B. Sc., Electronics and Communication Systems

Syllabus

AFFILIATED COLLEGES

Program Code: 26B

2025 – 2026 Onwards

BHARATHIAR UNIVERSITY

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

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

Program Educational Objectives (PEOs)	
The **B. Sc., ELECTRONICS AND COMMUNICATION SYSTEMS** 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.

Program Specific Outcomes (PSOs)	
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

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

BHARATHIAR UNIVERSITY: COIMBATORE-641046

B.Sc., Electronics and Communication Systems Curriculum (University Affiliated Colleges)

Scheme of Examination (CBCS PATTERN)

(For the students admitted during the academic year 2025–26 onwards)

Course Code	Title of the Course	Hours		Maximum Marks			Credits
		Theory	Practical	CIA	CEE	TOTAL	
	FIRST SEMESTER						
11T	Language –I	6	-	25	75	100	4
12E	English–I	4	-	25	75	100	4
13A	**Core Paper I:** Basic Electronics	7	-	25	75	100	4
--	**Core Practical I:** Basic Electronics Lab	-	3	-	-	-	-
--	**Core Practical II**: Semiconductor Devices Lab	-	3	-	-	-	-
1AA	**Allied I :** Mathematics–I	5	-	25	75	100	4
1FA	Environmental Studies*	2	-	-	50	50	2
	Total	24	6	100	350	450	18
	SECOND SEMESTER						
21T	Language–II	6	-	25	75	100	4
22E	English–II	4	-	25	25	50[@]	2
23A	**Core Paper II:** Semiconductor Devices	5	-	25	75	100	4
23P	**Core Practical I:** Basic Electronics Lab	-	3	25	75	100	4
23Q	**Core Practical II:** Semiconductor Devices Lab	-	3	25	75	100	4
2AA	**Allied II :** Mathematics–II	5	-	25	75	100	4
2FB	**Value Education–** Human Rights*	2	-	-	50	50	2
2NM	Naan Mudhalvan –Skill Course	2	-	25	25	50[#]	2
--	**Swachh Bharat–** Summer Internship [$]	-	-	-	-	-	-
	Total	24	6	175	475	650	26

THIRD SEMESTER							
31T	Language-III	6	-	25	75	100	4
32E	English- III	4	-	25	75	100	4
33A	**Core Paper III:** Electronic Circuits	5	-	25	75	100	4
--	**Core Practical III:** Digital Electronics lab	-	2	-	-	-	-
--	**Core Practical IV:** Electronic Circuits and Instrumentation Lab	-	2	-	-	-	-
3AD	**Allied: III** Object Oriented Programming using C++	2	-	20	30	50	2
3ZA	**Skill based Subject I:** Digital Principles and Applications	4	-	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
3NM	Naan Mudhalvan –Skill Course	2	-	5	25	50#	2
3HW	Health and Wellness**	1	-	25	-	25	1
Total		26	4	165	385	550	22
FOURTH SEMESTER							
41T	Language-IV	6	-	25	75	100	4
42E	English- IV	4	-	25	75	100	4
43A	**Core Paper IV:** IC's and Instrumentation	4	-	25	75	100	4
43P	**Core Practical III:** Digital Electronics Lab	-	2	25	75	100	4
43Q	**Core Practical IV:** Electronic Circuits and Instrumentation Lab	-	2	25	75	100	4
4AD	**Allied: IV** Internet of Things	3	-	25	25	50@	2

43R	**Core Practical V:** C++ Programming Lab	-	2	25	25	50	2
4ZB	**Skill based Subject II:** Digital and Cellular Communication	3	-	25	25	50@	2
4FB/ 4FE	Tamil**/Advanced Tamil * (OR) **Non-major elective -II** (General Awareness *)	2	-	-	50	50	2
4NM	Naan Mudhalvan –Skill Course	2	-	25	25	50#	2
Total		24	6	225	525	750	30
FIFTH SEMESTER							
53A	**Core Paper V**: 8085 Microprocessor and Applications	6	-	25	75	100	4
5EA/ 5EB/ 5EC/ 5ED	**Elective – I**	6	-	25	75	100	4
5EE/ 5EF/ 5EG/ 5EH	**Elective-II**	6	-	25	75	100	4
--	**Core Practical VI:** Microprocessor and Microcontroller Lab	-	3	-	-	-	-
--	**Core Practical VII:** Industrial and Power Electronics Lab	-	3	-	-	-	-
--	**Core Practical VIII**: Electronic Communication Lab	-	3	-	-	-	-
5ZC	**Skill based subject–III** Internet and Java Programming	3	-	30	45	75	3
5NM	Naan Mudhalvan –Skill Course	-	-	25	25	50#	2
Total		21	9	130	295	425	17

