M	L	M	M	S	M

*S-Strong; M-Medium; L-L

Course code	3ZA	BIOMEDICAL INSTRUMENTATION	L	T	P	C
Core /Elective / Supportive:		Skill Based Subject: I	3			3
Pre-requisite		Higher secondary biology	Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:

- ❖ To presents various bio-potentials and working principles ofmedical instruments
- ❖ To enable the students to learn about bio-potentials andmedical instruments

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the Concept of bio-potential	K2
2	Understand the concept of medical instruments	K2
3	Develop the troubleshooting Skills of medical instruments	K3
4	Understand the concepts of signal conditioners & diagnostic equipment	K2
5	Analyse physiological assist devices	K4

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit:1	BASIC PHYSIOLOGY	9 hours

Cells and their Structures - Transport of Ions through Cell Membrane - Resting and Excited State Transmembrane Potential - Nervous System - Physiology of Muscles - Heart and Blood Circulation

Unit:2	ELECTRODES AND TRANSDUCERS	9 hours

Basic Electrode Theory - Micro Electrodes - Skin Surface Electrodes - Needle Electrodes - Equivalent Circuit - Electrode Materials - Chemical Electrodes - Reference Electrodes - The pH Electrode - Blood Gas Electrode – Thermistor

Unit:3	SIGNAL CONDITIONERS & DIAGNOSTIC EQUIPMENTS	9 hours

Instrumentation Amplifiers - Current Amplifiers - Isolation Amplifier - Need for Filters - Low Pass, High Pass and Band Pass Active Filters - Notch Filters - Heated Stylus and Ink Pen Recorders. DIAGNOSTIC EQUIPMENTS: Typical Electrocardiogram (ECG)-Electrocardiograph - Electroencephalogram (EEG) - Muscle Response - Electromyograph (EMG)

Unit:4	DIAGNOSTIC EQUIPMENTS & BIOTELEMETRY	9 hours

X-ray Imaging - Radio Fluoroscopy - Image Intensifiers - Angiography - Endoscopy – Diathermy. BIOTELEMETRY AND PATIENT SAFETY: Need for Biotelemetry - Elements of Telemetry System - Radio Telemetry System - Physiological Signals used in Telemetry .

Unit:5	**PHYSIOLOGICAL ASSIST DEVICES**	**9 hours**
Need for Pacemakers - Pacemaker Parameters and Circuits - Different Modes of Operation - DC Defibrillator - Artificial Heart Valves - Heart Lung Machines - Artificial Lung Machines - Artificial Kidney Machine - Nerve and Muscle Stimulator. COMPUTER APPLICATIONS: Data Acquisition Systems - Analysis of ECG signals - Computerized Axial Tomography (CAT)Scanner - Ultrasonic Scanner .		
	Total Lecture hours	**45 hours**

Text Book(s)

1	Joseph J. Carr and John M. Brown, **"Introduction to Biomedical Equipment Technology",**
2	Leslie Cromwell.,FredJ. Webell., Erich A. Pfeffer.,**"Bio-medical Instrumentation**

Reference Books

1	Khandpur, **"Handbook on Biomedical Instrumentation",** Tata McGraw Hill Company, New
2	Ohn G Webster, Ed., **"Medical Instrumentation Application and Design",** Third Edition, John Wiley & Sons, Singapore, 1999
3	Arumugam.M,**"BiomedicalInstrumentation",**AnuradhaAgenciesPublishers,Chennai,1992

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1	https://www.youtube.com/watch?v=i2mZylgP1Fk
2	https://www.youtube.com/watch?v=4ldv98F7Zng
3	https://nptel.ac.in/courses/108/105/108105101/
4	https://nptel.ac.in/courses/108/105/108105091/

Course Designed By:
Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &
Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

Mapping with Programme Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	L	L	M	M	M	L	L	M	S	M
CO2	L	M	M	L	L	M	L	S	L	S
CO3	M	L	S	L	M	L	L	M	M	L
CO4	L	L	S	M	S	S	L	S	M	L
CO5	L	L	S	S	M	L	S	L	M	S

*S-Strong; M-Medium; L-Low

Fourth Semester

Course code	43A	IC'S AND INSTRUMENTATION	L	T	P	C
Core /Elective / Supportive:		Core paper V	5			4
Pre-requisite		Basic Electronics	Syllabus Version		2023-24	

Course Objectives:

- To impart the knowledgeon IC fabrication, Timer, PLL, and electronic instruments
- To enable the students to acquire the knowledge of Op-amp., transducers and its applications in electronic circuits and know the technique of measurements using electronic instruments

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Recognize the standardsin IC Fabrication Technology	K1
2	Understand the workingofTimer and PLL	K2
3	Design simplecircuits usingOp-amp.	K3
4	Understand the principle ofvarioustypes of transducers K2 Study the construction and working of frequently used equipment'slike CRO	K4
5	Digital Voltmeter etc.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit:1	ICFABRICATIONTECHNOLOGY	**12hours**

Fundamentals of Monolithic IC Technology – Basic Planar Process- Wafer Preparation EpitaxialGrowth–Oxidation–Photolithography–DiffusionofImpurities–Isolation Techniques– Metallization–MonolithicTransistors–IntegratedResistors- Thin and Thick Film Technology.

Unit:2	**TIMERANDPLL**	**12hours**

Functional Block Diagram of 555 timer – Monostable Operation – Applications: – Linear Ramp Generator – Pulse Width Modulator – Astable Operation – Applications: Schmitt Trigger – FSK Generator - Phase Locked Loop: Functional Block Diagram – Phase Detector / Comparator –Voltage Controlled Oscillator – Low Pass Filter .

Unit:3	**OPERATIONALAMPLIFIER**	**12hours**

Ideal Characteristics - Inverting and Non-inverting Amplifier – Op-amp Parameters – Summing Amplifier – Difference Amplifier – Integrator – Differentiator – Instrumentation Amplifier – Voltage to Current Converter – Current to Voltage Converter – Precision half Wave Rectifiers – Precision Full Wave Rectifiers.

Unit:4	**TRANSDUCERS**	**12hours**

Introduction – Electrical Transducer – Basic requirements of Transducer – Classification of Transducers – Selection of Transducers – Resistive Transducers – Potentiometers – Thermistors – Thermocouple – Piezoelectric Transducers – Hall Effect Transducers – Photoelectric Transducers – Digital Displacement Transducers.

Unit:5	**ELECTRONIC INSTRUMENTS**	**12 hours**
Q Meters- CRO: Block Diagram – Cathode Ray Tube – Measurement of Frequency – Measurement of Voltage and Current – Digital Oscilloscope – Digital voltmeter– Dual Slope Integrating Type DVM – Digital Multimeter – Humidity Measurement – Measurement of PH.		
	Total Lecture hours	**60 hours**
Text Book(s)		
1	D.Roy Choudhury and Shahil B Jain, **Linear Integrated Circuits"**, Second Edition New Age International Publishers, 2004	
2	K.R.Botkar,**—Integrated Circuits"**, 10th Edition KhannaPublishers , 2006	
Reference Books		
1	J.B.GUPTA,‖ **A Course In Electronic and Electrical Measurements and Instrumentation"**, 12th Edition, S.K Kataria & Sons.	
2	A.K. Sawhney,‖ **ELECTRICAL & ELECTRONIC MEASUREMENTS AND INSTRUMENTATION:**, Dhanpath Rai & Co (P) Ltd, 2004.	
Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]		
1	https://nptel.ac.in/courses/108/108/108108111/Integrated circuits,opamps and their applications	
2	https://nptel.ac.in/courses/117/106/117106030/Analog IC Design	
Course Designed By: Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur & Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode..		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	M	M	M	M	S	M	M	S
CO2	S	M	M	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	L	M	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	M	L	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	4AD	PYTHON PROGRAMMING	L	T	P	C
Core/Elective/ Supportive		ALLIED PAPER IV	3	0	0	4
Pre-requisite		Knowledge on logic of the programs and oops concept.	Syllabus Version		2023-24	

CourseObjectives:

The main objectives of this courseareto:

1. To introduce the fundamentals of Python Programming.
2. To teach about the concept of Functions in Python.
3. To impart the knowledge of Lists, Tuples, Files and Directories.
4. To learn about dictionaries in python.
5. To explore the object-oriented programming, Graphical programming aspects of python with help of built in modules.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Remembering the concept of operators,data types, looping statements in Python programming.	**K1**
2	Understanding the concepts of Input / Output operations in file.	**K2**
3	Applying the concept of functions and exception handling	**K3**
4	Analyzing the structures of list, tuples and maintaining dictionaries	**K4**
5	Demonstrate significant experience with python program development environment	**K4-K6**

K1-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5** -Evaluate; **K6** -Create

Unit:1	BASICS OF PYTHON	10hours

BASICS : Python - Variables - Executing Python from the Command Line - Editing Python Files - Python Reserved Words - Basic Syntax-Comments - Standard Data Types – Relational Operators - LogicalOperators -Bit Wise Operators-Simple Input and Output. Python Frameworks : Django, Flask,Bottle,Web2Py,Cherry,OnlineIDE's –Google Colab, Jupyter Notebook – Overview.

Unit:2	CONTROL STATEMENTS	10hours

CONTROL STATEMENTS: Control Flow and Syntax - Indenting - if Statement - statements andexpressions- string operations- Boolean Expressions -while Loop - break and continue - for Loop.**LISTS**:List-listslices-listmethods-listloop–mutability–aliasing-cloninglists-listparameters.**TUPLES**: Tupleassignment, tupleasreturn value-Sets– Dictionaries

Unit:3	FUNCTIONS	10hours

FUNCTIONS: Definition - Passing parameters to a Function - Built-in functions- Variable NumberofArguments-Scope- Modules - Standard Modules – sys – math – time -dir -help Function. **Libraries in Python**: TensorFlow,Matplotlib,OpenCV,Pandas, NumPy, SciPy, Scrapy, PyTorch, Scikit Learn.

