B. Sc. Electronics and Communication Systems

Syllabus

AFFILIATED COLLEGES

Program Code: 26B

2021 – 2022 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 analyse specific engineering problems of communication, electronic circuits, computer programming, embedded systems, VLSI design and semiconductor technology by applying the knowledge of basic sciences, engineering mathematics and engineering fundamentals.
PSO4	Ability to communicate effectively with excellent interpersonal skills and demonstrate the practice of professional ethics for societal benefit
PSO5	Graduates will be able to apply fundamentals of electronics in various domains of analog and digital systems.
PSO6	Use embedded system concepts for developing IoT applications

Program Outcomes (POs)	
On successful completion of the B.Sc. ELECTRONICS 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 analyse complex engineering problems reaching substantiated conclusion using principles of mathematics and Engineering sciences
PO3	Design/Development of solutions: Design solutions for complex Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal and environmental conditions.
PO4	Conduct investigation of complex problems: Use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and Sustainability: Understand the impact of the professional engineering solution in societal and environmental contexts, and demonstrate the knowledge of and need 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 inmultidisciplinary 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 2021 – 22 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		-	-	200	250	450	18
SECOND SEMESTER							
21T	Language – II	6	-	50	50	100	4
22E	English – II	6	-	50	50	100	4
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		-	-	300	350	650	26
THIRD SEMESTER							
33A	**Core Paper III** : Principles of Communication Systems	4	-	50	50	100	4
33B	**Core Paper IV:** Digital Principles and Applications	4	-	50	50	100	4
33C	**Core Paper V:** Electronic Circuits	4	-	50	50	100	4
	Core Practical III:	-					

--	**Digital** Electronic lab		3	-	-	-	-
--	**Core Practical IV:** Electronic circuits, Radio, TV and Instrumentation lab	-	3	-	-	-	-
3AD	**Allied : III** Programming in C	4	-	30	45	75	3
--	**Core Practical V:** Computer Programming Lab	-	3	-	-	-	-
3ZA	**Skill based Subject I :** Computer Architecture and organization	3	-	30	45	75	3
3FB/ 3FC	Tamil @ / Advanced Tamil#(OR) Non-major elective - I (Yoga for Human excellence # Womens Rights#)	2	-	-	50	50	2
Total		-	-	210	290	500	20
FOURTH SEMESTER							
43A	**Core Paper VI :**IC's and Instrumentation	4	-	50	50	100	4
43B	**Core Paper VII** : Modern Television Engineering	4	-	50	50	100	4
43C	**Core Paper VIII** Digital and cellular communication	4	-	50	50	100	4
43P	**Core Practical III** Digital Electronics Lab	-	3	50	50	100	4
43Q	**Core Practical IV:** Electronic circuits, Radio, TV and Instrumentation lab	-	3	50	50	100	4
4AD	**Allied: IV** Object Oriented Programming using C++	4	-	30	45	75	3
43R	**Core Practical V :** Computer Programming Lab	-	3	25	25	50	2
4ZB	**Skill based Subject II :** Visual Programming	3	-	30	45	75	3
4FB/ 4FE	Tamil @ /Advanced Tamil # (OR) Non-major elective -II (General Awareness #)	2	-	-	50	50	2
Total				335	415	750	30

FIFTH SEMESTER							
53A	**Core Paper IX** : 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 microcontroller lab	-	3	-	-	-	-
--	**Core Practical VII:** Industrial and Power Electronics Lab	-	3	-	-	-	-
--	**Core Practical VIII** : Electronics communication lab	-	3	-	-	-	-
5ZC	**Skill based subject – III** Internet and java programming	3	-	30	45	75	3
	Total	-	-	180	195	375	15
SIXTH SEMESTER							
63A	**Core Paper X** : 8051 Microcontroller and embedded systems	5	-	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:** Electronics and communication Lab	-	3	50	50	100	4
67V	**PROJECT**	5	-	75	75	150	6
6EI/ 6EJ/ 6EK/ 6EL	**Elective- III**	4	-	50	50	100	4

6ZP	**Skill based Subject –IV** Practical Visual & java Programming	-	3	30	45	75	*3*
67A	Extension Activities @	-	-	50	-	50	2
Total				405	370	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 120 marks and viva-voce 30 marks

List of Elective papers (Colleges can choose any one of the paper 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	Internet of Things
	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		2021-2022	

Course Objectives:

The main objectives of this course are to:

1. To become familiar with fundamentals of electronic components
2. To learn to use common electronic components
3. To design electronic circuits to perform realistic tasks

Expected Course Outcomes:

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

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

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

Unit:1	RESISTORS & INDUCTORS	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'sLawOfElectromagneticInduction-EnergyStoredInAnInductor-InductanceInSeries 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.Suresh Kumar, A.Vallavaraj**"ELECTRONIC DEVICES AND CIRCUITS"**-Tata McGraw-Hill Publishing Company Limited, New Delhi. 1998
2	B.V.Narayana Rao "**PRINCIPLES OF ELECTRONICS**", Wiley Eastern Limited, 1992

Reference Books

1	BernardGrob**"BASIC ELECTRONICS"**-Tata McGraw-Hill Publishing Company Limited, 9thEdition.
2	B.L.Theraja, **"BASIC ELECTRONICS-SOLID STATE DEVICES",**S.Chand Company Ltd. **2000**

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

1	https://nptel.ac.in/courses/108/104/108104139/
2	https://nptel.ac.in/courses/108/101/108101091/
3	https://www.youtube.com/playlist?list=PLFF553CED56CDE25D
4	https://www.youtube.com/watch?v=w8Dq8blTmSA

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

Mapping with Programme Outcomes

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

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

Second Semester

Course code	23A	SEMICONDUCTR DEVICES	L	T	P	C
Core-II			5	T		4
Pre-requisite		Higher secondary **physics**	Syllabus Version		2021-2022	

Course Objectives:

The main objectives of this course are to:

1. To enable the students to understand and gain the knowledge on semiconductor devices.
2. To acquaint the students with construction, theory and characteristics of the electronic devices.