SIXTHSEMESTER							
63A	**Core Paper VI**: 8051 Microcontroller and Embedded Systems	6	-	25	75	100	4
63P	**Core Practical VI**: Microprocessor and Microcontroller lab	-	3	25	75	100	4
63Q	**Core Practical VII:** Industrial and Power Electronics Lab	-	3	25	75	100	4
63R	**Core Practical VIII:** Electronic Communication Lab	-	3	25	75	100	4
67V	**PROJECT***	4	-	-	100	100	4
6EI/ 6EJ/ 6EK/ 6EL	**Elective- III**	6	-	25	75	100	4
6ZP	**Skill based Subject–IV** Java Programming Lab	-	3	20	55	75	3
67A	Extension Activities **	-	-	50	-	50	2
6NM	Naan Mudhalvan –Skill Course	2	-	25	25	50#	2
	Total	18	12	220	555	775	31
	Grand Total					**3600**	**144**

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

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		2025-2026	

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 VoltageandCurrentSources-Millman'sTheorem-StarandDeltaConversion-MaximumPower Transfer Theorem - Simple Problems in DC Circuits.

Unit:5	**AC CIRCUITS**	**12hours**

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 -

	Total Lecture hours	**60 hours**

Text Book(s)

1. S.Salivahanan, N.Suresh Kumar, A. Vallavaraj—**ELECTRONIC DEVICES AND CIRCUITS** Ⅱ- 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=w8Dq8blTmSA

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

Mapping with Programme Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	M	L	L	L	L	M	S	M
CO2	L	L	L	L	L	M	M	S	M	S
CO3	M	M	S	L	M	S	L	L	M	M
CO4	M	L	L	L	L	S	L	L	M	S
CO5	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			5	T		4
Pre-requisite		Higher secondary physics	Syllabus Version		2025-2026	

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

ZenerDiode-VICharacteristics–Breakdown-BackwardDiode–VaractorDiode-Step Recovery Diode - Point Contact Diode – Scott key Diode - Tunnel Diode - Gunn Diode – Impatt Diode - PIN Diode – PNPN 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

Unit:5	OPTOELECTRONIC DEVICES	12 hours
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		
	Total Lecture hours	**60 hours**

Text Book(s)	
1	S. Salivahanan, N. SureshKumar, A. Vallavaraj,**—ELECTRONICS DEVICES AND CIRCUITS‖,** Tata McGraw Hill Publishing Company Limited, New Delhi, 8th edition.
2	B. L. Theraja,**—BASIC ELECTRONICS–SOLID STATE DEVICES‖**,S.Chand & Company Ltd.
Reference Books	
1	S.L.Kakani, K.C.BhanDai**—ATEXTBOOKOFELECTRONICS‖**. S.Chand& Company Ltd.2000
2	Bernard Grob**—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		2025-2026	

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 12 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	https://nptel.ac.in/courses/122/106/122106025/
2	https://nptel.ac.in/courses/122/106/122106026/

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		2025-2026	

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 12 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

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

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

Third Semester

Course Code	33A	**ELECTRONIC CIRCUITS**	**L**	**T**	**P**	**C**
Core paper III			6	T		4
Pre-Requisite:	Basic Electronics		Syllabus Version		2025-2026	

Course Objectives:

The Main Objectives of this course are to:

- ❖ To enable the students to understand and gain the knowledge on power supplies, amplifiers and oscillators.
- ❖ To Acquaint the students with construction, theory and characteristics of the electronic amplifier circuits and types of multivibrators.

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; **K**4-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	12 hours
Basic concepts of feedback– Positive Feedback– Negative Feedback – Effects of Negative feedback on Gain, Bandwidth and Distortion – Noise – Voltage Series Feedback - Voltage Shunt Feedback – Current Series Feedback – Current Shunt Feedback.		
Unit:5	**OSCILLATORS AND MULTIVIBRATORS**	**12 hours**
Barkhausen Criterion – Hartley Oscillator – Colpitts Oscillator – Phase Shift Oscillator – Wein Bridge Oscillators –Piezo Electric Crystal and its Effects – Crystal Oscillator – Astable Multivibrator–Monostable Multivibrator–Bistable Multivibrator–Schmitt Trigger.		
	Total Lecture hours	**60 hours**

Text Book(s)

1	S.K.Sahdev,**—ELECTRONIC PRINCIPLES**, Dhanpat Rai & Co (P)Ltd,2nd Edition, 1998
2	B.L.Theraja, **-BASIC ELECTRONICS**, Chand Company Ltd, 2000

Reference Books

1	V.K.Metha, Rohit Metha, **PRINCIPLES OF ELECTRONICS.** S Chand, 2006 .
2	B.Sasikala, C.Poornachandra, **ELECTRONIC DEVICES AND CIRCUITS**, Scitech 2003.

Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]

1	http://www.ee.iitm.ac.in/~ani/2012/ec5135/lectures.htmlLecture Notes
2	https://nptel.ac.in/courses/108/102/108102097/#Introduction to Electronic circuitsNPTEL.
3	https://nptel.ac.in/courses/108/102/108102095/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

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		2025- 2026	

Course Objectives:

The Main Objectives of this course are to:

- ❖ To acquire the basic knowledge of Number system, Digital logic circuits and its application.
- ❖ To outline the formal procedures for the analysis and design of combinational and sequential circuits.
- ❖ To learn the concepts of A/D, D/A conversions and their types.

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 Sub tractor – Full Sub tractor – 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, NPEL, Website etc.]	
1	https://soaneemrana.org/onewebmedia/DIGITAL%20PRINCIPLES%20AND%20APPLICATION%20BY%20LEACH%20&%20MALVINO.pdf E book, Malvino& Leech, **—DIGITAL PRINCIPLES AND APPLICATIONS**, Tata McGraw Hill Edition X!,2011
2	https://nptel.ac.in/courses/117/106/117106086/Introduction to digital circuits
3	https://www.youtube.com/watch?v=CL3ups78jrs/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

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

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

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

Course Code	3AD	**OBJECT ORIENTED PROGRAMMING USING C++**	**L**	**T**	**P**	**C**
Allied: III			2	T		2
Pre-Requisite:	Students should have basic Computer Knowledge		Syllabus Version		2025-2026	

Course Objectives:

The Main Objectives of this course are to:

- ❖ Impart knowledge of object-oriented programming concepts and implement them in C++.
- ❖ Enable to differentiate procedure oriented and object-oriented concepts.
- ❖ Equip with the knowledge of concept of Inheritance so that learner understands the need of inheritance.
- ❖ 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

Unit:1	**INTRODUCTION TO C++**	**9 hours**

Basic Concepts of OOPs – Advantages OOPs– 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 – Array –Types of array.

Unit:2	**CLASSES AND OBJECTS**	**9 hours**

Functions in C++, Inline Functions – Function Overloading-Declaring objects – Defining member functions – Static member variables and functions – Array of objects – Friend functions – Overloading member functions – Constructor and Destructors. – String Functions.

Unit:3	**OPERATOR OVERLOADING & INHERITANCE**	**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.

Unit:4	**POINTERS**	**9 hours**

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

Unit:5	**EXCEPTION HANDLING & FILES**	**9 hours**

Exception handling -File stream classes – File Modes – Sequential read/write operations – Binary and ASCII files –Random Access File.

	Total Lecture hours	**45 hours**

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, NPEL, Website etc.]

1	https://onlinecourses.nptel.ac.in/noc24_cs44/preview
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

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		2025-2026	

Course Objectives:

The Main Objectives of this course are to:

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

Expected Course Outcomes:

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

1	Recognize the 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; **K**4-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–ElectricalTransducer–BasicrequirementsofTransducer– ClassificationTransducers – Selection of Transducers – Resistive Transducers – Potentiometers –Thermistors – Thermocouple – LVDT – RVDT – Piezoelectric Transducers – Hall Effect Transducers – Photoelectric Transducers – Digital Displacement Transducers		
nit: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, **—LINEAR INTEGRATED CIRCUITS**, Second Edition New Age International Publishers, 2004	
2	K.R. Botkar,**—INTEGRATEDCIRCUITS**,10th Edition Khanna Publishers, 2006	
Reference Books		
1	J.B. GUPTA**—ACOURSE IN ELECTRONICAND ELECTRICAL MEASUREMENTS AND INSTRUMENTATION**, 12th Edition, S.K Kataria & Sons	
2	A.K. Sawhney, **ELECTRICAL & ELECTRONIC MEASUREMENTS AND INSTRUMENTATION**, Dhanpath Rai & Co (P) Ltd, 2004.	
Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]		
1	https://nptel.ac.in/courses/108/108/108108111/Integrated circuits,op-amps and their applications	
2	https://nptel.ac.in/courses/117/106/117106030/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

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		2025-2026	

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; **K**4-Analyze; **K5**-Evaluate; **K6**-Create

Unit:1	**IOT FUNDAMENTALS**	**8 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**	**8 hours**

Introduction - IoT / M2M systems - Communication Technologies - Data management, data consolidation and Device management – Interpreting IoT Data.

Unit:3	**PROGRAMMING FUNDAMENTALS WITH C USING ARDUINO IDE**	**8 hours**

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

Unit:4	ARDUINO BASED INTERFACING FOR SMART APPLICATIONS	8 hours
Analog and Digital Sensors – Soil Moisture, Temperature, Humidity. Interfacing Analog and Digital Sensors with Arduino – Smart Agriculture – Industrial IoT.		
Unit:5	**IoT INTEGRATION: NODEMCU TO AZURE WITH RASPBERRY PI**	**8 hours**
Introduction to ESP8266 NODEMCU WiFi Module – Programming NODEMCU - Using WiFi and NODEMCU to transmit data from sensors to Open Source IoT cloud platform – Introduction to Raspberry Pi – Pin Configuration – Interfacing Raspberry Pi with Cloud Platform.		
	Total Lecture hours	**40 hours**

Text Book(s)

1	Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-On Approach", 2014. ISBN: 978-0996025515
2	Boris Adryan, Dominik Obermaier, Paul Fremantle, "The Technical Foundations of IoT", Artech Houser Publishers, 2017.

