B. Sc. Electronics and Communication Systems

Syllabus

AFFILIATEDCOLLEGES

Program Code: 26B

2022 – 2023 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)**

Coimbatore - 641 046, Tamil Nadu, India

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 environmentalconditions.
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 engineeringpractice.
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 641 046
B.Sc. Electronics and Communication Systems
Curriculum

(For the students admitted during the academic year 2022 – 23 onwards)

Course Code	Title of the Course	Hours		Maximum Marks			Credits
		Theory	Practical	CIA	ESE	TOTAL	
FIRST SEMESTER							
11T	Language –I	6	-	50	50	100	4
12E	English – I	6	-	50	50	100	4
13A	**Core Paper I:** Basic Electronics	5	-	50	50	100	4
--	**Core Practical I:** Basic Electronics Lab	-	3	-	-	-	-
--	**Core Practical II**: Semiconductor Devices Lab	-	3	-	-	-	-
1AA	**Allied I** Mathematics–I	5	-	50	50	100	4
1FA	Environmental Studies #	2	-	-	50	50	2
Total		24	6	200	250	450	18
SECOND SEMESTER							
21T	Language – II	6	-	50	50	100	4
22E	English – II	4	-	25	25	50	2
2NM	Naan MudhalvanCourse-Generic Name: Language Proficiency for Employability Course Name: Effective English	2	-	25	25	50**	2
23A	**Core Paper II:** Semiconductor Devices	5	-	50	50	100	4
23P	**Core Practical I:** Basic Electronics Lab	-	3	50	50	100	4
23Q	**Core Practical II:** Semiconductor Devices Lab	-	3	50	50	100	4
2AA	**Allied: II** Mathematics–II	5	-	50	50	100	4
2FB	Value Education – Human Rights #	2	-	-	50	50	2
	Swatch Bharat- Summer internship **	-	-	-	-	-	
Total		24	6	325	325	650	26
THIRD SEMESTER							
31T	Language - III	6	-	50	50	100	4

32E	English - III	6	-	50	50	100	4
33A	**Core Paper III:** Electronic Circuits	4	-	50	50	100	4
--	**Core Practical III:** DigitalElectronic lab	-	3	-	-	-	-
--	**Core Practical IV:** Electronic Circuits and Instrumentation Lab	-	3	-	-	-	-
3AD	**Allied: III** Object Oriented Programming usingC++	3	-	30	45	75	3
3ZA	**Skill based Subject I:** Digital Principles and Applications	3	-	30	45	75	3
3FB/ 3FC	Tamil @ / Advanced Tamil#(OR) Non-major elective - I (Yoga for Human excellence # Women's Rights#)	2	-	-	50	50	2
Total		24	6	210	290	500	20
FOURTH SEMESTER							
41T	Language - IV	5	-	50	50	100	4
42E	English - IV	5	-	50	50	100	4
43A	**Core Paper IV:** IC's and Instrumentation	3	-	50	50	100	4
43P	**Core Practical III:** Digital Electronics Lab	-	3	50	50	100	4
43Q	**Core Practical IV:** Electronic Circuits and InstrumentationLab	-	3	50	50	100	4
4AD	**Allied:IV** Internet of Things	2	-	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 MudhalvanCourse-Generic Name: Digital skills for Employability Course Name: Office Fundamentals	2	-	25	25	50**	2
Total		22	8	375	375	750	30

FIFTH SEMESTER							
53A	**Core Paper V**: 8085 Microprocessor and Applications	6	-	50	50	100	4
5EA/ 5EB/ 5EC/ 5ED	**Elective – I**	6	-	50	50	100	4
5EE/ 5EF/ 5EG/ 5EH	**Elective - II**	6	-	50	50	100	4
--	**Core Practical VI:** Microprocessor and MicrocontrollerLab	-	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
Total		21	9	180	195	375	15
SIXTH SEMESTER							
63A	**Core Paper VI**: 8051 Microcontroller and Embedded Systems	6	-	50	50	100	4
63P	**Core Practical VI**: Microprocessorand Microcontroller lab	-	3	50	50	100	4
63Q	**Core Practical VII:** Industrial and Power Electronics Lab	-	3	50	50	100	4

63R	**Core Practical VIII:** Electronic Communication Lab	-	3	50	50	100	4
67V	**PROJECT**	4	-	-	-	100*	4
6EI/ 6EJ/ 6EK/ 6EL	**Elective- III**	6	-	50	50	100	4
6ZP	**Skill based Subject –IV** Java Programming Lab	-	3	30	45	75	3
67A	Extension Activities @	-	-	-	-	50	2
6NM	Naan Mudhalvan Course: Salesforce	2	-	25	25	50**	2
Total		18	12	330	295	775	31
Grand Total						**3500**	**140**

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

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

*** Swatch 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 it will be converted for 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 it will be converted for 25 marks.

**Naan Mudhalvan – Skill courses- external 25 marks will be assessed by Industry and internal will be offered by respective 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			5	**T**		4
Pre-requisite		Higher secondary Physics	**Syllabus Version**		2022-2023	

Course Objectives:

The main objectives of this course are to:
1. To become familiar with fundamentals of electroniccomponents
2. To learn to use common electroniccomponents
3. To design electronic circuits to perform realistictasks

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'sLaw ofElectromagneticInduction-EnergyStored in anInductor-Inductance inSeries 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'sLaw-Kirchoff'sCurrent Law-Analysis of Resistance in Series Circuits, Parallel Circuits and Series Parallel Circuits-Concept of Voltage Source and Current Source-Voltage Source in Series and Current Source in Parallel-Simple Problems in DC Circuits.

Unit:4	**NETWORK THEOREMS**	**12hours**

Superposition Theorem - Thevenin Theorem-Thevenizinga 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.SureshKumar,A.Vallavaraj**—ELECTRONICDEVICESANDCIRCUITS**‖-Tata McGraw-Hill Publishing Company Limited, New Delhi.1998
2	B.V.Narayana Rao "**PRINCIPLES OF ELECTRONICS**", Wiley Eastern Limited, 1992

Reference Books

1	BernardGrob**—BASIC ELECTRONICS-**Tata McGraw-Hill Publishing Company Limited, 9thEdition.
2	B.L.Theraja,**—BASICELECTRONICS-SOLIDSTATEDEVICES,**S.ChandCompanyLtd.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**		2022-2023	

Course Objectives:

The main objectives of this course are to:
1. To enable the students to understand and gain the knowledge on semiconductordevices.
2. To acquaint the students with construction, theory and characteristics of the electronicdevices.