Unit:4	ERROR HANDLING	12hours

ERROR HANDLING: Run Time Errors - Exception Model - Exception Hierarchy – HandlingMultipleExceptions-Handling IO Exceptions .**DataStreams**-AccessModesWriting-DatatoaFileReading-DataFroma File - File Methods – Workingwith Directories.

Unit:5	OBJECT ORIENTED FEATURES	10hours

OBJECT ORIENTED FEATURES: Classes Principles of Object Orientation - Creating Classes – Instance Methods-Class Variables–Inheritance – Polymorphism - Regular Expressions.		
Unit:6	**ContemporaryIssues**	**3hours**
Expert lectures,online seminars -webinars		
	TotalLecturehours	**55hours**

TextBook(s)	
1	Mark Summerfield,Programming in Python3:AComplete introduction to the Python Language, Addison-Wesley Professional, 2009.
2	Martin C.Brown, PYTHON: The Complete Reference, McGraw-Hill, 2001
3	E. Balagurusamy (2017), “Problem Solving and Python Programming”, McGraw-Hill, First Edition.
Reference Books	
1	Allen B.Downey,“Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff /O‘ Reilly Publishers, 2016
2	Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated forPython3.2, NetworkTheory Ltd., 2011
3	Wesley J Chun, Core Python Applications Programming,Prentice Hall,2012.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	Python for Everybody-Specialisation - Coursera
2	Learn Python: The Complete Python Programming Course - Udemy
3	Python for Data Science – NPTEL / Swayam

Course Designed By:

Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &
Mr. S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	L	S	M	L	M	S	S
CO2	S	S	S	L	S	M	L	M	S	S
CO3	S	S	S	L	S	M	L	M	S	S
CO4	S	S	S	L	S	M	L	M	S	S
CO5	S	S	S	L	S	M	L	M	S	S

*S-Strong;M-Medium;L-Low

Course Code	43P	DIGITAL ELECTRONICS AND LINEAR IC's LAB	L	T	P	C
Core /Elective / Supportive:	Core Practical III				2	3
Pre-Requisite:	Digital Electronics and Microprocessor theory		Syllabus Version		2023-24	

Course Objectives:

The Main Objectives of this course are to:

- To understand the logical operation of various gatesand theorems
- To develop variousdigital circuits
- To develop the assembly language programming of Microprocessor and to interface it with various peripheral devices

Expected Course Outcomes:

On the Successful completion of the course, student will be able to:

1	Analyze the circuit using Boolean laws	K6
2	Design the Adder and subtractor circuit using logic gate	K6
3	Gain knowledge of arithmetic Programming of8085	K6
4	Knowledge about logic Programming of8085	K6
5	Understand the wave form generation	K1

K1:Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create

Part I	DIGITAL ELECTRONICS(ANY 6)	40 Hours

1 Verification of Basic Gates andUniversal gates
2 Verification ofDemorgan's Theorem
3 Half Adder and Full Adder & Half Subtractor andFull Subtractor
4 Decade Counter &BCD Counter
5 Study ofFlip-Flops
6 Multiplexer andDe-Multiplexers
7 Encoder and Decoder
8 BCD to7-SegmentDisplay
9 Binary to Grey code and Grey to Binary code 10.
Synchronous and Asynchronous Counter
11 Design and Simulation of Logic Gate using VHDL Coding
12.Design and Simulation of Adder Circuits using VHDL Coding

Part II	LINEAR IC'S LAB (ANY 6)	45 ours

1 Astable Multivibratorusing555
2 Monostable Multivibratorusing555
3 Inverting and Non Inverting Amplifier
4 Adder and Subtractor usingIC741
5 Instrumentation Amplifier
6 Voltage to Current Converter and Current to Voltage Convertor
7 Wein Bridge Oscillator usingIC741
8 Square Wave and Triangular Generator

9. Adder and Subtractor usingIC741

	Total Lecture hours	**85 hours**

Course Designed By:
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Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	M	M	M	M	S	M	M	S
CO2	S	M	M	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	L	M	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	M	L	M	M	S	M

*S-Strong; M-Medium; L-Low

Course Code	43Q	ELECTRONIC CIRCUITS & COMMUNICATION LAB	L	T	P	C
Core /Elective / Supportive:	Core Practical IV				2	3
Pre-Requisite:	Electronic circuits theory and Communication theory		Syllabus Version		2023-24	

Course Objectives:

The Main Objectives of this course are to:

- To understand the concept of working of regulated power supplies, rectifiers, amplifiersandoscillators.
- To experiment the modulation anddetectiontechniques.

Expected Course Outcomes:

On the Successful completion of the course, student will be able to:

1	sign power supply and rectifier circuits	K6
2	sign Amplifiercircuits	K6
3	sign different Oscillator circuits	K6
4	sign different Modulation circuits	K6
5	Study on communication antennas	K1

K1:Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create

Part I	ELECTRONIC CIRCUITS	45 hours

1. DC Regulated Power Supply using ZenerDiode
2. VoltageDoubler
3. FeedbackAmplifier
4. EmitterFollower
5. Transformer CoupledAmplifier
6. HartleyOscillator
7. Colpitts Oscillator
8. Phase shiftOscillator
9. Wein BridgeOscillator
10. RCCoupledAmplifier
11. Half Wave and Full WaveRectifier
12 FilterCircuits

Part II	ELECTRONIC COMMUNICATION	40 hours

1. Performance ofIFAmplifier
2. AM Modulation andDetection
3. FM Modulation and Detection
4. PAM Modulation

5. PINDiodeOscillator
6. Alignment ofDishAntenna
7. Alignment ofSatelliteReceiver
8. PWMModulation
9. PPMModulation
10. PCMModulation
11. GUNNDiodeOscillator

(Any 16 Experiments)

	Total Lecture hours	**85 hours**

Course Designed By:
Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &
Mr. S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	M	M	M	M	S	M	M	S
CO2	S	M	M	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	L	M	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	M	L	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	43R	ALLIED LAB : COMPUTER PROGRAMMING LAB OBJECT ORIENTED PROGRAMMING USING C++ & PYTHON PROGRAMMING LAB	L	T	P	C
Core/Elective/Supportive		Allied Lab V			2	2
Pre-requisite		Basics of any Programming Language	Syllabus		2023-24	

Course Objectives:

The main objectives of this course are to:

1. This course presents an overview of elementary data items, lists, dictionaries, sets and tuples
2. To understand and write simple OOP WITH C++ Python programs
3. To Understand the OOPS concepts of Python
4. To develop web applications using Python

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	To write programs in Python using OOPS concepts	K1,K2
2	To understand the concepts of File operations and Modules in Python	K2,K3
3	Implementation of lists, dictionaries, sets and tuples as programs	K3,K4
4	To develop web applications using Python	K5,K6

K1-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5** -Evaluate; **K6** -Create

LIST OF PROGRAMS	45 hours

OBJECT ORIENTED PROGRAMMING WITH C++ (Any 6)

1. Create a class to implement the data structure STACK . Write a constructor to initialize the TOP of the stack to 0 . Write a member function POP( ) to delete an element . Check for overflow and underflow conditions.

2. Create a class ARITH which consists of a FLOAT and an integer Variable . Write member ADD( ), SUB ( ), MUL ( ), DIV ( ), MOD ( ) to perform addition, multiplication, division and modulus respectively . Write member functions to get and display values.

3. Create a class MAT has a 2-d matrix and R&C represents the rows and columns of the matrix . Overload the operators +, -, * to add subtract and multiply two matrices. Write member functions to get and display MAT object values.

4. Create a class STRING . Write member function to initialize, get and display strings. Overload the operator + to concatenate two strings, = = to compare two strings and a member function to find the length of the string.

5. Create a class which consists of EMPLOYEE detail like eno, ename, dept, basic-salary, grade. Write member functions to get and display them. Derive a class PAY from the above class and write a member function to calculate da , hra , pf depending on the grade and Display the Payslip in a neat format using console I/O.

6. Create a class SHAPE which consist of two VIRTUAL FUNCTIONS Cal_Area( ) and Cal_PERI to calculate AREA and PERIMETER of various figures. Derive three classes SQUARE,RECTANGLE and TRIANGLE from the class SHAPE and calculate AREA and PERIMETER of each class separately and Display the result.

7. Create two classes which consists of two private variables, one float And one integer variables in each class. Write member functions to get and display them . Write FRIEND function common to arguments. And the integer and float values of both the objects separately and Display the result.

8. Write a user defined function USERFUN( ) which has the formatting commands like setw( ), showpoint , showpos precision( ). Write a program which prints an multiplication table and uses USERFUN( ) for formatting.

9. Write a program to perform Insertion , Deletion and Updation using files .

10. Write a program which takes a file as argument and copies in to another file with line numbers using Command Line Arguments.

PYTHON PROGRAMMING LAB (Any 6)

Implement the following in Python:

1. Write a Python program by getting input from the user and displays the following information: Your name, Full address, Mobile number, College name, Course, Subjects.
2. Write a Python program to find the largest three integers using if-else and conditional operator.
3. Write a Python program that asks the user to enter a series of positive numbers (The user should enter a negative number to signal the end of the series) and the program should display the numbers in order and their sum.
4. Write a Python program to find the product of two matrices [A] m x p and [B] p x r.
5. Write recursive functions for Fibonacci sequence up to given number n.
6. Write recursive functions to display prime number from 2 to n.
7. Write a Python program that writes a series of random numbers to a file from 1 to n and display.
8. Write a Python program to sort a given sequence: String, List and Tuple.
9. Write a Python program to make a simple calculator using functions.
10. Write a Python program for Linear Search using functions.
11. Write a Python program for Inheritance
12. Write a Python program to slice a given list.
13. Write a Python program to count the number of words.
14. Write a Python program to copy a file.
15. Write a Python program to check the given password is correct or not using regular expressions.

Total Lecture hours	**45 hours**

Text Books

1	Bill Lubanovic, “Introducing Python”, O’Reilly, First Edition - Second Release, 2014.
2	Mark Lutz, “Learning Python”, O’ Reilly, Fifth Edition, 2013.