Reference Books

1	Michael Margolis, "Arduino Cookbook", O"Reilly, 2011
2	Marco Schwartz, "Internet of Things with ESP8266", Packt Publishing, 2016

Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]

1	https://onlinecourses.nptel.ac.in/noc24_cs35/course
2	https://ocw.cs.pub.ro/courses/iot/courses/02 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.

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	4ZB	**DIGITAL AND CELLULAR COMMUNICATION**	**L**	**T**	**P**	**C**
Skill based Subject – II			3	T		2
Pre-Requisite:	Basic Electronics		Syllabus Version		2025-2026	

Course Objectives:

The Main Objectives of this course are to:

- ❖ To enhance the knowledge in communication with digital and cellular systems
- ❖ To learn the digital and cellular technology

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	K4
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**	**8 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**	**8 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**	**8 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	8 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	8 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	**40 hours**

Text Book(s)

1	Sam K .Shanmugam, **—DIGITAL AND ANALOG COMMUNICATION SYSTEMS**, John Wiley Publications, 2005
2	John G.Proakis,**—DIGITAL COMMUNICATIONS‖**,Tata McGraw Hill International,2001.

Reference Books

1	W.C.Y.Lee,**—MOBILE CELLULAR TELECOMMUNICATION‖**,McGrawHill Publications, 1995
2	Ke-Lin Du, M.N.S.Swamy, "**WIRELESS COMMUNICATION SYSTEMS‖**, Cambridge University Press, 2010.

Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]

1	https://nptel.ac.in/courses/106/106/106106167/Wireless and Cellular Communication
2	https://nptel.ac.in/courses/117/105/117105077/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

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:			2		P	4
Pre-Requisite:	Digital Electronics		Syllabus Version		2025- 2026	

Course Objectives:

The Main Objectives of this course are to:

- To understand the logical operation of various gates and theorems
- To develop various digital circuits

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 12 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

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 Practical IV			2		P	4
Pre-Requisite:	BASIC ELECTRONICS LAB		Syllabus Version		2025-2026	

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; **K**4-Analyze; **K5**-Evaluate; **K6**-Create

(Any 12 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. Bridge Rectifier
13. Filter Circuits
14. Characteristics of Piezoelectric Transducer
15. Monostable Multivibrator
16. Astable Multivibrator
17. Function Generator
18. Inverting and Non-Inverting Amplifier

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	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		2025-2026	

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	https://onlinecourses.nptel.ac.in/noc24_cs44/preview
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
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

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		2025-2026	

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 themwith8085.

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

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

Text Book(s)	
1	R.S.Gaonkar,**—MicroprocessorArchitecture,ProgramAndItsApplicationWith8085‖**, New Age International (P)Ltd,
2	S.Malarvizhi**,—MicroprocessorandItsApplication‖**,-AnuradheAgenciesPublications–I edition, March1999.
Reference Books	
1	DoughlasV.Hall, "**Microprocessors and Interfacing, Programming and Hardware**", TMH,2012
2	M. Rafi Quazzaman, "**Microprocessors Theory and Applications: Intel and Motorola**", : Prentice Hall of India, Pvt. Ltd., New Delhi, 2003.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://onlinecourses.nptel.ac.in/noc24_ee46/preview
2	https://www.youtube.com/watch?v=t0Z8P_hpbFk&vl=en
3	https://www.youtube.com/watch?v=fS7FFOaC_iQ

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		2025- 2026	

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

Unit:5	**Managing I/O Operation and Applet**	**8--hours**
File – Input Stream, Output Stream, and File Stream. Applets-Tag, Order of Applet Initialization, Repainting, Sizing Graphics- Introduction to AWT Programming		
	Total Lecture hours	**36--hours**

Text Book(s)

1	Harley Hahn, **—The internet complete reference‖**,Tata McGraw publicity,2nd Edition ,1997
2	Patrick Naughton., **— Patrick Naughton‖**, Then Java hand book, Tata McGraw,1997

Reference Books

1	Herbert Schildt, "The Complete Reference, Java", McGraw-Hill.
2	E.Balaguruswamy, "Programming with Java A Primer", McGraw-Hill.