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**	**12hours**

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**	**12hours**

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

Unit:3	**BJT**	**12hours**

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:FixedBias-CollectortoBaseBias –VoltageDividerBias–BiasCompensation-Thermal Runaway – Heat Sink

Unit:4	**FET AND UJT**	**12hours**

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**	**12hours**

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	**60hours**

Text Book(s)	
1	S.Salivahanan,N.SureshKumar,A.Vallavaraj,**—ELECTRONICSDEVICESAND CIRCUITS‖,** Tata McGraw Hill Publishing Company Limited, New Delhi, 8th edition.
2	B.L.Theraja,**—BASICELECTRONICS–SOLIDSTATEDEVICES‖**,S.Chand&Company Ltd.
Reference Books	
1	S.L.Kakani,K.C.BhanDai**—ATEXTBOOKOFELECTRONICS‖**. S.Chand& Company Ltd.2000
2	BernardGrob**—BASIC ELECTRONICS‖**-Tata McGraw-Hill Publishing Company Limited, 9thEdition.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/108/108/108108122/
2	https://nptel.ac.in/courses/108/108/108108112/
3	https://nptel.ac.in/courses/115/102/115102103/
Course Designed By: K.Manikantan , Assistant Professor, Government Arts College ,Ooty& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty	

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

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

Course code	23P	**BASIC ELECTRONICS LAB**	**L**	**T**	**P**	**C**
Core Practical - I			3		P	4
Pre-requisite		Higher secondary Physics	**Syllabus Version**		2022-2023	

Course Objectives:

The main objectives of this course are to:

1. To understand the fundamental principles of circuittheory
2. To make use of circuit laws and theorems and measuring the circuitparameters.

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 thecircuits using series and parallel equivalents and using Thevenin's and Norton'sequivalent circuits.	K3
3	Design resonance circuits.	K4
4	Use the oscilloscope for the display and measurements of signals.	K2
5	Apply the electronic components in network theorems.	K3

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

ANY 16 EXPERIMENTS

1. Study of Multimeter – CheckingofComponents
2. Measurement of Amplitude, Frequency & Phase DifferenceusingCRO
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 CurrentDividers
7. Verification of Kirchoff's Law
8. WheatstoneBridge
9. Verification of Norton's Theorem
10. Verification of Thevenin'sTheorem
11. Verification of Millman'sTheorem
12. Verification of SuperpositionTheorem
13. LCRBridge
14. Series ResonanceCircuit
15. Parallel ResonanceCircuit
16. Transient Response of RCCircuit
17. Transient Response of RLCircuit
18. Capacitors & Inductors in Series &Parallel
19. Frequency Response of R, L&C
20. Low Pass Filter & High PassFilter
21. Band pass and Band RejectionFilter
22. Verification of Maximum Power TransferTheorem
23. Measurement of resistance and capacitance in seriesandparallel

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**		2022-2023	

Course Objectives:

The main objectives of this course are to:

1. To understand and experiment the basic parameters of electronic devices.
2 To construct few applications using semiconductor devices.

Expected Course Outcomes:

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

1	Experiment the fundamental operations of the main semiconductor electronic devices.	K3
2	Design and construct electronic circuits using semiconductor devices.	K3
3	Understand the transistor characteristics	K2
4	Understand the characteristics of LDR and solar cell	K2
5	Use the special diodes for various applications	K3

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

ANY 16 EXPERIMENTS

1. Band Gap Energy of Silicon /GermaniumDiode
2. V-I Characteristics ofJunctionDiode
3. V-I Characteristics ofZenerDiode
4. Transistor Characteristics ofCEConfiguration
5. Transistor Characteristics ofCBConfiguration
6. Transistor Characteristics ofCCConfiguration
7. ClippingCircuits
8. ClampingCircuits
9. Measurement of Stability Factor ofFixedBias
10. Measurement of Stability Factor ofSelfBias
11. V-I CharacteristicsofJFET
12. V-I CharacteristicsofUJT
13. UJTasOscillator
14. FET as Voltage VariableResistor(VVR)
15. Characteristics of LDR
16. Characteristics ofSolarCell
17. Study of IR(Tx&Rx)
18. Study of LED and 7Segmentdisplay
19. Temperature Co-efficient of JunctionDiode
20. Zener as a Voltageregulator
21. ON / OFF control of relay using Opto–Couplers
22. CharacteristicsofSCR
23. TRIACCharacteristics

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			4	T		4
Pre-Requisite:	Basic Electronics		Syllabus Version		2022-2023	

Course Objectives:

The Main Objectives of this course are to:

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

Expected Course Outcomes:

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

1	Understand the concepts of Rectifiers and regulators	K2
2	Study about Small signal amplifiers	K1
3	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 PowerSupply.

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 – FETAmplifier.

Unit:3	**POWER AMPLIFIERS**	**12 hours**

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

Unit:4	**FEEDBACK AMPLIFIERS**	**12hours**

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

Unit:5	**OSCILLATORS AND MULTIVIBRATORS**	**12 hours**
Barkhausen Criterion – Hartley Oscillator – Colpitts Oscillator – Phase Shift Oscillator – Wein Bridge Oscillators –Peizo Electric Crystal and its Effects – Crystal Oscillator - AstableMultivibrator–Monostablemultivibrator–BistableMultivibrator–Schmitt Trigger		
Unit:6	**Contemporary Issues**	**2 hours**
https://nptel.ac.in/courses/108/102/108102097/#Introduction to Electronic circuits NPTEL.		
https://nptel.ac.in/courses/108/102/108102095/Analog Electronic circuits NPTEL.		
	Total Lecture hours	**60 hours**

Text Book(s)	
1	S.K.Sahdev,**–ELECTRONICPRINCIPLES**,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			3	T		3
Pre-Requisite:	Higher secondary Physics		Syllabus Version	2022-2023		

Course Objectives:

The Main Objectives of this course are to:

- To acquire the basic knowledge of Number system, Digital logic circuits and itsapplication.
- To outline the formal procedures for the analysis and design of combinationaland sequentialcircuits.
- To learn the concepts of A/D, D/A conversions andtheir 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; **K**4-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–UpDowncounter–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, –**DIGITALPRINCIPLESANDAPPLICATIONS**, Tata McGraw Hill Edition V, 2002.	
2	M.MorrisMano–**DIGITALLOGICANDCOMPUTERDESIGN**,PHI2005.	
Reference Books		
1	Floyd and Jain, **Digital Fundamentals,** Prentice Hall2010	
2	M. Morris Mano Charles Kime, **Digital Logic and Computer Design Fundamentals**, Pearson Education Limited, 2014	
Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]		
1	https://soaneemrana.org/onewebmedia/DIGITAL%20PRINCIPLES%20AND%20APPLICATION%20BY%20LEACH%20&%20MALVINO.pdfE book, Malvino& Leech, –**DIGITALPRINCIPLESAND 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			3	T	-	3
Pre-Requisite:	Students should have basic Computer Knowledge		Syllabus Version		2022-2023	

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

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

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

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

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

Unit:3	**OPERATOR OVERLOADING**	**9 hours**

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

Unit:4	**POINTERS**	**9 hours**
Declaration – Pointer to class, object – THIS pointer – Pointer to derived classes and base classes – Arrays – Characteristics – Arrays of classes – Memory models – New and delete operators – Dynamic objects – Binding, Polymorphisms and Virtual functions.		
Unit:5	**FILES**	**9 hours**
File stream classes – File Modes – Sequential read/write operations – Binary and ASCII files – Random access operation – Templates – Exception handling – Strings – Declaring and initializing string objects – String attributes – Miscellaneous functions.		
	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	shorturl.at/mruW9
2	https://www.w3schools.com/cpp/

Course Designed By:

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

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	S	M	M	M	M	M	M	L
CO2	S	S	S	S	S	S	S	M	M	M
CO3	S	S	S	S	S	S	S	M	M	M
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			3	T		4
Pre-Requisite:	Basic Electronics		Syllabus Version		2022-2023	

Course Objectives:

The Main Objectives of this course are to:

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

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–Classification of Transducers – Selection of Transducers – Resistive Transducers – Potentiometers – Thermistors – Thermocouple – LVDT – RVDT – Piezoelectric Transducers – Hall Effect Transducers – Photoelectric Transducers – DigitalDisplacementTransducers

Unit:5	**ELECTRONIC INSTRUMENTS**	**12 hours**
Q Meters- CRO: Block Diagram – Cathode Ray Tube – Measurement of Frequency – MeasurementofVoltageandCurrent–DigitalOscilloscope–Digitalvoltmeter:RampType DVM– Dual Slope Integrating Type DVM – Digital Multimeter – Humidity and Humidity Measurement – Measurement ofPH.		
	Total Lecture hours	**60 hours**
Text Book(s)		
1	D.Roy Choudhury and Shahil B Jain, **–LINEARINTEGRATEDCIRCUITS**,Second Edition New Age International Publishers, 2004	
2	K.R.Botkar,**–INTEGRATEDCIRCUITS**,10th EditionKhannaPublishers, 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			2			2
Pre-Requisite:	Basic Electronics		Syllabus Version		2022-2023	

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	AnalyzetheIoTapplications	K4

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

Unit:1	**IOT FUNDAMENTALS**	**6 hours**

Introduction to IoT: Definition & Characteristics of IoT – Architecture of IoT – Technologies for IoT – Developing IoT Applications – Security in IoT

Unit:2	**DESIGN PRINCIPLES FOR CONNECTED DEVICES**	**6 hours**

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

Unit:3	**PROGRAMMING FUNDAMENTALS WITH C USING ARDUINO IDE**	**6 hours**

Arduino IDE- Data Types / Variables / Constant – Operators–Conditional Statements and Loops– Strings.

Unit:4	**SENSORS AND ACTUATORS**	**6 hours**
Analog and Digital Sensors – Interfacing temperature sensor with Arduino – Interfacing LED and Buzzer with Arduino.		
Unit:5	**SENDING SENSOR DATA OVER INTERNET**	**6 hours**
Introduction to ESP8266 NODEMCU WiFi Module – Programming NODEMCU - Using WiFi and NODEMCU to transmit data from temperature sensor to Open Source IoT cloud platform.		
	Total Lecture hours	**30 hours**

Text Book(s)	
1	ArshdeepBahga, 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://nptel.ac.in/courses/106/105/106105166/ Introduction to IoT Part I – Lecture 1
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		2022-2023	

Course Objectives:

The Main Objectives of this course are to:

- ❖ To enhance the knowledge in communication with digitalandcellular systems
- ❖ To learn the digital andcellulartechnology

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	**DATA TRANSMISSION**	**10 hours**

Introduction – Representation of Data Signal – Parallel and Serial Data Transmission – 20milli Amps Loop and Line Drivers – Transient Noise – Data Signal – Signal Shaping and Signalling Speed – Noise and Error Analysis – Repeaters.

Unit:2	**COMMUNICATION SYSTEM**	**10 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 – Analysisof Communication System – Design of Communication System.

Unit:3	**DIGITAL CARRIER MODULATION SCHEMES**	**10 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**	**10 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**	**10 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–TransmissionandModulation–CDMA–TermsofCDMASystems–Call Processing – Hand Over Procedures		
	Total Lecture hours	**0 hours**
Text Book(s)		
1	Sam K.Shanmugam, **—DIGITAL AND ANALOG COMMUNICATION SYSTEMS**, John Wiley Publications, 2005	
2	JohnG.Proakis,**—DIGITALCOMMUNICATIONS‖**,TataMcGrawHill International,2001.	
Reference Books		
1	W.C.Y.Lee,**—MOBILECELLULARTELECOMMUNICATION‖**,McGrawHill Publications, 1995	
2	Ke-Lin Du, M.N.S.Swamy, "**WIRELESS COMMUNICATIONSYSTEMS‖**, 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:			3		3	4
Pre-Requisite:	Digital Electronics		Syllabus Version		2022-2023	

Course Objectives:

The Main Objectives of this course are to:

- To understand the logical operation of various gatesandtheorems
- To develop variousdigitalcircuits

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

	DIGITAL ELECTRONICS LAB	**90 hours**

(ANY 16 EXPERIMENTS)

1. Verification of Basic Gates andUniversalGates
2. Verification ofDemorgan'sTheorem
3. 2-bit Comparator using Gates
4. Half Adder andFullAdder
5. Half Subtractor and FullSubtractor
6. 4-bitBinaryAdder
7. Multiplexer andDemultiplexers
8. Encoder and Decoder
9. BCD to 7-SegmentDisplay
10. Study ofFlip Flops
11. Binary to Grey and Grey toBinaryConversion
12. Shift Registers andRingCounter
13. Analog toDigitalConverter
14. Digital toAnalogConverter
15. Op-Amp: Adder andSubtractor

16. Op-Amp: IntegratorandDifferentiator
17. Current to Voltage and Voltage toCurrentConverter
18. Realize Basic gates fromuniversalgates
19. Synchronous and AsynchronousCounter
20. MagnitudeComparator.
21. Design and Simulation of Basic Logic Gates usingVHDLCoding.
22. Design and Simulation of adder using VHDLCoding.
23. Design and Simulation of subtractor Circuit using VHDLCoding

Total Lecture hours	**90 Hours**

Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College.&
Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.

Mapping with Programme Outcomes

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

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

Course Code	43Q	**ELECTRONIC CIRCUITS AND INSTRUMENTATION LAB**	**L**	**T**	**P**	**C**
Core /Elective / Supportive:	**Core Practical IV**				**3**	**4**
Pre-Requisite:	**BASIC ELECTRONICS LAB**		**Syllabus Version**		2022-2023	

Course Objectives:

The Main Objectives of this course are to:

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

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 Amplifiercircuits	K6
3	Design different Oscillator circuits	K6
4	Design different Instrumentation circuits	K6
5	Design circuits withTransducers	K6

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

(Any 16 Experiments)

1. DC Regulated Power Supply usingZenerDiode
2. VoltageDoubler
3. FeedbackAmplifier
4. EmitterFollower
5. TransformerCoupledAmplifier
6. HartleyOscillator
7. ColpittsOscillator
8. PhaseshiftOscillator
9. WeinBridgeOscillator
10. RCCoupledAmplifier
11. Half Wave and Full WaveRectifier
12. FilterCircuits
13. Voltage to Current Converter
14. Current to Voltage Converter
15. Characteristics of Piezoelectric Transducer
16. Summing Amplifier
17. Difference Amplifier
18. Inverting and Non Inverting Amplifier
19. Temperature measurement usingthermistor.
20. Displacement measurement usingLVDT.
21. Instrumentation Amplifier
22. Weighing machine using load cell
23. Characteristics of photo voltaic cell (solarcell)