Expected Course Outcomes:

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

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

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

Unit:1	PN JUNCTION DIODE	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	OPTOELECTROIC 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. Suresh Kumar, A. Vallavaraj, **"ELECTRONICS DEVICES AND CIRCUITS",** Tata McGraw Hill Publishing Company Limited, New Delhi, 8th edition.
2	B. L. Theraja, **"BASIC ELECTRONICS – SOLID STATE DEVICES"**, S.Chand& Company Ltd.
Reference Books	
1	S. L. Kakani, K. C. Bhan Dai **"A TEXT BOOK OF ELECTRONICS"**. S.Chand& Company Ltd. 2000
2	BernardGrob**"BASIC ELECTRONICS"**-Tata McGraw-Hill Publishing Company Limited, 9thEdition.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/108/108/108108122/
2	https://nptel.ac.in/courses/108/108/108108112/
3	https://nptel.ac.in/courses/115/102/115102103/
Course Designed By: K.Manikantan , Assistant Professor, Government Arts College ,Ooty& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty	

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

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

Course code	23P	BASIC ELECTRONICS LAB	L	T	P	C
core		Core practical - I	3		I	4
Pre-requisite		Higher secondary Physics	Syllabus Version		2021-2022	

Course Objectives:

The main objectives of this course are to:

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

Expected Course Outcomes:

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

1	Apply the concept of basic circuit and theorems	K3
2	Simplify 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

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

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

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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		Core practical – II	3		II	4
Pre-requisite		Higher secondary Physics	Syllabus Version		2021-2022	

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

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

1. Band Gap Energy of Silicon / GermaniumDiode
2. V-I Characteristics of JunctionDiode
3. V-I Characteristics of ZenerDiode
4. Transistor Characteristics of CEConfiguration
5. Transistor Characteristics of CBConfiguration
6. Transistor Characteristics of CCConfiguration
7. ClippingCircuits
8. ClampingCircuits
9. Measurement of Stability Factor of FixedBias
10. Measurement of Stability Factor of SelfBias
11. V-I Characteristics ofJFET
12. V-I Characteristics ofUJT
13. UJT asOscillator
14. FET as Voltage Variable Resistor(VVR)
15. Characteristics of LDR
16. Characteristics of SolarCell
17. Study of IR (Tx&Rx)
18. Study of LED and 7 Segmentdisplay
19. Temperature Co-efficient of JunctionDiode
20. Zener as a Voltageregulator
21. ON / OFF control of relay using Opto –Couplers
22. Characteristics ofSCR
23. TRIACCharacteristics

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	
2	
3	
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

Third Semester

Course code	33A	PRINCIPLES OF COMMUNICATION SYSTEMS	L	T	P	C
Core- III			4	T		4
Pre-requisite		Higher secondary physics	Syllabus Version		2021-2022	

Course Objectives:

The main objectives of this course are to:

1. To understand the concept of wave propagation and itstypes.
2. To acquire knowledge on Amplitude and Frequencymodulation.
3. To inculcate the principle of radio receivers and itstypes.

Expected Course Outcomes:

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

1	Understand the basic building blocks of communication systems	K2
2	Analyze the performance of amplitude and frequency modulation techniques.	K4
3	Demonstrate the stages of radio receiver.	K3
4	Compare the operation of FM and SSB receivers	K4
5	Analyze the performance of receiver.	K4

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

Unit:1	WAVE PROPAGATION	10hours

EM Waves – Free Space Propagation – Surface Wave Propagation – Sky Wave Propagation – Space Wave Propagation – Tropospheric Scatter Propagation – Structure Of Atmosphere – Virtual Height – MUF – LUF – Skip Distance – OWF – Ionosphere Abnormalities- Duct Propagation

Unit:2	ANTENNAS	10hours

Electromagnetic Radiations – Elementary Doublet – Current And Voltage Distribution – Resonant Antennas, Radiation Patterns and Length Calculations – Non Resonant Antennas – Antenna Gain and Effective Radiated Power – Antenna Resistance – Bandwidth, Beam Width and Polarization – Grounded and Ungrounded Antennas – Effects Of Height – Feed Point – Couplers – Impedance Matching – Dipole Arrays - Yagi UdaAntenna – Parabolic Antenna – Horn and Lens Antenna – Helical Antenna

Unit:3	MODULATION TECHINIQUES	10hours

Introduction to Communication Systems – Information – Transmitter – Channel – Noise – Receiver–-Needfor Modulation Band Width Requirement–Amplitude Modulation: AMTheory – Frequency Spectrum of AM Wave – Representation of AM – Power Relations In AM Wave – AM Transmitter Block Diagram–Frequency Modulation–System Description
– Mathematical Representation – Frequency Spectrum – Generation of FM – Direct and Indirect Methods.

Unit:4	SINGLE SIDEBAND MODULATION	9hours

Introduction – Principles – Balanced Modulator – SSB Generation: Filter Method, Phase Shift Method and Third Method – SSB Reception: Pilot Carrier SSB and Independent Side Band – Vestigial Sideband Transmission – Introduction to PAM, PWM And PPM

Unit:5	RECEIVER	9hours
Introduction – Super Heterodyne Receiver – Choice of IF and Oscillator Frequencies – Image Rejection – Adjacent Channel Selectivity – Spurious Response - Tracking – AGC – Double Conversion Receiver		
	Total Lecture hours	**48hours**

	Text Book(s)
1	Kennedy and Davis **"Electronic Communication Systems"** Tata McGraw Hill, 8th edition, 1999
2	Dennis Roddy and John Coolen, **"Electronic Communications"** PHI, 4th edition, 1995.
	Reference Books
1	K.D. Prasad and Satyaprakahan**"Antenna Wave Propagation"** 3rd edition.
2	
	Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1	https://swayam.gov.in/nd1_noc20_ee16/preview
2	https://swayam.gov.in/nd1_noc19_ee47/preview
4	

Course Designed By: K.Manikantan , Assistant Professor, Government Arts College ,Ooty&
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Mapping with Programme Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	L	L	M	L	L	L	L	M	S	M
CO2	L	M	M	M	L	M	L	S	M	L
CO3	M	L	S	L	L	S	L	L	L	M
CO4	M	M	L	L	L	S	M	L	M	L
CO5	L	M	S	M	M	M	L	L	M	M

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

Course Code	33B	DIGITAL PRINCIPLES AND APPLICATIONS	L	T	P	C
Core paper IV			4	T		4
Pre-Requisite:	Higher secondary Physics		Syllabus Version	2021-2022		

Course Objectives:

The Main Objectives of this course are to:

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

Expected Course Outcomes:

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

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

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

Unit:1	NUMBER SYSTEM AND CODES	12 hours

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

Unit:2	BOOLEAN ALGEBRA AND LOGIC GATES	12 hours

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

Unit:3	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	33C	ELECTRONIC CIRCUITS	L	T	P	C
Core paper V			4			4
Pre-Requisite:	Basic Electronics		Syllabus Version		2021-2022	

Course Objectives:

The Main Objectives of this course are to:

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

Expected Course Outcomes:

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

1	Understand the concepts of Rectifiers and regulators	K2
2	Study about Small signal amplifiers	K1
3	Analyse the functions of Power amplifiers	K4
4	Analyse the performance of negative as well as positive feedback circuits	K4
5	Design oscillators and Multivibrators	K6

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

Unit:1	**RECTIFIERS AND REGULATORS**	**12 hours**

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

Unit:2	**SMALL SIGNAL AMPLIFIERS**	**12 hours**

CE, CB, CC amplifiers – Calculation of I/P Resistance, O/P Resistance – Current Gain - VoltageGain–PowerGain–SingleStageTransistorAmplifier–DCandACloadline–RC Coupled Amplifier – Gain Frequency Response – Bandwidth – Transformer Coupled Amplifier – Impedance Matching – 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 - Astable Multivibrator – Monostable multivibrator – Bistable Multivibrator – 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, **-ELECTRONIC PRINCIPLES**, Dhanpat Rai & Co (P) Ltd, 2nd Edition, 1998
2	B.L.Theraja, **-BASIC ELECTRONICS**, Chand Company Ltd, 2000
Reference Books	
1	V.K.Metha, Rohit Metha, **PRINCIPLES OF ELECTRONICS.** S Chand, 2006 .
2	B.Sasikala, C.Poornachandra,**ELECTRONIC DEVICES AND CIRCUITS**, Scitech 2003.
Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]	
1	http://www.ee.iitm.ac.in/~ani/2012/ec5135/lectures.htmlLecture Notes
2	https://nptel.ac.in/courses/108/102/108102097/#Introduction to Electronic circuitsNPTEL.
3	https://nptel.ac.in/courses/108/102/108102095/Analog Electronic circuits NPTEL.

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

Mapping with Programme Outcomes

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

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

Course Code	3ZA	COMPUTER ARCHITECTURE AND ORGANIZATION	L	T	P	C
Skill based Subject – I			3	T		3
Pre-Requisite:	Higher Secondary Computer Science		Syllabus Version		2021-2022	

Course Objectives:

The Main Objectives of this course are to:

To **e**nable the students to learn the newest computer technology and trends.

To learn subject presents the Modern computer organization, Processor and memory design, Peripherals and recent system architecture.

Expected Course Outcomes:

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

1	Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os.	K3
2	Analyse the performance of commercially available computers.	K6
3	Distinguish the organization of various parts of a system memory hierarchy	K6
4	Understand the design of the various functional units and components of computers.	K1
5	dentify the elements of modern instructions sets and their impact on processor design.	K5

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

Unit:1	MODERN COMPUTER ORGANIZATION	9 hours

Introduction – Layers in Modern Computer - Computer Organization – Main Memory – CPU Operation – Computer Types – System Performance and Measurement – High Performance Techniques – Booting Sequence – Computer Design Process – Computer Structure – Computer Function – Architecture And Organization – CISC Vs RISC

Unit:2	PROCESSOR DESIGN AND DATA PATH	9 hours

Introduction–ProcessorRole–ProcessorDesignGoals–ProcessorDesignProcess – Data Path Organization – Main Memory Interface – Local Storage Register File – Data Path Simple Instructions

Unit:3	MEMORY DESIGN AND MANAGEMENT	9 hours

Introduction – Memory Parameters – Classification of Memory – Memory Technology – Main Memory Allocation – Static RAM IC – Dynamic RAM – ROM Logic – Multiple Memory Decoding – Memory Hierarchy – Main Memory Drawbacks –Cache Memory – Principle of Cache – Virtual Memory Concept – Advantage of Virtual Memory.

Unit:4	**COMPUTER PERIPHERALS**	**9 hours**
Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic StorageDevices –FloppyDiskDrive–HardDiskDrive–SpecialTypesofDiskDrives–MouseandTrack Ball– Modem–CD-ROMDrive–Scanner–DigitalCamera–DVD–SpecialPeripherals.		
Unit:5	**ADVANCED SYSTEM ARCHITECTURE**	**9 hours**
Introduction–High Performance Computer Architecture – RISC Systems– Superscalar Architecture – VLIW Architecture – EPIC Architecture –Multiprocessor Systems.		
	Total Lecture hours	**45 hours**

Text Book(s)	
1	Govindarajalu.B, **"COMPUTER ARCHITECTURE AND ORGANIZATION DESIGN PRINCIPLES AND APPLICATIONS"** Tata McGraw-Hill, 2006.
2	M. Moris Mano, "**COMPUTER SYSTEM ARCHITECTURE"**, 3rd edition, Pearson/PHI, India,2006.
Reference Books	
1	William Stallings, "**COMPUTER ORGANIZATION AND ARCHITECTURE**", Prentice Hall of India, Sixth Edition.
2	Patterson & Hennessy, "**COMPUTER ORGANIZATION AND DESIGN**", Morgan Kaufmann, 2007.
Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]	
1	https://nptel.ac.in/courses/106/102/106102062/Introductionto computer architecture,Nptel
2	https://nptel.ac.in/courses/106/103/106103068/ ComputerArchitecture andOrganization
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

Fourth Semester

Course Code	43A		L	T	P	C
Core paper VI	IC'S AND INSTRUMENTATION		4			4
Pre-Requisite:	Basic Electronics		Syllabus Version		2021-2022	

Course Objectives:

The Main Objectives of this course are to:

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

Expected Course Outcomes:

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

1	Recognize the standards in IC Fabrication Technology.	K1
2	Understand the working of Timer and PLL	K2
3	Design simple circuits using Op Amp.	K6
4	Understand the principle of various types of transducers	K2
5	Study the construction and working of frequently used equipment's like CRO, Digital Voltmeter etc.	K4

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

Unit:1	IC FABRICATION TECHNOLOGY	12 hours

Fundamentals of Monolithic IC Technology – Basic Planar Process – Wafer Preparation – EpitaxialGrowth–Oxidation–Photolithography–DiffusionofImpurities–Isolation Techniques – Metallization – Monolithic Transistors – Integrated Resistors – Integrated Capacitors - Integrated Inductors - Thin and Thick film Technology.