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FIFTH

Semester

Course code	53A	8051 MICROCONTROLLER AND ITS APPLICATIONS	L	P	C
Core /Elective / Supportive:		Core paper VI	5		4
Pre-requisite:		Digital Electronics 8085 Microprocessor	Syllabus Version		2023-24

Course Objectives:

The main objectives of this course are to:

- To Study the architecture and addressing modesof8051
- To Impart knowledge about assembly language programsof8051
- to understand the importance of different peripheral devices and their interfacingto8051
- To Impart knowledge of different types of external interfaces includingLCD,Keypad Matrix, Stepper motorandsensors

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Describe architecture and operation of Microcontroller 8051	K1
2	Foster ability to understand the design concept of interfacing Microcontroller with various peripherals	K2
3	Analyse the data transfer and interfacing techniques	K3
4	Foster ability to understand the role of embedded systems in industry	K4
5	Analyze the data transfer through serial and parallel ports.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit:1	MICROCONTROLLER OVERVIEW	18 hours

Introduction to Microcontroller – Comparison of µP & µC - 8051 Microcontroller Block Diagram - 8051 Oscillator and Clock – A, B & Register Banks – Stack - Program Counter & Data Pointer– – Flag & PSW – Special Function Registers – Internal Memory – Input / Output Pins & Ports.

Unit:2	ADDRESSING MODES, ARITHMETIC AND LOGICAL INSTRUCTION	18 hours

Introduction – Addressing Modes: Direct – Indirect – Register - Indexed – Arithmetic Instructions: Addition, Subtraction, Multiplication, Division, Increment And Decrement – Logic & Compare Instructions: AND, OR, XOR, CPL & Compare – Rotate & Swap Instruction: RR, RL, RRC, RLC - Simple Programs.

Unit:3	DATA TRANSFER AND BRANCH OPERATIONS	18 hours

Introduction – Internal Data Move - External Data Move – Code Memory Read Only Data Move - Loop and Jump Instructions – Conditional Jump – Unconditional Jump – Call Instructions: LCALL and ACALL – Push and Pop Instructions – Simple Programs.

Unit:4	PERIPHERALS	18hours

Timer and Counter: Timer Registers – TMOD – TCON - Mode 1 and 2 Programming – Counter Programming – Serial: MAX232 – Baud Rate – SBUF Register – SCON Register – Program to Transfer and Receive Data Serially - Interrupts: Enabling & Disabling Interrupt.

Unit:5	INTERFACING	18hours
Interfacing of LCD – LCD Operation – Pin Descriptions – Command and Data to the LCD – ADC 0804 – LM34 Temperature Sensor – Stepper Motor – Step Angle – Motor Speed – Interfacing Key Board – Scanning and Identifying the keys.		
	Total Lecture hours	**90 hours**

Text Book(s)	
1	Mohamed Ali Maszidi & Janice Gillispie Maszidi**, "The 8051 Microcontroller and Embedded System"**, Pearson Publishers
2	Kenneth J. Ayala, **"The 8051 Microcontroller Architecture, Programming and Application"**2 nd Edition, Penram Int ernational Publications
Reference Books	
1	Myke predko, **"Programming and Customizing the 8051 Microcontroller"**, Tata McGraw Hill, 1st Edition
2	AyalaJ.K., **—The8051 Microcontroller:Architecture, programming and applications"**, Penram International (2005) 3rd edition.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.youtube.com/watch?v=84YUQu8tE4w
2	https://www.youtube.com/watch?v=GPz_mR7Flas
3	https://www.youtube.com/watch?v=uFhDGagZzjs

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Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	S	M	M	M	S	L	L	S
CO2	S	S	S	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	S	S	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	S	L	M	M	S	S

*S-Strong; M-Medium; L-Low

Course Code	53B	INTERNET OF THINGS	L	T	P	C
Core/Elective /Supportive:	CORE PAPER VIII		5			4
Pre-Requisite:	Basic Electronics		Syllabus Version		2023-24	

Course Objectives:

The Main Objectives of this course are to:

- To enable the students to learn about IoT and also to understand theconcept of embedded devices andInterfacing sensors.

Expected Course Outcomes:

On the Successful completion of the course, student will be able to:

1	Study the concept of basic IoT	K1
2	Familiarize the principle of connected devices	K2
3	Gain knowledge about embedded devices	K3
4	Analyze different sensor Interface technology	K4
5	Analyze the IoT applications	K4

K1:Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create

Unit:1	IOT FUNDAMENTALS	18 hours

Introduction to IoT: Evolution of IoT – Definition & Characteristics of IoT - Architecture of IoT – Technologies for IoT – Developing IoT Applications – Applications of IoT – Industrial IoT – Security inIoT

Unit:2	DESIGN PRINCIPLES FOR CONNECTED DEVICES	18 hours

Introduction-IoT/M2m systems - Communication Technologies - Data management, data consolidation and Device management - Ease of Designing and Affordability.

Unit:3	PROGRAMMING FUNDAMENTALS WITH C USING ARDUINO IDE	18 hours

Arduino IDE – Basic Syntax – Data Types/ Variables/ Constant – Operators – Conditional Statements and Loops – Using Arduino C Library Functions for Serial, delay and other invoking Functions – Strings and Mathematics Library Functions.

Unit:4	SENSORS AND ACTUATORS	18 hours

Analog and Digital Sensors – Interfacing temperature sensor, ultrasound sensor and infrared (IR) sensor with Arduino – Interfacing LED and Buzzer with Arduino.

Unit:5	SENDING SENSOR DATA OVER INTERNET	18 hours

Introduction to ESP8266 NODEMCU WiFi Module – Programming NODEMCU using Arduino IDE – Using WiFi and NODEMCU to transmit data from temperature sensor to Open Source IoT cloud platform .

Total Lecture hours	90 Hours

Text Book(s)	
1	Arshdeep Bahga, Vijay Madisetti, **—Internet of Things:A Hands-On Approach**", 2014. ISBN: 978-0996025515
2	Boris Adryan, Dominik Obermaier, Paul Fremantle, **—The Technical Foundations Of Iot"**, Artech Houser Publishers, 2017.
Reference Books	
1	Michael Margolis,**—Arduino Cookbook**", O"Reilly, 2011
2	Marco Schwartz, **—Internet of ThingswithESP8266**", Packt Publishing,2016
Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]	
1	https://nptel.ac.in/courses/106/105/106105166/Introduction to IoT Part I – Lecture 1
2	-https://ocw.cs.pub.ro/courses/iot/courses/02Electronics for Internet of Things – Lecture II
3	https://nptel.ac.in/courses/106105166/Introduction to Arduino – I – Lecture 22

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Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	M	M	M	M	S	M	M	S
CO2	S	M	M	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	L	M	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	M	L	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	5ZC	VISUAL PROGRAMMING	L	T	P	C
Core /Elective / Supportive:		Skill Based Subject III:	3			3
Pre-requisite		Computer skills and familiarity with Microsoft Windows.	Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:

- To design and develop Windows-based applications usingVisualBasic
- To Emphasis on the fundamentals of design, development, implementation and documentation
- To Gain knowledge about to write visualC++programming

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Explore Visual Basic's	K1
2	Implement syntax rules in Visual Basic programs	K2
3	Explain variables and data types used in program development	K3
4	Write and apply visual C++ principles and programming techniques	K4
5	Write and apply procedures, sub-procedures, and functions to data transfer	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit:1	VISUAL BASIC OVERVIEW	9hours

Introduction to Windows Programming – Event Driven Programming – Data Types – Resources – Window Message – Device Context – Document Interfaces – Dynamic Linking – Software Development Kit (SDK) Tools – Context Help.

Unit:2	VISUAL BASIC OBJECTS	9hours

Visual Basic Programming – Forum Design – VBX Controls – Properties – Event Procedures MenusandToolbars–UsingDialogBoxes–WorkingwithControlArrays–ActiveXControls Multiple Documents Interface (MDI) – File System Controls – Data Control – Database Applications.

Unit:3	BUILDING THE USER INTERFACE	9hours

Visual C++ Programming – Frame Work Classes – VC++ Components – Resources – Event Handling – Message Dispatch System – Model and Modeless Dialogs – Important VBX Controls – Document view Architecture – Serialization – Multiple Document Interface – Splitter Windows – Coordination between Controls

Unit:4	DATABASE AND APPLICATIONS	9 hours

Database Connectivity – Min Database Applications – Embedding Controls in View creating user defined DLL's – Dialog Based Applications – Dynamic Data Transfer Function – Data Base Management with ODBC – Communicating with other applications – ObjectLinking and Embedding

Unit:5	DESIGN AND DEVELOPMENT	9 hours

Basics of GUI Design – Visual Interface Design – File System – Storage and Retrieval System -Simultaneous Multi- Platform Development

Total Lecture hours	45 hours

Text Book(s)	
1	Petzold,‖**Windows Programming**‖, Microsoft Press, 1995
2	Marion Cottingham,‖**Visual Basic**‖, Peachpitt Press, 1999
3	Kate Gregory,‖**Using Visual C++**‖, Prentice Hall of India Pvt. Ltd
4	PapparandMurray,‖**VisualC++:TheCompleteReference**‖,TataMcGrawHill,NewDelhi, 2000.
Reference Books	
1	John Paul Muller, **"Visual C++ from the Ground Up"**, Tata McGraw Hill, Delhi.
2	Richard C. Leinecker and Tom Archer, **"Visual C++ 6 Programming Bible",** Wiley India Pvt Ltd.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.youtube.com/watch?v=5nahqfJTQXs
2	https://www.youtube.com/watch?v=1oGpl6qNKoQ
3	https://www.youtube.com/watch?v=gcFHyVYdeFU

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Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	S	M	M	M	S	L	L	S
CO2	S	S	S	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	S	S	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	S	L	M	M	S	S

*S-Strong; M-Medium; L-Low

Sixth Semester

Course code	63A	DESIGN WITH PIC MICROCONTROLLER	L	T	P	C
Core/Elective/ Supportive:		Core paper VIII	6			4
Pre-requisite		Students having knowledge of electronics fundamentals coupled with some programming experiences are the ideal participants for this course.	Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:

- To Study the architecture and addressing modes of PIC MicrocontrollerImpart knowledge about assembly language programs of PICMicrocontroller
- To know various peripheral devices and to interface them withPIC Microcontroller

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the evolution in microcontroller technology	K1
2	Describe Harvard architecture model and programming techniques	K2
3	Describe the operation and need for interrupts and timers	K3
4	List out various operators in modelling the design units	K4
5	Apply the concept for I/O port expansion	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit:1	CPU ARCHITECTURE AND INSTRUCTION SET	15hours

Overview – Harvard Architecture and Pipelining – Program Memory Considerations – Register File Structure and Addressing Modes – CPU registers – Instruction Set – Simple Operations

Unit:2	LOOP TIME SUBROUTINE, TIMER 2 AND INTERRUPTS	15 hours

Timer 2 Use – Interrupt Logic – Timer 2 Scalar Initialization – Interrupt Service - Interrupt Service Routine – Loop Time Subroutine

Unit:3	EXTERNAL INTERRUPTS AND TIMERS	15 hours

RB0/INT External Interrupt Input – Timer 0 – Compare Mode – Capture Mode – Timer1/CCP Programmable Period Scalar – Timer1 External Event Counter – Timer1 and Sleep Mode – Pulse Width Modulated Outputs – Port B Change Interrupts

Unit:4	I/O PORT EXPANSION	15hours

Synchronous Serial Port Module – Serial Peripheral Interface – Output Port Expansion – Input Port Expansion – LCD Display

Unit:5	I^2C BUS FOR PERIPHERAL CHIP ACCESS	15hours

I2C Bus Operation - I2C Bus Subroutines – DAC Output – Temperature Sensor – Serial EEPROM

	Total Lecture hours	75 hours

Text Book(s)

1. John B.Peatman,**—Design with PIC Microcontrollers—**,Pearson Education Publishing

Reference Books

1. Muhammad Ali Mazidi, Rolin D. McKinlay, and Danny Causey, **"The PIC MicrocontrollerandEmbeddedsystems**–UsingAssemblyandCforPIC18,‖Prentice Hall, 2007

	Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1	https://www.youtube.com/watch?v=nLlBssKCN2w
2	https://www.youtube.com/watch?v=VEAYB1A9SiA
3	https://www.youtube.com/watch?v=aSsnLyKtIAU

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Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	S	M	M	M	S	L	L	S
CO2	S	S	S	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	S	S	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	S	L	M	M	S	S

*S-Strong; M-Medium; L-Low

Course code	63P	Internet of Things System Design Lab	L	T	P	C
Core/Elective/ Supportive		Core –Practical- VI			3	4
Pre-requisite		Basic knowledge of Electronic Circuits or permission of instructor	Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:

- ❖ To make the students to design IoT based circuits
- ❖ To understand the characteristics of Arduino &sensors .

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Interfacing the system and IoT	K4
2	Understand the characteristics of Internet of Things .	K6
3	Design the smart works	K5
4	Design Various Applications using IoT	K5
5	Understand the Sensors methods	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

(ANY 8 EXPERIMENTS)

1. Installation and Library Management
2. LED interfacing.
   - [i] Blinking
   - [ii] Running Light
3. Switch Interfacing
   - [i] Without Interrupt
   - [ii] With Interrupt
4. Serial Communication & Plotter
5. ADC Interfacing
6. Buzzer interfacing
7. Tone Generation
8. LCD interfacing
9. Servo Motor interfacing
10. Joystick interfacing
11. Tilt Sensor interfacing
12. Reed Switch interfacing
13. Thyristor protection circuit

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Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	M	M	S	S	S	M	S	M	M	S
CO2	S	S	S	M	M	M	S	M	L	L
CO3	S	S	M	M	M	L	L	L	S	M
CO4	S	S	M	S	S	S	L	L	S	M
CO5	M	M	S	S	S	L	L	L	S	M

*S-Strong; M-Medium; L-Low

Course code	63Q	INDUSTRIAL AND POWER ELECTRONICS	L	T	P	C
Core/Elective/ Supportive		Core –Practical- VII			3	4
Pre-requisite		Basic knowledge of Electronic Circuits or permission of instructor	Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:

- ❖ To make the students to design triggering circuitsofSCR.
- ❖ To understand the characteristics of powerelectronicdevices.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Design triggering circuits of SCR	K4
2	Understand the characteristics of power electronic devices.	K6
3	Design power Inverter Circuits	K5
4	Design Various Applications of SCR	K5
5	Design Cyclo Converter Circuits	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit I	INDUSTRIAL AND POWER ELECTRONICS	90 Hours

(ANY 16 EXPERIMENTS)

1. Triggering of SCR by R, C andDiac.
2. Design of snubbercircuit.
3. Fan regulator usingTriac.
4. Thyristorchopper.
5. TRIACFlasher.
6. CommutationTechniques.
7. Speed control of DC motor usingSCR.
8. Automatic street light controller
9. Burglar Alarm
10. Sequencer Circuit.
11. Power Inverter
12. Switching Regulators
13. Automatic Battery Charger 14.Firealarm
15. ON / OFF relay control using opto – coupler
16. Servo stabilizer
17. Layout and Art Work preparation forPCB
18. Etching Drilling and Component mounting of PCB
19. Temperature controller using AD 590/ LM 35.
20. Construction of EmergencyLamp.
21. Phase Control Circuit
22. Cycloconverter
23. Thyristor protection circuit

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Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	M	M	S	S	S	M	S	M	M	S
CO2	S	S	S	M	M	M	S	M	L	L
CO3	S	S	M	M	M	L	L	L	S	M
CO4	S	S	M	S	S	S	L	L	S	M
CO5	M	M	S	S	S	L	L	L	S	M

*S-Strong; M-Medium; L-Low

Course code	63R	8051 MICROCONTROLLER LAB	L	T	P	C
Core/Elective/ Supportive:		Core –Practical – VIII			3	4
Pre-requisite		DigitalElectronics8085 Microprocessor	Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:

To introduces the assembly language programming ofMicrocontroller

To develop the student's Assembly language programming skills and gives practical training of interfacing the peripheral devices with theMicrocontroller

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Apply the fundamentals of assembly level programming of microcontroller	K3
2	Design and Develop program for real time interface	K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

8051/ PIC PROGRAMMING

(ANY 16EXPERIMENTS)

1. Addition / Subtraction of 8 / 16bitData
2. Multiplication / division 8bitData
3. BlockDataTransfer
4. Smallest / Largest ofNNumbers
5. To Arrange in Ascending /DescendingOrder
6. Sum of N 8 bitNumbers
7. 1's and 2's Compliment of an Array (8 /16bit)
8. UP/DOWN Counter using 7SegmentDisplay
9. Traffic Light ControlInterface
10. WaveFormGeneration
11. ADCInterface
12. DACInterface
13. StepperMotorInterface
14. Solid StateRelayInterface
15. DCMotorInterface
16. TemperatureController
17. Rolling and Blinking ofaMessage
18. LCDInterface
19. Frequency Counter
20. WaterLevelIndicator

Course Designed By:

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Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	M	M	S	S	S	M	S	M	M	S
CO2	S	S	S	M	M	M	S	M	L	L
CO3	S	S	M	M	M	L	L	L	S	M
CO4	S	S	M	S	S	S	L	L	S	M
CO5	M	M	S	S	S	L	L	L	S	M

*S-Strong; M-Medium; L-Low

Course code	6ZP	VISUAL PROGRAMMING LAB	L	T	P	C
Core/Elective/ Supportive		Skill Based Subject Practical-IV			3	2
Pre-requisite		Basic computer skills and familiarity with Microsoft Windows.	Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:

- ❖ Learn to design and develop Windows-based business applications usingVisualBasic

Emphasis on the fundamentals of structured design, development, implementation, and documentation

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Implement syntax rules in Visual Basic programs	K2
2	Explain variables and data types used in program development	K3
3	Write visual C++ principles and programming techniques	K6
4	Design Application Editor and Control	K5
5	Design VB application Link	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

VISUAL PROGRAMMING (ANY 8 EXPERIMENTS)

1. Building Simple Applications usingBasicTools
2. Working with Intrinsic Control and ActiveXcontrols
3. Create an Application with Multiple Forms andDialogs
4. Write a VB Program to Design an e-mailRegistrationForm
5. Create an Application withMenuEditor
6. Create an Application with DAO Controls
7. Create an Application usingCommonDialogs
8. Write a program for Drag andDropEvents
9. Create a Database for library management usingADDControls
10. Creating an Application using ActiveXcontrol
11. Create a Scientific CalculatorinVB
12. Develop a VB application to either link or Embed MS Word Document to an OLEControl
13. Display Student Information usingGridControl
14. Create an Application using RDOControls
15. Develop an Application to perform the following operation intheEmployee TableusingDAO
    - i) Add anewRecord.
    - ii) DeleteaRecord.
    - iii) ModifyaRecord.