	Total Lecture hours	**90 hours**

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**		2022-2023	

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	shorturl.at/mruW9
2	https://www.w3schools.com/cpp/

Course Designed By:

1. Dr. K. Venmathi, Assistant Professor, LRG Government College for Women,Tiruppur.

2. Mr. M. Arun Prasad, Assistant Professor, KG College of Arts and Science,Coimbatore.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	S	M	M	M	M	M	M	L
CO2	S	S	S	S	S	S	S	M	M	M
CO3	S	S	S	S	S	S	S	M	M	M
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**		2022-2023	

Course Objectives:

The main objectives of this course are to:

1. To enable the students to learn the MicroprocessorArchitecture.
2. To learn the instruction set of 8085 and to developprogrammingskills.
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 microprocessor with various peripheral devices.	K3
4	Understand the operation of Programmable Interface Devices and realize the programming & interfacing of it with 8085 microprocessor.	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 ControlSignals –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 TIMERLOGIC
8085Interrupts – ArchitectureofProgrammableInterruptController8259—Architectureof8254Programmable Interval Timer / Counter – Modes of Operation of 8254 – Generating Square WaveUsing8254

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://nptel.ac.in/courses/108/103/108103157/
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**		2022-2023	

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, classesand files.
2. To learn the internet concept and Java programmingsystems.

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

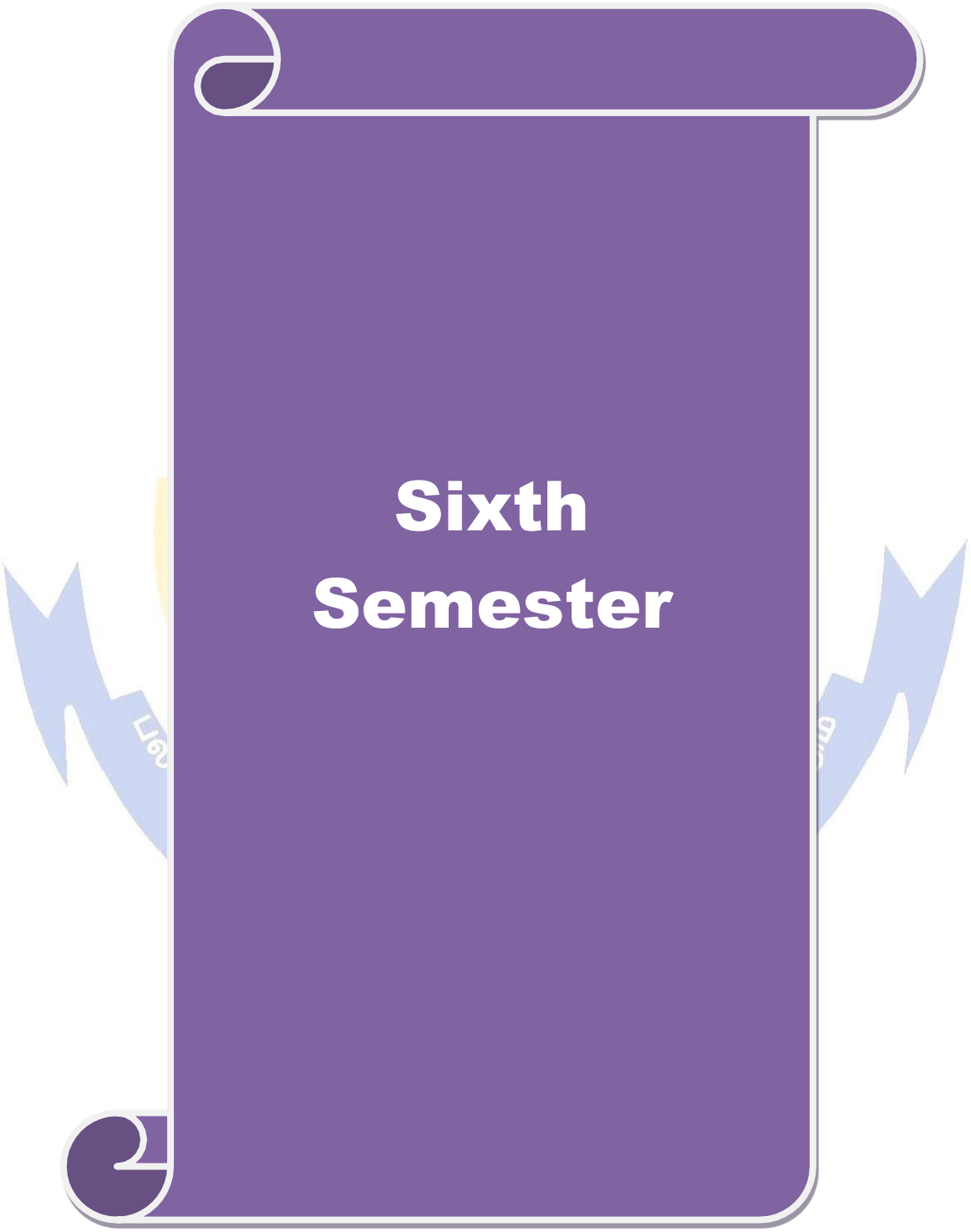
2 Patrick Naughton., **— PatrickNaughton‖**, Then Java hand book, Tata McGraw,1997

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://www.youtube.com/watch?v=pWusFlk747Y
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


Sixth
Semester

Course code	63A	**8051 MICROCONTROLLER AND EMBEDDED SYSTEMS**	**L**	**T**	**P**	**C**
Core VI			6	T		4
Pre-requisite		DigitalElectronics, 8085 Microprocessor	**Syllabus Version**		2022-2023	

Course Objectives:

The main objectives of this course are to:

1. Study the architecture and addressing modesof8051.
2. Impart knowledge about assembly language programsof8051.
3. Helps to understand the importance of different peripheral devices&their interfacingto8051.
4. Impart knowledge of different types of external interfaces includingLEDS,LCD, keypad Matrix, Switches & Seven segmentdisplay.

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 andRegisters.

Unit:2	**Assembly Programming and Addressing Modes**	**15—hours**

Introductionto8051AssemblyProgramming–The Program Counter and ROM– Data Typesand Directives–FlagBitsandPSWRegister–RegisterBankandStack–LoopandJumpInstructions – 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.ProgrammingwithC:DataTypes–TimeDelayProgramming–I/OProgramming – 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**

InterfacingLCDtothe8051–InterfacingADC–InterfacingSensorsto8051–InterfacingStepper Motor – 8051 Interfacing to the Keyboard – Interfacing DAC to the8051

	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	4
Pre-requisite		Requires the basic of Digital circuits and Programming languages	**Syllabus Version**		2022-2023	

Course Objectives:

The main objectives of this course are to:

1. To introduces the assembly language programming of Microprocessor and Microcontroller.
2. It develops the student's Assembly language programming skills and gives practical training of interfacing the peripheral devices with the Microprocessor and Microcontroller.

