

# B. Sc. Electronics and Communication Systems

## Syllabus

**AFFILIATED COLLEGES**

**Program Code: 26B**

**2023 - 2024**



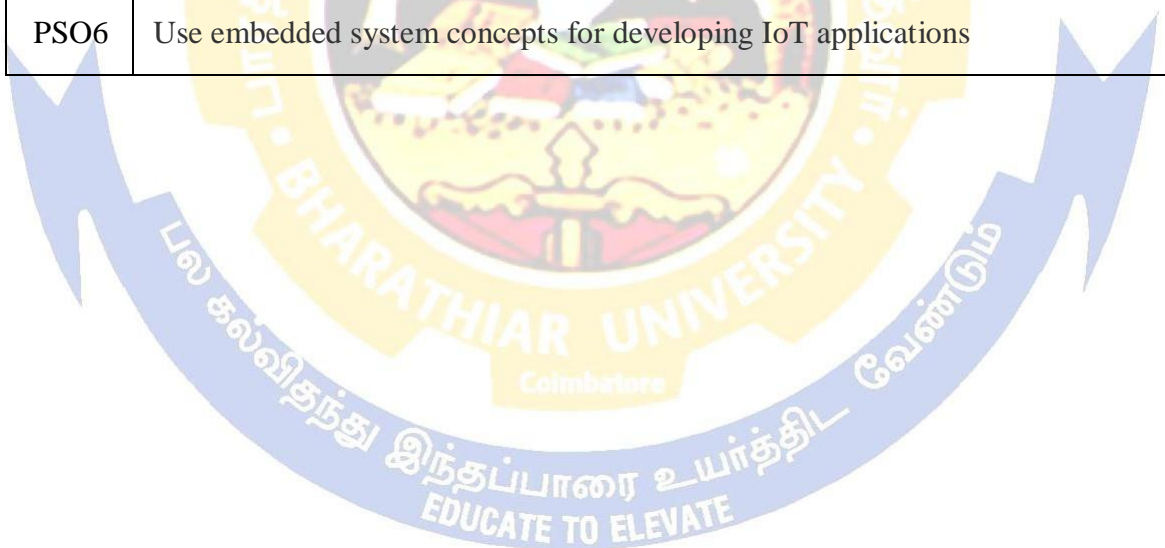
**BHARATHIAR UNIVERSITY**

(A State University, Accredited with "A" Grade by NAAC,  
Ranked 13<sup>th</sup> among Indian Universities by MHRD-NIRF,

World Ranking: Times -801-1000, Shanghai -901-1000, URAP - 982)

<b>Program Educational Objectives (PEOs)</b>	
The <b>B. Sc. ELECTRONICS AND COMMUNICATION SYSTEMS</b> 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 allied disciplines.
PEO2	Impart analytic and thinking skills to develop initiatives and innovative ideas for R&D, Industry and societal requirements.
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.

<b>Program Specific Outcomes (PSOs)</b>	
After the successful completion of B.Sc. ELECTRONICS AND COMMUNICATION SYSTEMS program, the students are expected to	
PSO1	Demonstrate proficiency in use of software and hardware required to practice electronics and communication profession.
PSO2	Graduates will be able to apply fundamentals of electronics in various domains of analog and digital systems
PSO3	Apprehend and analyze 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



<b>Program Outcomes (POs)</b>	
On successful completion of the B.Sc. ELECTRONICS AND COMMUNICATION SYSTEMS program	
<b>PO1</b>	Engineering knowledge: Apply the knowledge of mathematics, Science, Engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
<b>PO2</b>	Problem analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusion using principles of mathematics and Engineering sciences
<b>PO3</b>	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.
<b>PO4</b>	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.
<b>PO5</b>	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
<b>PO6</b>	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.
<b>PO7</b>	Environment and Sustainability: Understand the impact of the professional engineering solution in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development
<b>PO8</b>	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO9</b>	Individual and team work: Function effectively as an individual, an as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO10</b>	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 and Communication Systems**

**Curriculum**

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

Course Code	Title of the Course	Hours		Maximum Marks			Credits
		Theory	Practical	CIA	CEE	TOTAL	
FIRST SEMESTER							
11T	Language –I	4	-	25	75	100	4
12E	English – I	4	-	25	75	100	4
13A	<b>Core Paper I:</b> Basic Electronics	7	-	25	75	100	4
.- -	<b>Core Practical I:</b> Basic Electronics Lab	-	4	-	-	-	-
--	<b>Core Practical II:</b> Semiconductor Devices Lab	-	4	-	-	-	-
1AA	<b>Allied I</b> Mathematics–I	5	-	25	75	100	4
1FA	Environmental Studies *	2	-	-	50	50	2
<b>Total</b>		22	8	100	350	450	18
SECOND SEMESTER							
21T	Language – II	4	-	25	75	100	4
22E	English – II	4	-	25	25	50 <sup>@</sup>	2
2NM	Naan Mudhalvan Course- Generic Name: Language Proficiency for Employability Course Name: Effective English	2	-	25	25	50 <sup>#</sup>	2
23A	<b>Core Paper II:</b> Semiconductor Devices	7	-	25	75	100	4
23P	<b>Core Practical I:</b> Basic Electronics Lab	-	3	25	75	100	4
23Q	<b>Core Practical II:</b> Semiconductor Devices Lab	-	3	25	75	100	4
2AA	<b>Allied: II</b> Mathematics–II	5	-	25	75	100	4

**B.Sc. Electronics & Communication Systems 2023 -24 onwards-Affiliated Colleges**  
**Annexure No. 30(a)(2) SCAA DATED:18.05.2023**

2FB	Value Education – Human Rights *	2	-	-	50	50	2
	Swachh Bharat – Summer Internship \$	-	-	-	-	-	-
<b>Total</b>		24	6	175	475	650	26
<b>THIRD SEMESTER</b>							
31T	Language - III	4	-	25	75	100	4
32E	English - III	4	-	25	75	100	4
33A	<b>Core Paper III:</b> Electronic Circuits	6	-	25	75	100	4
--	<b>Core Practical III:</b> Digital Electronics lab	-	3	-	-	-	-
--	<b>Core Practical IV:</b> Electronic Circuits and Instrumentation Lab	-	3	-	-	-	-
3AD	<b>Allied: III</b> Object Oriented Programming using C++	3	-	20	55	75	3
3ZA	<b>Skill based Subject I:</b> Digital Principles and Applications	5	-	20	55	75	3
3FB/ 3FC	Tamil ** / Advanced Tamil * (OR) Non-major elective – I: Yoga for Human excellence */ Women's Rights *)	2	-	-	50	50	2
<b>Total</b>		24	6	115	385	500	20
<b>FOURTH SEMESTER</b>							
41T	Language - IV	4	-	25	75	100	4
42E	English - IV	4	-	25	75	100	4
43A	<b>Core Paper IV:</b> IC's and Instrumentation	4	-	25	75	100	4
43P	<b>Core Practical III:</b> Digital Electronics Lab	-	3	25	75	100	4

**B.Sc. Electronics & Communication Systems 2023 -24 onwards-Affiliated Colleges**  
**Annexure No. 30(a)(2) SCAA DATED:18.05.2023**

43Q	<b>Core Practical IV:</b> Electronic Circuits and Instrumentation Lab	-	3	25	75	100	4
4AD	<b>Allied: IV</b> Internet of Things	3	-	25	25	50 <sup>@</sup>	2
43R	<b>Core Practical V:</b> C++ Programming Lab	-	2	25	25	50	2
4ZB	<b>Skill based Subject II:</b> Digital and Cellular Communication	3	-	25	25	50 <sup>@</sup>	2
4FB/ 4FE	Tamil ** /Advanced Tamil * (OR) Non-major elective -II (General Awareness *)	2	-	-	50	50	2
4NM	Naan Mudhalvan Course- Generic Name: Digital skills for Employability Course Name: Office Fundamentals	2	-	25	25	50 <sup>#</sup>	2
<b>Total</b>		22	8	225	525	750	30

**FIFTH SEMESTER**

53A	<b>Core Paper V:</b> 8085 and Microprocessor Applications	6	-	25	75	100	4
5EA/ 5EB/ 5EC/ 5ED	<b>Elective – I</b>	6	-	25	75	100	4
5EE/ 5EF/ 5EG/ 5EH	<b>Elective - II</b>	6	-	25	75	100	4
--	<b>Core Practical VI:</b> Microprocessor and Microcontroller Lab	-	3	-	-	-	-
--	<b>Core Practical VII:</b> Industrial and Power Electronics Lab	-	3	-	-	-	-

**B.Sc. Electronics & Communication Systems 2023 -24 onwards-Affiliated Colleges**  
**Annexure No. 30(a)(2) SCAA DATED:18.05.2023**

--	<b>Core Practical VIII:</b> Electronic Communication Lab	-	3	-	-	-	-
5ZC	<b>Skill based subject – III</b> Internet and Java Programming	3	-	30	45	75	3
<b>Total</b>		21	9	105	270	375	15
<b>SIXTH SEMESTER</b>							
63A	<b>Core Paper VI:</b> 8051 Microcontroller and Embedded Systems	6	-	25	75	100	4
63P	<b>Core Practical VI:</b> Microprocessor and Microcontroller lab	-	3	25	75	100	4
63Q	<b>Core Practical VII:</b> Industrial and Power Electronics Lab	-	3	25	75	100	4
63R	<b>Core Practical VIII:</b> Electronic Communication Lab	-	3	25	75	100	4
67V	<b>PROJECT*</b>	4	-	-	100	100	4
6EI/ 6EJ/ 6EK/ 6EL	<b>Elective- III</b>	6	-	25	75	100	4
6ZP	<b>Skill based Subject –IV</b> Java Programming Lab	-	3	20	55	75	3
67A	Extension Activities **	-	-	50	-	50	2
6NM	Naan Mudhalvan Course: Salesforce	2	-	25	25	50 <sup>#</sup>	2
<b>Total</b>		18	12	220	555	775	31
<b>Grand Total</b>						<b>3500</b>	<b>140</b>

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



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

\$ Swachh Bharat – Summer Internship. Extra 2 Credits would be given. It is mandatory.

\*For Project report 80 marks and viva-voce 20 marks

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

@ **Allied: IV Internet of Things & Skill based Subject II: Digital and Cellular Communication**  
 University semester examination will be conducted for 50 marks  
 (As per existing pattern of Examination) and the marks will be converted to 25 marks.

#Naan Mudhalvan Course: CEE will be assessed by industry for 25 marks and CIA will be done by the course teacher.

Naan Mudhalvan	<a href="http://kb.naanmudhalvan.in/Bharathiar_University_(BU)">http://kb.naanmudhalvan.in/Bharathiar_University_(BU)</a>
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List of Elective papers (Colleges can choose any one of the papers as electives)		
Elective – I	A	ASIC Design
	B	Remote Sensing
	C	Mobile Computing
	D	Industrial and Power Electronics
Elective – II	E	Robotics and Automation
	F	Programmable Logic Control
	G	Automotive Electronics
	H	Satellite Communications
Elective – III	I	Fiber Optic Communication
	J	Virtual Instrumentation
	K	Biomedical Instrumentation
	L	VLSI Design



# **First Semester**

Course code	13A	BASIC ELECTRONICS		L	T	P	C
Core-I				7	T		4
Pre-requisite		Higher secondary Physics		Syllabus Version		2023-2024	
Course Objectives:							
The main objectives of this course are to:							
1. To become familiar with fundamentals of electronic components							
2. To learn to use common electronic components							
3. 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 concepts of resistors and inductors.						K2
2	Understand the basic concepts of capacitors.						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			12hours		
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’s Law of Electromagnetic Induction-Energy Stored in an Inductor-Inductance in Series and Parallel-Testing of Resistance and Inductance using Multimeter.							
Unit:2		CAPACITORS			12hours		
Principles of Capacitance-Parallel Plate Capacitor-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			12hours		
Potential Difference- Electric Current-Electromotive Force-Ohms Law- Kirchoff’s Law- Kirchoff’s Current 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			12hours		

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

<b>Unit:5</b>	<b>AC CIRCUITS</b>	<b>12hours</b>
Introduction to Sinusoidal Wave - RMS Value - Average Value - AC Circuits with Resistance- Circuits with XL Alone-Circuits with XC Alone-Series Reactance and Resistance - Parallel Reactance and Resistance - Series Parallel Reactance and Resistance - Real Power -		
<b>Total Lecture hours</b>		<b>60 hours</b>

**Text Book(s)**

- 1 S.Salivahanan, N.Suresh Kumar, A. Vallavaraj—**ELECTRONIC DEVICES AND CIRCUITS**—Tata McGraw-Hill Publishing Company Limited, New Delhi. 1998
- 2 B.V.Narayana Rao “**PRINCIPLES OF ELECTRONICS**”, Wiley Eastern Limited, 1992

**Reference Books**

- 1 Bernard Grob—**BASIC ELECTRONICS**-Tata McGraw-Hill Publishing Company Limited, 9th Edition.
- 2 B.L.Theraja,—**BASIC ELECTRONICS-SOLID STATE DEVICES**, S.Chand Company Ltd. 2000

**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=w8Dq8bITmSA>

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	S	S	M	M	M	M	M	M	M	M

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



# **Second Semester**



Course code	23A	SEMICONDUCTOR DEVICES	L	T	P	C
Core-II			7	T		4
Pre-requisite		Higher secondary physics	Syllabus Version			2023-2024
Course Objectives:						
The main objectives of this course are to:						
1. To enable the students to understand and gain the knowledge on semiconductor devices.						
2. To acquaint the students with construction, theory and characteristics of the electronic devices.						
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 - Analyze; K5 - Evaluate; K6 - Create						
Unit:1	PN JUNCTION DIODE				12 hours	
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				12 hours	
Zener Diode- V Characteristics–Breakdown–Backward Diode–Varactor Diode–Step Recovery Diode - Point Contact Diode – Scott key Diode - Tunnel Diode - Gunn Diode – Impatt Diode - PIN Diode – PNP Diode						
Unit:3	BJT				12 hours	
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 – Heat Sink						
Unit:4	FET AND UJT				12 hours	
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						

<b>Unit:5</b>	<b>OPTOELECTRONIC DEVICES</b>	<b>12 hours</b>
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 – Opto–Couplers		
	<b>Total Lecture hours</b>	<b>60 hours</b>

**Text Book(s)**

- 1 S.Salivahanan,N.SureshKumar,A.Vallavaraj,—**ELECTRONICSDEVICESAND CIRCUITS**||, Tata McGraw Hill Publishing Company Limited, New Delhi, 8th edition.
- 2 B.L.Theraja,—**BASICELECTRONICS–SOLIDSTATEDEVICES**||,S.Chand & Company Ltd.