Course Designed By:
Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &
Mr. S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	M	M	S	S	S	M	S	M	M	S
CO2	S	S	S	M	M	M	S	M	L	L
CO3	S	S	M	M	M	L	L	L	S	M
CO4	S	S	M	S	S	S	L	L	S	M
CO5	M	M	S	S	S	L	L	L	S	M

*S-Strong; M-Medium; L-Low

Elective Courses

Course Code	5EA	PCB DESIGN AND FABRICATION	L	T	P	C
Core/Elective/Supportive	Elective-I-A		4			3
Pre-requisite	Basic knowledge of circuits familiar with the functions and performance of various components and have a good logical thinking ability.		Syllabus Version	2023-24		

Course Objectives:

The main objectives of this course are to:

- ❖ To inculcate the knowledge ofPCBdesign
- ❖ To impart knowledge on various methods of laying outaPCB
- ❖ To learn how to etchandsolder
- ❖ To develop various techniques used for PCB designandfabrication

Expected Course Outcomes:

On the Successful completion of the course, student will be able to:

1	Classify the boards and layers	K1
2	Design layout and make use of the photo printing and etching techniques	K2
3	Understand the design rules and automation techniques	K3
4	Understand basic concepts of transmission line, crosstalk and thermal issues	K4
5	sign (schematic and layout) PCB for analog circuits, digital circuits and mixed circuits	K5

K1:Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create

Unit:1	**TYPES OFPCB**	**18 hours**

Single sided board – double sided – Multilayer boards – Plated through holes technology – Benefits of Surface Mount Technology (SMT) – Limitation of SMT – Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's

Unit:2	**LAYOUT AND ARTWORK**	**18 hours**

Planning – General Rules Layout of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check

Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection

Unit:3	**LAMINATES AND PHOTO PRINTING**	**18 hours**

Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process – Basic Printing Process for Double Sided PCB's – Photo Resists –

Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film resists – Dry Film Resists

Unit:4	**ETCHING AND SOLDERING**	**18 hours**

Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice

Unit:5	DESIGN RULES AND AUTOMATION	18 hours
Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD		
	Total Lecture hours	**90 hours**

Text Book(s)	
1	Walter C. Bosshart, ―PCB Design and Technology‖, Tata McGraw Hill Publications, Delhi 1983
2	RS Khandpur, ―Printed Circuit Board‖byTata McGraw Hill Education Pvt Ltd., New Delhi
Reference Books	
1	S D Mehta , ―ElectronicProduct Design‖ Volume-I, S Chand Publications
Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]	
1	https://www.wikihow.com/Create-Printed-Circuit-Boards
2	http://www.siongboon.com/projects/2005-09-07_home_pcb_fabrication/
3	https://reprap.org/wiki/MakePCBInstructions#Making_PCBs_yourself
4	https://www.youtube.com/watch?v=mv7Y0A9YeUc
4	https://www.youtube.com/watch?v=imQTCW1yWkg
Course Designed By: Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur & Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	S	M	M	M	S	L	L	S
CO2	S	S	S	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	S	S	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	S	L	M	M	S	S

*S-Strong; M-Medium; L-Low

Course code	5EB	ADVANCED COMMUNICATION SYSTEMS	L	T	P	C
Core/ Elective/ Supportive:		Elective I B	4			3
Pre-requisite		Principles of Communication Systems	Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:

- ❖ To analyze various data communicationsystems
- ❖ To make the students understand the basic concept in the field of pulse communications and cellular communicationsystems
- ❖ To know basis of satellite communication and expose the learners to the basics ofsignal propagation through opticalfibers

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Explain the different types of Pulse communication systems	K2
2	Analyse the performance of modulation techniques	K4
3	Demonstrate the Satellite and cellular communication system	K4
4	Analyse the performance of cellular communication systems	K4
5	Study the principle of optical fibre structure and its various applications	K4

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - An4alyze; **K5** - Evaluate; **K6** - Create

Unit:1	DATA COMMUNICATION	18hours

Introduction – Data Forms – Transmission Modes – Simplex, Half Duplex – Full Duplex – Point to Point Network – Star Network – Ring Network – Bus Network – Telephone Lines – Dial- upLines – Dedicated Lines – Data Communication System – Asynchronous and Synchronous Transmission – USART's and ACIA's – RS 232 Inter Connect Cable – Modems –Protocols

Unit:2	PULSE COMMUNICATION	18hours

Basic Concepts of Pulse Modulation – Sampling Theorem – PAM – PTM – PFM – PPM – PCM – Differential PCM– Delta Modulation–Adaptive Delta Modulation–TDM– FDM– ASK–FSK– PSK

Unit:3	SATELLITE CONMMUNICATION	18 hours

Introduction – Satellite Orbit – Satellite Position – Up link – Down Link – Cross Link – Assignable Satellite Frequencies
Inside Satellite: Transponder – Antenna System – Power Package and Station Keeping – Forms of Modulation–Free Path Space Losses–Ground Station– Aligning the Satellite Dish

Unit:4	CELLULAR COMMUNICATION SYSTEM	18hours

Introduction Cellular Mobile System – Basic Cellular System – Operational Cellular System – Maximum number of Calls per Cell – Maximum Number of Frequency Channel - Concept of Frequency Channel Cell Splitting – Permanent Splitting – Real Time Splitting – Frequency Management – Channel Assignment

Unit:5	OPTICAL COMMUNICATION	18hours

Introduction to Optical Fibers – Optical Fiber Structure – Numerical aperture – Propagation of LightRaysthroughit–ApplicationsofOpticalFiber(Videolink,Satellitelink,Computerlink, Communicating Antenna Televisionlink)

Total Lecture hours	90hours

Text Book(s)	
1	Robert J. Shoernbeck,—**ElectronicCommunicationsModulationandTransmission**‖, PHI,1999
2	. AnokSingh,—**PrinciplesofCommunicationEngineering**‖, S.Chandand Company, 2nd Edition
3	Sanjeev Gupta,—**ElectronicCommunicationSystem**‖,KannaPublishingCompany
Reference Books	
1	**Data communications and networking** (sie) By behrouz a. Forouzan (author)
2	**Electronic Communications** 4th Edition by Dennis Roddy and J Coolen, Pearson Education
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/108/101/108101113/
2	https://nptel.ac.in/courses/117/105/117105143/
3	https://nptel.ac.in/courses/106/106/106106167/
Course Designed By: Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur & Mr. S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	S	M	M	M	S	L	L	S
CO2	S	S	S	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	S	S	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	S	L	M	M	S	S

*S-Strong; M-Medium; L-Low

Course Code	5EC	Introduction of Artificial Intelligence	L	T	C
Core/Elective /Supportive:	Elective I -C		4		3
Pre-Requisite:	New Technology Introduction		Syllabus Version		2023-24

Course Objectives:

The Main Objectives of this course are to:

- To presents various bio-potentials and working principles of medical instruments
- To enable the students to learn about bio-potentials and medical instruments

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the evolution in microcontroller technology	K2
2	Describe Harvard architecture model and programming techniques	K2
3	Describe the operation and need for interrupts and timers	K3
4	List out various operators in modelling the design units	K2
5	Apply the concept for I/O port expansion	K4

K1:Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create

Unit:1	Introduction	18 hours

Introduction – Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents – Typical Intelligent Agents – Problem Solving Approach to Typical AI Problems.

Unit:2	Problem Solving Methods	18 hours

Problem Solving Methods – Search Strategies – Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems – Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games.

Unit:3	Knowledge Representation	18 hours

Knowledge Representation – First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining – Backward – Chaining – Resolution – Knowledge Representation – Ontological Engineering – Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems

Unit:4	Software Agents	18 hours

Software Agents – Architecture for Intelligent Agents – Agent Communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent Systems.

Unit:5	AI Applications	18 hours

AI Applications – Language Models – Information Retrieval – Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning - Moving.	
Total Lecture hours	**90 Hours**

Text Book(s)	
1	S. Russell and P. Norvig, ―Artificial Intelligence: A Modern Approach‖, Prentice Hall, Third Edition, 2009.
2	I. Bratko, - Prolog: Programming for Artificial Intelligence, Fourth Edition, Addison-Wesley Educational Publishers Inc., 2011.
Reference Books	
1	M. Tim Jones, - Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers Inc.; First Edition, 2008.
2	Nils J. Nilsson, - The Quest for Artificial Intelligence, Cambridge University Press, 2009.
Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]	
1	https://www.youtube.com/watch?v=i2mZylgP1Fk
2	https://www.youtube.com/watch?v=4ldv98F7Zng
3	https://nptel.ac.in/courses/108/105/108105101/
4	https://nptel.ac.in/courses/108/105/108105091/

Course Designed By:
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Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	M	M	M	M	S	M	M	S
CO2	S	M	M	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	L	M	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	M	L	M	M	S	M

*S-Strong; M-Medium; L-Low

Course Code	5ED	ADVANCED COMPUTER ARCHITECTURE	L	T	P	C
Core/Elective/Supportive:		ELECTIVE I-D	4	0	0	3
Pre-requisite:		Basic Computer Architecture	Syllabus version			2023-24

Course Objectives:

The objectives of this course are:

- ❖ To provide knowledge on fundamentals of Advanced Computerdesign.
- ❖ To understand the concept of instruction level parallelism, pipelining and memory hierarchy associated withit.
- ❖ To enhance the knowledge on advancedprocessors.

Expected Course Outcomes:

On successful completion of the course, student will be able to:

1	Gain the knowledge on advanced computer design principles.	K1
2	Able to analyze the parallel computer model with instruction level parallelism.	K4
3	Gain the knowledge on pipelining.	K2
4	Understand the memory hierarchy in developing an advanced computer.	K2
5	Apply the multiprocessor concepts in advanced processors.	K3

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit: 1	PRINCIPLES OF COMPUTER DESIGN	18 Hours

Introduction-Quantitative principles of computer design - Control Units-Hardwired and Micro Programmed Design Concept – Microprogramming - Bus architectures: Uni-bus and multi-bus architectures.

Unit: 2	INSTRUCTION LEVEL PARALLELISM	18 Hours

Classification of parallel computers-Multiprocessors andmulti-computers - Multi-vector and SIMD computers-Instruction Level Parallelism - Overcoming DataHazards with DynamicScheduling-Reducing Branch Penalties with Dynamic - HardwareSupport for Extracting More Parallelism.

Unit: 3	PIPELINING	18 Hours

Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling.

Unit: 4	MEMORY HIERARCHY	18 Hours

Introduction- the Fundamentals of Caches-Reducing Cache Misses and Miss Penalty - Reducing Hit Time-Main Memory-Virtual Memory-Issues in Memory Hierarchy design.

Unit: 5	PRINCIPLES OF ADVANCED PROCESSOR	18 Hours

Advanced processor technology, CISC Scalar Processors, RISC Scalar Processors,Superscalar Processors, VLIW Architectures, Vector and Symbolic processors

	Total Lecture Hours	90 Hours

Text Books

1	Kai Hwang,—Advancedcomputer architecture‖,Tata Mc.Graw Hill Science/Engineering/Math 1st Edition, 1992.
2	D.A.PattersonandJ.L.Hennessey,—Computerorganizationanddesign,‖MorganKaufmann, ARM Edition, 2010.