Unit:2	TIMER AND PLL	12 hours

Functional Block Diagram of 555 timer – Mono stable Operation–Applications:–Linear Ramp Generator – Pulse Width Modulator – A stable Operation – Applications: Schmitt Trigger–FSK Generator- Phase Locked Loop: Functional Block Diagram – Phase Detector / Comparator –Voltage Controlled Oscillator – Low Pass Filter – Applications: Frequency Multiplier / Division – AM Detection

Unit:3	OPERATIONAL AMPLIFIER	12 hours

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

Unit:4	TRANSDUCERS	12 hours

Introduction–ElectricalTransducer–BasicrequirementsofTransducer–Classification of Transducers – Selection of Transducers – Resistive Transducers – Potentiometers – Thermistors – Thermocouple – LVDT – RVDT – Piezoelectric Transducers – Hall Effect Transducers – Photoelectric Transducers – Digital DisplacementTransducers

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,opamps 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	43B		L	T	P	C
Core paper VII	**MODERN TELEVISION ENGINEERING**		4			4
Pre-Requiste:	Basic Electronics		Syllabus Version		2021-2022	

Course Objectives:

The Main Objectives of this course are to:

- ❖ To design of the subject is to impart the knowledge on Television standards, receiver section, and sync separator color television with advancedtechniques.
- ❖ To acquire the knowledge about color television and its recentdevelopments

Expected Course Outcomes:

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

1	Acquire knowledge on television standards	K1
2	Study on Transmitter and receiver standards	K2
3	Understand the Picture tube of color TV	K2
4	Knowledge on performance of Color TV and other modern devices	K3
5	Familiarize Advanced TV Systems	K4

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

Unit:1	**FUNDAMENTALS OF TELEVISION**	**12 hours**

Aspect ratio-Image continuity-Number of scanning lines-Interlaced scanning-Picture resolution-Camera tubes-Image Orthicon-Videocon-Plumbicon- Monochrome picture tubes-Composite video signal- video signal dimension-horizontal sync. Composition- vertical sync.Detailsfunctionsofverticalpulsetrain-Scanningsequencedetails-VSBtransmission- Sound signal transmission- Standard channel band width.

Unit:2	**MONOCHROME TELEVISION TRANSMITTER AND RECEIVER**	**12 hours**

TV transmitter-TV signal Propagation- Interference- TV Transmission Antennas-Monochrome TV receiver- RF tuner- UHF, VHF tuner-Digital tuning techniques-AFT- IF subsystems-AGC Noise cancellation-Video and Sound inter-carrier detection-Vision IF subsystem- DC re-insertion-Video amplifier circuits-Sync operation- - Line deflection circuits -EHT generation- Receiver antennas

Unit:3	**ESSENTIALS OF COLOUR TELEVISION**	**12 hours**

Three colour theory- Luminance, Hue and saturation- colour television cameras-Values of luminance and colour difference signals-Colour television display tubes-Delta-gun Precision-in-lineandTrinitroncolourpicturetubes-Purityandconvergence-Purityandstatic and Dynamic convergence adjustments- Pincushion-correction techniques-Automatic degaussing circuit.

Unit:4	COLOUR TELEVISION SYSTEMS	12 hours
NTSC colour TV systems - SECAM system- PAL colour TV systems- Cancellation of phase errors- -Chromo signal amplifier-separation of U and V signals- colour burst separation-Burst phase Discriminator-ACC amplifier-Reference Oscillator-Ident and colour killer circuits-U and V demodulators- Sound in TV.		
Unit:5	**ADVANCED TELEVISION SYSTEMS**	**12 hours**
Satellite TV technology - Geo Stationary Satellites - Domestic Broadcast System - Cable TV- Cable Signal Sources- Cable Signal Processing, Distribution & Scrambling- Video Recording - Video Home Formats -DVD Players - Digital television-Transmission and reception –Projection television-Flat panel display TV receivers-LCD and Plasma screen receivers-3DTV-EDTV.		
	Total Lecture hours	**60 hours**
Text Book(s)		
1	R.R.Gulati, “Monochrome Television Practice, Principles, Technology and servicing.” Third Edition 2006, New Age International (P) Publishers.	
2	R.R.Gulati, Monochrome & Color Television, New Age International Publisher, 2003.	
Reference Books		
1	A.M Dhake, “Television and Video Engineering”, 2nd ed., TMH, 2003.	
2	2. R.P.Bali, Color Television, Theory and Practice, Tata McGraw-Hill, 1994	
Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]		
1	https://nptel.ac.in/courses/117/102/117102059/Introduction to communication	
2	https://www.youtube.com/watch?reload=9&v=EAybxdgS2T4TV Transmission	
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	43C		L	T	P	C
Core Paper – VIII	DIGITAL AND CELLULAR COMMUNICATIONS		4	T		4
Pre-Requisite: Basic Electronics			Syllabus Version		2021-2022	

Course Objectives:

The Main Objectives of this course are to:

- To enhance the knowledge in communication with digital andcellular systems
- To learn the digital and cellulartechnology

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	Analyse the cellular system design and technical challenges.	K4

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

Unit:1	DATA TRANSMISSION	12 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	12 hours

Model of Communication System – Elements of Digital Communication System: Information Source, Source Encoder/Decoder, Communication Channel, Modulator, Demodulator, Channel Encoder/Decoder, Other Functional Blocks – Analysis of Communication System – Design of Communication System.

Unit:3	DIGITAL CARRIER MODULATION SCHEMES	12 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	12hours

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	12 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	**60 hours**
Text Book(s)		
1	Sam K.Shanmugam, **"DIGITAL AND ANALOG COMMUNICATION SYSTEMS"**, John Wiley Publications, 2005	
2	John G.Proakis, **"DIGITAL COMMUNICATIONS"**, Tata McGraw Hill International, 2001.	
Reference Books		
1	W.C.Y.Lee, **"MOBILE CELLULAR TELECOMMUNICATION"**, McGraw Hill 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	TITLE OF THE COURSE	L	T	P	C
Core practical III:		DIGITAL ELECTRONICS LAB	3		3	4
Pre-Requisite:	Digital Electronics		Syllabus Version		2021-2022	

Course Objectives:

The Main Objectives of this course are to:

- To understand the logical operation of various gates andtheorems
- To develop various digitalcircuits

Expected Course Outcomes:

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

1	Understand the logical operation of various gates & theorems	K2
2	Analyze the circuit using Boolean laws	K4
3	Design the Adder and subtractor circuit using logic gates	K6
4	Design and analyze Combinational and Sequential circuits	K6
5	Acquire knowledge about VHDL code for design and simulate of digital logic circuits	K2

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

	DIGITAL ELECTRONICS LAB	**90 hours**

(ANY 16 EXPERIMENTS)

