

# B. Sc. Electronics and Communication Systems

## Syllabus

### AFFILIATED COLLEGES

Program Code:26B

2020 – 2021 onwards

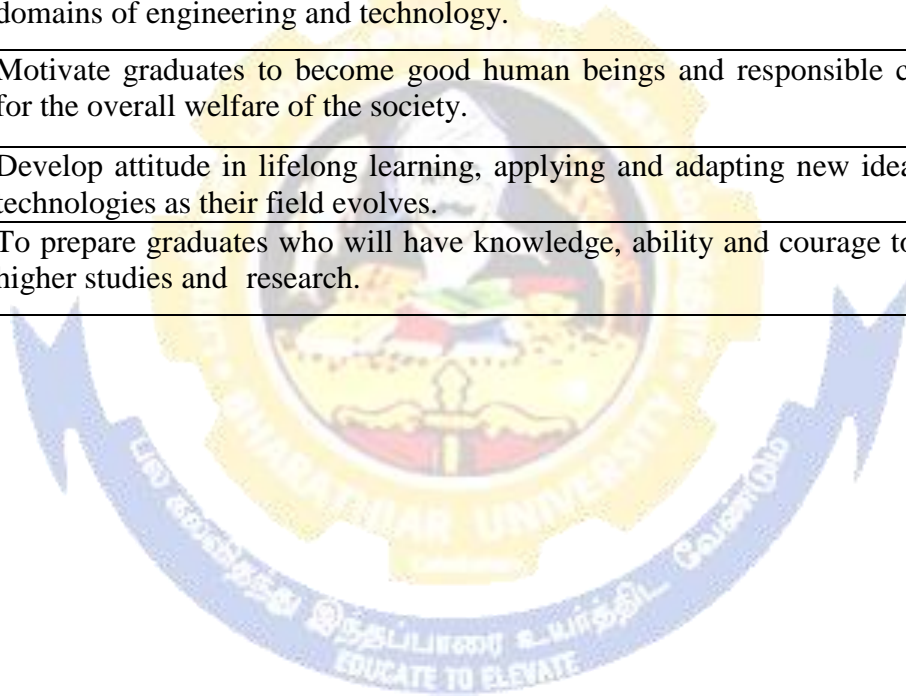


## BHARATHIAR UNIVERSITY

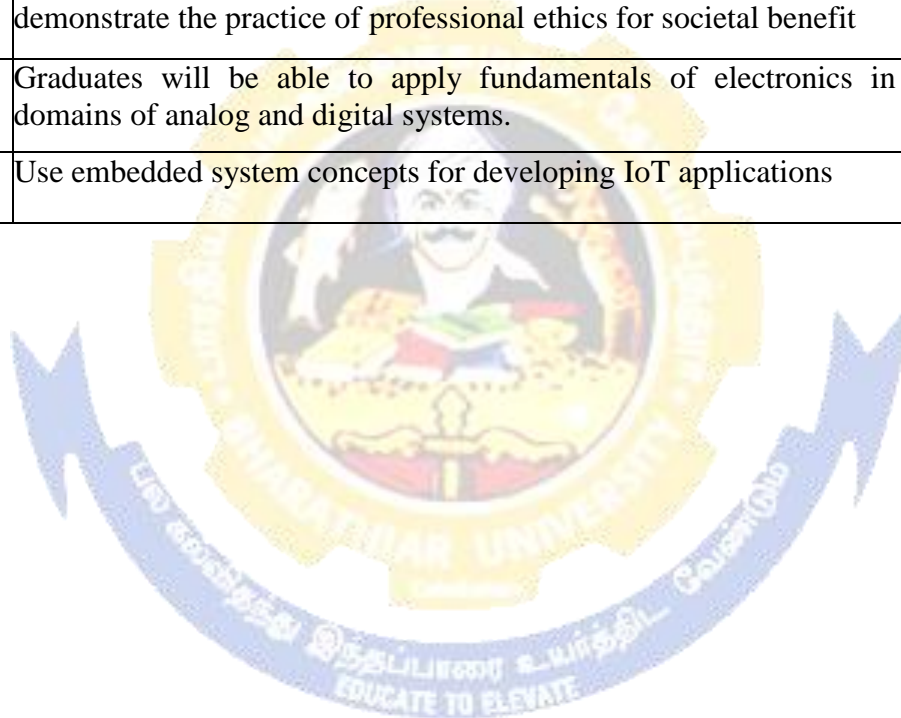
(A State University, Accredited with “A” Grade by NAAC,  
Ranked 13<sup>th</sup> among Indian Universities by MHRD-NIRF,  
World Ranking: Times -801-1000, Shanghai -901-1000, URAP - 982)

Coimbatore - 641 046, Tamil Nadu, India

<b>Program Educational Objectives (PEOs)</b>	
The <b>B. Sc. ELECTRONICS AND COMMUNICATION SYSTEMS</b> program describe accomplishments that graduates are expected to attain within five to seven years after graduation	
<b>PEO1</b>	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.
<b>PEO2</b>	Impart analytic and thinking skills to develop initiatives and innovative ideas for R&D, Industry and societal requirements.
<b>PEO3</b>	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.
<b>PEO4</b>	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.
<b>PEO5</b>	Motivate graduates to become good human beings and responsible citizens for the overall welfare of the society.
<b>PEO6</b>	Develop attitude in lifelong learning, applying and adapting new ideas and technologies as their field evolves.
<b>PEO7</b>	To prepare graduates who will have knowledge, ability and courage to pursue higher studies and research.