Reference Books	
1	Hayes,J.P., ―Computer Architecture and Organization‖, 3rdEdition, TataMc-GrawHill, 1998.
2	William Stallings, ―Computer Organization and Architecture – Designing for Performance‖, 6th Edition, Pearson Education,2003.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/106/103/106103206/
2	https://www.youtube.com/watch?v=v7iefsovo9M
3	https://www.youtube.com/watch?v=L9X7XXfHYdU&list=PLxCzCOWd7aiHMonh3G6QNKq53C6oNXGrX

Course Designed By:
Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &
Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

	Mapping with Program Outcomes									
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	L	L	L	L	L	L	L	L	L
CO2	S	M	L	L	M	L	M	L	L	M
CO3	S	M	S	L	L	L	L	L	L	M
CO4	S	S	L	L	L	L	L	L	L	L
CO5	S	S	M	M	M	L	M	L	L	M

Course Code	5EE	Arduino and Sensors	L	T	P	C
Core/Elective/Supportive:		ELECTIVE II-E	4	0	0	3
Pre-requisite:		Basic Computer Architecture	Syllabus version			2023-24

Course Objectives:

The objectives of this course are:

- ❖ To provide knowledge on fundamentals of Advanced Computerdesign.
- ❖ To understand the concept of instruction level parallelism, pipelining and memory hierarchy associated withit.
- ❖ To enhance the knowledge on advancedprocessors.

Expected Course Outcomes:

On successful completion of the course, student will be able to:

1	Gain the knowledge on advanced computer design principles.	K1
2	Able to analyze the parallel computer model with instruction level parallelism.	K4
3	Gain the knowledge on pipelining.	K2
4	Understand the memory hierarchy in developing an advanced computer.	K2
5	Apply the multiprocessor concepts in advanced processors.	K3

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit: 1	Arduino and Sensors	18 Hours

Microcontroller - Install the Software - The Integrated Development Environment (IDE) - Our first circuit-Updated Circuit-Our First Program-Comments- Gotchas

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Unit: 2	Embedded "C":	18 Hours

"Blinky" - IF Statements - ELSE Statements- WHILE statements - What is truth(true) - Combinations - FOR statements - Our New Circuit - Introducing Arrays

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Unit: 3	Input and Output:	18 Hours

Input - Pushbuttons- Potentiometers - RGB LEDs- Sound Circuit - Simple note - Music - Music with functions – Making a digital thermometer - Serial Monitor - Measuring the temperature - Hooking up the LCD - Talking to the LCD - Bringing it all together

Unit: 4	Sensors-1 :	18 Hours

Introduction - Photo Cell (Light Sensor) - Tilt Sensor Reed Switch (Magnetic Field Detector) - Piezo Element (Vibration sensor)

Unit: 5	Sensors-2:	18 Hours

One Servo - Joystick Pan/Tilt bracket - Adding a firing mechanism		
	Total Lecture Hours	**90 Hours**

Text Books	
1	"Introduction to Arduino", Alan G. Smith, 2011, ISBN: 1463698348 and ISBN-13: 978-1463698348.
Reference Books	
1	"Exploring Arduino: Tools and Techniques for Engineering Wizardry" by Jeremy Blum**,** ISBN-10 1118549368, Publisher Wiley 2013.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/106/103/106103206/
2	https://www.youtube.com/watch?v=v7iefsovo9M
3	https://www.youtube.com/watch?v=L9X7XXfHYdU&list=PLxCzCOWd7aiHMonh3G6QNKq53C6oNXGrX

Course Designed By:
Dr.T.Siva Kumar , Principal ,RVS College Of Arts and Science,Coimbatore &
Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur .

	Mapping with Program Outcomes									
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	L	L	L	L	L	L	L	L	L
CO2	S	M	L	L	M	L	M	L	L	M
CO3	S	M	S	L	L	L	L	L	L	M
CO4	S	S	L	L	L	L	L	L	L	L
CO5	S	S	M	M	M	L	M	L	L	M

*S-Strong; M-Medium; L-Low

Course Code	5EF	MICROWAVE AND FIBER OPTIC COMMUNICATION	L	T	P	C
Core/Elective/ Supportive:	Elective II-F		4			3
Pre-Requisite:	Basic Electronics and Principles of Communication systems		Syllabus Version		2023-24	

Course Objectives:

The Main Objectives of this course are to:

- To inculcate the principle of microwave theory and working of waveguides
- To know the operation and applications of fibreoptic communication
- To impart knowledge on the working principle of microwave amplifiersand oscillators

Expected Course Outcomes:

On the Successful completion of the course, student will be able to:

1	Understand various parameters of waveguide and use of component as per applications.	K1
2	Analyze and find applications and limitations of microwave Semiconductor devices.	K4
3	Discriminate different Radars, find applications and use of its supporting systems	K5
4	Understand The structures of Fiber Optics and types	K2
5	Apply Fiber optics in Sensors Application and in Network Design	K3

K1:Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create

Unit:1	INTRODUCTION TO MICROWAVES	18 Hours

Introduction – Maxwell's Equation – Amperes Law – Faradays Law – Gauss Law – Wave Equation – Types of Wave Guides – TE and TM Modes – Propagation of TM Waves in Rectangular Wave Guide – TM Modes in Rectangular Wave Guide.

Unit:2	MICROWAVE AMPLIFIERS AND OSCILLATORS	18 Hours

Microwave Tubes: - Two Cavity Klystron – Multi cavity Klystron – Reflex Klystron – Traveling Wave Tube (TWT) – Backward Wave Oscillator (BWO) – Magnetron – Applications.

Unit:3	MICROWAVE DEVICES & RADAR	18 Hours

Microwave Transistors – Gallium Arsenide (GaAs) Metal Semi-conductor FET – Varactor Diode – PIN Diode – Schottky Diode – MASER Principle – Applications – RADAR Block Diagram – Classification – Radar Range Equation – Factors Affecting the Range of a Radar Receivers – Line Pulse Modulator – PPI (Plane Position Indicator) – Moving Target Indicator (MTI) – FM CW Radar- Applications.

Unit:4	OPTICAL FIBER COMMUNICATION	18 Hours

Basic Fiber Optic System – Frequencies – Fiber Optic Cables – Refraction – Numerical Aperture – Graded Index Cables – Single Mode – Multi Mode – Cable Constructions – Cable Losses – Connectors – Light Sources – Light Detector – Systems Components – Advantages and Disadvantages.

Unit:5	FIBER OPTICS SENSORS AND APPLICATIONS	18 Hours
Intensity Modulated Sensors - Hybrid sensors- phase sensors - Diffraction Grating Sensor Inter ferometric sensor - Fiber Fabry Perot Fiber Optic sensor - Chemical Senor Community Antenna Television – Networking - Digital VideoTransmission.		
	Total Lecture hours	**90 Hours**
Text Book(s)		
1	Kennedy; Davis,‖**Electronic Communication Systems",** Tata McGraw Hill Publishing Company Limited, III edition	
2	Gerd Keiser, **—OpticalFiber Communication",**McGrawHillPublication,IVth Edition, 2011.	
Reference Books		
1	Samuel Y. Liao **,"Microwave Devices and Circuits"**, PHI, III Edition.	
2	Govind P. Agrawal,‖**Fiber Optic Communication Systems"**, WileyPublications, IVth Edition, 2012.	
Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]		
1	https://nptel.ac.in/courses/108/103/108103141/Introduction to microwave Engineering	
2	https://www.classcentral.com/course/swayam-microwave-engineering-14199Microwave engineering swayam course	
Course Designed By: Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur & Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	M	M	M	M	S	M	M	S
CO2	S	M	M	M	M	M	S	L	L	L
CO3	S	M	S	M	M	L	L	L	M	M
CO4	S	S	M	S	S	S	L	L	M	M
CO5	S	S	S	S	M	L	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	5EG	AUTOMOTIVE ELECTRONICS	L	T	P	C
Core/Elective/ Supportive		Elective-II –G	4			3
Pre-requisite		Basic Electronics	Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:

- To understand the concepts of Automotive Electronics and its evolution andTrends automotive systems &subsystems overview.
- To understand sensors and sensor monitoring mechanisms aligned to automotive Systems, different signal conditioning techniques, interfacing techniquesand actuator
- To understand, design and model various automotive control systems using Model baseddevelopment technique.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Obtain an overview of automotive componentsand subsystems.	K2
2	Interface automotive sensors and actuators with microcontrollers	K4
3	Understand the design cycles, communication protocols and safety systems employed in today's automotive industry.	K2
4	Understand the engine management systems	K2
5	Analyse Engine Management System	K4

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit:1	INTRODUCTION	18hours

Automotive Component, Operation, Electrical Wiring Terminals and Switching, Multiplexed Wiring Systems, Circuit Diagrams and Symbols. Charging Systems and Starting Systems: Charging Systems Principles, Alternations and Charging Circuits, NewDevelopments,
Requirements of the Starting System, Basic Starting Circuit

Unit:2	IGNITION SYSTEMS	18hours

Ignition Fundamental, Electronic Ignition Systems. Programmed Ignition,
Distribution Less Ignition, Direct Ignition, Spark Plugs. Electronic Fuel Control: Basics of Combustion, Engine Fuelling and Exhaust Emissions, Electronic Control of Carburetion Petrol Fuel Injection, DieselFuelInjection

Unit:3	INSTRUMENTATION SYSTEMS	18hours

Introduction to Instrumentation Systems, Various Sensors Used for Different Parameters, Sensing Driver Instrumentation Systems, Vehicle Condition Monitoring Trip Computer, Different Types of Visual Display

Unit:4	ELECTRONIC CONTROL OF BRAKING AND TRACTION	18 hours

Introduction and Description Control Elements and Control Methodology, Electronic Control of Automatic Transmission: Introduction and Description Control Of Gear Shift and Torque Converter Lockup, Electric Power Steering, Electronic Clutch

Unit:5	**ENGINE MANAGEMENT SYSTEMS**	**18hours**
Combined Ignition And Fuel Management Systems, Exhaust Emission Control, Digital Control Techniques, Complete Vehicle Control Systems, Artificial Intelligence and Engine Management, Automotive Microprocessor Uses. Lighting and Security Systems: Vehicles LightingCircuits,SignallingCircuit,CentralLockingandElectricWindowsSecuritySystems, Airbags and Seat Belt Tensioners, Miscellaneous Safety and ComfortSystems		
	Total Lecture hours	**90hours**