1. Verification of Basic Gates and UniversalGates
2. Verification of Demorgan'sTheorem
3. 2-bit Comparator using Gates
4. Half Adder and FullAdder
5. Half Subtractor and FullSubtractor
6. 4-bit BinaryAdder
7. Multiplexer and Demultiplexers
8. Encoder and Decoder
9. BCD to 7-SegmentDisplay
10. Study of Flipops
11. Binary to Grey and Grey to BinaryConversion
12. Shift Registers and RingCounter
13. Analog to DigitalConverter
14. Digital to AnalogConverter
15. Op-Amp: Adder andSubtractor

16. Op-Amp: Integrator andDifferentiator
17. Current to Voltage and Voltage to CurrentConverter
18. Realize Basic gates from universalgates
19. Synchronous and AsynchronousCounter
20. MagnitudeComparator.
21. Design and Simulation of Basic Logic Gates using VHDLCoding.
22. Design and Simulation of adder using VHDL Coding.
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, RADIO,TV AND INSTRUMENTATION LAB	L	T	P	C
Core /Elective / Supportive:	Core Practical IV				3	4
Pre-Requisite:	BASIC ELECTRONICS LAB		Syllabus Version		2021-2022	

Course Objectives:

The Main Objectives of this course are to:

- To understand the concept of working of regulated power supplies,rectifiers, amplifiers andoscillators.
- To experiment the modulation and detectiontechniques.

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 Modulation circuits	K6
5	Design circuits withTransducers	K6

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

Part I	ELECTRONIC CIRCUITS	45 hours

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

Part II	RADIO, TV AND INSTRUMENTATION	45 hours

13. First IFAmplifier
14. AM Modulation andDetection
15. FM Modulation andDetection
16. Second IF amplifier

17. Audio amplifier using TBA 810
18. Alignment of colour TV using video pattern generator.
19. Sync separator
20. Vertical selection and horizontsl selection fault of TV receiver
21. Video amplifier fault.
22. EHT generation
23. Temperature measurement using thermistor.
24. Displacement measurement using LVDT.
25. Weighing machine using load cell
26. Instrumentation amplifier.
27. Characteristics of photo voltaic cell (solar cell)

(Any 16 Experiments)

	Total Lecture hours	**90 hours**

Course Designed By:C.N. Omprakash Anand, Assistant professor , Government Arts College ,Ooty, Coimbatore& 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	4ZB	**VISUAL PROGRAMMING**	**L**	**T**	**P**	**C**
Core/Elective/Supportive		Supportive-II	4	T		3
Pre-requisite		Basic computer skills and familiarity with Microsoft Windows.	**Syllabus Version**		2021-2022	

Course Objectives:

The main objectives of this course are to:

1. To provide fundamental skills in utilizing the tools of a visual environment.
2. To implement SDI and MDI applications while using forms, dialogs, and other types of GUI components
3. To Apply visual programming concept in software development by designing projects with menus and submenus
4. To use visual programming environment to create simple visual applications.

Expected Course Outcomes:

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

1	Gain the Knowledge of different elements of a visual programming language as building blocks to develop correct, coherent programs.	K2
2	Ability to implement the event driven programming using Visual Basic 6.0 forms and Controls	K3
3	Ability to create menu to make the application more interactive	K6
4	Gain the Knowledge about how to use existing Common Dialog Controls like File Dialog box, Color Dialog box, etc. to enhance the functionality	K4
5	Testing and debug Visual Basic programs	K5
6	Using exception-handling techniques to develop fault-tolerant, reliable programs	K6

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

Unit:1	**Visual Basic Overview**	**8—hours**

Visual Basic: Getting Started – Visual Basic Environment: Tool Bars – The Tool Box and Custom Controls and Components – Using File Menu, Edit Menu, View Menu, Project Menu, Format Menu, Debug Menu, Adding Menu and Window Menu – Customizing a Form and Writing Simple Programs

Unit:2	**Visual Basic Objects**	**7—hours**

The Tool Box – Creating Controls – Properties Setting – First Steps in Programming- Code Window – Visual Basic's Editing Tools – Statements in VB – Data Types – Working with Variables – Input Boxes and Message Boxes – Displaying Information

Unit:3	**Building the User Interface**	**7—hours**

ControllingProgramFlow–Built-InFunctions–UserDefinedFunctionsandProcedures–ControlArrays – List and Combo Boxes – The Flex Grid Control- Finishing the Interface: Frames – Option Buttons – CheckBoxes–ScrollBars–Timers–CommonDialogBoxes–TheMicrosoftWindowsCommonControls 6.0 – Menus – MDI Forms

Unit:4	**Database with visual Basic**	**7—hours**

Communicating with Other Window Applications – Database Development with Visual Basic (DAO, RDO) – Building Active Controls – OLE

Unit:5	**Debugging and Appilications**	**7—hours**

VC++ Fundamentals – Using Visual Studio's IDE – Menus – Writing, Compiling and Debugging Simple Programs – Building a Basic Application – Types – Overview of MFC

	Total Lecture hours	**36—hours**

Text Book(s)	
1	Gary Cornell, **"Visual Basic 6.0 from the Ground Up"**, Tata McGraw Hill Company, 1999.
2	Chris H. Pappas & William H. Murray, **"The Complete Reference Visual C++ 6"** , Tata McGraw Hill, Delhi.
Reference Books	
1	John Paul Muller, **"Visual C++ from the Ground Up"**, Tata McGraw Hill, Delhi.
2	Richard C. Leinecker and Tom Archer, **"Visual C++ 6 Programming Bible",** Wiley India Pvt Ltd.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.youtube.com/watch?v=5nahqfJTQXs
2	https://www.youtube.com/watch?v=1oGpl6qNKoQ
3	https://www.youtube.com/watch?v=gcFHyVYdeFU

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

Fifth Semester

Course code	53A	8085 MICROPROCESSOR AND APPLICATIONS	L	T	P	C
Core/Elective/Supportive		Core IX	6	T		4
Pre-requisite		Requires the basic of Digital circuits and Programming languages	Syllabus Version		2021-2022	

Course Objectives:

The main objectives of this course are to:

1. To enable the students to learn the Microprocessor Architecture.
2. To learn the instruction set of 8085 and to develop programmingskills.
3. To know various peripheral devices and to interface them with8085.

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** - Undestand; **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 TIMER LOGIC

8085Interrupts-ArchitectureofProgrammableInterruptController8259—Architectureof8254Programmable Interval Timer / Counter – Modes of Operation of 8254 – Generating Square Wave Using8254

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, **"Microprocessor Architecture, Program And Its Application With 8085"**, New Age International (P) Ltd,
2	S.Malarvizhi**, "Microprocessor and Its Application"**, - Anuradhe Agencies Publications – I edition, March 1999.
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

Sixth Semester

Course code	6ZA	INTERNET AND JAVA PROGRAMMING	L	T	P	C
Core/Elective/Supportive		Supportive III				
Pre-requisite		This course requires that the students are familiar with programming language such as C/C++ and data structures, algorithms	Syllabus Version		2021-2022	

Course Objectives:

The main objectives of this course are to:

1. To design of the subject is to provide knowledge about internet, Java data types, classes and files.
2. To learn the internet concept and Java programming systems.