<b>Program Specific Outcomes (PSOs)</b>	
After the successful completion of B.Sc. ELECTRONICS AND COMMUNICATION SYSTEMS program, the students are expected to	
<b>PSO1</b>	Demonstrate proficiency in use of software and hardware required to practice electronics and communication profession.
<b>PSO2</b>	Graduates will be able to apply fundamentals of electronics in various domains of analog and digital systems
<b>PSO3</b>	Apprehend and analyses 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.
<b>PSO4</b>	Ability to communicate effectively with excellent interpersonal skills and demonstrate the practice of professional ethics for societal benefit
<b>PSO5</b>	Graduates will be able to apply fundamentals of electronics in various domains of analog and digital systems.
<b>PSO6</b>	Use embedded system concepts for developing IoT applications



<b>Program Outcomes (POs)</b>	
On successful completion of the B.Sc. ELECTRONICS AND COMMUNICATION SYSTEMS program	
<b>PO1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, Science, Engineering fundamentals ,and an engineering specialization to the solution of complex engineering problems
<b>PO2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature and analyses complex engineering problems reaching substantiated conclusion using principles of mathematics and Engineering sciences
<b>PO3</b>	<b>Design/Development of solutions:</b> Design solutions for complex Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal and environmental conditions.
<b>PO4</b>	<b>Conduct investigation of complex problems:</b> Use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
<b>PO5</b>	<b>Modern tool usage:</b> 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
<b>PO6</b>	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
<b>PO7</b>	<b>Environment and Sustainability:</b> Understand the impact of the professional engineering solution in societal and environmental contexts, and demonstrate the knowledge of and need fire sustainable development
<b>PO8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO9</b>	<b>Individual and team work:</b> Function effectively as an individual, an as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO10</b>	<b>Life-Long learning:</b> 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 2020 – 21 onwards)

Course Code	Title of the Course	Credits	Hours		Maximum Marks		
			Theory	Practical	CIA	ESE	TOTAL
<b>FIRST SEMESTER</b>							
11T	Language –I	4	6	-	25	75	100
12E	English – I	4	6	-	25	75	100
13A	<b>Core Paper I :</b> Basic Electronics	4	5	-	25	75	100
--	<b>Core Practical I:</b> Basic Electronics Lab	-	-	3	-	-	-
--	<b>Core Practical II :</b> Semiconductor Devices Lab	-	-	3	-	-	-
1AA	<b>Allied I</b> Mathematics–I	4	5	-	25	75	100
1FA	Environmental Studies #	2	2	-	-	50	50
<b>Total</b>		18	-	-	100	350	450
<b>SECOND SEMESTER</b>							
21T	Language – II	4	6	-	25	75	100
22E	English – II	4	6	-	25	75	100
23A	<b>Core Paper II :</b> Semiconductor Devices	4	5	-	25	75	100
23P	<b>Core Practical I:</b> Basic Electronics Lab	4	-	3	40	60	100
23Q	<b>Core Practical II:</b> Semiconductor Devices Lab	4	-	3	40	60	100
2AA	<b>Allied : II</b> Mathematics–II	4	5	-	25	75	100
2FB	Value Education – Human Rights #	2	2	-	-	50	50

	Swatch Bharat- Summer internship **		-	-	-	-	-
<b>Total</b>		26	-	-	180	470	650
<b>THIRD SEMESTER</b>							
33A	<b>Core Paper III :</b> Principles of Communication Systems	4	4	-	25	75	100
33B	<b>Core Paper IV:</b> Digital Principles and Applications	4	4	-	25	75	100
33C	<b>Core Paper V:</b> Electronic Circuits	4	4	-	25	75	100
--	<b>Core Practical III:</b> Digital Electronic lab	-	-	3	-	-	-
--	<b>Core Practical IV:</b> Electronic circuits, Radio, TV and Instrumentation lab	-	-	3	-	-	-
3AD	<b>Allied : III</b> Programming in C	3	4	-	20	55	75
--	<b>Core Practical V:</b> Computer Programming Lab	-	-	3	-	-	-
3ZA	<b>Skill based Subject I :</b> Computer Architecture and organization	3	3	-	20	55	75
3FB/ 3FC	Tamil @ / Advanced Tamil#(OR) Non-major elective - I (Yoga for Human excellence # Womens Rights#)	2	2	-	-	50	50
<b>Total</b>		20	-	-	115	385	500
<b>FOURTH SEMESTER</b>							
43A	<b>Core Paper VI :</b> IC's and Instrumentation	4	4	-	25	75	100
43B	<b>Core Paper VII :</b> Modern Television	4	4	-	25	75	100