**Reference Books**

- 1 S.L.Kakani,K.C.BhanDai—**A TEXTBOOK OF ELECTRONICS**||. S.Chand & Company Ltd.2000
- 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/108/108/108108122/>
- 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	M	S	L	M	L	S	M	M	M

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

Course code	23P	BASIC ELECTRONICS LAB	L	T	P	C
Core Practical - I			3		P	4
Pre-requisite		Higher secondary Physics	Syllabus Version		2023-2024	
Course Objectives:						
The main objectives of this course are to:						
1. To understand the fundamental principles of circuit theory						
2. To make use of circuit laws and theorems and measuring the circuit 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	Apply the electronic components in network theorems.					K3
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create						
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 Kirchoff'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
Course Designed By: K.Manikantan , Assistant Professor, Government Arts College ,Ooty& Dr.N Om Muruga , Assistant Professor, Government Arts College,Ooty

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

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	L	L	L	L	M	M	S	M	S
CO3	M	M	M	M	L	L	S	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	23Q	SEMICONDUCTOR DEVICES LAB	L	T	P	C
Core practical – II			3		P	4
Pre-requisite			Higher secondary Physics		Syllabus Version	2023-2024
Course Objectives:						
The main objectives of this course are to:						
1. To understand and experiment the basic parameters of electronic devices.						
2 To construct few applications using semiconductor devices.						
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	Use the special diodes for various applications					K3
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create						
ANY 16 EXPERIMENTS						
1. Band Gap Energy of Silicon /Germanium Diode						
2. V-I Characteristics of Junction Diode						
3. V-I Characteristics of Zener Diode						
4. Transistor Characteristics of CE Configuration						
5. Transistor Characteristics of CB Configuration						
6. Transistor Characteristics of CC Configuration						
7. Clipping Circuits						
8. Clamping Circuits						
9. Measurement of Stability Factor of Fixed Bias						
10. Measurement of Stability Factor of Self Bias						
11. V-I Characteristics of JFET						
12. V-I Characteristics of UJT						
13. UJT as Oscillator						
14. FET as Voltage Variable Resistor(VVR)						
15. Characteristics of LDR						
16. Characteristics of Solar Cell						
17. Study of IR (Tx & Rx)						
18. Study of LED and 7Segmentdisplay						
19. Temperature Co-efficient of Junction Diode						
20. Zener as a Voltage regulator						
21. ON / OFF control of relay using Opto-Couplers						
22. Characteristics of SCR						
23. TRIAC Characteristics						



<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://nptel.ac.in/courses/108/108/108108122/">https://nptel.ac.in/courses/108/108/108108122/</a>
2	<a href="https://nptel.ac.in/courses/108/108/108108112/">https://nptel.ac.in/courses/108/108/108108112/</a>
3	<a href="https://nptel.ac.in/courses/115/102/115102103/">https://nptel.ac.in/courses/115/102/115102103/</a>
Course Designed By: K.Manikantan , Assistant Professor, Government Arts College ,Ooty& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty	

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

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





# **Third Semester**

Course Code	33A	ELECTRONIC CIRCUITS	L	T	P	C
Core paper III			6	T		4
Pre-Requisite:	Basic Electronics		Syllabus Version		2023-2024	
Course Objectives:						
The Main Objectives of this course are to:						
<div><div>❖ To enable the students to understand and gain the knowledge on power supplies, amplifiers and oscillators.</div><div>❖ To Acquaint the students with construction, theory and characteristics of the electronic amplifier circuits and types of multivibrators.</div></div>						
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	Analyze the functions of Power amplifiers				K4	
4	Analyze 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 – Overload Protection – 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 – VoltageGain–PowerGain–SingleStageTransistorAmplifier–DCandACloadline–RC Coupled Amplifier – Gain Frequency Response – Bandwidth – Transformer Coupled Amplifier – Impedance Matching – 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 – Crossover Distortion – Complementary Symmetry Push Pull Amplifier						
Unit:4	FEEDBACK AMPLIFIERS				12hours	

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 –Piezo Electric Crystal and its Effects – Crystal Oscillator - AstableMultivibrator–Monostablemultivibrator–BistableMultivibrator–Schmitt Trigger		
Unit:6	Contemporary Issues	2 hours
<a href="https://nptel.ac.in/courses/108/102/108102097/#">https://nptel.ac.in/courses/108/102/108102097/#</a> Introduction to Electronic circuits NPTEL.		
<a href="https://nptel.ac.in/courses/108/102/108102095/">https://nptel.ac.in/courses/108/102/108102095/</a> Analog Electronic circuits NPTEL.		
	Total Lecture hours	60 hours
Text Book(s)		
1	S.K.Sahdev,— <b>ELECTRONIC PRINCIPLES</b> , Dhanpat Rai & Co (P)Ltd,2nd Edition, 1998	
2	B.L.Theraja, - <b>BASIC ELECTRONICS</b> , Chand Company Ltd, 2000	
Reference Books		
1	V.K.Metha, Rohit Metha, <b>PRINCIPLES OF ELECTRONICS</b> . S Chand, 2006 .	
2	B.Sasikala, C.Poornachandra, <b>ELECTRONIC DEVICES AND CIRCUITS</b> , Scitech 2003.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Website etc.]		
1	<a href="http://www.ee.iitm.ac.in/~ani/2012/ec5135/lectures.html">http://www.ee.iitm.ac.in/~ani/2012/ec5135/lectures.html</a> Lecture Notes	
2	<a href="https://nptel.ac.in/courses/108/102/108102097/#">https://nptel.ac.in/courses/108/102/108102097/#</a> Introduction to Electronic circuitsNPTEL.	
3	<a href="https://nptel.ac.in/courses/108/102/108102095/">https://nptel.ac.in/courses/108/102/108102095/</a> Analog Electronic circuits NPTEL.	
Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College & Dr.N Om Muruga . Assistant Professor, Government Arts College ,Ooty		

#### 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

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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	3ZA	DIGITAL PRINCIPLES AND APPLICATIONS	L	T	P	C
Skill Based Subject: I			5	T		3
Pre-Requisite:	Higher secondary Physics		Syllabus Version	2023-2024		
Course Objectives:						
The Main Objectives of this course are to: <ul style="list-style-type: none"><li>❖ To acquire the basic knowledge of Number system, Digital logic circuits and its application.</li><li>❖ To outline the formal procedures for the analysis and design of combinational and sequential circuits.</li><li>❖ To learn the concepts of A/D, D/A conversions and their types.</li></ul>						
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 SYSTEM AND CODES				12 hours	
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 – EBCDIC Codes – Hollerith Code – Parity Advantages.						
Unit:2	BOOLEAN ALGEBRA AND LOGIC GATES				12 hours	
Boolean logic operations – Boolean functions – Truth Tables – Basic Laws – DeMorgan’s 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	COMBINATIONAL LOGIC CIRCUITS				12 hours	

Half Adder – Full Adder – Half Subtractor – Full Subtractor – Parallel Binary Adder – 4-bit Binary Adder / Subtractor – BCD adder – Multiplexer – Demultiplexer – Decoders – Encoders – Parity Generators / Checkers – Magnitude Comparators – VHDL Coding for Combinational Circuits		
Unit:4	SEQUENTIAL LOGIC CIRCUITS	12 hours
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 – Successive Approximation Type – Accuracy and Resolution.		
	Total Lecture hours	60 hours
Text Book(s)		
1	Malvino & Leech, —DIGITAL PRINCIPLES AND APPLICATIONS, Tata McGraw Hill 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, NPTEL, Website etc.]		
1	<a href="https://soaneemrana.org/onewebmedia/DIGITAL%20PRINCIPLES%20AND%20APPLICATION%20BY%20LEACH%20&amp;%20MALVINO.pdf">https://soaneemrana.org/onewebmedia/DIGITAL%20PRINCIPLES%20AND%20APPLICATION%20BY%20LEACH%20&amp;%20MALVINO.pdf</a> E book, Malvino& Leech, —DIGITALPRINCIPLESAND APPLICATIONS, Tata McGraw Hill Edition X!,2011	
2	<a href="https://nptel.ac.in/courses/117/106/117106086/">https://nptel.ac.in/courses/117/106/117106086/</a> Introduction to digital circuits	
3	<a href="https://www.youtube.com/watch?v=CL3ups78jrs/">https://www.youtube.com/watch?v=CL3ups78jrs/</a> Introduction to digital Design	
Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College & Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty		

<b>Mapping with Programme Outcomes</b>										
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

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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
Allied: III			3	T	-	3
Pre-Requisite:	Students should have basic Computer Knowledge		Syllabus Version		2023-2024	
Course Objectives:						
The Main Objectives of this course are to:						
<div><div>❖</div>Impart knowledge of object-oriented programming concepts and implement them in C++.</div> <div><div>❖</div>Enable to differentiate procedure oriented and object-oriented concepts.</div> <div><div>❖</div>Equip with the knowledge of concept of Inheritance so that learner understands the need of inheritance.</div> <div><div>❖</div>Explain the importance of data hiding in object-oriented programming.</div>						
Expected Course Outcomes:						
On the Successful completion of the course, student will be able to:						
1	Define the different programming paradigm such as procedure oriented and object-oriented programming methodology and conceptualize elements of OO methodology.					K1
2	Illustrate and model real world objects and map it into programming objects for a legacy system.					K2
3	Identify the concepts of inheritance and its types and develop applications using overloading features.					K3
4	Discover the usage of pointers with classes.					K4
5	Explain the usage of Files, templates and understand the importance of exception Handling.					K5
K1: Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create						
Unit:1	INTRODUCTION TO C++					9 hours
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++ - For – While – Do...While loops – Functions in C++, In line Functions – Function Overloading.						
Unit:2	CLASSES AND OBJECTS					9 hours
Declaring objects – Defining member functions – Static member variables and functions – Array of objects – Friend functions – Overloading member functions – Bit fields and Class – Constructor and Destructors – Characteristics – Calling constructor and Destructors – Constructor and Destructor with static member.						
Unit:3	OPERATOR OVERLOADING					9 hours

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.		
<b>Unit:4</b>	<b>POINTERS</b>	<b>9 hours</b>
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.		
<b>Unit:5</b>	<b>FILES</b>	<b>9 hours</b>
File stream classes – File Modes – Sequential read/write operations – Binary and ASCII files – Random access operation – Templates – Exception handling – Strings – Declaring and initializing string objects – String attributes – Miscellaneous functions.		
	<b>Total Lecture hours</b>	<b>45 hours</b>
<b>Text Book(s)</b>		
1	Ashok N Kamthane, Object-Oriented Programming with Ansi And Turbo C++, Pearson Education, 2003.	
<b>Reference Books</b>		
1	E. Balagurusamy, Object-Oriented Programming with C++, TMH, 1998.	
2	Maria Litvin& Gray Litvin, C++ for you, Vikas publication, 2002.	
<b>Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]</b>		
1	shorturl.at/mruW9	
2	https://www.w3schools.com/cpp/	
Course Designed By:		
1. Dr. K. Venmathi, Assistant Professor, LRG Government College for Women,Tiruppur.		
2. Mr. M. Arun Prasad, Assistant Professor, KG College of Arts and Science,Coimbatore.		

**Mapping with Programme Outcomes**

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



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CO4	S	S	S	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	M	M	S

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



# **Fourth Semester**

Course Code	43A	IC'S AND INSTRUMENTATION	L	T	P	C
Core paper IV			4	T		4
Pre-Requisite:	Basic Electronics		Syllabus Version		2023-2024	
Course Objectives:						
The Main Objectives of this course are to:						
<div>❖ To impart the knowledge on IC fabrication, Timer, PLL, and electronic instruments</div> <div>❖ 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</div>						
Expected Course Outcomes:						
On the Successful completion of the course, student will be able to:						
1	Recognize the standards in IC Fabrication Technology.					K1
2	Understand the working of Timer and PLL					K2
3	Design simple circuits using Op Amp.					K6
4	Understand the principle of various types of transducers					K2
5	Study the construction and working of frequently used equipment's like CRO, Digital Voltmeter etc.					K4
K1: Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create						
Unit:1	IC FABRICATION TECHNOLOGY					12 hours
Fundamentals of Monolithic IC Technology – Basic Planar Process – Wafer Preparation – EpitaxialGrowth–Oxidation–Photolithography–DiffusionofImpurities–Isolation Techniques – Metallization – Monolithic Transistors – Integrated Resistors – Integrated Capacitors - Integrated Inductors - Thin and Thick film Technology.						
Unit:2	TIMER AND PLL					12 hours
Functional Block Diagram of 555 timer – Mono stable Operation–Applications:–Linear Ramp Generator – Pulse Width Modulator – A stable Operation – Applications: Schmitt Trigger–FSK Generator- Phase Locked Loop: Functional Block Diagram – Phase Detector / Comparator –Voltage Controlled Oscillator – Low Pass Filter – Applications: Frequency Multiplier / Division – AM Detection						
Unit:3	OPERATIONAL AMPLIFIER					12 hours
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					12 hours

Introduction–Electrical Transducer–Basic requirements of Transducer–Classification of Transducers – Selection of Transducers – Resistive Transducers – Potentiometers – Thermistors – Thermocouple – LVDT – RVDT – 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: Ramp Type DVM– Dual Slope Integrating Type DVM – Digital Multimeter – Humidity and Humidity Measurement – Measurement of PH.		
	Total Lecture hours	60 hours
Text Book(s)		
1	D.Roy Choudhury and Shahil B Jain, — <b>LINEAR INTEGRATED CIRCUITS</b> , Second Edition New Age International Publishers, 2004	
2	K.R. Botkar,— <b>INTEGRATED CIRCUITS</b> , 10th Edition Khanna Publishers, 2006	
Reference Books		
1	J.B. GUPTA— <b>A COURSE IN ELECTRONIC AND ELECTRICAL MEASUREMENTS AND INSTRUMENTATION</b> , 12th Edition, S.K Kataria & Sons	
2	A.K. Sawhney, <b>ELECTRICAL &amp; ELECTRONIC MEASUREMENTS AND INSTRUMENTATION</b> , Dhanpath Rai & Co (P) Ltd, 2004.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Website etc.]		
1	<a href="https://nptel.ac.in/courses/108/108/108108111/">https://nptel.ac.in/courses/108/108/108108111/</a> Integrated circuits, op-amps and their applications	
2	<a href="https://nptel.ac.in/courses/117/106/117106030/">https://nptel.ac.in/courses/117/106/117106030/</a> Analog IC Design	
Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College & Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.		