Text Book(s)	
1	TOM DENTON, **Automobile Electrical and Electronic Systems**, Edward Arnold pb., 1995
Reference Books	
1	1.DON KNOWLES**, Automotive Electronic and Computer controlled Ignition Systems, Don**
2	WILLIAM, T.M., **Automotive Mechanics**, McGraw Hill Book Co.,
3	WILLIAM, T.M., **Automotive Electronic Systems**, Heiemann Ltd., London, 1978.
4	Ronald K Jurgen, **Automotive Electronics Handbook**, McGraw Hill, Inc, 1999.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/107/103/107103084/
2	https://nptel.ac.in/courses/107/106/107106088/
3	https://www.youtube.com/watch?v=vJ4EfyGXehg
4	https://www.youtube.com/watch?v=BG4N2dBgJrQ

Course Designed By:
Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur &
Mr. S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	S	M	M	M	S	L	L	S
CO2	S	S	S	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	S	S	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	S	L	M	M	S	S

*S-Strong; M-Medium; L-Low

Course Code	5EH	SATELLITE COMMUNICATIONS	L	T	P	C
Core/Elective/Supportive:		ELECTIVE-II-H	4	0	0	3
Pre-requisite:		PRINCIPLES OF COMMUNICATION	Syllabus version		2023-24	

Course Objectives:

The objectives of this course are:

- To provide knowledge on fundamentals of Advanced Computerdesign.
- To understand the concept of instruction level parallelism, pipelining and memory hierarchy associated withit.
- To enhance the knowledge on advancedprocessors.

Expected Course Outcomes:

On successful completion of the course, student will be able to:

1	Gain the knowledge on advanced computer design principles.	K1
2	Able to analyze the parallel computer model with instruction level parallelism.	K4
3	Gain the knowledge on pipelining.	K2
4	Understand the memory hierarchy in developing an advanced computer.	K2
5	Apply the multiprocessor concepts in advanced processors.	K3

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit: 1	SATELLITE SYSTEMS – OVERVIEW	18 Hours

Introduction- Basic concepts of Satellite communications- Frequency allocations for satellite systems. Advantages and applications of satellite communications over other communications

Unit: 2	ORBITAL ASPECTS OF SATELLITE SYSTEMS	18 Hours

Orbital Mechanics- look angle determination- orbit perturbations- Orbital determination- launches and launch vehicles- orbital effects in communication systems performance.

Unit: 3	THE SPACE SEGMENT	18 Hours

Introduction- spacecraft subsystems- attitude and orbit control systems- Telemetry- tracking and command- power systems- communication subsystems.

Unit: 4	SATELLITE LINK DESIGN	18 Hours

Basic transmission theory- system noise temperature and G/T ratio- Design of down links- up link design- design of satellite link for specified C/N.

Unit: 5	APPLICATIONS OF SATELLITE SYSTEMS	18 Hours

INTELSAT Series- INSAT- VSAT- GSM- GPS- INMARSAT-Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH)- Digital audio broadcast (DAB)- World space services- Business TV(BTV)- GRAMSAT.

	Total Lecture Hours	90 Hours

Text Books

1	Timothy Pratt, Charles Bostian,JeremyAllnutt, Satellite Communications, 2nd edition, John willey, 2006.
2	W. L. Pritchard, H. G. Suyderhoud and R. A. Nelson, Satellite Communication systems Engineering, 2nd edition, Pearson educational pblishers, New Delhi, 2003.

Reference Books

1	Dennis Roddy, Satellite Communications, 3rd edition, Mc Graw Hill, International, 2001.

2	Dr D.C. Agrwal, Satellite Communications,4th edition, Khanna Publications, NewDelhi, 2001.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/117/105/117105131/
2	https://www.youtube.com/watch?v=hXa3bTcIGPU
3	https://www.youtube.com/watch?v=BvjlBpP4zU8

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	Mapping with Program Outcomes									
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO
CO1	S	L	L	L	L	L	L	L	L	L
CO2	S	M	L	M	M	L	L	L	L	M
CO3	S	M	M	L	L	L	L	L	L	L
CO4	S	S	M	M	M	M	L	L	L	M
CO5	S	L	L	L	L	L	L	L	L	M

*S-Strong; M-Medium; L-Low

Course code	6EI	INDUSTRIAL AND POWER ELECTRONICS	L	T	P	C
Core/Elective/ Supportive		Elective-III –I	6			3
Pre-requisite		Basic knowledge of Electronic Circuits or permission of instructor	Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:

- ❖ To presents the principles and applications of industrial and power electronics
- ❖ To enable the students to learn and design industrial and power electronic circuits
- ❖ To develop the circuits designing skills related to the power electronics and understood the concept of industrial electronics

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Developed the Circuit designing skills power electronics. Understood the concept industrial electronics system design.	K1
2	Acquire knowledge about fundamental concepts and techniques used in power electronics.	K2
3	Ability to analyze various single phase and three phase power converter circuits and understand their applications.	K3
4	Foster ability to identify basic requirements for power electronics based design application.	K4
5	To develop skills to build, and troubleshoot power electronics circuits.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit:1	THYRISTORS	15hours

Introduction– Principles, Construction, Operation and Characteristics of SCR – Two Transistor Model –TRIAC – DIAC – GTO – SCS – SUS – SBS – LASCR – MOSFET – UJT– Relaxation Oscillator – PUT

Unit:2	TURN ON/OFF MECHANISMS	15 hours

Introduction– Types of Turn on Methods: AC Gate Triggering: Forward Voltage Triggering– Thermal Triggering– Radiation Triggering– DC Gate Triggering: Pulse Triggering – Types of Turn Off Methods: Natural Commutation – Forced Commutation: Self Commutation – Complimentary Commutation – Auxiliary Commutation – External Pulse Commutation—Line Commutation – Thyristor Rating

Unit:3	CONTROLLED RECTIFIERS & INVERTERS	15 hours

Introduction– Single phase Half Wave Controlled Rectifiers with Resistive Load – HWCR with Inductive Load – HWCR with Free Wheeling Diode – Single phase Full Wave Controlled RectifierswithResistive,InductiveLoads–FWCRwithFreewheelingDiode-INVERTERS:
Single Phase Half & Full Bridge Voltage Inverters

Unit:4	CYCLO CONVERTERS AND CHOPPERS	15hours

Introduction – Single Phase Centre Tapped Step-Up Cyclo Converter – Single Phase Centre Tapped Step- Down Cyclo Converter – Three Phase toSingle Phase Cyclo converter—Three Phase To Three Phase Cyclo Converters— Step-up and Step-downChoppers

Unit:5	APPLICATIONS	15 hours

Introduction –Dielectric Heating – Induction Heating – SMPS – UPS – Static Circuit Breaker – Battery Charger –Emergency Lighting System – Time Delay Control – StaticSwitches

Total Lecture hours	**75 hours**

Text Book(s)	
1	MDSingh,—**PowerElectronics**‖, 2nd Edition, Tata-McGrawHill, 2007.
2	M.Ramamoorthy,—**ThyristorandtheirApplications**‖,2nd Edition,EastWestPvt.Ltd,1999
Reference Books	
1	Harish C Rai, **"Industrial and Power Electronics"** 10th edition, Umesh publications 2002
2	Timothy J Maloni, **"Industrial Solid State Electronic Devices and Circuits"** 2nd edition 1986
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.youtube.com/watch?v=1Auay7ja2oY
2	https://www.youtube.com/watch?v=oqnLQVFaqYI
3	https://www.youtube.com/watch?v=naxnRkOfh2Q

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Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	S	M	M	M	S	L	L	S
CO2	S	S	S	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	S	S	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	S	L	M	M	S	S

*S-Strong; M-Medium; L-Low

Course Code	6EJ	ROBOTICS	L	T	P	C
Core/Elective/ Supportive:		Elective III –J	6			3
Pre-Requisite:		Basic Electronics	Syllabus Version		2023-24	

Course Objectives:

The Main Objectives of this course are to:

- To familiarize the students with the applicationsofRobots
- To know about the sensors, actuators used inRobotsdesigning

Expected Course Outcomes:

On the Successful completion of the course, student will be able to:

1	scribe the working concept and types of Robots	K3
2	ply the knowledge of types of sensors and actuators	K2
3	e Programming Languages for Robot design models	K6
4	derstand the concept of Mobile Robotic Locomotion	K2
5	Study the various applications of Robots	K3

K1:Remember; **K2**-Understand; **K3**-Apply; **K**4-Analyze; **K5**-Evaluate; **K6**-Create

Unit:1	FUNDAMENTALS OF ROBOTS	15 hours

Introduction: Automations and Robotics - Robotics Drive System - Robot Anatomy - Work Volume - Control System and Precision of Movement - Serial Robot - Robot Subsystems - Motion Sub Systems - Recognition Sub System: Robot Classification : Coordinate Systems - Actuation Systems - Control Method - Program Method.

Unit:2	ROBOT END EFFECTORS	15hours

Introduction: Types of End Effectors - Mechanical Grippers - Other Types of Gripper – Vacuum Cups -Magnetic Gripper - Adhesive Gripper – Hook - Scoops other Miscellaneous Device - Tools as End Effectors - Considerations in Gripper Selections and Design

Unit:3	SENSORS IN ROBOTS	15 hours

Sensor Classification - Internal Sensors - External Sensors - Vision System - Sensors in Robotics: Tactile Sensors - Proximity and Range Sensors - Miscellaneous Sensors and Sensor based Systems - Uses of Sensors in Robotics - Actuators in Robotics - Pneumatic Actuators - Hydraulic Actuators - Electric Actuators - DC Motors - AC Motors.