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

1	https://onlinecourses.nptel.ac.in/noc24_cs43/preview
2	https://www.youtube.com/watch?v=M9G_VeQgy7I
3	https://www.youtube.com/watch?v=3u1fu6f8Hto

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

Six 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		2025-2026	

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

Text Book(s)	
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.
Reference Books	
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.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.youtube.com/watch?v=84YUQu8tE4w
2	https://www.youtube.com/watch?v=GPz_mR7Flas
3	https://www.youtube.com/watch?v=uFhDGagZzjs
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	63P	**Microprocessor and Microcontroller Lab**	**L**	**T**	**P**	**C**
Core Practical-VI			3		P	4
Pre-requisite		Requires the basic of Digital circuits and Programming languages	Syllabus Version		2025-2026	

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 12 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 generatorusing8255
12. ADC Interface
13. DAC Interface
14. Stepper Motor Interface

8051 MICROCONTROLLERLAB

15. Arithmetic and Logical Programs
16. Key Interface
17. LED Interface
18. Solid State RelayInterface
19. Square Wave Generation
20. ADCInterface
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

CO5	M	M	S	S	S	L	L	L	S	M

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

Course code	63Q	**INDUSTRIAL AND POWER ELECTRONICS LAB**	**L**	**T**	**P**	**C**
Core Practical-VII			3		P	4
Pre-requisite		Basic knowledge of Electronic Circuits or permission of instructor		Syllabus Version		2025-2026

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 12 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. Fire alarm
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
24. Solid State Relay

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		P	4
Pre-requisite		Basic knowledge of Electronic Communication	Syllabus Version		2025-2026	

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 12 EXPERIMENTS)

1. Amplitude Modulation
2. Frequency Modulation
3. Pulse Amplitude Modulation (PAM) and Detection
4. Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM)
5. Generation and Detection of PCM
6. Generation of delta and Adaptive delta modulation
7. Amplitude Shift Keying
8. Frequency Shift Keying
9. Phase Shift Keying
10. QPSK
11. DPSK
12. Study of TDM / FDM
13. Full duplex communication model
14. Alignment of satellite receiver
15. Study of GPS Handset
16. Study of GSM Module
17. PIN Diode Characteristics
18. Laser Diode Characteristics
19. Fiber Optics Tx and Rx
20. Signal Sampling and Reconstruction
21. Radiation pattern of HORN antenna.
22. Radiation pattern of Dipole & Yagi Uda antennas
23. 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		2025-2026	

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)

- Program to print the following triangle of numbers 1 121231234
- Defining a class with the following attributes1.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
- Program to create and display a message on the window
- Program to draw several shapes in the created window.
- Program to create an applet and draw gridlines.
- 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.
- Java program to create a frame with four text fields for name, age and qualification and a text field of multiple lines for address.
- Program to draw circle, ellipse, square and rectangle at the mouse click position.
- 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.
- Java program to demonstrate the multiple selection list boxes.
- 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.
- Java program to create a menu bar and pull down menus.
- 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.
- Java program to move different shapes (Circle, Ellipse, Square, and Rectangle) according to the arrow key pressed.
- Program to handle the divide by zero exception.
- 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.
- 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	T		4
Pre-Requites	Basic Electronics		Syllabus Version		2025-2026	

Course Objectives:

The Main Objectives of this course are to:

- ❖ To prepare the student to be an entry-level industrial standard ASIC or FPGA designer.
- ❖ To understand the issues and tools related to ASIC/FPGA design and implementation and basics of System on Chip and Platform based design.

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	**INTRODUCTION TO ASICS**	**12 hours**

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

Unit:2	**CMOS LOGIC**	**12 hours**

CMOS Transistors –Design Rules – Combinational Logic Cells: Pushing Bubbles – DriveStrength–TransmissionGates–EX-ORCell,SequentialLogicCells:FF–Clocked Inverter, Data Path Logic Cells: Data Path Elements

Unit:3	**ASIC DESIGN**	**12 Hours**

Programmable ASICS: Antifuse – Static RAM – 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.

Unit:4	**VHDL**	**12 hours**

Introduction to VHDL – Behavioral, Data Flow and Structural Model - Operators – Data Objects - Data Types - Design Examples

Unit:5	VERILOG	12 hours
Introduction - Language Elements- Gate-Level modeling- Data Flow- Behavioral- Structural Modeling – Modeling Examples		
	Total Lecture hours	**60 hours**

Text Book(s)	
1	Michael John Sebastian Smith,**—APPLICATIONSPECIFICINTEGRATED CIRCUITS"**, Addition-Wesley, 2nd reprint,2000.
2	Bhasker. J, **"VHDL PRIMER",** BS Publications, 2001
3	Bhasker. J. **‖A VERILOG HDL PRIMER‖**, BS Publications, 2001
Reference Books	
1	Charles.J.Roth,**—DIGITALSYSTEMDESIGNUSINGVHDL‖**,PWSPublishing (Thomson learning),2002.
2	StephenBrown,ZvonkoVranesic,**—FUNDAMENTSOFDIGITALLOGICWITH VHDL DESIGN‖** Tata McGraw-Hill,2002
Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]	
1	https://nptel.ac.in/courses/106/105/106105161/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.	