#### 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

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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	INTERNET OF THINGS	L	T	P	C
Allied IV			3	T		2
Pre-Requisite:	Basic Electronics		Syllabus Version		2023-2024	
Course Objectives:						
The Main Objectives of this course are to:						
❖ To enable the students to learn about IoT and also to understand the concept of embedded devices and Interfacing 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					6 hours
Introduction to IoT: Definition & Characteristics of IoT – Architecture of IoT – Technologies for IoT – Developing IoT Applications – Security in IoT						
Unit:2	DESIGN PRINCIPLES FOR CONNECTED DEVICES					6 hours
Introduction - IoT / M2m systems – Communication Technologies - Data management, data consolidation and Device management.						
Unit:3	PROGRAMMING FUNDAMENTALS WITH C USING ARDUINO IDE					6 hours
Arduino IDE- Data Types / Variables / Constant – Operators–Conditional Statements and Loops– Strings.						

<b>Unit:4</b>	<b>SENSORS AND ACTUATORS</b>	<b>6 hours</b>
Analog and Digital Sensors – Interfacing temperature sensor with Arduino – Interfacing LED and Buzzer with Arduino.		
<b>Unit:5</b>	<b>SENDING SENSOR DATA OVER INTERNET</b>	<b>6 hours</b>
Introduction to ESP8266 NODEMCU WiFi Module – Programming NODEMCU - Using WiFi and NODEMCU to transmit data from temperature sensor to Open Source IoT cloud platform.		
	<b>Total Lecture hours</b>	<b>30 hours</b>
<b>Text Book(s)</b>		
1	Arshdeep Bahga, Vijay Madiseti, “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.	
<b>Reference Books</b>		
1	Michael Margolis, “Arduino Cookbook”, O’Reilly, 2011	
2	Marco Schwartz, “Internet of Things with ESP8266”, Packt Publishing, 2016	
<b>Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]</b>		
1	<a href="https://nptel.ac.in/courses/106/105/106105166/">https://nptel.ac.in/courses/106/105/106105166/</a> Introduction to IoT Part I – Lecture 1	
2	<a href="https://ocw.cs.pub.ro/courses/iot/courses/02">https://ocw.cs.pub.ro/courses/iot/courses/02</a> Electronics for Internet of Things – Lecture II	
Course Designed By:		
1. Dr. K. Venmathi, Assistant Professor, LRG Government College for Women, Tiruppur.		
2. Mr. M. Arun Prasad, Assistant Professor, KG College of Arts and Science, Coimbatore.		

<b>Mapping with Programme Outcomes</b>										
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	4ZB	DIGITAL AND CELLULAR COMMUNICATION	L	T	P	C
Skill based Subject – II			3	T		2
Pre-Requisite:	Basic Electronics		Syllabus Version		2023-2024	
Course Objectives:						
The Main Objectives of this course are to: <ul style="list-style-type: none"><li>❖ To enhance the knowledge in communication with digital and cellular systems</li><li>❖ To learn the digital and cellular technology</li></ul>						
Expected Course Outcomes:						
On the Successful completion of the course, student will be able to:						
1	Know the concepts of data transmission systems				K1	
2	Analyze the Model of Communication system				K6	
3	Familiarize Digital carrier Modulation Schemes				K4	
4	Understand pulse modulation and quantization techniques				K2	
5	Analyze the cellular system design and technical challenges.				K4	
K1:Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create						
Unit:1	DATA TRANSMISSION				9 hours	
Introduction – Representation of Data Signal – Parallel and Serial Data Transmission – Transient Noise – Data Signal – Signal Shaping and Signaling Speed – Noise and Error Analysis – Repeaters.						
Unit:2	COMMUNICATION SYSTEM				9 hours	
Model of Communication System – Elements of Digital Communication System: Information Source, Source Encoder/Decoder, Communication Channel, Modulator, Demodulator, Channel Encoder/Decoder, Other Functional Blocks – Analysis of Communication System – Design of Communication System.						
Unit:3	DIGITAL CARRIER MODULATION SCHEMES				9 hours	
Binary Phase Shift Keying – Differential Phase Shift Keying – Differentially Encoded PSK – Quadrature Phase Shift Keying – Base Band Signal Receiver – Phase Shift Keying – Frequency Shift Keying – Non-Coherent Detection of FSK.						

Unit:4	PULSE MODULATION AND QUANTIZATION	9 hours
Pulse Amplitude Modulation - Pulse Width Modulation - Pulse Position Modulation - Quantization of Signals–Quantization Error–Pulse Code Modulation–Electrical Representation of Binary Digits–PCM System– Companding– Multiplexing PCM Signals – Differential PCM – Delta Modulation – Adaptive Delta Modulation		
Unit:5	DIGITAL CELLULAR SYSTEMS	9 hours
GSM Architecture – Layer Modeling – Transmission – Data Service – Multiple Access Scheme – Channel Coding Inter Leaving – Radio Resource Management – Mobility Management – Communication Management – Network Management – TDMA Architecture–Transmission and Modulation–CDMA–Terms of CDMA Systems–Call Processing – Hand Over Procedures		
	Total Lecture hours	45 hours
Text Book(s)		
1	Sam K .Shanmugam, —DIGITAL AND ANALOG COMMUNICATION SYSTEMS, John Wiley Publications, 2005	
2	John G.Proakis,—DIGITAL COMMUNICATIONSII,Tata McGraw Hill International,2001.	
Reference Books		
1	W.C.Y.Lee,—MOBILECELLULARTELECOMMUNICATIONII,McGrawHill Publications, 1995	
2	Ke-Lin Du, M.N.S.Swamy, “WIRELESS COMMUNICATIONSYSTEMSII, Cambridge University Press, 2010.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Website etc.]		
1	<a href="https://nptel.ac.in/courses/106/106/106106167/">https://nptel.ac.in/courses/106/106/106106167/</a> Wireless and Cellular Communication	
2	<a href="https://nptel.ac.in/courses/117/105/117105077/">https://nptel.ac.in/courses/117/105/117105077/</a> Digital Communication	
Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College.& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.		

#### **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

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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	43P	DIGITAL ELECTRONICS LAB	L	T	P	C
Core practical III:			3		P	4
Pre-Requisite:	Digital Electronics		Syllabus Version		2023-2024	
Course Objectives:						
The Main Objectives of this course are to: <ul style="list-style-type: none"><li>❖ To understand the logical operation of various gates and theorems</li><li>❖ To develop various digital circuits</li></ul>						
Expected Course Outcomes:						
On the Successful completion of the course, student will be able to:						
1	Understand the logical operation of various gates & theorems					K2
2	Analyze the circuit using Boolean laws					K4
3	Design the Adder and subtractor circuit using logic gates					K6
4	Design and analyze Combinational and Sequential circuits					K6
5	Acquire knowledge about VHDL code for design and simulate of digital logic circuits					K2
K1:Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create						
	DIGITAL ELECTRONICS LAB					90 hours
(ANY 16 EXPERIMENTS)						
1. Verification of Basic Gates and Universal Gates						
2. Verification of Demorgan’s Theorem						
3. 2-bit Comparator using Gates						
4. Half Adder and Full Adder						
5. Half Subtractor and Full Subtractor						
6. 4-bitBinaryAdder						
7. Multiplexer and Demultiplexers						
8. Encoder and Decoder						
9. BCD to 7-SegmentDisplay						
10. Study of Flip Flops						
11.Binary to Grey and Grey to Binary Conversion						
12. Shift Registers and Ring Counter						
13. Analog to Digital Converter						

14. Digital to Analog Converter 15. Op-Amp: Adder and Subtractor	
16. Op-Amp: Integrator and Differentiator 17. Current to Voltage and Voltage to Current Converter 18. Realize Basic gates from universal gates 19. Synchronous and Asynchronous Counter 20. Magnitude Comparator. 21. Design and Simulation of Basic Logic Gates using VHDL Coding. 22. Design and Simulation of adder using VHDL Coding. 23. Design and Simulation of subtractor Circuit using VHDL Coding	
<b>Total Lecture hours</b>	<b>90 Hours</b>
Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College.& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.	

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 AND INSTRUMENTATION LAB	L	T	P	C
Core /Elective / Supportive:	Core Practical IV		3		P	4
Pre-Requisite:	BASIC ELECTRONICS LAB		Syllabus Version	2023- 2024		
Course Objectives:						
The Main Objectives of this course are to: ❖ To understand the concept of working of regulated power supplies, rectifiers, amplifiers and oscillators. ❖ To experiment the modulation and detection techniques.						
Expected Course Outcomes:						
On the Successful completion of the course, student will be able to:						
1	Design power supply and rectifier circuits				K6	
2	Design Amplifier circuits				K6	
3	Design different Oscillator circuits				K6	
4	Design different Instrumentation circuits				K6	
5	Design circuits with Transducers				K6	
K1:Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create						
(Any 16 Experiments)						
1. DC Regulated Power Supply using Zener Diode 2. Voltage Doubler 3. Feedback Amplifier 4. Emitter Follower 5. Transformer Coupled Amplifier 6. Hartley Oscillator 7. Colpitts Oscillator 8. Phase shift Oscillator 9. Wein Bridge Oscillator 10. RC Coupled Amplifier 11. Half Wave and Full Wave Rectifier 12. Filter Circuits 13. Voltage to Current Converter 14. Current to Voltage Converter 15. Characteristics of Piezoelectric Transducer 16. Summing Amplifier 17. Difference Amplifier 18. Inverting and Non-Inverting Amplifier						

19. Temperature measurement using thermistor. 20. Displacement measurement using LVDT. 21. Instrumentation Amplifier 22. Weighing machine using load cell 23. Characteristics of photo voltaic cell (solar cell)
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	<b>Total Lecture hours</b>	<b>90 hours</b>
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Course Designed By:

1. Dr. K. Venmathi, Assistant Professor, LRG Government College for Women, Tiruppur.
2. Mr. M. Arun Prasad, Assistant Professor, KG College of Arts and Science, Coimbatore.

<b>Mapping with Programme Outcomes</b>										
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	C++ PROGRAMMING LAB	L	T	P	C
Core Practical V			2		P	2
Pre-requisite		Basic computer skills and familiarity with Microsoft Windows.	Syllabus Version		2023-2024	
Course Objectives:						
The main objectives of this course are to:						
1. Impart knowledge of object-oriented programming concepts and implement them in C++						
2. Enable to differentiate procedure oriented and object-oriented concepts.						
3. Equip with the knowledge of concept of Inheritance so that learner understands the need of inheritance.						
4. Explain the importance of data hiding in object-oriented programming.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Define the different programming paradigm such as procedure oriented and object-oriented programming methodology and conceptualize elements of OO methodology					K1
2	Illustrate and model real world objects and map it into programming objects for a legacy system.					K2
3	Identify the concepts of inheritance and its types and develop applications using overloading features.					K3
4	Discover the usage of pointers with classes.					K4
5	Explain the usage of Files, templates and understand the importance of exception Handling.					K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Programs			36 hours			
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 employee number, employee name, 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.

**Text Book(s)**

- |   |   |
|---|---|
| 1 | Ashok N Kamthane, Object-Oriented Programming with Ansi And Turbo C++, Pearson Education, 2003. |
|---|---|

**Reference Books**

- |   |   |
|---|---|
| 1 | E. Balagurusamy, Object-Oriented Programming with C++, TMH, 1998. |
| 2 | Maria Litvin& Gray Litvin, C++ for you, Vikas publication, 2002.  |

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

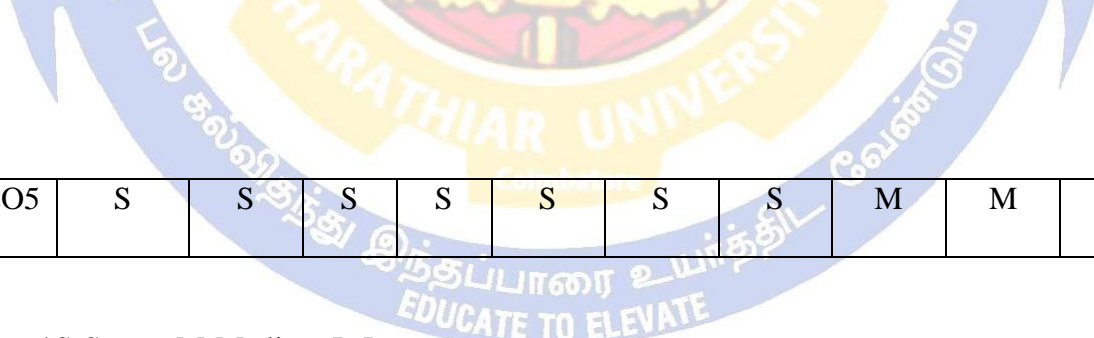
- |   |   |
|---|---|
| 1 | <a href="http://shorturl.at/mruW9">shorturl.at/mruW9</a>                    |
| 2 | <a href="https://www.w3schools.com/cpp/">https://www.w3schools.com/cpp/</a> |

**Course Designed By:**

1. Dr. K. Venmathi, Assistant Professor, LRG Government College for Women,Tiruppur.
2. Mr. M. Arun Prasad, Assistant Professor, KG College of Arts and Science,Coimbatore.