Unit:4	MOBILE ROBOTICS LOCOMOTION	15 hours

Introduction Key Uses for Locomotion - Leg Mobile Robots - Leg Configuration and Assembly - Consideration for Dynamics - Types of Legged Robot Locomotion - One Leg; Two Legs Biped - Four Legs (Quadruped) - Six Legs (Hexapod) - Concept of Wheeled Mobile Robots

Unit:5	ROBOTIC APPLICATIONS	15 hours

Industrial Applications: Material Handling - Processing Applications - Arc Welding - Assembly Applications - Inspection Applications - Robotics for Arc Welding - Assembly Applications - Robot Safety - Non Industrial Application of Robotics: Home Sector - Health Sector - Service Sector - Agriculture Farms - Research and Exploration.

Total Lecture hours	**75 hours**

Text Book(s)	
1	M.P.Groover,Mitchellweiss,Roger.N.Nagel,NicholasG.Odrey,‖**Industrial Robotics– Technology,programmingandApplication**‖,McGraw-Hill, 2008.
2	Ghosh,**—Control in Roboticsand Automation:SensorBased Integration”**, Allied Publishers, Chennai,1998.
Reference Books	
1	Deb. S.R., **—Robotics Technology andflexible Automation**‖, John Wiley,USA 1992.
2	KlafterR.D., ChimielewskiT.A., Negin M., **—Robotic Engineering– Anintegrated approach**‖, Prentice Hall of India, New Delhi, 1994.
Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]	
1	https://nptel.ac.in/courses/112/105/112105249/Introduction to Robots
2	https://nptel.ac.in/courses/112/101/112101098/Robotics and Automation
Course Designed By: Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur & Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode..	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	M	M	M	M	S	M	M	S
CO2	S	M	M	M	M	M	S	L	L	L
CO3	S	M	S	M	M	L	L	L	M	M
CO4	S	S	M	S	S	S	L	L	M	M
CO5	S	S	S	S	M	L	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	6EK	PROGRAMMABLE LOGIC CONTROLLERS	L	T	P	C
Core/Elective/ Supportive:		Elective III – K	3			6
Pre-requisite		Digital Electronics and computer Architecture and Organization	Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:

- ❖ To provide knowledge levels needed for PLC programming and operating input and output modules.
- ❖ To train the students to create ladder diagrams from process control descriptionand understand various types of PLCregisters
- ❖ Apply PLC Timers and Counters for the control of industrial processes, PLC functionsand DataHandlingFunctions.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Gain knowledge on Programmable Logic Controllers and will understand different types of Devices to which PLC input and output modules	K2
2	Gain knowledge about various types of PLC registers, ladder diagrams from process control descriptions	K2
3	Develop a coil and contact control system and analog PLC operations	K4
4	Apply time delay on PLC operations	K3
5	Able to use different types PLC functions, data handling functions and its various	K2

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyse; **K5** - Evaluate; **K6** - Create

Unit:1	PROGRAMMABLE LOGIC	15hours

Programmable Logic – Introduction - Programmable Logic Structures - Programmable Logic Arrays (PLAS), Programmable Array Logic (Pals), Programmable Gate Arrays (PGAS), Field ProgrammableGateArrays(FPGAS) - Sequential Network Design With ProgrammableLogic Devices (PLDs) -Design of Sequential Networks Using ROMs and Flash -Traffic Light ControllerUsingPAL

Unit:2	PROGRAMMABLE LOGIC CONTROLLERS	15hours

Programmable LogicControllers(PLCS) - Introduction Parts Of PLC - Principles of Operation-PLCSizes - PLC Hardware Components - I/O Section- AnalogI/OSection - Analog I/O Modules, Digital I/O Modules CPU - Processor Memory Module - Programming Devices -Diagnostics of PLCS withComputers

Unit:3	BASICS OF PLC PROGRAMMING	15hours

PLCProgramming-SimpleInstructions - Programming EXAMINE ON And EXAMINE OFF Instructions -Electromagnetic Control Relays-MotorStarters -Manually Operated Switches -MechanicallyOperatedandProximitySwitches - Output Control Devices - Latching Relays -PLCLadderDiagram - Converting Simple Relay Ladder Diagram into PLC Relay LadderDiagram

Unit:4	PLC INSTRUCTIONS	15 hours

Timer Instructions ON DELAY Timer and OFF DELAY Timer - Counter Instructions - Up/Down Counters -Timer and Counter Applications - Program Control Instructions - Data Manipulating Instructions - Math Instructions

Unit:5	**APPLICATIONS OF PLC**	**15hours**
Applications of PLC - Simple Materials Handling Applications - Automatic Control of Warehouse Door - Automatic Lubricating Oil Supplier Conveyor Belt - Motor Control Automatic Car Washing Machine - Bottle Label Detection - Process Control Application		

	Total Lecture hours	**75 Hours**
Text Book(s)		
1	Charles H. Roth, Jr **"Fundamentals of Logic Design ",** Fourth Edition, Jaico Publishing	
2	Frank D. Petruzella" **Programmable Logic Controllers ",** McGraw- Hill book, company,	
3	**Siemens "PLC Handbook "**.	
Reference Books		
1	1. William I. Fletcher **"An Engineering Approach to Digital Design "**, Prentice, Hall of India Ltd., New Delhi, 1999.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://unitronicsplc.com/what-is-plc-programmable-logic-controller/	
Course Designed By: Dr.K.Venmathi ,Assistant professor,L.R.G.Govt Arts College for Women, Tirupur & Mr.S.Shankar , Assistant Professor, Sri Vasavi College, SF Wing, Erode.		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	M	M	M	M	S	M	M	S
CO2	S	M	M	M	M	M	S	L	L	L
CO3	S	M	S	M	M	L	L	L	M	M
CO4	S	S	M	S	S	S	L	L	M	M
CO5	S	S	S	S	M	L	M	M	S	M

*S-Strong; M-Medium; L-Low

Course Code	6EL	VLSI DESIGN	L	T	P	C
Core/Elective/Supportive:		ELECTIVE – III-L	6	0	0	3
Pre-requisite:		Digital Principles and Applications	Syllabus version			2023-24

Course Objectives:

The objectives of this course are:

- To provide knowledge on Fabrication Process of NMOS,PMOS ,CMOS AND BICMOS, Super integrationconcepts.
- To develop the skill to analyze the electrical properties of MOS transistor, design stick diagrams and layout diagrams for MOS transistors, contacts andwires.
- To investigate the effect of floor planning, placement, routing and power delay estimation in physical design of digital circuits and memorydesign.
- To apply the concept of Combinational and Sequential CircuitTesting.

Expected Course Outcomes:

On successful completion of the course, student will be able to:

1	Gain the knowledge on fabrication principles.	K1
2	Able to analyze the electrical properties of MOS transistors.	K4
3	Apply the appropriate layout design rule to create a VLSI layout for a design.	K6
4	Understand the physical design steps and gain the knowledge on types of VLSI design styles.	K2
5	Gain the knowledge, analyze and apply test principles to evaluate the VLSI designs.	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit: 1	VLSI TECHNOLOGY	15 Hours

Fabrication sequence – process flow – Testing – Super integration concepts – Integrated Passive components – MOS Resistors and capacitors – Crossovers – NMOS – PMOS – CMOS – BICMOS fabrication processes – comparison.

Unit: 2	ELECTRICAL PROPERTIES OF MOS DEVICES	15 Hours

Drain to source current (I_{ds}) versus Drain to source voltage (V_{ds}) relationships – MOS transistor threshold voltage (V_t) – MOS transistor trans-conductance g_m and output conductance g_{ds} – figure of merit (ω_0) – pass transistor- pull – up to pull – down ratio.

Unit: 3	DESIGN PROCESSES	15 Hours

VLSI designflow- stick diagram design rules withexamples- Designrulesfor Layout diagramsofdigitalcircuits–sheetresistanceR_s–standardunitofcapacitance–Inverterdelays– Propagation delays- scaling of MOS circuits – limitations of scaling.

Unit: 4	VLSI PHYSICAL DESIGN AND STYLES	15 Hours

PHYSICAL DESIGN:

Floor Planning – Placement – Routing – Power Delay Estimation – Clock Routing – Power Routing.

VLSI DESIGN STYLES:

Full Custom – Semi custom – Standard Cells – Gate Arrays – FPGAs – CPLDs.

Unit: 5	TESTING OF VLSI CIRCUITS	15 Hours

Test Principles-BIST-Test Bench- Combinational Circuit Testing, Sequential Circuit Testing, Test Bench Techniques.		
	Total Lecture Hours	**75 Hours**

Text Books	
1	Basic VLSI Design, Douglas ,3rd Edition, A. Pucknell, Kamran Eshraghian, PHI, New Delhi, 2011.
2	Modern VLSI design, Wayne Wolf, 3rdEdition, Pearson Education, New Delhi, 4th impression 2008.
Reference Books	
1	Introduction to VLSI Circuits and Systems, John .P. Uyemura, John Wiley, Student Edition, New Delhi, Reprint 2006.
2	Principles of CMOS VLSI Design, N.H.E Weste , K.Eshraghian, Adisson Wesley, 2nd Edition, NewDelhi.
3	Application Specific Integrated Circuits, Michel John Sebastian Smith, Addison Wesley, Indian Edition, 4th Indian Reprint 2001, New Delhi.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/117/101/117101058/
2	https://www.youtube.com/watch?v=9SnR3M3CIm4
3	https://www.youtube.com/watch?v=Y8FvvzcocT4
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	Mapping with Program Outcomes									
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	L	L	L	L	L	L	L	L	L
CO2	S	S	L	S	M	L	M	L	L	L
CO3	S	M	S	L	S	L	M	M	L	S
CO4	S	L	M	L	S	L	L	L	M	L
CO5	S	S	M	M	S	L	L	L	M	S

*S-Strong; M-Medium; L-Low

Annexure

BHARATHIAR UNIVERSITY : : COIMBATORE 641046
DEPARTMENT OF ELECTRONICS

MISSION

- To develop appropriate facilities for promotingresearch activities.
- To inculcate leadership qualities among students for self and societalgrowth.
- To nurture students on emerging technologies for serving industry needs through industryinstitute interface.
- To enrich teaching learning process by transforming young minds to beresourceful engineers.