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

Course Code	5EB	**REMOTE SENSING**	**L**	**T**	**P**	**C**
Elective I - B			6	T		4
Pre-Requites:	Basic Electronics		Syllabus Version		2025-2026	

Course Objectives:

The Main Objectives of this course are to:

- To design fully equipped with concepts, methodologies and applications of Remote Sensing Technology.
- To Define and describe remote sensing and explain its applications, history, electromagnetic spectrum and interactions with various types of media.

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; **K**4-Analyze; **K5**-Evaluate; **K6**-Create

Unit:1	**PRINCIPLES OF REMOTE SENSING**	**12 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**	**12 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**	**12 hours**

Differences between Aerial and SpaceBorne Imagery-Elements of Visual Interpretation 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**	**12 hours**

Image Transformations - Subtraction – Rationing - NDVI and PCA - Thematic ClassificationandClusteringtoIncludeUnsupervisedandSupervisedClassificationBased on Minimum Distance and Maximum Likelihood Classification - Accuracy Assessment of Classification - Concepts of Hyper spectral Image Analysis		
Unit:5	**ANCILLARY DATA SOURCES AND INTEGRATION**	**12 hours**
GroundTruth-GeographicandRadiometric-IntroductionofGIS-IntegrationofRemote Sensing and GIS -Digital Terrain Models - GPS and its Role to Remote Sensing Data.		
	Total Lecture hours	**60 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, NPEL, Website etc.]		
1	https://www.coursera.org/lecture/gis-applications/remote-sensing-basics-wr6KdRemote 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		

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	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	T		4
Pre-Requisite:	Basic Electronics		Syllabus Version		2025-2026	

Course Objectives:

The Main Objectives of this course are to:

- To Learn the context of wireless network systems such as2G/3G/4G mobile telephony, Data networks, and other wireless networks and infrastructure.
- To emphasize the interface between mobile computing devices and programming those devices

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; **K**4-Analyze; **K5**-Evaluate; **K6**-Create

Unit:1	**INTRODUCTION**	**12 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**	**12 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**	**12 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**	**12 hours**

Traditional TCP- Indirect TCP- Snooping TCP- Mobile TCP - Fast Retransmit/ Fast Recovery- Transmission/Timeout Freezing – Selective Retransmission- Transaction Oriented TCP

Unit:5	**WAP**	**12 hours**

Architecture – Datagram Protocol- Transport Layer Security- Transaction Protocol- Session Protocol-Application Environment-Wireless Telephony Application

	Total Lecture hours	60 hours

Text Book(s)	
1	J.Schiller, **MOBILE COMMUNICATION**, Addison Wesley, 2000.
2	William Stallings, **WIRELESS COMMUNICATION AND NETWORKS**, Pearson Education, 2003.
Reference Books	
1	William C.Y.Lee, **Mobile Communication Design Fundamentals**, John Wiley, 1993.
2	Singhal, **WAP-Wireless Application Protocol**, Pearson Education,2003.
Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]	
1	https://nptel.ac.in/courses/106/106/106106147/Mobile Computing

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

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

Course code	5ED	**INDUSTRIAL AND POWER ELECTRONICS**	**L**	**T**	**P**	**C**
Elective I - D			6	T		4
Pre-requisite		Basic knowledge of Electronic Circuits or permission of instructor	Syllabus Version		2025-2026	

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**	**12—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 – Static AC and DC Switches–Flasher Circuits-Time Delay Circuits–Fan Regulator using TRIAC Thyristor Protection Circuits: Over Current Protection – Over Voltage Protection – Gate Protection

Unit:2	**Welding and Heating**	**12—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**	**12—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**	**12—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

Unit:5	**Industrial Robotic Systems**	**12—hours**

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.

	Total Lecture hours	**60—hours**

Text Book(s)

1	Harish C Rai, **—Industrial and Power Electronics‖** 10th edition, Umesh publications 2002
2	TimothyJMaloni,**—Industrial Solid State Electronic Devices and Circuits‖** 2nd edition 1986

Reference Books

1	P S Bimbhra,"Power Electronics", Khanna Publishers.
2	M.H. Rashid, "Power Electronics Circuits, Devices& Applications ,Pearson Education.

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

1	https://www.youtube.com/watch?v=1Auay7ja2oY
2	https://www.youtube.com/watch?v=oqnLQVFaqYI
3	https://www.youtube.com/watch?v=naxnRkOfh2Q

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

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	5EE	**ROBOTICS AND AUTOMATION**	**L**	**T**	**P**	**C**
Elective II-E			6	T		4
Pre-Requisite:	Basic Electronics		Syllabus Version		2025-2026	

Course Objectives:

The Main Objectives of this course are to:

- ❖ To learn the concepts of Robots.
- ❖ To know about the sensors, actuators used in Robots designing.
- ❖ To familiarize the students with the applications of Robots.