**Mapping with Programme Outcomes**

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



CO5	S	S	S	S	S	S	S	M	M	S
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\*S-Strong;M-Medium;L-Low



# **Fifth Semester**

Course code	53A	8085 MICROPROCESSOR AND APPLICATIONS	L	T	P	C
Core V			6	T		4
Pre-requisite	Requires the basic of Digital circuits and Programming languages		Syllabus Version		2023-2024	
Course Objectives:						
The main objectives of this course are to:						
1. To enable the students to learn the Microprocessor Architecture.						
2. To learn the instruction set of 8085 and to develop programming skills.						
3. To know various peripheral devices and to interface them with 8085.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Explain the 8085-microprocessor architecture and its instruction set.					K1
2	Understand and realize the Interfacing of memory & various I/O devices with 8085 Microprocessor					K2
3	Interface the 8085 microprocessors with various peripheral devices.					K3
4	Understand the operation of Programmable Interface Devices and realize the programming & interfacing of it with 8085 microprocessors.					K4
5	Explain the need for different interfacing devices					K5
6	Program the microprocessor for various applications.					K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit:1	Introduction to 8085				14—hours	
Pin Diagram – Architecture – Demultiplexing the Bus – Generation of Control Signals – Fetching, Decoding and Execution of Instruction – Instruction Timing and Operation Status.						
Unit:2	Instruction Set and Addressing Modes				15—hours	
Instruction Set – Addressing Modes – Instruction Format – Simple Program – Memory Read Machine Cycle– Memory Write Machine Cycle						
Unit:3	Interfacing Concepts				14—hours	
Peripheral I/O Instructions – Device Selection and Data Transfer – Input Interfacing – Practical Input Interfacing Using Decoders – Interfacing O/P Devices: LED and 7 Segment Display – Interfacing Memory – Memory Time and Unit States						
Unit:4	Parallel and Serial Interface				14—hours	
Introduction to Programmable Peripheral Interface 8255 – Pin Diagram – Architecture – Modes of Operation: I/O and BSR – Architecture and Operation of 8251 (USART) INTERRUPT AND TIMER LOGIC 8085 Interrupts – Architecture of Programmable Interrupt Controller 8259— Architecture of 8254 Programmable Interval Timer / Counter – Modes of Operation of 8254 – Generating Square Wave Using 8254						

<b>Unit:5</b>	<b>Applications</b>	<b>15—hours</b>
Time Delay Program – Traffic Light Control System – Water Level Controller – Stepper Motor Control – Interfacing DAC – Interfacing ADC – Temperature Measurement		
	<b>Total Lecture hours</b>	<b>72--hours</b>

<b>Text Book(s)</b>	
1	R.S.Gaonkar,— <b>MicroprocessorArchitecture,ProgramAndItsApplicationWith8085</b> ll, New Age International (P)Ltd,
2	S.Malarvizhi,— <b>MicroprocessorandItsApplication</b> ll,—AnuradheAgenciesPublications—I edition, March1999.
<b>Reference Books</b>	
1	DoughlasV.Hall, “ <b>Microprocessors and Interfacing, Programming and Hardware</b> ”, TMH,2012
2	M. Rafi Quazzaman, " <b>Microprocessors Theory and Applications: Intel and Motorola</b> ", : Prentice Hall of India, Pvt. Ltd., New Delhi, 2003.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://nptel.ac.in/courses/108/103/108103157/">https://nptel.ac.in/courses/108/103/108103157/</a>
2	<a href="https://www.youtube.com/watch?v=t0Z8P_hpbFk&amp;vl=en">https://www.youtube.com/watch?v=t0Z8P_hpbFk&amp;vl=en</a>
3	<a href="https://www.youtube.com/watch?v=fS7FFOaC_iQ">https://www.youtube.com/watch?v=fS7FFOaC_iQ</a>
Course Designed By: M.Baskaran, Assistant Professor , KSG College of Arts and Science&Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.	

#### 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	5ZC	INTERNET AND JAVA PROGRAMMING	L	T	P	C
Skill based Subject – III			3	T		3
Pre-requisite	This course requires that the students are familiar with programming language such as C/C++ and data structures, algorithms		Syllabus Version		2023-2024	
Course Objectives:						
The main objectives of this course are to:						
1. To design of the subject is to provide knowledge about internet, Java data types, classes and files.						
2. To learn the internet concept and Java programming systems.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Gain knowledge about the concepts of Internet and able to program the applications using Java.					K1
2	Design, create, build, and debug Java applications and applets					K2
3	Implement object-oriented programming concepts in Java.					K3
4	Demonstrate use of Multithreading in Java application.					K4
5	Enhance logical reasoning and programming skills.					K5
6	Develop application incorporating features like Package, Exception Handling, I/O handling.					K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit:1	Introduction to Internet			7--hours		
Internet – Introduction- Understanding Internet- Internet Addressing - Hardware Requirements to connect to the Internet.						
Unit:2	Basics of java			7--hours		
Data Types, Arrays, Operators, Flow Control – Branching, Looping						
Unit:3	Inheritance and Interfaces			7--hours		
Classes – New Operator, Dot Operator, Method Declaration and Calling, Constructors, This in Constructors, Inheritance, Super, Method Overriding Final, Finalize, Static, Package and Import Statement, Interface and Implements						
Unit:4	Exception Handling and Multithreading			7--hours		
Exception Handling – Exception Types, Uncaught and Calling, Nested Try Statements, Java Thread Model, and Thread, Runnable, Thread Priorities, Synchronization, Deadlock						

<b>Unit:5</b>	<b>Managing I/O Operation and Applet</b>	<b>8--hours</b>
File – Input Stream, Output Stream, and File Stream. Applets-Tag, Order of Applet Initialization, Repainting, Sizing Graphics- Introduction to AWT Programming		
	<b>Total Lecture hours</b>	<b>36--hours</b>
<b>Text Book(s)</b>		
1	Harley Hahn, — <b>The internet complete reference</b> ll, Tata McGraw publicity, 2nd Edition , 1997	
2	Patrick Naughton., — <b>Patrick Naughton</b> ll, Then Java hand book, Tata McGraw, 1997	

<b>Reference Books</b>	
1	Herbert Schildt, “The Complete Reference, Java”, McGraw-Hill.
2	E.Balaguruswamy, “Programming with Java A Primer”, McGraw-Hill.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://www.youtube.com/watch?v=pWusFlk747Y">https://www.youtube.com/watch?v=pWusFlk747Y</a>
2	<a href="https://www.youtube.com/watch?v=M9G_VeQgy7I">https://www.youtube.com/watch?v=M9G_VeQgy7I</a>
3	<a href="https://www.youtube.com/watch?v=3u1fu6f8Hto">https://www.youtube.com/watch?v=3u1fu6f8Hto</a>
Course Designed By: M.Baskaran, Assistant Professor , KSG College of Arts and Science & Dr.N Om Muruga , Assistant Professor, Government Arts College , Ooty.	

<b>Mapping with Programme Outcomes</b>										
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	8051 MICROCONTROLLER AND EMBEDDED SYSTEMS	L	T	P	C
Core VI			6	T		4
Pre-requisite		Digital Electronics, 8085 Microprocessor	Syllabus Version		2023-2024	
Course Objectives:						
The main objectives of this course are to:						
1. Study the architecture and addressing modes of 8051.						
2. Impart knowledge about assembly language programs of 8051.						
3. Helps to understand the importance of different peripheral devices & their interfacing to 8051.						
4. Impart knowledge of different types of external interfaces including LEDS, LCD, keypad Matrix, Switches & Seven segment display.						
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 Microcontroller.					K2
3	Design various applications using its peripherals.					K3
4	Analyze the data transfer through serial and parallel ports.					K4
5	Learn basic hardware of various microcontrollers.					K2
6	Foster ability to understand the role of embedded systems in industry					K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit:1		Overview and Instruction Set			14—hours	
Microcontrollers and Embedded Processors – Microcontrollers for Embedded Systems – Overview of 8051 Family – 8051 Instruction Set and Registers.						
Unit:2		Assembly Programming and Addressing Modes			15—hours	
Introduction to 8051 Assembly Programming–The Program Counter and ROM– Data Types and Directives–Flag Bits and PSW Register–Register Bank and Stack–Loop and Jump Instructions – I/O Port Programming – Addressing Modes.						
Unit:3		Arithmetic and Logical Operations In AIP and C			14—hours	
Arithmetic Instructions and Programs – Unsigned Addition and Subtraction and Unsigned Multiplication and Division – Logic Instructions and Programs – Single Bit Instructions and Programming. Programming with C: Data Types–Time Delay Programming–I/O Programming – Logic Operations Arithmetic Operations						
Unit:4		8051 Interrupts and Peripherals			14—hours	
Basic Registers of Timer – Programming 8051 Timer – Counter Programming – Basics of Serial Communication–8051 Connection to RS232–8051 Serial Communication Programming – 8051 Interrupts – Programming External Hardware Interrupts						

<b>Unit:5</b>	<b>Real World Applications</b>	<b>15—hours</b>
Interfacing LCD to the 8051–Interfacing ADC–Interfacing Sensors to 8051–Interfacing Stepper Motor – 8051 Interfacing to the Keyboard – Interfacing DAC to the 8051		
	<b>Total Lecture hours</b>	<b>72--hours</b>

<b>Text Book(s)</b>	
1	Muhammad Ali Mazidi, Janice GillispieMazidi and Rolin D. McKinlay, “The 8051 Microcontroller And Embedded Systems Using Assembly And C ”, PHI, 2nd edition 2006.
2	Ayala J.K., The 8051 Microcontroller: Architecture, programming and applications, Penram International (2005) 3rd ed.
<b>Reference Books</b>	
1	Mazidi,E. and Mazidi,F., The 8051 Microcontroller and Embedded Systems, Prentice-Hall of India (2004) 2nd ed.
2	Peatman J., Embedded system Design using PIC18Fxxx, Prentice Hall, 2003.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://www.youtube.com/watch?v=84YUQu8tE4w">https://www.youtube.com/watch?v=84YUQu8tE4w</a>
2	<a href="https://www.youtube.com/watch?v=GPz_mR7Flas">https://www.youtube.com/watch?v=GPz_mR7Flas</a>
3	<a href="https://www.youtube.com/watch?v=uFhDGagZzjs">https://www.youtube.com/watch?v=uFhDGagZzjs</a>
Course Designed By: M.Baskaran, Assistant Professor , KSG College of Arts and Science&Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.	

<b>Mapping with Programme Outcomes</b>										
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	Microprocessor and Microcontroller Lab	L	T	P	C
Core Practical-VI					3	4
Pre-requisite		Requires the basic of Digital circuits and Programming languages	Syllabus Version		2023-2024	
Course Objectives:						
The main objectives of this course are to:						
1. To introduces the assembly language programming of Microprocessor and Microcontroller.						
2.It develops the student’s Assembly language programming skills and gives practical training of interfacing the peripheral devices with the Microprocessor and Microcontroller.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Learn assembly language programming of Microprocessor and Microcontroller with interfacing the peripheral devices.					K3
2	Program the microprocessor for various applications.					K6
3	Interface the 8085 microprocessor with various peripheral devices.					K3
4	Analyze the data transfer through serial and parallel ports.					K4
5	Program the micrcontroller for various applications.					K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						

**(ANY 16 EXPERIMENTS)**

**8085 MICROPROCESSOR LAB**

1. Addition / Subtraction of 8 / 16 bit Data
2. Multiplication / Division 8 bit Data
3. Block Data Transfer
4. Smallest / largest of N Numbers
5. To arrange in ascending / Descending Order
6. Sum of N 8-bit Numbers
7. 1's and 2's Compliment of an Array(8bit)
8. UP/DOWN Counter using 7 Segment Displays
9. Traffic Light Control Interface
10. Data Transfer using 255(PPI)
11. Square wave generator using 8255
12. ADC Interface
13. DAC Interface
14. Stepper Motor Interface

**8051 MICROCONTROLLER LAB**

15. Arithmetic and Logical Programs
16. Key Interface
17. LED Interface
18. Solid State Relay Interface
19. Square Wave Generation
20. ADC Interface
21. DAC Interface
22. Stepper Motor Interface
23. LCD Interface

**Course Designed By:** M.Baskaran, Assistant Professor , KSG College of Arts and Science & Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.

**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

**B.Sc. Electronics & Communication Systems 2023 -24 onwards-Affiliated Colleges**  
**Annexure No. 30(a)(2) SCAA DATED:18.05.2023**

CO5	M	M	S	S	S	L	L	L	S	M
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\*S-Strong;M-Medium;L-Low

Course code	63Q	INDUSTRIAL AND POWER ELECTRONICS LAB	L	T	P	C
Core Practical-VII					3	4
Pre-requisite		Basic knowledge of Electronic Circuits or permission of instructor	Syllabus Version		2023-2024	
Course Objectives:						
The main objectives of this course are to:						
1. To make the students to design triggering circuits of SCR.						
2. To understand the characteristics of power electronic devices.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Design triggering circuits of SCR					K2
2	Understand the characteristics of power electronic devices.					K3
3	Acquire knowledge about fundamental concepts and techniques used in power electronics.					K2
4	Foster ability to identify basic requirements for power electronic 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						
(ANY 16 EXPERIMENTS)						
1. Triggering of SCR by R, C and Diac.						
2. Design of snubber circuit.						
3. Fan regulator using Triac.						
4. Thyristor chopper.						
5. TRIAC Flasher.						
6. Commutation Techniques.						
7. Speed control of DC motor using SCR.						
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 for PCB						
18. Etching Drilling and Component mounting of PCB						
19. Temperature controller using AD 590/ LM 35.						
20. Construction of Emergency Lamp.						
21. Phase Control Circuit						
22. Cycloconverter						
23. Thyristor protection circuit						

Course Designed By: M.Baskaran, Assistant Professor , KSG College of Arts and Science&Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.

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	Electronic Communication Lab	L	T	P	C
Core Practical-VIII					3	4
Pre-requisite		Basic knowledge of Electronic Communication	Syllabus Version		2023-2024	
Course Objectives:						
The main objectives of this course are to:						
1. To Understand the concept of Digital Communication						
2. To experiment the Modulation and Detection techniques						
3. To study about wireless communication technologies.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the concept of Digital Communication and wireless communication technologies.					K2
2	Obtain experiment knowledge about the Modulation and Detection techniques					K3
3	Familiarize Digital carrier Modulation Schemes					K4
4	Analyze the Model of Communication system					K4
5	Analyze the cellular system design and technical challenges.					K4
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						