Expected Course Outcomes:

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

1	Learn assembly language programming of Microprocessor and Microcontroller with interfacing the peripheral devices.	K3
2	Program the microprocessor for various applications.	K6
3	Interface the 8085 microprocessor with various peripheral devices.	K3
4	Analyze the data transfer through serial and parallel ports.	K4
5	Program the micrcontroller for various applications.	K6

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

(ANY 16 EXPERIMENTS)

8085 MICROPROCESSOR LAB

1. Addition / Subtraction of 8 / 16 bit Data
2. Multiplication / Division 8 bit Data
3. Block DataTransfer
4. Smallest / largest of NNumbers
5. To arrange in ascending / DescendingOrder
6. Sum of N 8 bitNumbers
7. 1's and 2's Compliment of an Array(8bit)
8. UP/DOWN Counter using 7 SegmentDisplays
9. Traffic Light Control Interface
10. Data Transfer using 8255(PPI)
11. Square wave generatorusing8255
12. ADCInterface
13. DACInterface
14. Stepper Motor Interface

8051 MICROCONTROLLERLAB

15. Arithmetic and LogicalPrograms
16. KeyInterface
17. LEDInterface
18. Solid State RelayInterface
20. Square Wave Generation
21. ADCInterface
22. DACInterface
23. Stepper Motor Interface
24. 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	4
Pre-requisite		Basic knowledge of Electronic Circuits or permission of instructor	**Syllabus Version**		2022-2023	

Course Objectives:

The main objectives of this course are to:

1. To make the students to design triggering circuitsofSCR.
2. To understand the characteristics of powerelectronicdevices.

Expected Course Outcomes:

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

1	Design triggering circuits of SCR	K2
2	Understand the characteristics of power electronic devices.	K3
3	Acquire knowledge about fundamental concepts and techniques used in power electronics.	K2
4	Foster ability to identify basic requirements for power electronic based design application.	K4
5	To develop skills to build, and troubleshoot power electronics circuits	K5

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

(ANY 16 EXPERIMENTS)

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

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

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

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

Course code	63R	**Electronic Communication Lab**	**L**	**T**	**P**	**C**
Core Practical-VIII					3	4
Pre-requisite		Basic knowledge of Electronic Communication	**Syllabus Version**		2022-2023	

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 communicationtechnologies.

Expected Course Outcomes:

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

1	Understand the concept of Digital Communication and wireless communication technologies.	K2
2	Obtain experiment knowledge about the Modulation and Detection techniques	K3
3	Familiarize Digital carrier Modulation Schemes	K4
4	Analyze the Model of Communication system	K4
5	Analyze the cellular system design and technical challenges.	K4

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

(ANY 16 EXPERIMENTS)

1. Pulse Amplitude Modulation (PAM) and Detection
2. Pulse Width Modulation (PWM) and Pulse PositionModulation(PPM)
3. Generation and Detection of PCM
4. Generation of delta and Adaptive deltamodulation
5. Amplitude ShiftKeying
6. Frequency ShiftKeying
7. Phase ShiftKeying
8. QPSK
9. DPSK
10. Study ofTDM/FDM
11. Full duplex communication model
12. Alignment of satellite receiver
13. Study of GPSHandset
14. Study of GSMModule
15. PIN DiodeCharacteristics
16. LaserDiode
17. Characteristics
18. Fiber Optics TX andRx
19. Signal Sampling and Reconstruction
20. GUNN diodeOscillator
21. Reflex Klystron Characteristics using micro wave bench
22. Radiation pattern of HORN antenna.
23. Radiation pattern of Dipole & Yagi Uda antennas
24. Radiation pattern Loop & array antennas

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

Mapping with Programme Outcomes

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

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

Course code	6ZP	**JAVA PROGRAMMING LAB**	**L**	**T**	**P**	**C**
Skill Based Subject: IV		Practical.			3	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**		2022-2023	

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 writeJava programs.
3. To implement and gain knowledge in Arrays, functions, Structures, Pointers and File handling.

Expected Course Outcomes:

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

1	Understand the basic concepts of Java Programming with emphasis on ethics and principles of professional coding.	K1, K2
2	Demonstrate the creation of objects, classes and methods and the concepts of constructor, methods overloading, Arrays, branching and looping.	K2
3	Create data files and Design a page using AWT controls and Mouse Events in Java programming Implement the concepts of code reusability and debugging.	K2, K3
4	Develop applications using Strings, Interfaces and Packages and applets	K3
5	Construct Java programs using Multithreaded Programming and Exception Handling	K3

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

JAVA PROGRAMMING (ANY 12 PROGRAMS)

1. Program to print the following triangle of numbers 1 121231234
2. Definingaclasswiththefollowingattributes1.xname2.DateofBirth3.Dateo n 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 itsdetails
3. Program to create and display a message on thewindow
4. Program to draw several shapes in the created window.
5. Program to create an applet and drawgridlines.
6. Java program to create a frame with two buttons called father and mother. When we click the father button the name of the father, his age and designation must appear. When we click mother similar details of mother appear.
7. Java program to create a frame with four text fields for name, age and qualification and a text field of multiple lines foraddress.
8. Program to draw circle, ellipse, square and rectangle at the mouse click position.

9. Java program to create four text fields for the name, street, city and pin code with suitable labels. Also add a button called my details, when you click the button your name, street, city and pin code must appear in the textfields.
10. Java program to demonstrate the multiple selection listboxes.
11. Program to create a canvas which displays a clock with hour hand and a minute hand depending upon an int variable minutes. Write another program with a frame, which displays the clock canvas. It must also have three buttons, tick, reset and close. When we click reset, the clock must reset to 12 hrs. When we click close, the frame closes.
12. Java program to create a menu bar and pull downmenus.
13. Java program to create a window when we press M or m the window displays Good Morning A or the window displays Good Afternoon or the window displays Good Evening or n the window displays GoodNight.
14. Java program to move different shapes (Circle, Ellipse, Square, and Rectangle) according to the arrow keypressed.
15. Program to handle the divide by zeroexception.
16. Program to explain the multithreading with the use of multiplication tables. Three threads must be defined and each one must create one multiplication table; they are 5 tables, 7 tables and13table.
17. Program to illustrate thread priority. Create three threads and assign three differentpriorities.