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

Unit:5	**COMPUTER NUMERICAL CONTROL (CNC)**	**9 Hours**
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		
	Total Lecture hours	**48 Hours**

Text Book(s)	
1	MikellP. Groover, **—AUTOMATION PRODUCTIO N SYSTEMS AND COMPUTERINTEGRATEDMANUFACTURING‖**, Prentice-Hall India, New Delhi, 1987. / Pearson Education, New Delhi
2	K.S. Fu, R.C. Gonzalez and C S G Lee, "**ROBOTICS: CONTROL, SENSING, VISION AND INTELLIGENCE**", McGraw Hill,New Delhi, 1987
Reference Books	
1	W. Bolton, **—MECHATRONICS‖**, Pearson Education Asia, 2002.
2	Mikell P. Groover, "**INDUSTRIAL ROBOTICS – TECHNOLOGY, PROGRAMMING AND APPLICATIONS**", McGraw Hill,New Delhi, 1986
Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]	
1	https://onlinecourses.nptel.ac.in/noc24_me18/preview
2	https://onlinecourses.nptel.ac.in/noc24_ge31/preview

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**	**PO10**
CO1	S	S	M	M	M	M	S	M	M	S
CO3	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	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		2025-2026	

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	10 hours

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	10 hours

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	10 hours

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

Unit:4	COUNTER AND TIMER	9 hours
Timer Instructions ON DELAY Timer and OFF DELAY Timer - Counter Instructions - Up/Down Counters -Timer and Counter Applications - Program Control Instructions - Data Manipulating Instructions - Math Instructions		

Unit:5	APPLICATIONS	9 hours
Applications of PLC - Simple Materials Handling Applications - Automatic Control of Warehouse Door - Automatic Lubricating Oil Supplier Conveyor Belt - Motor Control Automatic Car Washing Machine - Bottle Label Detection - Process Control Application		
	Total Lecture hours	**48 hours**

Text Book(s)

1. Charles H. Roth, Jr **—Fundamentals of Logic Design ",** Fourth Edition, Jaico Publishing house, 1999,
2. Frank D. Petruzella" **Programmable Logic Controllers ",** McGraw- Hill book, company, 1989
3. **Siemens —PLC Handbook "**.

Reference Books

1. 1. William I. Fletcher **—An Engineering Approach to Digital Design "**, Prentice, Hall of India Ltd., New Delhi, 1999.

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

1. https://unitronicsplc.com/what-is-plc-programmable-logic-controller/

Course Designed By: 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

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	M	M	S	M	M	S
CO3	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	5EG	**AUTOMOTIVE ELECTRONICS**	**L**	**T**	**P**	**C**
Elective-II –G			6	T		4
Pre-requisite			Syllabus Version		2025-2026	

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**	**9 hours**

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**	**10 hours**

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

Unit:3	**INSTRUMENTATION SYSTEMS**	**10 hours**

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

Unit:4	ELECTRONIC CONTROL OF BRAKING AND TRACTION	9 hours
Introduction and Description Control Elements and Control Methodology, Electronic Control of Automatic Transmission: Introduction and Description Control of Gear Shift and Torque Converter Lockup, Electric Power Steering, Electronic Clutch		

Unit:5	ENGINE MANAGEMENT SYSTEMS	10 hours
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		
	Total Lecture hours	**48 hours**

Text Book(s)

1	TOM DENTON, **Automobile Electrical and Electronic Systems**, Edward Arnold pb., 1995

Reference Books

1	1.DON KNOWLES**, Automotive Electronic and Computer controlled Ignition Systems, Don Knowles,** Prentice Hall, Englewood Cliffs, New Jersey 1988.
2	WILLIAM, T.M., **Automotive Mechanics**, McGraw Hill Book Co.,
3	WILLIAM, T.M., **Automotive Electronic Systems**, Heiemann Ltd., London, 1978.
4	Ronald K Jurgen, **Automotive Electronics Handbook**, McGraw Hill, Inc, 1999.

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

1	https://nptel.ac.in/courses/107/103/107103084/
2	https://nptel.ac.in/courses/107/106/107106088/
3	https://www.youtube.com/watch?v=vJ4EfyGXehg
4	https://www.youtube.com/watch?v=BG4N2dBgJrQ

Course Designed By: K.Mnikantan , 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	L	L	M	S	M	M	S
CO3	S	L	M	L	M	M	S	L	L	L
CO3	L	S	L	M	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

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

Course Code	5EH	SATELLITE COMMUNICATIONS	L	T	P	C
Elective II - H		ELECTIVE-II-H	6	T		4
Pre-requisite:		PRINCIPLES OF COMMUNICATION	Syllabus Version			2025- 2026

Course Objectives:

The objectives of this course are:

- ❖ To provide knowledge on fundamentals of Advanced Computer design.
- ❖ To understand the concept of instruction level parallelism, pipelining and memory hierarchy associated with it.
- ❖ To enhance the knowledge on advanced processors.

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, Jeremy Allnutt, Satellite Communications, 2nd edition, John willey, 2006.