**(ANY 16 EXPERIMENTS)**

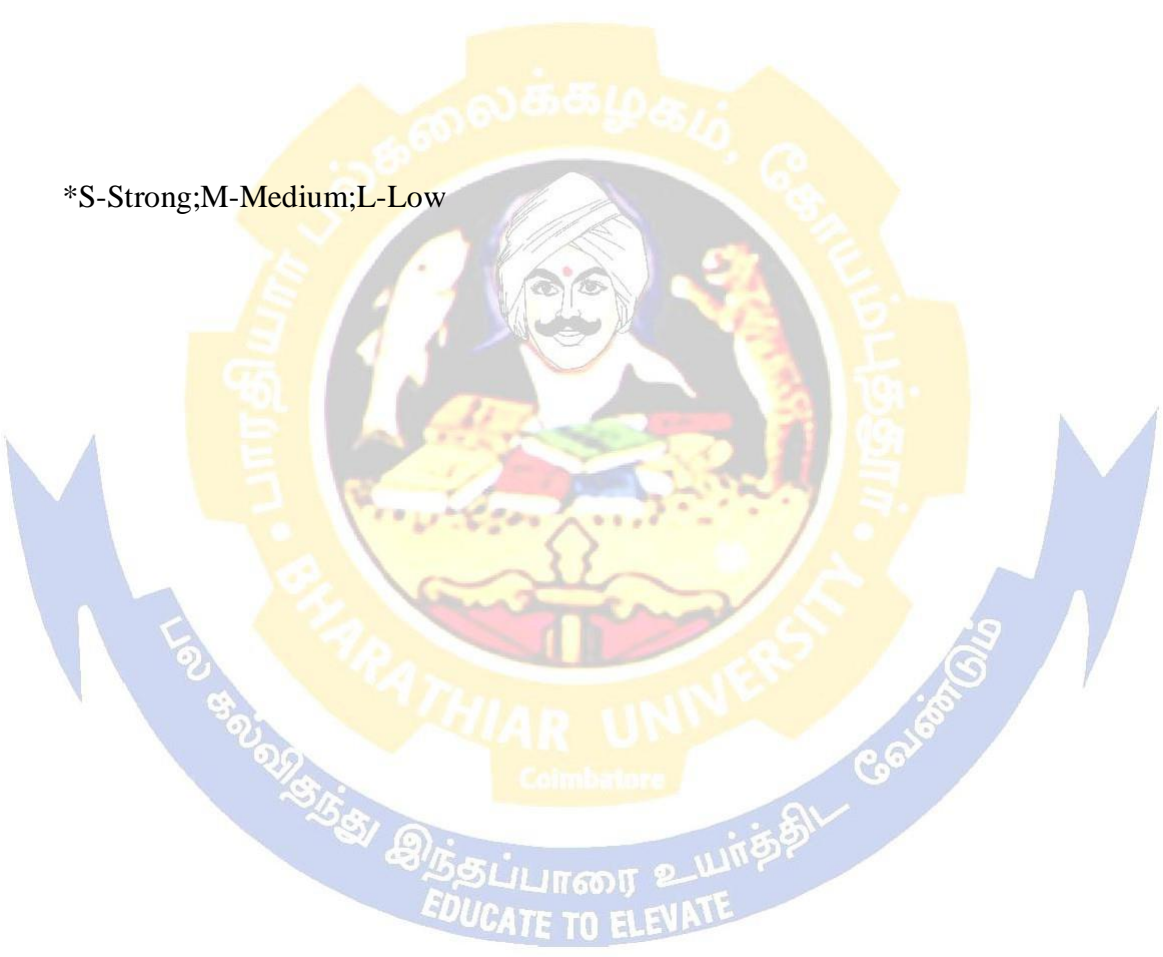
1. Pulse Amplitude Modulation (PAM) and Detection
2. Pulse Width Modulation (PWM) and Pulse Position Modulation(PPM)
3. Generation and Detection of PCM
4. Generation of delta and Adaptive delta modulation
5. Amplitude Shift Keying
6. Frequency Shift Keying
7. Phase Shift Keying
8. QPSK
9. DPSK
10. Study of TDM/FDM
11. Full duplex communication model
12. Alignment of satellite receiver
13. Study of GPS Handset
- 14 Study of GSM Module
- 15 PIN Diode Characteristics
- 16 Laser Diode
- 17 Characteristics
- 18 Fiber Optics TX and Rx
- 19 Signal Sampling and Reconstruction
- 20 GUNN diode Oscillator
- 21 Reflex Klystron Characteristics using micro wave bench
- 22 Radiation pattern of HORN antenna.
- 23 Radiation pattern of Dipole & Yagi Uda antennas
- 24 Radiation pattern Loop & array antennas

Course Designed By: M.Baskaran, Assistant Professor , KSG College of Arts and Science&Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.

**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	JAVA PROGRAMMING LAB	L	T	P	C
Skill Based Subject: IV	Practical.		3		P	3
Pre-requisite	Basic computer skills and familiarity with Microsoft Windows. students are familiar with programming language such as C/C++ and data structures, algorithms		Syllabus Version		2023-2024	
Course Objectives:						
The main objectives of this course are to:						
1. The main objective of JAVA Programming Lab is to provide the students a strong foundation on programming concepts and its applications through hands-on training.						
2.Gain knowledge about basic Java language syntax and semantics to write Java programs.						
3.To implement and gain knowledge in Arrays, functions, Structures, Pointers and File handling.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the basic concepts of Java Programming with emphasis on ethics and principles of professional coding.					K1, K2
2	Demonstrate the creation of objects, classes and methods and the concepts of constructor, methods overloading, Arrays, branching and looping.					K2
3	Create data files and Design a page using AWT controls and Mouse Events in Java programming Implement the concepts of code reusability and debugging.					K2, K3
4	Develop applications using Strings, Interfaces and Packages and applets					K3
5	Construct Java programs using Multithreaded Programming and Exception Handling					K3
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						

**JAVA PROGRAMMING (ANY 12 PROGRAMS)**

1. Program to print the following triangle of numbers 1 121231234
2. Defining a class with the following attributes 1.xname 2.Date of Birth 3.Date on which leg injection has to be given (sixty days from date of birth) 4.xdate on which polio drops is to be given (45 days from Date of birth). Write a constructor to construct the baby object. The constructor must find out the leg and polio drops dates from the date of birth. In the main program define a baby and display its details
3. Program to create and display a message on the window
4. Program to draw several shapes in the created window.
5. Program to create an applet and draw gridlines.
6. Java program to create a frame with two buttons called father and mother. When we click the father button the name of the father, his age and designation must appear. When we click mother similar details of mother appear.
7. Java program to create a frame with four text fields for name, age and qualification and a text field of multiple lines for address.
8. Program to draw circle, ellipse, square and rectangle at the mouse click position.
9. Java program to create four text fields for the name, street, city and pin code with suitable labels. Also add a button called my details, when you click the button your name, street, city and pin code must appear in the text fields.
10. Java program to demonstrate the multiple selection list boxes.
11. Program to create a canvas which displays a clock with hour hand and a minute hand depending upon an int variable minutes. Write another program with a frame, which displays the clock canvas. It must also have three buttons, tick, reset and close. When we click reset, the clock must reset to 12 hrs. When we click close, the frame closes.
12. Java program to create a menu bar and pull down menus.
13. Java program to create a window when we press M or m the window displays Good Morning A or the window displays Good Afternoon or the window displays Good Evening or n the window displays Good Night.
14. Java program to move different shapes (Circle, Ellipse, Square, and Rectangle) according to the arrow key pressed.
15. Program to handle the divide by zero exception.
16. Program to explain the multithreading with the use of multiplication tables. Three threads must be defined and each one must create one multiplication table; they are 5 tables, 7 tables and 13 table.
17. Program to illustrate thread priority. Create three threads and assign three different priorities.



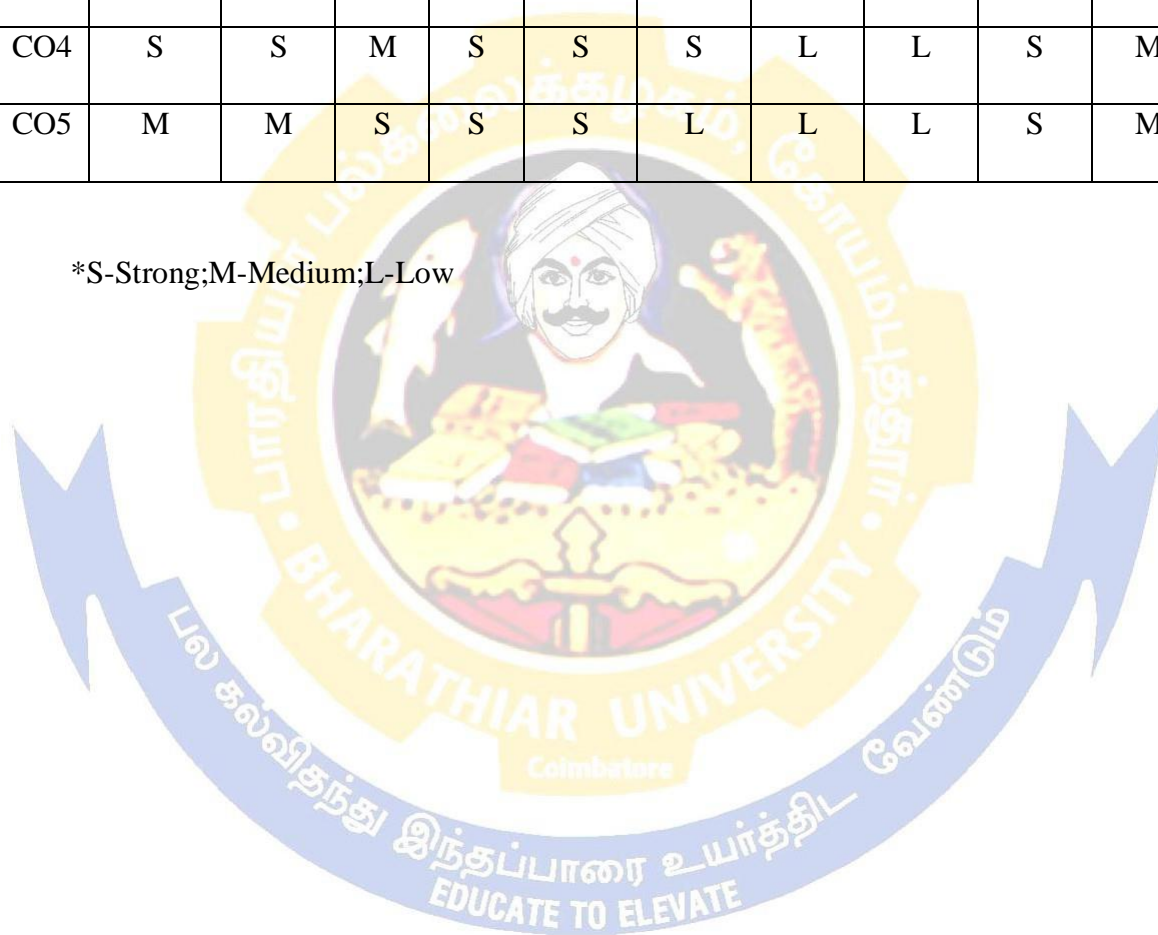
Course Designed By:

1. Dr. K. Venmathi, Assistant Professor, LRG Government College for Women, Tiruppur.
2. Mr. S. Venkatesan, Assistant Professor, KSG College of Arts and Science, Coimbatore.

**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	ASIC DESIGN	L	T	P	C
Elective I - A			6			4
Pre-Requites	Basic Electronics		Syllabus Version		2023-2024	
<b>Course Objectives:</b>						
<b>The Main Objectives of this course are to:</b> <ul style="list-style-type: none"><li>❖ To prepare the student to be an entry-level industrial standard ASIC or FPGA designer.</li><li>❖ To understand the issues and tools related to ASIC/FPGA design and implementation and basics of System on Chip and Platform based design.</li></ul>						
<b>Expected Course Outcomes:</b>						
On the Successful completion of the course, student will be able to:						
1	Know the concepts of data transmission systems					K1
2	analyze the Model of Communication system					K6
3	Familiarize Digital carrier Modulation Schemes .					K4
4	Understand pulse modulation and quantization techniques					K2
5	Analyze the cellular system design and technical challenges.					K4
<b>K1:Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create</b>						
<b>Unit:1</b>	<b>INTRODUCTION TO ASICS</b>					<b>18 hours</b>
Types of ASICS: Full-Custom ASIC–Standard Cell-Based ASIC–Gate Array Based ASIC Channelled Gate Array - Structured Gate Array – Programmable Logic Devices – FPGA, Design Flow – Case Study						
<b>Unit:2</b>	<b>CMOS LOGIC</b>					<b>18 hours</b>
CMOS Transistors –Design Rules – Combinational Logic Cells: Pushing Bubbles – DriveStrength–TransmissionGates–EX-ORCell,SequentialLogicCells:FF–Clocked Inverter, Data Path Logic Cells: Data Path Elements						
<b>Unit:3</b>	<b>ASIC DESIGN</b>					<b>18 Hours</b>
Programmable ASICS: Antifuse – StaticRAM – EPROM and EEPROM Technology-Programmable ASIC Logic Cells: Actel ACT - Xilinx LCA and Altera FLEX Architectures - Programmable ASIC I/O Cells: DC Output –DC Input, Programmable ASIC Design Software: Logic Synthesis – FPGA Synthesis.						
<b>Unit:4</b>	<b>VHDL</b>					<b>18hours</b>
Introduction to VHDL – Behavioral, Data Flow and Structural Model - Operators – Data Objects - Data Types - Design Examples						
<b>Unit:5</b>	<b>VERILOG</b>					<b>18 hours</b>

**B.Sc. Electronics & Communication Systems 2023 -24 onwards-Affiliated Colleges**  
**Annexure No. 30(a)(2) SCAA DATED:18.05.2023**

Introduction - Language Elements- Gate-Level modeling- Data Flow- Behavioral- Structural Modeling – Modeling Examples		
	<b>Total Lecture hours</b>	<b>90 hours</b>

<b>Text Book(s)</b>	
1	MichaelJohnSebastianSmith,— <b>APPLICATIONSPECIFICINTEGRATED CIRCUITS"</b> , Addition- Wesley, 2nd reprint,2000.
2	Bhasker. J, " <b>VHDL PRIMER</b> ", BS Publications, 2001
3	Bhasker.J. <b>  A VERILOG HDL PRIMER  </b> , BS Publications, 2001
<b>Reference Books</b>	
1	Charles.J.Roth,— <b>DIGITALSYSTEMDESIGNUSINGVHDL  </b> ,PWSPublishing (Thomson learning),2002.
2	StephenBrown,ZvonkoVranesic,— <b>FUNDAMENTSOFDIGITALLOGICWITH VHDL DESIGN  </b> Tata McGraw-Hill,2002
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Website etc.]</b>	
1	<a href="https://nptel.ac.in/courses/106/105/106105161/">https://nptel.ac.in/courses/106/105/106105161/</a> VLSI Physical Design
Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College.& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty, C. N Omprakash Anand , Assistant Professor, Government Arts College ,Ooty.	