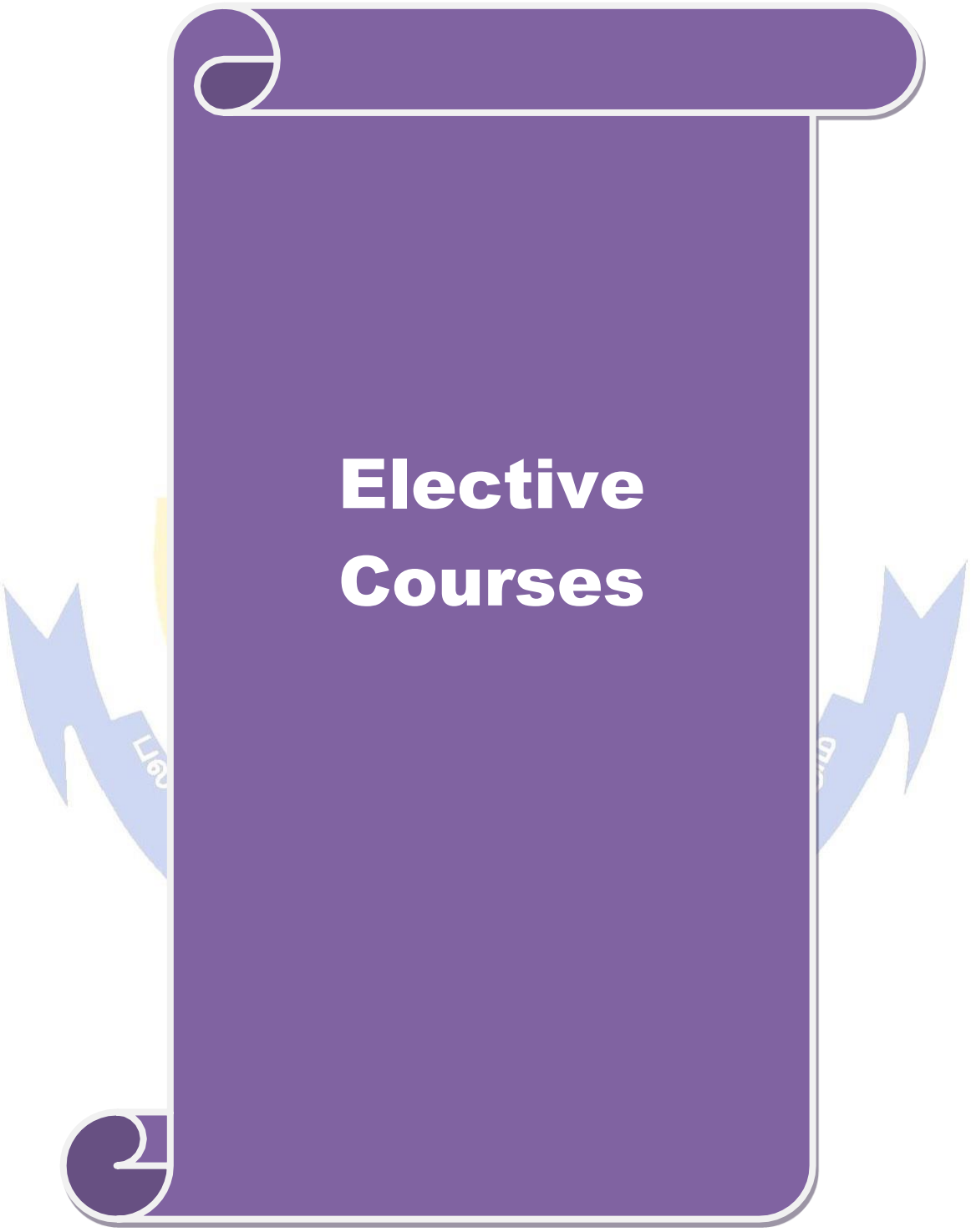
Course Designed By:

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

Mapping with Programme Outcomes

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

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


Elective
Courses

Course Code	5EA	**ASIC DESIGN**	**L**	**T**	**P**	**C**
Elective I - A			6			4
Pre-Requites	Basic Electronics		Syllabus Version		2022-2023	

Course Objectives:

The Main Objectives of this course are to:

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

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	**INTRODUCTION TO ASICS**	**18 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**	**18 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**	**18 Hours**

Programmable ASICS: Antifuse – StaticRAM – EPROM and EEPROM Technology- Programmable ASIC Logic Cells: Actel ACT - Xilinx LCA and Altera FLEX Architectures - Programmable ASIC I/O Cells: DC Output –DC Input, Programmable ASIC Design Software: Logic Synthesis – FPGA Synthesis.

Unit:4	**VHDL**	**18hours**

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

Unit:5	**VERILOG**	**18 hours**

Introduction - Language Elements- Gate-Level modeling- Data Flow- Behavioral- Structural Modeling – Modeling Examples

	Total Lecture hours	**90 hours**

Text Book(s)	
1	MichaelJohnSebastianSmith,—**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.	

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

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

Course Code	5EB	**REMOTE SENSING**	**L**	**T**	**P**	**C**
Elective I - B			6			4
Pre-Requites:	Basic Electronics		Syllabus Version		2022-2023	

Course Objectives:

The Main Objectives of this course are to:

- To design fully equipped with concepts, methodologiesandapplications of RemoteSensingTechnology.
- To Define and describe remote sensing and explain its applications, history, electromagnetic spectrum and interactions with various typesof 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 Comunication 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**	**18 hours**

Remote Sensing System and its Components - Electromagnetic Spectrum - Definition of Emissivity - Reflectance - Absorbance and Transmittance - Spectral Signature - Atmospheric Window - Active and Passive Remote Sensing Systems - Interaction of Electromagnetic Energy with Atmosphere and Earth Features - Factors Affecting the Reflectance

Unit:2	**PLATFORMS AND SENSORS**	**18 hours**

Airborne and Space Platforms - Advantages and Disadvantages of each Principle and Functioning of Camera - Films, Multi-Spectral, Thermal & Line Scanners, Side Looking Air Borne Radars - Hyperspectral Sensors - Different Satellite and SensorCombinations: LANDSAT – SPOT - IRS Series of Satellites andSensors.

Unit:3	**IMAGE CHARACTERISTICS AND INTERPRETATION**	**18 hours**

DifferencesbetweenAerialandSpaceBorneImagery-ElementsofVisualInterpretation of Images - Radiometric Processing Including Correction of Instrumental Artifacts - Atmospheric Corrections; Geometric Corrections - Registration. Geometric Enhancement including Spatial Filtering - Edge Detection and Enhancement.

Unit:4	**DIGITAL IMAGE PROCESSING**	**18 hours**

Image Transformations - Subtraction – Rationing - NDVI and PCA - Thematic ClassificationandClusteringtoIncludeUnsupervisedandSupervisedClassificationBased on Minimum Distance and Maximum Likelihood Classification - Accuracy Assessment of Classification - Concepts of Hyperspectral Image Analysis

Unit:5	**ANCILLARY DATA SOURCES AND INTEGRATION**	**18 hours**
GroundTruth-GeographicandRadiometric-IntroductionofGIS-IntegrationofRemote Sensing and GIS -Digital Terrain Models - GPS and its Role to Remote SensingData.		
	Total Lecture hours	**90 hours**
Text Book(s)		
1	Lillesand, T.M. and Kiefer, R.W., **REMOTE SENSING AND IMAGE INTERPRETATION**.	
2	Curran, Paul J., **PRINCIPLES OF REMOTE SENSING**	
3	Campbell, J.B**., INTRODUCTION OF REMOTE SENSING**	
Reference Books		
1	Sabins,F.F., **REMOTE SENSING: PRINCIPLES AND INTERPRETATIONS**	
2	Reddy, M. Anji, **REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM**	
Related Online Contents [MOOC, SWAYAM, 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			4
Pre-Requisite:	Basic Electronics		Syllabus Version		2022-2023	

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 devicesand programmingthosedevices

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**	**18 Hours**

Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing – Wireless Transmissions – Multiplexing – Spread Spectrum and Cellular Systems–Medium Access Control–SDMA–FDMA–TDMA–CDMA-Comparison of Access Mechanisms