Expected Course Outcomes:

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

1	Gain knowledge about the concepts of Internet and able to program the applications using Java.	K1
2	Design, create, build, and debug Java applications and applets	K2
3	Implement object oriented programming concepts in Java.	K3
4	Demonstrate use of Multithreading in Java application.	K4
5	Enhance logical reasoning and programming skills.	K5
6	Develop application incorporating features like Package, Exception Handling, I/O handling.	K6

K1 - Remember; **K2** - Undestand; **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

Course code	63A	8051 MICROCONTROLLER AND EMBEDDED SYSTEMS	L	T	P	C
Core/Elective/Supportive		Core X				
Pre-requisite		Digital Electronics8085 Microprocessor	Syllabus Version		2021-2022	

Course Objectives:

The main objectives of this course are to:

1. Study the architecture and addressing modes of8051.
2. Impart knowledge about assembly language programs of8051.
3. Helps to understand the importance of different peripheral devices &their interfacing to8051.
4. Impart knowledge of different types of external interfaces including LEDS,LCD, keypad Matrix, Switches & Seven segment display.

Expected Course Outcomes:

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

1	Describe architecture and operation of Microcontroller 8051.	K1
2	Foster ability to understand the design concept of Microcontroller.	K2
3	Design various applications using its peripherals.	K3
4	Analyze the data transfer through serial and parallel ports.	K4
5	Learn basic hardware of various microcontrollers.	K2
6	Foster ability to understand the role of embedded systems in industry	K6

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

Unit:1	Overview and Instruction Set	14—hours

Microcontrollers and Embedded Processors – Microcontrollers for Embedded Systems – Overview of 8051 Family – 8051 Instruction Set and Registers.

Unit:2	Assembly Programming and Addressing Modes	15—hours

Introductionto8051AssemblyProgramming–The Program Counter and ROM– Data Type sand 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/Elective/Supportive		Core –Practical-VI			3	4
Pre-requisite		Requires the basic of Digital circuits and Programming languages	Syllabus Version		2021-2022	

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

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

(ANY 16 EXPERIMENTS)
8085 MICROPROCESSOR LAB

1. Addition / Subtraction of 8 / 16 bit Data
2. Multiplication / Division 8 bit Data
3. Block Data Transfer
4. Smallest / largest of N Numbers
5. To arrange in ascending / Descending Order
6. Sum of N 8 bit Numbers
7. 1's and 2's Compliment of an Array (8bit)
8. UP/DOWN Counter using 7 Segment Displays
9. Traffic Light Control Interface
10. Data Transfer using 8255 (PPI)
11. Square wave generator using8255
12. ADC Interface
13. DAC Interface
14. Stepper Motor Interface
15. 8051 MICROCONTROLLER LAB
16. Arithmetic and Logical Programs
17. Key Interface
18. LED Interface
19. Solid State Relay Interface
20. Square Wave Generation
21. ADC Interface
22. DAC Interface
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**	**L**	**T**	**P**	**C**
Core/Elective/Supportive		Core –Practical- VII			3	4
Pre-requisite		Basic knowledge of Electronic Circuits or permission of instructor	**Syllabus Version**		2021-2022	

Course Objectives:

The main objectives of this course are to:

1. To make the students to design triggering circuits ofSCR.
2. To understand the characteristics of power electronicdevices.

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

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

(ANY 16 EXPERIMENTS)

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

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

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

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

Course code	63R	Electronic Communication Lab	L	T	P	C
Core/Elective/Supportive		Core –Practical- VIII			3	4
Pre-requisite		Basic knowledge of Electronic Communication	Syllabus Version		2021-2022	

Course Objectives:

The main objectives of this course are to:

1. To Understand the concept of Digital Communication
2. To experiment the Modulation and Detection techniques
3. To study about wireless communication technologies.

Expected Course Outcomes:

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

1	Understand the concept of Digital Communication and wireless communication technologies.	K2
2	Obtain experiment knowledge about the Modulation and Detection techniques	K3

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

(ANY 16 EXPERIMENTS)

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

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

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

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

Course code	6ZP	**VISUAL AND JAVA PROGRAMMING LAB**	**L**	**T**	**P**	**C**
Core/Elective/Supportive		**Supportive** 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**		2021-2022	

Course Objectives:

The main objectives of this course are to:

1. To design and develop Windows-based business applications using Visual Basic
2. Emphasis on the fundamentals of structured design, development, implementation,and documentation.
3. Gain knowledge about basic Java language syntax and semantics to write Javaprograms

Expected Course Outcomes:

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

1	Develop Windows-based business applications using Visual Basic fundamentals of structured design, development, implementation, and documentation.	K6
2	Gain knowledge about basic Java language syntax and semantics to write Java Programs	K2

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

VISUAL PROGRAMMING (ANY 8 EXPERIMENTS)

1. Building Simple Applications using Basic Tools.
2. Working with Intrinsic Control and Active Xcontrols.
3. Create an Application with multiple forms and dialogs.
4. Write a VB program to design an e-mail registration form.
5. Create an Application with Menu editor.
6. Create an Application with DAO controls
7. Create an Application using Common dialogs.
8. Write a program for Drag and Drop Events.
9. Create a Database for library management using ADD controls.
10. Creating an application using Active Xcontrol.
11. Create a Scientific calculator inVB.
12. Develop a VB application to either link or embed MS Word document to an OLE control.
13. Display Student information using Grid control.
14. Create an Application using RDO controls.
15. Develop an application to perform the following operation in the Employeetable using DAO.

i) Add a newRecord.
ii) Delete aRecord.
iii) Modify a Record.