### 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	5EB	REMOTE SENSING		L	T	P	C
Elective I - B				6			4
Pre-Requites:	Basic Electronics			Syllabus Version		2023-2024	
Course Objectives:							
<b>The Main Objectives of this course are to:</b> <ul style="list-style-type: none"><li>❖ To design fully equipped with concepts, methodologies and applications of Remote Sensing Technology.</li><li>❖ To Define and describe remote sensing and explain its applications, history, electromagnetic spectrum and interactions with various types of media.</li></ul>							
Expected Course Outcomes:							
On the Successful completion of the course, student will be able to:							
1	Know the concepts of data transmission systems						K1
2	analyze the Model of Communication system						K6
3	Familiarize Digital carrier Modulation Schemes.						K4
4	Understand pulse modulation and quantization techniques						K2
5	Analyze the cellular system design and technical challenges.						K4
K1:Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create							
Unit:1	PRINCIPLES OF REMOTE SENSING						18 hours
Remote Sensing System and its Components - Electromagnetic Spectrum - Definition of Emissivity - Reflectance - Absorbance and Transmittance - Spectral Signature - Atmospheric Window - Active and Passive Remote Sensing Systems - Interaction of Electromagnetic Energy with Atmosphere and Earth Features - Factors Affecting the Reflectance							
Unit:2	PLATFORMS AND SENSORS						18 hours
Airborne and Space Platforms - Advantages and Disadvantages of each Principle and Functioning of Camera - Films, Multi-Spectral, Thermal & Line Scanners, Side Looking Air Borne Radars - Hyperspectral Sensors - Different Satellite and Sensor Combinations: LANDSAT – SPOT - IRS Series of Satellites and Sensors.							
Unit:3	IMAGE CHARACTERISTICS AND INTERPRETATION						18 hours
DifferencesbetweenAerialandSpaceBorneImagery-ElementsofVisualInterpretation of Images - Radiometric Processing Including Correction of Instrumental Artifacts - Atmospheric Corrections; Geometric Corrections - Registration. Geometric Enhancement including Spatial Filtering - Edge Detection and Enhancement.							
Unit:4	DIGITAL IMAGE PROCESSING						18 hours

Image Transformations - Subtraction – Rationing - NDVI and PCA - Thematic Classification and Clustering to Include Unsupervised and Supervised Classification Based on Minimum Distance and Maximum Likelihood Classification - Accuracy Assessment of Classification - Concepts of Hyperspectral Image Analysis		
Unit:5	ANCILLARY DATA SOURCES AND INTEGRATION	18 hours
Ground Truth-Geographic and Radiometric-Introduction of GIS-Integration of Remote Sensing and GIS -Digital Terrain Models - GPS and its Role to Remote Sensing Data.		
	Total Lecture hours	90 hours
Text Book(s)		
1	Lillesand, T.M. and Kiefer, R.W., REMOTE SENSING AND IMAGE INTERPRETATION.	
2	Curran, Paul J., PRINCIPLES OF REMOTE SENSING	
3	Campbell, J.B., INTRODUCTION OF REMOTE SENSING	
Reference Books		
1	Sabins, F.F., REMOTE SENSING: PRINCIPLES AND INTERPRETATIONS	
2	Reddy, M. Anji, REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM	
Related Online Contents [MOOC, SWAYAM, NPTEL, Website etc.]		
1	<a href="https://www.coursera.org/lecture/gis-applications/remote-sensing-basics-wr6Kd">https://www.coursera.org/lecture/gis-applications/remote-sensing-basics-wr6Kd</a> Remote sensing Basics	
Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College.& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty, C. N Omprakash Anand , Assistant Professor, Government Arts College ,Ooty		

<b>Mapping with Programme Outcomes</b>										
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	L	L
CO5	M	L	S	S	M	L	L	L	S	M

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

Course Code	5EC	MOBILE COMPUTING		L	T	P	C
Elective I - C				6			4
Pre-Requisite:	Basic Electronics			Syllabus Version		2023-2024	
Course Objectives:							
The Main Objectives of this course are to: <ul style="list-style-type: none"><li>❖ To Learn the context of wireless network systems such as 2G/3G/4G mobile telephony, Data networks, and other wireless networks and infrastructure.</li><li>❖ To emphasize the interface between mobile computing devices and programming those devices</li></ul>							
Expected Course Outcomes:							
On the Successful completion of the course, student will be able to:							
1	Mobile environments and communications systems.					K1	
2	Hardware devices and interacting with these devices.					K6	
3	Mobile operating systems available.					K6	
4	Programming applications on a mobile system.					K2	
5	Data and knowledge management					K4	
K1:Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create							
Unit:1	INTRODUCTION					18 Hours	
Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing – Wireless Transmissions – Multiplexing – Spread Spectrum and Cellular Systems–Medium Access Control–SDMA–FDMA–TDMA–CDMA–Comparison of Access Mechanisms							
Unit:2	WIRELESS NETWORKS					18 Hours	
Wireless LAN: Infrared Vs Radio Transmission – Infrastructure Networks- Ad hoc Networks- IEEE 802.11– HIPERLAN – Bluetooth- Wireless ATM: Working Group- Services- Reference Model – Functions – Radio Access Layer – Handover- Location Management- Addressing Mobile Quality of Service- Access Point Control Protocol							
Unit:3	MOBILE NETWORK LAYER					18 Hours	
Mobile IP: Goals – Assumptions and Requirement – Entities – IP Packet Delivery- Agent Advertisement and Discovery – Registration – Tunneling and Encapsulation – Optimization – Reverse Tunneling – Ipv6 – DHCP-Ad Hoc Networks							
Unit:4	MOBILE TRANSPORT LAYER					18 hours	
Traditional TCP- Indirect TCP- Snooping TCP- Mobile TCP - Fast Retransmit/ Fast Recovery- Transmission/Timeout Freezing – Selective Retransmission- Transaction Oriented TCP							
Unit:5	WAP					18 hours	
Architecture – Datagram Protocol- Transport Layer Security- Transaction Protocol- Session Protocol-Application Environment-Wireless Telephony Application							



	<b>Total Lecture hours</b>	<b>90 hours</b>
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**Text Book(s)**

1	J.Schiller, <b>MOBILE COMMUNICATION</b> , Addison Wesley, 2000.
2	William Stallings, <b>WIRELESS COMMUNICATION AND NETWORKS</b> , Pearson Education, 2003.

**Reference Books**

1	William C.Y.Lee, <b>Mobile Communication Design Fundamentals</b> , John Wiley, 1993.
2	Singhal, <b>WAP-Wireless Application Protocol</b> , Pearson Education, 2003.

**Related Online Contents [MOOC, SWAYAM, NPTEL, Website etc.]**

1	<a href="https://nptel.ac.in/courses/106/106/106106147/">https://nptel.ac.in/courses/106/106/106106147/</a> Mobile Computing
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Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College.&  
 Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty,  
 C. N Omprakash Anand , Assistant Professor, Government Arts College ,Ooty

**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	L	M	L	M	M	S	L	L	L
CO3	S	L	S	L	M	L	L	L	L	M
CO4	M	L	M	S	L	S	L	L	M	L
CO5	M	M	S	S	M	L	L	M	S	M

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

Course code	5ED	INDUSTRIAL AND POWER ELECTRONICS	L	T	P	C
Core/Elective/Supportive	ELECTIVE1-D		6	T		4
Pre-requisite	Basic knowledge of Electronic Circuits or permission of instructor		Syllabus Version		2023-2024	
Course Objectives:						
The main objectives of this course are to:						
1. To presents the principles and applications of industrial and power electronics.						
2. To enable the students to learn and design industrial & power electronic circuits.						
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.					K2
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 electronic based design application.					K4
5	To develop skills to build, and troubleshoot power electronics circuits.					K5
6	Foster ability to understand the use of power converters in commercial and industrial applications.					K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit:1						
Introduction		15—hours				
Principles of Single Phase Inverter, Converter, Cyclo Converter And DC Chopper– UPS– HVDC Static Circuit Breaker – Battery Charging Circuit – SCR Current Limiting Circuit Breaker – StaticACandDCSwitches–FlasherCircuits-TimeDelayCircuits–FanRegulatorusingTRIAC Thyristor Protection Circuits: Over Current Protection – Over Voltage Protection – Gate Protection						
Unit:2		Welding and Heating			14—hours	
Resistance Welding – Types of Resistance Welding – Electronic Control in Resistance Welding: Ignitron Contractor – Heat Control – Non Synchronous Timer Synchronous Weld Timer – Sequence Timer –Energy Storage Welding Systems – Induction Heating – Applications of Induction Heating – Dielectric Heating –Application of Dielectric Heating						
Unit:3		Waves and Measurement			14—hours	
Generation of Ultrasonic Waves – Applications of Ultrasonic – Production of X Rays – Applications – Measurement of Non-Electrical Quantities: Pressure Measurements – Displacement Measurements – Level Measurements – Flow Measurements – Measurement of Thickness						
Unit:4		Application in Industrial Systems			14—hours	
Thermistor Control Of Quench Oil Temperature – Proportional Mode Pressure Control System – Strip Tension Controller – Automatic Weighing System – Control Of Relative Humidity In A Textile Moistening Process – Warehouse Humidity Controller						



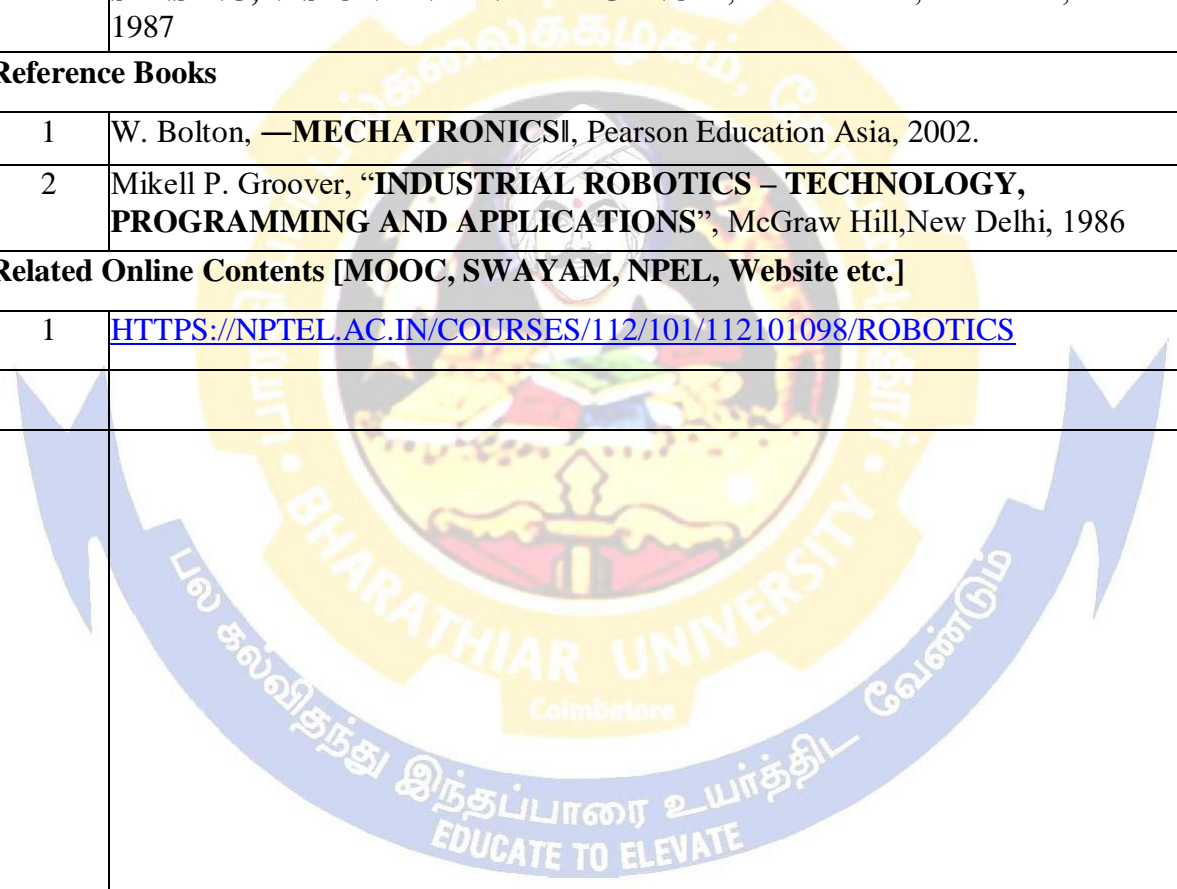
<b>Unit:5</b>	<b>Industrial Robotic Systems</b>	<b>15—hours</b>
Parts of Robotic Systems – Classifications of Robotic Systems – Robotic System Configurations Degrees of Freedom of Robotic System – Programming Robotic Systems – Motions of Robotic Systems– Sensor for Robotic Systems – Mechanical Parts – Control Systems. Microprocessor Based Industrial Applications: Speed Control of DC Motor–Measurement of Physical Quantities Water Level Indicator – Firing Angle Control of Thyristor		
	<b>Total Lecture hours</b>	<b>72—hours</b>
<b>Text Book(s)</b>		
1	Harish C Rai, — <b>Industrial and Power Electronics</b>    10th edition, Umesh publications 2002	
2	TimothyJMaloni,— <b>IndustrialSolidStateElectronicDevicesandCircuits</b>   2ndedition1986	
<b>Reference Books</b>		
1	P S Bimbhra,“Power Electronics”, Khanna Publishers.	
2	M.H. Rashid, “Power Electronics Circuits, Devices& Applications ,Pearson Education.	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1	<a href="https://www.youtube.com/watch?v=1Auay7ja2oY">https://www.youtube.com/watch?v=1Auay7ja2oY</a>	
2	<a href="https://www.youtube.com/watch?v=oqnLQVFaqYI">https://www.youtube.com/watch?v=oqnLQVFaqYI</a>	
3	<a href="https://www.youtube.com/watch?v=naxnRkOfh2Q">https://www.youtube.com/watch?v=naxnRkOfh2Q</a>	
Course Designed By: M.Baskaran, Assistant Professor , KSG College of Arts and Science& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty, C. N Omprakash Anand , Assistant Professor, Government Arts College ,Ooty		

<b>Mapping with Programme Outcomes</b>										
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

**B.Sc. Electronics & Communication Systems 2023 -24 onwards-Affiliated Colleges**  
**Annexure No. 30(a)(2) SCAA DATED:18.05.2023**

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

Course Code	5EE	ROBOTICS AND AUTOMATION	L	T	P	C
Elective II-E			6	T		4
Pre-Requisite:	Basic Electronics		Syllabus Version		2023-2024	
Course Objectives:						
The Main Objectives of this course are to:						
<div>❖ To learn the concepts of Robots.</div> <div>❖ To know about the sensors, actuators used in Robots designing.</div> <div>❖ To familiarize the students with the applications of Robots.</div>						
Expected Course Outcomes:						
On the Successful completion of the course, student will be able to:						
1	Study the fundamentals of robots ad components					K1
2	Illustrate sensors and vision systems.					K3
3	Apply programming techniques in Automation.					K6
4	Familiarize programmable Logic Controllers.					K2
5	Analyze Computer Numerical Control					K4
K1:Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create						
Unit:1	CLASSIFICATION OF ROBOTIC SYSTEMS					10 Hours
Basic Structure of a Robot - Classification of Robots: Cartesian, Cylindrical, Spherical, Articulated -. Accuracy, Resolution and Repeatability of Robots - Robot Application in Manufacturing: Material Transfers - Machine Loading and Unloading – Processing Operations – Assembly and Inspection. Drives and Control Systems: Hydraulic and Pneumatic Systems: Cylinders, Control Valves, Hydro Moto -Robot End Effectors.						
Unit:2	SENSORS AND VISION SYSTEMS					10 Hours
Types of Sensors: Tactile Sensors- Proximity Sensors- Speed Sensors– Encoder, Resolvers. Vision Systems: Image Processing and Analysis – Segmentation - Feature Extraction - Object Recognition.						
Unit:3	ROBOT PROGRAMMING & AUTOMATION					10 Hours
Lead through Programming - Textual Programming -Programming Examples – Social and Economic Aspects of Robots - Typical Layouts of Robots in Industries. AUTOMATION: Advantages of Automation – Building Blocks of Automation. Automatic Feeding Lines - Material-Handling Devices – ASRS - Transfer Lines - Automatic Inspection -Intelligent Automation. Introduction to Artificial Intelligence						
Unit:4	PROGRAMMABLE LOGIC CONTROLLERS ( PLC)					9 Hours
Basics of PLC - Architecture of PLC – Advantages - Types of PLC - Types of Programming- Simple Process Control Program's Using Relay Ladder Logic. Introduction to PLC Networking -Introduction to HMI - DCs and SCADA Systems						