Unit:2	**WIRELESS NETWORKS**	**18 Hours**

Wireless LAN: Infrared Vs Radio Transmission – Infrastructure Networks- Ad hoc Networks- IEEE 802.11– HIPERLAN – Bluetooth- Wireless ATM: Working Group- Services- Reference Model – Functions – Radio Access Layer – Handover- Location Management- Addressing Mobile Quality of Service- Access Point Control Protocol

Unit:3	**MOBILE NETWORK LAYER**	**18 Hours**

Mobile IP: Goals – Assumptions and Requirement – Entities – IP Packet Delivery- Agent Advertisement and Discovery – Registration – Tunneling and Encapsulation – Optimization – Reverse Tunneling – Ipv6 – DHCP-Ad Hoc Networks

Unit:4	**MOBILE TRANSPORT LAYER**	**18 hours**

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

Unit:5	**WAP**	**18 hours**

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

	Total Lecture hours	**90 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

Mapping with Programme Outcomes

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

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

Course code	5ED	**INDUSTRIAL AND POWER ELECTRONICS**	**L**	**T**	**P**	**C**
Core/Elective/Supportive		ELECTIVE1-D	6	T		4
Pre-requisite		Basic knowledge of Electronic Circuits or permission of instructor	**Syllabus Version**		2022-2023	

Course Objectives:

The main objectives of this course are to:

1. To presents the principles and applications of industrial and powerelectronics.
2. To enable the students to learn and design industrial & power electroniccircuits.

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** - Undestand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit:1	**Inroduction**	**15—hours**

Principles of Single Phase Inverter, Converter, Cyclo Converter And DCChopper– UPS– HVDC Static Circuit Breaker – Battery Charging Circuit – SCR Current Limiting Circuit Breaker – StaticACandDCSwitches–FlasherCircuits-TimeDelayCircuits–FanRegulatorusingTRIAC Thyristor Protection Circuits: Over Current Protection – Over Voltage Protection – Gate Protection

Unit:2	**Welding and Heating**	**14—hours**

Resistance Welding – Types of Resistance Welding – Electronic Control in Resistance Welding: Ignitron Contractor – Heat Control – Non Synchronous Timer
Synchronous Weld Timer – Sequence Timer –Energy Storage Welding Systems – Induction Heating – Applications of Induction Heating – Dielectric Heating –Application of Dielectric Heating

Unit:3	**Waves and Measurement**	**14—hours**

Generation of Ultrasonic Waves – Applications of Ultrasonic – Production of X Rays – Applications – Measurement of Non-Electrical Quantities: Pressure Measurements – DisplacementMeasurements – Level Measurements – Flow Measurements – Measurement of Thickness

Unit:4	**Application in Industrial Systems**	**14—hours**

Thermistor Control Of Quench Oil Temperature – Proportional Mode Pressure Control System – Strip Tension Controller – Automatic Weighing System – Control Of Relative Humidity In A Textile Moistening Process – Warehouse Humidity Controller

Unit:5	**Industrial Robotic Systems**	**15—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 BasedIndustrialApplications:SpeedControlofDCMotor–MeasurementofPhysicalQuantities Water Level Indicator – Firing Angle Control ofThyristor		
	Total Lecture hours	**72—hours**
Text Book(s)		
1	Harish C Rai, **—Industrial and Power Electronics‖** 10th edition, Umesh publications 2002	
2	TimothyJMaloni,**—IndustrialSolidStateElectronicDevicesandCircuits‖**2ndedition1986	
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		2022-2023	

Course Objectives:

The Main Objectives of this course are to:

- ❖ To learn the conceptsofRobots.
- ❖ To know about the sensors, actuators used inRobotsdesigning.
- ❖ To familiarize the students with the applicationsofRobots.

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

Mapping with Programme Outcomes

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 – ProcessingOperations – AssemblyandInspection.DrivesandControlSystems:Hydraulic and Pneumatic Systems: Cylinders, Control Valves, Hydro Moto -Robot EndEffectors.		
Unit:2	**SENSORS AND VISION SYSTEMS**	**10 Hours**
TypesofSensors:TactileSensors-ProximitySensors-SpeedSensors–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-SimpleProcessControlProgram'sUsingRelayLadderLogic.Introduction to PLC Networking - Introduction to HMI - DCs and SCADASystems		
Unit:5	**COMPUTER NUMERICAL CONTROL (CNC)**	**9 Hours**
BlockDiagramofACNCControlSystem–Advantages-PowerSupply–CPU-CNC and PLC Interfacing - Control Loops - Feedback Devices in CNC Machine - Analog and Digital CNC Systems - Introduction toFMS		
	Total Lecture hours	**48 Hours**

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

Text Book(s)	
1	MikellP.Groover, **—AUTOMATION PRODUCTION 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://NPTEL.AC.IN/COURSES/112/101/112101098/ROBOTICS
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	L	M	L	M	S	L	M	S
CO2	S	L	M	M	L	M	S	L	L	L
CO3	L	S	S	L	M	L	L	L	M	M
CO4	M	L	M	S	S	S	L	L	M	M
CO5	M	M	S	S	M	L	M	M	S	M

Course code	5EF	**PROGRAMMABLE LOGIC CONTROL**	**L**	**T**	**P**	**C**
Elective –II – F			6	T		4
Pre-requisite		Digital Electronics and computer Architecture and Organization	**Syllabus Version**	2022-2023		

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 descriptionand understand various types of PLCregisters
3. Apply PLC Timers and Counters for the control of industrial processes, PLC functionsand DataHandlingFunctions.

Expected Course Outcomes:

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

1	Gain knowledge on Programmable Logic Controllers and will understand different types of Devices to which PLC input and output modules	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** - Undestand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Unit:1	**INTRODUCTION TO PLC**	**10hours**

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

Unit:2	**HARDWARE AND SOFTWARE COMPONENTS**	**10hours**

Programmable Logic Controllers (PLCS) - Introduction Parts Of PLC - Principles of Operation - PLC Sizes - PLC Hardware Components - I/O Section - Analog I/O Section - Analog I/O Modules, Digital I/O Modules CPU - Processor Memory Module - Programming Devices - Diagnostics of PLCS with Computers

Unit:3	**INSTRUCTIONS AND RELAYS**	**10hours**

PLC Programming -Simple Instructions - Programming EXAMINE ON And EXAMINE OFF Instructions -Electromagnetic Control Relays -Motor Starters -Manually Operated Switches - Mechanically Operated and Proximity Switches - Output Control Devices - Latching Relays - PLC Ladder Diagram - Converting Simple Relay Ladder Diagram into PLC Relay Ladder Diagram

Unit:4	**COUNTER AND TIMER**	**9hours**

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**	**9hours**
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	**48hours**

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**	2022-2023		

Course Objectives:

The main objectives of this course are to:

1. To understand the concepts of Automotive Electronics and its evolution andTrends automotive systems & sub systemsoverview.
2. To understand sensors and sensor monitoring mechanisms aligned to automotive Systems, different signal conditioning techniques, interfacing techniques andactuator
3. To understand, design and model various automotive control systems using Model based developmenttechnique.