JAVA PROGRAMMING (ANY 8 EXPERIMENTS)

1. Program to print the following triangle of numbers 1 12 1231234
2. Definingaclasswiththefollowingattributes1.xname2.DateofBirth3.Dateon which leg injection has to be given (sixty days from date of birth) 4. xdate on which polio drops is to be given (45 days from Date of birth). Write a constructor to construct the baby object. The constructor must find out the leg and polio drops dates from the date of birth. In the main program define a baby and display its details
3. Program to create and display a message on the window
4. Program to draw several shapes in the created window.
5. Program to create an applet and draw gridlines.
6. Java program to create a frame with two buttons called father and mother. When we click the father button the name of the father, his age and designation must appear. When we click mother similar details of mother appear.
7. Java program to create a frame with four text fields for name, age and qualification and a text field of multiple lines for address.
8. Program to draw circle, ellipse, square and rectangle at the mouse click position.
9. Java program to create four text fields for the name, street, city and pin code with suitable labels. Also add a button called my details, when you click the button your name, street, city and pin code must appear in the text fields.
10. Java program to demonstrate the multiple selection list boxes.
11. Program to create a canvas which displays a clock with hour hand and a minute hand depending upon an int variable minutes. Write another program with a frame, which displays the clock canvas. It must also have three buttons, tick, reset and close. When we click reset, the clock must reset to 12 hrs. When we click close, the frame closes.
12. Java program to create a menu bar and pull down menus.
13. Java program to create a window when we press M or m the window displays Good Morning A or the window displays Good Afternoon Eore the window displays Good Evening N or n the window displays Good Night.
14. Java program to move different shapes (Circle, Ellipse, Square, and Rectangle) according to the arrow key pressed.
15. Program to handle the divide by zero exception.
16. Program to explain the multithreading with the use of multiplication tables. Three threads must be defined and each one must create one multiplication table; they are 5 tables, 7 tables and 13table.
17. Program to illustrate thread priority. Create three threads and assign three different priorities.

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

Elective Courses

Course Code	5EA		L	T	P	C
Elective I - A	**ASIC DESIGN**		6			4
Pre-Requiest Basic Electronics			Syllabus Version		2021-2022	

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 Platform baseddesign.

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	Analyse 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	Michael John Sebastian Smith, **"APPLICATION SPECIFIC INTEGRATED 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, **"DIGITAL SYSTEM DESIGN USING VHDL"**, PWS Publishing (Thomson learning), 2002.
2	Stephen Brown, ZvonkoVranesic, **"FUNDAMENTS OF DIGITAL LOGIC WITH 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		L	T	P	C
Elective I - B	REMOTE SENSING		6			4
Pre-Requiest:	Basic Electronics		Syllabus Version		2021-2022	

Course Objectives:

The Main Objectives of this course are to:

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

Expected Course Outcomes:

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

1	Know the concepts of data transmission systems	K1
2	analyze the Model of Comunication system	K6
3	Familiarize Digital carrier Modulation Schemes .	K4
4	Understand pulse modulation and quantization techniques	K2
5	Analyse 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 nd 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		L	T	P	C
Elective I - C	MOBILE COMPUTING		6			4
Pre-Requisite:	Basic Electronics		Syllabus Version		2021-2022	

Course Objectives:

The Main Objectives of this course are to:

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

Expected Course Outcomes:

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

1	Mobile environments and communications systems.	K1
2	Hardware devices and interacting with these devices.	K6
3	Mobile operating systems available.	K6
4	Programming applications on a mobile system.	K2
5	Data and knowledge management	K4

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

Unit:1	INTRODUCTION	18 Hours

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

Unit:2	WIRELESS NETWORKS	18 Hours

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

Unit:3	MOBILE NETWORK LAYER	18 Hours

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

Unit:4	MOBILE TRANSPORT LAYER	18 hours

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

Unit:5	WAP	18 hours

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

	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		ELECTIVE 1-D	6	T		4
Pre-requisite		Basic knowledge of Electronic Circuits or permission of instructor	Syllabus Version		2021-2022	

Course Objectives:

The main objectives of this course are to:
1. To presents the principles and applications of industrial and power electronics.
2. To enable the students to learn and design industrial & power electronic circuits.

Expected Course Outcomes:

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

1	Developed the Circuit designing skills power electronics. Understood the concept industrial electronics system design.	K2
2	Acquire knowledge about fundamental concepts and techniques used in power electronics.	K2
3	Ability to analyze various single phase and three phase power converter circuits and understand their applications.	K3
4	Foster ability to identify basic requirements for power electronic based design application.	K4
5	To develop skills to build, and troubleshoot power electronics circuits.	K5
6	Foster ability to understand the use of power converters in commercial and industrial applications.	K6

K1 - Remember; **K2** - 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 – Displacement Measurements – Level Measurements – Flow Measurements – Measurement of Thickness

Unit:4	Application in Industrial Systems	14—hours

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

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 of Thyristor	
Total Lecture hours	**72—hours**
Text Book(s)	
1	Harish C Rai, **"Industrial and Power Electronics"** 10th edition, Umesh publications 2002
2	Timothy J Maloni, **"Industrial Solid State Electronic Devices and Circuits"** 2nd edition 1986
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		L	T	P	C
Elective II-E	**ROBOTICS AND AUTOMATION**		4			3
Pre-Requiste:	Basic Electronics		Syllabus Version		2021-2022	

Course Objectives:

The Main Objectives of this course are to:

- ❖ To learn the concepts ofRobots.
- ❖ To know about the sensors, actuators used in Robotsdesigning.
- ❖ To familiarize the students with the applications ofRobots.

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	Analyse Computer Numerical Control	K4

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

Unit:1	**CLASSIFICATION OF ROBOTIC SYSTEMS**	**10 Hours**

Basic Structure of a Robot - Classification of Robots: Cartesian, Cylindrical, Spherical, Articulated -. Accuracy, Resolution and Repeatability of Robots - Robot Application in Manufacturing: Material Transfers - Machine Loading and Unloading - 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**

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.	

Mapping with Programme Outcomes

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

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

Course code	5EF	PROGRAMMABLE LOGIC CONTROL	L	T	P	C
Elective –II – F			4	T		3
Pre-requisite		Digital Electronics and computer Architecture and Organization	Syllabus Version		2021-2022	

Course Objectives:

The main objectives of this course are to:

1. To provide knowledge levels needed for PLC programming and operating input and output modules.
2. To train the students to create ladder diagrams from process control description and understand various types of PLCregisters
3. Apply PLC Timers and Counters for the control of industrial processes, PLC functions and Data HandlingFunctions.