<b>Unit:5</b>	<b>COMPUTER NUMERICAL CONTROL (CNC)</b>	<b>9 Hours</b>
Block Diagram of a CNC Control System–Advantages–Power Supply–CPU–CNC and PLC Interfacing - Control Loops - Feedback Devices in CNC Machine - Analog and Digital CNC Systems - Introduction to FMS		
	<b>Total Lecture hours</b>	<b>48 Hours</b>
<b>Text Book(s)</b>		
1	Mikell P. Groover, — <b>AUTOMATION PRODUCTION SYSTEMS AND COMPUTER INTEGRATED MANUFACTURING</b>   , Prentice-Hall India, New Delhi, 1987. / Pearson Education, New Delhi	
2	K.S. Fu, R.C. Gonzalez and C S G Lee, “ <b>ROBOTICS: CONTROL, SENSING, VISION AND INTELLIGENCE</b> ”, McGraw Hill, New Delhi, 1987	
<b>Reference Books</b>		
1	W. Bolton, — <b>MECHATRONICS</b>   , Pearson Education Asia, 2002.	
2	Mikell P. Groover, “ <b>INDUSTRIAL ROBOTICS – TECHNOLOGY, PROGRAMMING AND APPLICATIONS</b> ”, McGraw Hill, New Delhi, 1986	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Website etc.]</b>		
1	<a href="https://npTEL.AC.IN/COURSES/112/101/112101098/ROBOTICS">HTTPS://NPTEL.AC.IN/COURSES/112/101/112101098/ROBOTICS</a>	
 <p>The logo of Bharathiar University is a circular emblem. It features a central lamp (diya) with a flame, set against a background of a book and a gear. The text 'BHARATHIAR UNIVERSITY' is written in a semi-circle above the lamp, and 'Coimbatore' is written below it. A banner at the bottom contains the motto 'EDUCATE TO ELEVATE' in English and its Tamil equivalent 'பல கல்விதந்து இந்தப்பாரை உயர்த்திட வேண்டும்'.</p>		
Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College &Dr.N Om Muruga , Assistant Professor, Government Arts College,Ooty , C. N Omprakash Anand , Assistant Professor, Government Arts College ,Ooty.		

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**Annexure No. 30(a)(2) SCAA DATED:18.05.2023**

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



Course code	5EF	PROGRAMMABLE LOGIC CONTROL	L	T	P	C
Elective –II – F			6	T		4
Pre-requisite		Digital Electronics and computer Architecture and Organization	Syllabus Version		2023-2024	
Course Objectives:						
The main objectives of this course are to:						
1. To provide knowledge levels needed for PLC programming and operating input and output modules.						
2. To train the students to create ladder diagrams from process control description and understand various types of PLC registers						
3. Apply PLC Timers and Counters for the control of industrial processes, PLC functions and Data Handling Functions.						
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					K1
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
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit:1		INTRODUCTION TO PLC			10hours	
Programmable Logic – Introduction - Programmable Logic Structures - Programmable Logic Arrays (PLAS), Programmable Array Logic (Pals), Programmable Gate Arrays (PGAS), Field Programmable Gate Arrays (FPGAS) - Sequential Network Design with Programmable Logic Devices (PLDs) - Design of Sequential Networks Using ROMs and Flash -Traffic Light Controller Using PAL						
Unit:2		HARDWARE AND SOFTWARE COMPONENTS			10hours	
Programmable Logic Controllers (PLCS) - Introduction Parts of PLC - Principles of Operation - PLC Sizes - PLC Hardware Components - I/O Section - Analog I/O Section - Analog I/O Modules, Digital I/O Modules CPU - Processor Memory Module - Programming Devices - Diagnostics of PLCS with Computers						
Unit:3		INSTRUCTIONS AND RELAYS			10hours	
PLC Programming -Simple Instructions - Programming EXAMINE ON and EXAMINE OFF Instructions -Electromagnetic Control Relays -Motor Starters -Manually Operated Switches - Mechanically Operated and Proximity Switches - Output Control Devices - Latching Relays - PLC Ladder Diagram - Converting Simple Relay Ladder Diagram into PLC Relay Ladder Diagram						

<b>Unit:4</b>	<b>COUNTER AND TIMER</b>	<b>9hours</b>
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		
<b>Unit:5</b>	<b>APPLICATIONS</b>	<b>9hours</b>
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		
	<b>Total Lecture hours</b>	<b>48hours</b>
<b>Text Book(s)</b>		
1	Charles H. Roth, Jr — <b>Fundamentals of Logic Design "</b> , Fourth Edition, Jaico Publishing house, 1999,	
2	Frank D. Petruzella" <b>Programmable Logic Controllers "</b> , McGraw- Hill book, company, 1989	
3	<b>Siemens —PLC Handbook "</b> .	
<b>Reference Books</b>		
1	1. William I. Fletcher — <b>An Engineering Approach to Digital Design "</b> , Prentice, Hall of India Ltd., New Delhi, 1999.	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1	<a href="https://unitronicsplc.com/what-is-plc-programmable-logic-controller/">https://unitronicsplc.com/what-is-plc-programmable-logic-controller/</a>	
Course Designed By: K.Manikantan , Assistant Professor, Government Arts College ,Ooty& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty, C. N Omprakash Anand , Assistant Professor, Government Arts College ,Ooty		

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

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

Course code	5EG	AUTOMOTIVE ELECTRONICS		L	T	P	C
Elective-II –G				6	T		4
Pre-requisite				Syllabus Version		2023-2024	
Course Objectives:							
The main objectives of this course are to:							
1. To understand the concepts of Automotive Electronics and its evolution and Trends automotive systems & sub systems overview.							
2. To understand sensors and sensor monitoring mechanisms aligned to automotive Systems, different signal conditioning techniques, interfacing techniques and actuator							
3. To understand, design and model various automotive control systems using Model based development technique.							
Expected Course Outcomes:							
On the successful completion of the course, student will be able to:							
1	Obtain an overview of automotive components and subsystems.						K2
2	Interface automotive sensors and actuators with microcontrollers						K3
3	Understand the design cycles, communication protocols and safety systems employed in today's automotive industry.						K2
4	Understand the engine management systems						K4
5	Understand the braking and traction systems						K2
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create							
Unit:1		INTRODUCTION				9hours	
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, New Developments, Requirements of the Starting System, Basic Starting Circuit							
Unit:2		IGNITION SYSTEMS				10hours	
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, Diesel Fuel Injection							
Unit:3		INSTRUMENTATION SYSTEMS				10hours	
Introduction to Instrumentation Systems, Various Sensors Used for Different Parameters, Sensing Driver Instrumentation Systems, Vehicle Condition Monitoring Trip Computer, Different Types of Visual Display							

<b>Unit:4</b>	<b>ELECTRONIC CONTROL OF BRAKING AND TRACTION</b>	<b>9 hours</b>
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		
<b>Unit:5</b>	<b>ENGINE MANAGEMENT SYSTEMS</b>	<b>10hours</b>
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 Lighting Circuits, Signaling Circuit, Central Locking and Electric Windows Security Systems, Airbags and Seat Belt Tensioners, Miscellaneous Safety and Comfort Systems		
	<b>Total Lecture hours</b>	<b>48hours</b>
<b>Text Book(s)</b>		
1	TOM DENTON, <b>Automobile Electrical and Electronic Systems</b> , Edward Arnold pb., 1995	
<b>Reference Books</b>		
1	1.DON KNOWLES, <b>Automotive Electronic and Computer controlled Ignition Systems</b> , Don Knowles, Prentice Hall, Englewood Cliffs, New Jersey 1988.	
2	WILLIAM, T.M., <b>Automotive Mechanics</b> , McGraw Hill Book Co.,	
3	WILLIAM, T.M., <b>Automotive Electronic Systems</b> , Heiemann Ltd., London, 1978.	
4	Ronald K Jurgen, <b>Automotive Electronics Handbook</b> , McGraw Hill, Inc, 1999.	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1	<a href="https://nptel.ac.in/courses/107/103/107103084/">https://nptel.ac.in/courses/107/103/107103084/</a>	
2	<a href="https://nptel.ac.in/courses/107/106/107106088/">https://nptel.ac.in/courses/107/106/107106088/</a>	
3	<a href="https://www.youtube.com/watch?v=vJ4EfyGXehg">https://www.youtube.com/watch?v=vJ4EfyGXehg</a>	
4	<a href="https://www.youtube.com/watch?v=BG4N2dBgJrQ">https://www.youtube.com/watch?v=BG4N2dBgJrQ</a>	
	Course Designed By: K.Mnikantan , Assistant Professor, Government Arts College ,Ooty&Dr.N Om Muruga , Assistant Professor, Government Arts College, Ooty.	

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

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CO5	M	M	S	S	M	L	M	M	S	M
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\*S-Strong; M-Medium; L-Low



Course Code	5EH	SATELLITE COMMUNICATIONS	L	T	P	C
Core/Elective/Supportive:		ELECTIVE-II-H	6	T		4
Pre-requisite:		PRINCIPLES OF COMMUNICATION	Syllabus version		2023-2024	
Course Objectives:						
The objectives of this course are:						
<div><div>❖</div>To provide knowledge on fundamentals of Advanced Computer design.</div> <div><div>❖</div>To understand the concept of instruction level parallelism, pipelining and memory hierarchy associated with it.</div> <div><div>❖</div>To enhance the knowledge on advanced processors.</div>						
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			10 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			10 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			10 Hours	
Introduction- spacecraft subsystems- attitude and orbit control systems- Telemetry- tracking and command- power systems- communication subsystems.						
Unit: 4		SATELLITE LINK DESIGN			09 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			09 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			48 Hours	
Text Books						
1	Timothy Pratt, Charles Bostian,JeremyAllnutt, Satellite Communications, 2 <sup>nd</sup> edition, John willey, 2006.					

2	W. L. Pritchard, H. G. Suyderhoud and R. A. Nelson, Satellite Communication systems Engineering, 2 <sup>nd</sup> edition, Pearson educational publishers, New Delhi, 2003.
<b>Reference Books</b>	
1	Dennis Roddy, Satellite Communications, 3 <sup>rd</sup> edition, Mc Graw Hill, International, 2001.
2	Dr D.C. Agrwal, Satellite Communications, 4 <sup>th</sup> edition, Khanna Publications, New Delhi, 2001.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://nptel.ac.in/courses/117/105/117105131/">https://nptel.ac.in/courses/117/105/117105131/</a>
2	<a href="https://www.youtube.com/watch?v=hXa3bTcIGPU">https://www.youtube.com/watch?v=hXa3bTcIGPU</a>
3	<a href="https://www.youtube.com/watch?v=Bvj1BpP4zU8">https://www.youtube.com/watch?v=Bvj1BpP4zU8</a>
Course Designed by: Dr.S.Vijayakumar, Associate Professor in ECE, Sreenivasa Institute of Technology and Management Studies, Autonomous, Chittoor.& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty, C. N Omprakash Anand , Assistant Professor, Government Arts College ,Ooty.	

	<b>Mapping with Program Outcomes</b>									
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	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	FIBER OPTIC COMMUNICATION	L	T	P	C
Core/Elective/Supportive:	Elective III-I	6	T		4
Pre-Requisite:	Basic knowledge in Communication Systems	Syllabus Version	2023-2024		
Course Objectives:					
The Main Objectives of this course are to:					
❖ To enable the students to learn about OFC and also to understand the concept of various optical fiber modes, configurations and various signal degradation factor.					
Expected Course Outcomes:					
On the Successful completion of the course, student will be able to:					
1	Remember the basic concepts in Fiber Optic Communication.				K1
2	Familiarize the principle of optical fiber cable.				K2
3	Gain knowledge about optical sources.				K3
4	Analyze optical communication systems.				K4
5	Analyze different types of measurements.				K4
K1: Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create					
Unit:1	BASIC PRINCIPLES OF OPTICS				18 hours
Introduction to fiber optics-Evolution of fiber optic system-Elements of optical fiber transmission link-Basic optical law and definition-Optical fiber mode configuration: Fiber types-Rays and Modes-Step index fiber structure-Ray optics representation-Mode theory for circular waveguides.					
Unit:2	FIBER				18 hours
Single mode fiber-Graded index fiber structure-Fiber material: Glass fiber, Active Glass Fiber-Fiber fabrication: Outside vapor phase oxidation-Vapor Phase axial deposition-Plasma activated chemical vapor deposition-Mechanical properties of fiber.					
Unit:3	OPTICAL SOURCES				18 hours
LED: Structure, Light source material, Quantum efficiency and LED power. LASER diodes: Modes and threshold conditions, Quantum efficiency, diode structure and radiation pattern-operating characteristics: photo detectors-principles of photo detection – PIN diode— photo-multiplier tubes-Light source linearity.					
Unit:4	OPTICAL COMMUNICATION SYSTEMS				18 hours
Basic optical communication systems-Receiver performance-sensitivity-Selectivity-Components of Optical communication system-Signals in optical communication system-Transmitter-Receiver.					

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<b>Unit:5</b>	<b>MEASUREMENTS</b>	<b>18 hours</b>
Measurement standard and test procedure-Attenuation measurement; Cutback technique, Insertion loss method-OTDR TRACE-Fiber fault location-Eye pattern-Optical Spectrum analyzer-Test equipment: Tunable laser sources, Optical power meter.		
	<b>Total Lecture hours</b>	<b>90 hours</b>
<b>Text Book(s)</b>		
1	Optical Fiber Communications, Tata Mc Graw-Hill international, Third edition,2000, by Gerd Keiser.	
2	Optical Communications, Components and Systems-Narosa Publishing House,2000, by J.H.Franz,V.K.Jain.	

<b>Reference Books</b>		
1	Optical Fiber Communications, Principles and Practice, Third edition, by John M Senior.	
2	Fiber Optic Communication Systems, Fifth edition, by Govind P Agrawal.	