Expected Course Outcomes:

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

1	Obtain an overview of automotive componentsandsubsystems.	K2
2	Interface automotive sensors and actuators with microcontrollers	K3
3	Understand the design cycles, communication protocols and safety systems employed in today's automotive industry.	K2
4	Understand the engine management systems	K4
5	Understand the braking and traction systems	K2

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

Unit:1	**INTRODUCTION**	**9hours**

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

Unit:2	**IGNITION SYSTEMS**	**10hours**

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

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

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

Unit:4	**ELECTRONIC CONTROL OF BRAKING AND TRACTION**	**9 hours**

Introduction and Description Control Elements and Control Methodology, Electronic Control of AutomaticTransmission:IntroductionandDescriptionControlofGearShiftandTorqueConverter Lockup, Electric Power Steering, Electronic Clutch

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

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
Core/Elective/Supportive:		ELECTIVE-II-H	6	T		4
Pre-requisite:		PRINCIPLES OF COMMUNICATION	Syllabus version		2022-2023	

Course Objectives:

The objectives of this course are:

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

Expected Course Outcomes:

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

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

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

Unit: 1	SATELLITE SYSTEMS - OVERVIEW	10 Hours

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

Unit: 2	ORBITAL ASPECTS OF SATELLITE SYSTEMS	10 Hours

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

Unit: 3	THE SPACE SEGMENT	10 Hours

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

Unit: 4	SATELLITE LINK DESIGN	09 Hours

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

Unit: 5	APPLICATIONS OF SATELLITE SYSTEMS	09 Hours

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

	Total Lecture Hours	48 Hours

Text Books

1	Timothy Pratt, Charles Bostian,JeremyAllnutt, Satellite Communications, 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**
Core/Elective/ Supportive:	**Elective III-I**	**6**	**T**		**4**
Pre-Requisite:	**Basic knowledge in Communication Systems**	**Syllabus Version**		2022-2023	

Course Objectives:

The Main Objectives of this course are to:

- To enable the students to learn about OFC and also to understand the conceptofvarious 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	Rememberthebasic concepts in Fiber Optic Communication.	K1
2	Familiarizetheprincipleofoptical fiber cable.	K2
3	Gainknowledge aboutoptical sources.	K3
4	Analyzeoptical communication systems.	K4
5	Analyzedifferent types of measurements.	K4

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

Unit:1	**BASICPRINCIPLESOFOPTICS**	**18 hours**

Introduction to fiber optics-Evolution of fiber optic system-Elements of optical fiber transmission link-Basic optical law and definition-Optical fiber mode configuration: Fiber types-Rays and Modes-Step index fiber structure-Ray optics representation-Mode theory for circular waveguides.

Unit:2	**FIBER**	**18 hours**

Single mode fiber-Graded index fiber structure-Fiber material: Glass fiber, Active Glass Fiber-Fiber fabrication: Outside vapor phase oxidation-Vapor Phase axial deposition-Plasma activated chemical vapor deposition-Mechanical properties of fiber.

Unit:3	**OPTICAL SOURCES**	**18 hours**

LED: Structure, Light source material, Quantum efficiency and LED power. LASER diodes: Modes and threshold conditions, Quantum efficiency, diode structure and radiation pattern-operating characteristics: photo detectors-principles of photo detection – PIN diode-– photo-multipliertubes-Light source linearity.

Unit:4	**OPTICALCOMMUNICATIONSYSTEMS**	**18 hours**

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

Unit:5	**MEASUREMENTS**	**18 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	**90 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**		2022-2023	

Course Objectives:

The main objectives of this course are to:

1. To provide basic concepts invirtualinstruments
2. To know about the programming methods in software used invirtualinstrumentation
3. To familiarize the students with the applications ofvirtualinstrumentation

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 labview applications	K2

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

Unit:1	**INTRODUCTION**	**9hours**

General Functional Description of a digital instrument - Block Diagram of a Virtual Instrument - Physical quantities and Analog Interfaces - Hardware and Software - User Interfaces- Advantages of Virtual Instruments Over Conventional Instruments - Architecture of a Virtual Instrument and its Relation to the Operating System

Unit:2	**SOFTWARE OVERVIEW**	**9hours**

Lab VIEW - Graphical User interfaces - Controls and Indicators - 'G' programming – Labels and Text - Shape, Size and Color - Owned and Free Labels - Data Type, Format, Precision and Representation - Data Types - Data flow programming - Editing - Debugging and Running a VirtualInstrument-GraphicalProgrammingPalettesandtools-FrontPanelObjects-Functionsand Libraries

Unit:3	**PROGRAMMING STRUCTURE**	**10hours**

FOR Loops, WHILE Loops, CASE Structure, Formula Nodes, Sequence Structures – Arrays and Clusters - Array Operations - Bundle - Bundle/Unbundle by Name, Graphs and Charts - String and File I/O - High level and Low Level File I/O's - Attribute Modes Local and Global Variables. OPERATING SYSTEM AND HARDWARE OVERVIEW: PC Architecture, Current Trends, Operating System Requirements, Drivers – Interface Buses – PCI Bus– Interface Cards – Specification – Analog and Digital Interfaces – Power, Speed and timing Considerations

Unit:4	**HARDWARE ASPECTS**	**10hours**

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**	**10hours**

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	**48hours**
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**	2022-2023		

Course Objectives:

The main objectives of this course are to:

1. To presents various bio-potentials and working principles ofmedicalinstruments
2. To enable the students to learn about bio-potentials andmedicalinstruments

Expected Course Outcomes:

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

1	Understand t h e C o nc eptofbio-potential	K2
2	Understandtheconcept of medicalinstruments	K4
3	Develop the troubleshooting Skills of medical instruments	K3
4	Understand the concepts of signal conditioners & diagnostic equipments	K2
5	Understand the concepts of various physiological assist devices	K2

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

Unit:1	**BASIC PHYSIOLOGY**	**9hours**

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

Unit:2	**ELECTRODES AND TRANSDUCERS**	**10 hours**

Basic Electrode Theory - Micro Electrodes - Skin Surface Electrodes - Needle Electrodes - Equivalent Circuit - Electrode Materials - Chemical Electrodes - Reference Electrodes - The pH Electrode - Blood Gas Electrode - Active Transducers and Passive Transducers - Strain Gauges – Thermistor

Unit:3	**SIGNAL CONDITIONERS & DIAGNOSTIC EQUIPMENTS**	**10hours**

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

Unit:4	**DIAGNOSTIC EQUIPMENTS & BIOTELEMETRY**	**10hours**

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**	**9hours**

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	**48hours**

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.,FredJ. Webell., Erich A. Pfeffer.,**—Bio-medicalInstrumentation andMeasurements‖**,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
Core/Elective/Supportive:		ELECTIVE –III-L	6	0	0	4
Pre-requisite:		Digital Principles and Applications	Syllabus version		2022-2023	

Course Objectives:

The objectives of this course are:

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

Expected Course Outcomes:

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

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

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

Unit: 1	VLSI TECHNOLOGY	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 andoutput 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 promotingresearchactivities
- To inculcate leadership qualities among students for self andsocietalgrowth
- To nurture students on emerging technologies for serving industry needs through industryinstituteinterface
- To enrich teaching learning process by transforming young minds to be resourcefulengineers