2	W. L. Pritchard, H. G. Suyderhoud and R. A. Nelson, Satellite Communication systems Engineering, 2nd edition, Pearson educational pblishers, New Delhi, 2003.
Reference Books	
1	Dennis Roddy, Satellite Communications, 3rd edition, Mc Graw Hill, International, 2001.
2	Dr D.C. Agrwal, Satellite Communications, 4th edition, Khanna Publications, New Delhi, 2001.

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

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.

	Mapping with Program Outcomes									
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	L	L	L	L	L	L	L	L	L
CO2	S	M	L	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
Elective III - I		6	T		4
Pre-Requisite:	Basic knowledge in Communication Systems	Syllabus Version		2025- 2026	

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	12 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	12 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	12 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	OPTICALCOMMUNICATIONSYSTEMS	12 hours

Basic optical communication systems-Receiver performance-sensitivity-Selectivity-Components of Optical communication system-Signals in optical communication system-Transmitter-Receiver.

Unit:5	MEASUREMENTS	12 hours
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.		
	Total Lecture hours	**60 hours**

Text Book(s)	
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.

Reference Books	
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, NPEL, Website etc.]	
1	**https://onlinecourses.nptel.ac.in/noc21_ee42/preview**
2	**https://onlinecourses.nptel.ac.in/noc20_ee79/preview**
3	**https://www.digimat.in/nptel/courses/video/108104113/L01.html**
4	**https://pdfslide.net/education/optical-fiber-communication-ppt-591cebc1a22db.html?**

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		2025-2026	

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**	**9 hours**

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**	**9 hours**

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**	**10 hours**

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

Unit:4	**HARDWARE ASPECTS**	**10 hours**
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		
Unit:5	**LABVIEW APPLICATIONS**	**10 hours**
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		
	Total Lecture hours	**48 hours**

Text Book(s)

1	Garry M Johnson, "**Labview Graphical Programming**", Tata McGraw Hill, New Delhi, 2nd Edition, 1996
2	**Labview : Basics I & II Manual, National Instruments, 2005**

Reference Books

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

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

1	https://www.ni.com/en-in/innovations/white-papers/06/virtual-instrumentation.html

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
CO3	L	M	M	L	L	M	L	S	L	S
CO3	L	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	6EK	**BIOMEDICAL INSTRUMENTATION**	**L**	**T**	**P**	**C**
Elective-III-K			6	T		4
Pre-requisite		Higher secondary biology	Syllabus Version		2025-2026	

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 the Concept 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**	**9 hours**

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**	**10 hours**

Instrumentation Amplifiers - Current Amplifiers - Isolation Amplifier - Need for Filters - Low Pass, High Pass and Band Pass Active Filters - Notch Filters - Heated Stylus and Ink Pen Recorders. DIAGNOSTIC EQUIPMENTS: Typical Electrocardiogram (ECG) - Electrocardiograph - Bipolar and Unipolar Leads - Einthoven Triangle - Electrical Activities of the Brain - Electroencephalogram (EEG) - Muscle Response - Electromyograph (EMG).

Unit:4	DIAGNOSTIC EQUIPMENTS & BIOTELEMETRY	10 hours
X-ray Imaging - Radio Fluoroscopy - Image Intensifiers - Angiography - Endoscopy – Diathermy. BIOTELEMETRY AND PATIENT SAFETY: Need for Biotelemetry - Elements of Telemetry System - Radio Telemetry System - Physiological Signals used in Telemetry - TDM and FDM – Implantable Units.		
Unit:5	**PHYSIOLOGICAL ASSIST DEVICES**	**9 hours**
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		
	Total Lecture hours	**48 hours**

Text Book(s)

1	Joseph J. Carr and John M. Brown, **—Introduction to Biomedical Equipment Technology‖,** Pearson EducationAsia,New Delhi, 4th Education, 2001
2	Leslie Cromwell.,Fred.J. Webell., Erich A. Pfeffer.,**—Bio-medical Instrumentation And Measurements‖**,PrenticeHall of India, New Delhi, 1990

Reference Books

1	Khandpur,**—HandbookonBiomedicalInstrumentation‖,**TataMcGrawHillCompany,New Delhi, 1989
2	OhnGWebster,Ed.,**—MedicalInstrumentationApplicationandDesign‖,**ThirdEdition, John Wiley & Sons, Singapore,1999
3	Arumugam.M,**—BiomedicalInstrumentation‖,**AnuradhaAgenciesPublishers,Chennai,1992

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

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

Course Designed By: 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
ELECTIVE –III-L			6			4
Pre-requisite:		Digital Principles and Applications	Syllabus Version		2025-2026	

Course Objectives:

The objectives of this course are:

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

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 (ω_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 forLayout diagrams of digital circuits– sheet resistance R_s –standard unit of capacitance – Inverter delays – Propagation delays- scaling of MOS circuits – limitations of scaling.

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

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

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

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

Annexure

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