**Related Online Contents [MOOC, SWAYAM, NPTEL, Website etc.]**

1	<a href="https://onlinecourses.nptel.ac.in/noc21_ee42/preview">https://onlinecourses.nptel.ac.in/noc21_ee42/preview</a>
2	<a href="https://onlinecourses.nptel.ac.in/noc20_ee79/preview">https://onlinecourses.nptel.ac.in/noc20_ee79/preview</a>
3	<a href="https://www.digimat.in/nptel/courses/video/108104113/L01.html">https://www.digimat.in/nptel/courses/video/108104113/L01.html</a>
4	<a href="https://pdfslide.net/education/optical-fiber-communication-ppt-591cebc1a22db.html?">https://pdfslide.net/education/optical-fiber-communication-ppt-591cebc1a22db.html?</a>

**Course Designed By:**

1. Dr. K. Venmathi, Assistant Professor, LRG Government College for Women,Tiruppur.
2. Mr. S. Venkatesan, Assistant Professor, KSG College of Arts and Science,Coimbatore.

**Mapping with Programme Outcomes**

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

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



Course code	6EJ	VIRTUAL INSTRUMENTATION	L	T	P	C
Elective-III – J			6	T		4
Pre-requisite	Digital Electronics, Microprocessor and Computer fundamentals	Syllabus Version	2023-2024			
Course Objectives:						
The main objectives of this course are to:						
1. To provide basic concepts in virtual instruments						
2. To know about the programming methods in software used in virtual instrumentation						
3. To familiarize the students with the applications of virtual instrumentation						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the basics concepts and programming in virtual instrumentation					K2
2	Apply virtual instrumentation tool set for a given problem					K3
3	Apply virtual instrumentation concept for a given applications					K3
4	Understand the basic programming concepts					K2
5	Understand the different lab view applications					K2
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit:1	INTRODUCTION				9hours	
General Functional Description of a digital instrument - Block Diagram of a Virtual Instrument - Physical quantities and Analog Interfaces - Hardware and Software - User Interfaces- Advantages of Virtual Instruments Over Conventional Instruments - Architecture of a Virtual Instrument and its Relation to the Operating System						
Unit:2	SOFTWARE OVERVIEW				9hours	
Lab VIEW - Graphical User interfaces - Controls and Indicators - 'G' programming – Labels and Text - Shape, Size and Color - Owned and Free Labels - Data Type, Format, Precision and Representation - Data Types - Data flow programming - Editing - Debugging and Running a Virtual Instrument-Graphical Programming Palettes and tools- Front Panel Objects-Functions and Libraries						
Unit:3	PROGRAMMING STRUCTURE				10hours	
FOR Loops, WHILE Loops, CASE Structure, Formula Nodes, Sequence Structures – Arrays and Clusters - Array Operations - Bundle - Bundle/Unbundle by Name, Graphs and Charts - String and File I/O - High level and Low-Level File I/O's - Attribute Modes Local and Global Variables. OPERATING SYSTEM AND HARDWARE OVERVIEW: PC Architecture, Current Trends, Operating System Requirements, Drivers – Interface Buses – PCI Bus– Interface Cards – Specification – Analog and Digital Interfaces – Power, Speed and timing Considerations						



<b>Unit:4</b>	<b>HARDWARE ASPECTS</b>	<b>10hours</b>
Installing hardware, Installing Drivers - Configuring the Hardware - Addressing the hardware in Lab VIEW - Digital and Analog I/O function - Data Acquisition - Buffered I/O - Real time Data Acquisition		
<b>Unit:5</b>	<b>LABVIEW APPLICATIONS</b>	<b>10hours</b>
IMAQ-Motion Control: General Applications - Feedback Devices, Motor Drives - Instrument Connectivity - GPIB, Serial Communication - General, GPIB Hardware & Software Specifications - PX1 / PC1: Controller and Chassis Configuration and Installation		
<b>Total Lecture hours</b>		<b>48hours</b>
<b>Text Book(s)</b>		
1	Garry M Johnson, "Labview Graphical Programming", Tata McGraw Hill, New Delhi, 2nd Edition, 1996	
2	Labview : Basics I & II Manual, National Instruments, 2005	
<b>Reference Books</b>		
1	Lisa K Wells, "Labview for Everyone", Prentice Hall of India, New Delhi, 1996	
2	Barry Paron, "Sensor, Transducers and Labview", Prentice Hall, New Delhi, 2000	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1	<a href="https://www.ni.com/en-in/innovations/white-papers/06/virtual-instrumentation.html">https://www.ni.com/en-in/innovations/white-papers/06/virtual-instrumentation.html</a>	
Course Designed By: K.Manikantan , Assistant Professor, Government Arts College ,Ooty&Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.		

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

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

Course code	6EK	BIOMEDICAL INSTRUMENTATION	L	T	P	C
Elective-III-K			6	T		4
Pre-requisite		Higher secondary biology	Syllabus Version		2023-2024	
Course Objectives:						
The main objectives of this course are to:						
1. To presents various bio-potentials and working principles of medical instruments						
2. 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 t h e C o nc ept of bio-potential					K2
2	Understand the concept of medical instruments					K4
3	Develop the troubleshooting Skills of medical instruments					K3
4	Understand the concepts of signal conditioners & diagnostic equipment					K2
5	Understand the concepts of various physiological assist devices					K2
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit:1	BASIC PHYSIOLOGY				9hours	
Cells and their Structures - Transport of Ions through Cell Membrane - Resting and Excited State Transmembrane Potential - Action Potential - Propagation of Bioelectric Potential - Nervous System - Physiology of Muscles - Heart and Blood Circulation						
Unit:2	ELECTRODES AND TRANSDUCERS				10 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 - Active Transducers and Passive Transducers - Strain Gauges – Thermistor						
Unit:3	SIGNAL CONDITIONERS & DIAGNOSTIC EQUIPMENTS				10hours	
Instrumentation Amplifiers - Current Amplifiers - Isolation Amplifier - Need for Filters - Low Pass, High Pass and Band Pass Active Filters - Notch Filters - Heated Stylus and Ink PenRecorders. DIAGNOSTIC EQUIPMENTS: Typical Electrocardiogram (ECG) - Electrocardiograph - Bipolar and Unipolar Leads - Einthoven Triangle - Electrical Activities of the Brain - Electroencephalogram (EEG) - Muscle Response - Electromyograph(EMG)						

<b>Unit:4</b>	<b>DIAGNOSTIC EQUIPMENTS &amp; BIOTELEMETRY</b>	<b>10hours</b>
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 - TDM and FDM – Implantable Units		
<b>Unit:5</b>	<b>PHYSIOLOGICAL ASSIST DEVICES</b>	<b>9hours</b>
NeedforPacemakers-PacemakerParametersandCircuits-DifferentModesofOperation-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 - Magnetic Resonance Imaging - Computer Based Patient Monitoring System		
	<b>Total Lecture hours</b>	<b>48hours</b>
<b>Text Book(s)</b>		
1	Joseph J. Carr and John M. Brown, — <b>Introduction to Biomedical Equipment Technology</b>   , Pearson EducationAsia,New Delhi, 4th Education, 2001	
2	Leslie Cromwell.,FredJ. Webell., Erich A. Pfeffer.,— <b>Bio-medicalInstrumentation andMeasurements</b>   ,PrenticeHall of India, New Delhi, 1990	
<b>Reference Books</b>		
1	Khandpur,— <b>HandbookonBiomedicalInstrumentation</b>   ,TataMcGrawHillCompany,New Delhi, 1989	
2	OhnGWebster,Ed.,— <b>MedicalInstrumentationApplicationandDesign</b>   ,ThirdEdition, John Wiley & Sons, Singapore,1999	
3	Arumugam.M,— <b>BiomedicalInstrumentation</b>   ,AnuradhaAgenciesPublishers,Chennai,1992	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1	<a href="https://www.youtube.com/watch?v=i2mZylgP1Fk">https://www.youtube.com/watch?v=i2mZylgP1Fk</a>	
2	<a href="https://www.youtube.com/watch?v=4ldv98F7Zng">https://www.youtube.com/watch?v=4ldv98F7Zng</a>	
3	<a href="https://nptel.ac.in/courses/108/105/108105101/">https://nptel.ac.in/courses/108/105/108105101/</a>	
4	<a href="https://nptel.ac.in/courses/108/105/108105091/">https://nptel.ac.in/courses/108/105/108105091/</a>	
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	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



Course Code	6EL	VLSI DESIGN	L	T	P	C
Core/Elective/Supportive:	ELECTIVE –III-L		6	0	0	4
Pre-requisite:	Digital Principles and Applications		Syllabus version		2023-2024	
Course Objectives:						
The objectives of this course are:						
<ul style="list-style-type: none"><li>❖ To provide knowledge on Fabrication Process of NMOS, PMOS, CMOS AND BICMOS, Super integration concepts.</li><li>❖ To develop the skill to analyze the electrical properties of MOS transistor, design stick diagrams and layout diagrams for MOS transistors, contacts and wires.</li><li>❖ To investigate the effect of floor planning, placement, routing and power delay estimation in physical design of digital circuits and memory design.</li><li>❖ To apply the concept of Combinational and Sequential Circuit Testing.</li></ul>						
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				10 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				10 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 ( $\omega_0$ ) – pass transistor- pull – up to pull – down ratio.						
Unit: 3	DESIGN PROCESSES				10 Hours	
VLSI design flow - stick diagram design rules with examples - Design rules for Layout diagrams of digital circuits– sheet resistance $R_s$ –standard unit of capacitance – Inverter delays – Propagation delays- scaling of MOS circuits – limitations of scaling.						

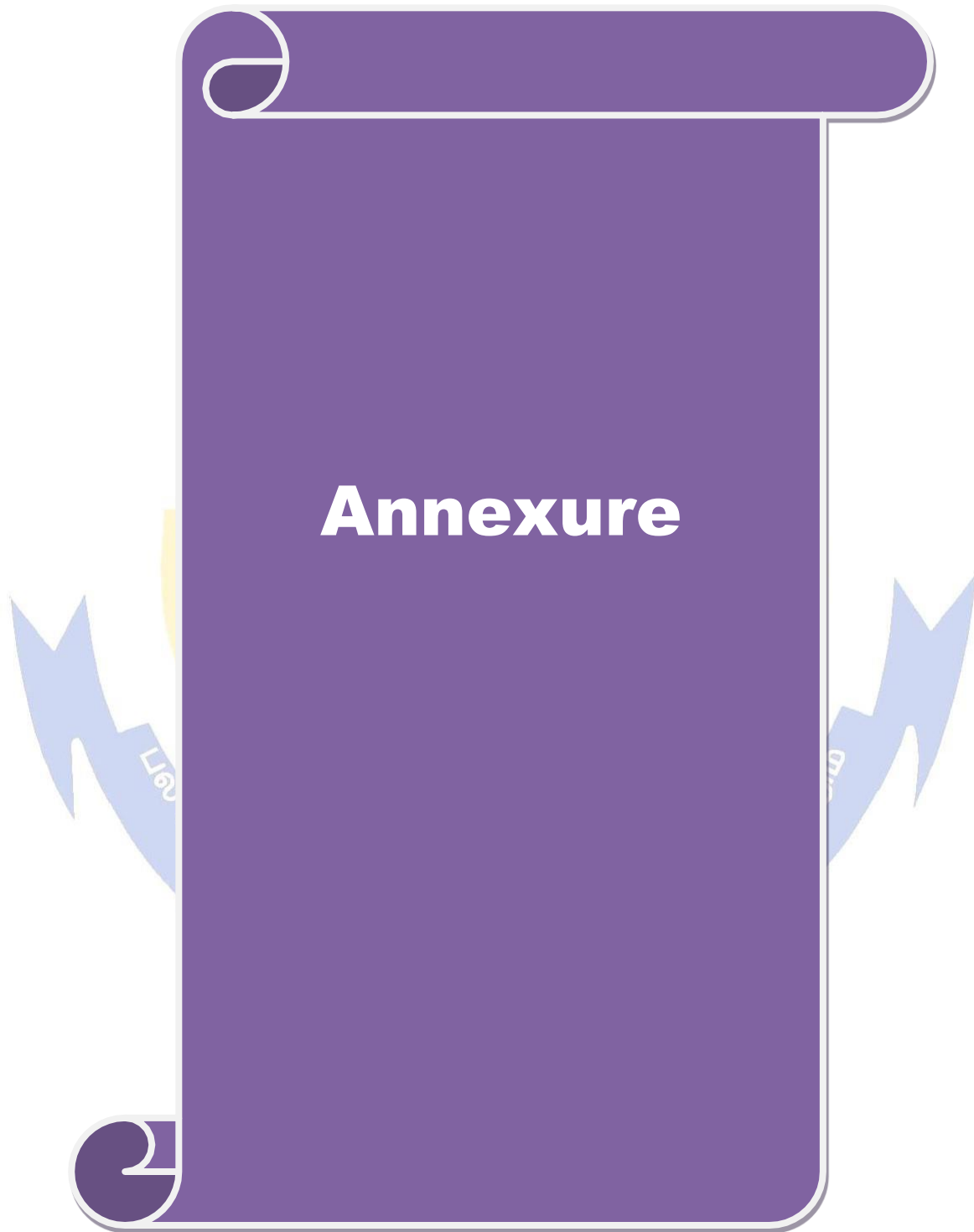


<b>Unit: 4</b>	<b>VLSI PHYSICAL DESIGN AND STYLES</b>	<b>09 Hours</b>
<b>PHYSICAL DESIGN:</b> Floor Planning – Placement – Routing – Power Delay Estimation – Clock Routing – Power Routing. <b>VLSI DESIGN STYLES:</b> Full Custom – Semi custom – Standard Cells – Gate Arrays – FPGAs – CPLDs.		
<b>Unit: 5</b>	<b>TESTING OF VLSI CIRCUITS</b>	<b>09 Hours</b>
Test Principles-BIST-Test Bench- Combinational Circuit Testing, Sequential Circuit Testing, Test Bench Techniques.		
<b>Total Lecture Hours</b>		<b>48 Hours</b>

<b>Text Books</b>	
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.
<b>Reference Books</b>	
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.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://nptel.ac.in/courses/117/101/117101058/">https://nptel.ac.in/courses/117/101/117101058/</a>
2	<a href="https://www.youtube.com/watch?v=9SnR3M3CI4">https://www.youtube.com/watch?v=9SnR3M3CI4</a>
3	<a href="https://www.youtube.com/watch?v=Y8FvzccocT4">https://www.youtube.com/watch?v=Y8FvzccocT4</a>
Course Designed by: Dr.S.Vijayakumar, Associate Professor in ECE, Sreenivasa Institute of Technology and Management Studies, Autonomous, Chittoor.& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.	

<b>Mapping with Program Outcomes</b>										
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



## **DEPARTMENT OF ELECTRONICS AND COMMUNICATION SYSTEMS**

### **MISSION**

- To develop appropriate facilities for promoting research activities
- To inculcate leadership qualities among students for self and societal growth
- To nurture students on emerging technologies for serving industry needs through industry institute interface
- To enrich teaching learning process by transforming young minds to be resourceful engineers