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.
2	

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

1	https://unitronicsplc.com/what-is-plc-programmable-logic-controller/
2	
3	

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			4	T		3
Pre-requisite			Syllabus Version	2021-2022		

Course Objectives:

The main objectives of this course are to:

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

Expected Course Outcomes:

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

1	Obtain an overview of automotive components andsubsystems.	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

K1 - Remember; **K2** - Undestand; **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
2	

	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	4	0	0	3
Pre-requisite:		PRINCIPLES OF COMMUNICATION	Syllabus version		2021-2022	

Course Objectives:

The objectives of this course are:

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

Expected Course Outcomes:

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

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

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

Unit: 1	SATELLITE SYSTEMS - OVERVIEW	10 Hours

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

Unit: 2	ORBITAL ASPECTS OF SATELLITE SYSTEMS	10 Hours

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

Unit: 3	THE SPACE SEGMENT	10 Hours

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

Unit: 4	SATELLITE LINK DESIGN	09 Hours

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

Unit: 5	APPLICATIONS OF SATELLITE SYSTEMS	09 Hours

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

	Total Lecture Hours	48 Hours

Text Books

1	Timothy Pratt, Charles Bostian,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	INTERNET OF THINGS	L	T	P	C
Core/Elective/Supportive:	Elective III-I	6			4
Pre-Requisite:	Basic Electronics	Syllabus Version		2021-2022	

Course Objectives:

The Main Objectives of this course are to:

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

Expected Course Outcomes:

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

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

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

Unit:1	IOT FUNDAMENTALS	18 hours

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

Unit:2	DESIGN PRINCIPLES FOR CONNECTED DEVICES	18 hours

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

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

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

Unit:4	SENSORS AND ACTUATORS	18 hours

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

Unit:5	SENDING SENSOR DATA OVER INTERNET	18 hours

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

	Total Lecture hours	90 hours

Text Book(s)

1 Arshdeep Bahga, Vijay Madisetti, "**Internet of Things: A Hands-On Approach**", 2014. ISBN: 978-0996025515

2 Boris Adryan, Dominik Obermaier, Paul Fremantle, "**The Technical Foundations Of Iot**", Artech Houser Publishers, 2017.

Reference Books	
1	Michael Margolis, "**Arduino Cookbook**", O"Reilly, 2011
2	Marco Schwartz, "**Internet of 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
3	https://nptel.ac.in/courses/106105166/ Introduction to Arduino – I – Lecture 22

Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College,Coimbatore. & 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	6EJ	VIRTUAL INSTRUMENTATION	L	T	P	C
Elective-III – J			4	T		3
Pre-requisite		Digital Electronics, Microprocessor and Computer fundamentals	Syllabus Version		2021-2022	

Course Objectives:

The main objectives of this course are to:

1. To provide basic concepts in virtualinstruments
2. To know about the programming methods in software used in virtualinstrumentation
3. To familiarize the students with the applications of virtualinstrumentation

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

K1 - Remember; **K2** - Undestand; **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	
2	
4	
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			4	T		3
Pre-requisite		Higher secondary biology	Syllabus Version		2021-2022	

Course Objectives:

The main objectives of this course are to:

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

Expected Course Outcomes:

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

1	Understand t h e C o n c ept ofbio-potential	K2
2	Understandth e concept of medicalinstruments	K4
3	Develop the troubleshooting Skills of medical instruments	K3
4	Understand the concepts of signal conditioners & diagnostic equipments	K2

K1 - Remember; **K2** - Undestand; **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

Need for Pacemakers - Pacemaker Parameters and Circuits - Different Modes of Operation - DC Defibrillator - Artificial Heart Valves - Heart Lung Machines - Artificial Lung Machines - Artificial

Kidney Machine - Nerve and Muscle Stimulator. COMPUTER APPLICATIONS: Data Acquisition Systems - Analysis of ECG signals - Computerized Axial Tomography (CAT) Scanner - Ultrasonic Scanner - 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-medical Instrumentation andMeasurements"**,PrenticeHall of India, New Delhi, 1990	
Reference Books		
1	Khandpur, **"Handbook on Biomedical Instrumentation",** Tata McGraw Hill Company, New Delhi, 1989	
2	Ohn G Webster, Ed., **"Medical Instrumentation Application and Design",** Third Edition, John Wiley & Sons, Singapore, 1999	
3	Arumugam. M, **"Biomedical Instrumentation",**Anuradha Agencies Publishers, 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	4	0	0	3
Pre-requisite:		Digital Principles and Applications	Syllabus version		2021-2022	

Course Objectives:

The objectives of this course are:

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

Expected Course Outcomes:

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

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

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

Unit: 1	VLSI TECHNOLOGY	10 Hours

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

Unit: 2	ELECTRICAL PROPERTIES OF MOS DEVICES	10 Hours

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

Unit: 3	DESIGN PROCESSES	10 Hours

VLSI design flow - stick diagram design rules with examples - Design rules forLayout diagrams of digital circuits– sheet resistance R_s –standard unit of capacitance – Inverter delays – Propagation delays- scaling of MOS circuits – limitations of scaling.

Unit: 4	VLSI PHYSICAL DESIGN AND STYLES	09 Hours

PHYSICAL DESIGN:

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

VLSI DESIGN STYLES:

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

Unit: 5	TESTING OF VLSI CIRCUITS	09 Hours

Test Principles-BIST-Test Bench- Combinational Circuit Testing, Sequential Circuit Testing, Test Bench Techniques.

	Total Lecture Hours	48 Hours

Text Books	
1	Basic VLSI Design, Douglas ,3rd Edition, A. Pucknell, Kamran Eshraghian, PHI, New Delhi, 2011.
2	Modern VLSI design, Wayne Wolf, 3rdEdition, Pearson Education, New Delhi, 4th impression 2008.
Reference Books	
1	Introduction to VLSI Circuits and Systems, John .P. Uyemura, John Wiley, Student Edition, New Delhi, Reprint 2006.
2	Principles of CMOS VLSI Design, N.H.E Weste , K.Eshraghian, Adisson Wesley, 2nd Edition, New Delhi.
3	Application Specific Integrated Circuits, Michel John Sebastian Smith, Addison Wesley, Indian Edition, 4th Indian Reprint 2001, New Delhi.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/117/101/117101058/
2	https://www.youtube.com/watch?v=9SnR3M3CIm4
3	https://www.youtube.com/watch?v=Y8FvvzcocT4
Course Designed by: Dr.S.Vijayakumar, Associate Professor in ECE, Sreenivasa Institute of Technology and Management Studies, Autonomous, Chittoor.& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.	

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

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

Annexure

DEPARTMENT OF ELECTRONICS AND COMMUNICATION SYSTEMS

MISSION

- To develop appropriate facilities for promoting researchactivities
- To inculcate leadership qualities among students for self and societalgrowth
- To nurture students on emerging technologies for serving industry needs through industry instituteinterface
- To enrich teaching learning process by transforming young minds to be resourceful engineers