	Engineering						
43C	<b>Core Paper III</b> Digital and cellular communication	4	4	-	25	75	100
43P	<b>Core Practical III</b> Digital Electronics Lab	4	-	3	40	60	100
43Q	<b>Core Practical IV:</b> Electronic circuits, Radio, TV and Instrumentation lab	4	-	3	40	60	100
4AD	<b>Allied: IV</b> Object Oriented Programming using C++	3	4	-	20	55	75
43R	<b>Core Practical V :</b> Computer Programming Lab	2	-	3	20	30	50
4ZB	<b>Skill based Subject II :</b> Visual Programming	3	3	-	20	55	75
4FB/ 4FE	Tamil @ /Advanced Tamil # (OR) Non-major elective -II (General Awareness #)	2	2	-	-	50	50
<b>Total</b>		30	-	-	215	535	750
<b>FIFTH SEMESTER</b>							
53A	<b>Core Paper IX : 8085</b> microprocessor and applications	4	6	-	25	75	100
5EA/ 5EB/ 5EC/ 5ED	<b>Elective – I</b>	4	6	-	25	75	100
5EE/ 5EF/ 5EG/ 5EH	<b>Elective - II</b>	4	6	-	25	75	100
--	<b>Core Practical VI:</b> Microprocessor and microcontroller lab	-	-	3	-	-	-

--	<b>Core Practical VII:</b> Industrial and Power Electronics Lab	-	-	3	-	-	-
--	<b>Core Practical VIII :</b> Electronics communication lab	-	-	3	-	-	-
5ZC	<b>Skill based subject – III</b> Internet and java programming	3	3	-	20	55	75
<b>Total</b>		15	-	-	95	280	375
<b>SIXTH SEMESTER</b>							
63A	<b>Core Paper X : 8051</b> Microcontroller and embedded systems	4	5	-	25	75	100
63P	<b>Core Practical VI:</b> Microprocessor and Microcontroller lab	4	-	3	40	60	100
63Q	<b>Core Practical VII:</b> Industrial and Power Electronics Lab	4	-	3	40	60	100
63R	<b>Core Practical VIII:</b> Electronics and communication Lab	4	-	3	40	60	100
67V	<b>PROJECT</b>	6	5	-			150
6EI/ 6EJ/ 6EK/ 6EL	<b>Elective- III</b>	4	4	-	25	75	100
6ZP	<b>Skill based Subject – IV</b> Practical Visual & java Programming	3	-	3	30	45	75
67A	Extension Activities @	2	-	-	50	-	50
<b>Total</b>		31	-	-	275	375	775
<b>Grand Total</b>		<b>140</b>	<b>-</b>	<b>-</b>	<b>955</b>	<b>2395</b>	<b>3500</b>

@ 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





**First Semester**

<b>Course code</b>	<b>13A</b>	<b>BASIC ELECTRONICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>	<b>Core</b>		<b>5</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Pre-requisite</b>	<b>Higher secondary Physics</b>		<b>Syllabus Version</b>		<b>2020-2021</b>	
<b>Course Objectives:</b>						
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						
<b>Expected Course Outcomes:</b>						
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
<b>K1-Remember;K2- Understand; K3-Apply;K4-Analyze; K5-Evaluate;K6-Create</b>						
<b>Unit:1</b>	<b>Resistors &amp; Inductors</b>				<b>11hours</b>	
<b>Types of Resistors:</b> Fixed, Variable - Brief mention of their Construction and Characteristics - Color Coding of Resistors - Connecting Resistors in Series and Parallel						
<b>Types of Inductors:</b> Fixed, Variable- Self and Mutual Inductance-Faraday's Law and Lenz's Law of Electromagnetic Induction-Energy Stored in an Inductor-Inductance in Series and Parallel-Testing of Resistance and Inductance using Multimeter.						
<b>Unit:2</b>	<b>Capacitors</b>				<b>11 hours</b>	
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.						
<b>Unit:3</b>	<b>Electrical Elements And Circuits</b>				<b>12 hours</b>	
Potential Difference- Electric Current-Electromotive Force-Ohms Law- Kirchoff's Law- Kirchoff's Current Law-Analysis of Resistance in Series Circuits, Parallel Circuits and Series Parallel Circuits- Concept of Voltage Source and Current Source-Voltage Source in Series and Current Source in Parallel-Simple Problems in DC Circuits.						
<b>Unit:4</b>	<b>Network Theorems</b>				<b>12 hours</b>	
Superposition Theorem - Thevenin Theorem-Thevenizing a Circuit with Two Voltage Sources - Bridge Circuit - Norton's Theorem - Thevenin Norton Conversion - Conversion of Voltage and Current Sources-Millman's Theorem-Star and Delta Conversion-Maximum Power Transfer Theorem - Simple Problems in DC Circuits.						
<b>Unit:5</b>	<b>AC Circuits</b>				<b>12 hours</b>	
Introduction to Sinusoidal Wave - RMS Value - Average Value - AC Circuits with Resistance-Circuits with XL Alone-Circuits with XC Alone-Series Reactance and Resistance- Parallel Reactance and Resistance - Series Parallel Reactance and Resistance - Real Power -						

<b>Unit:6</b>	<b>Contemporary Issue</b>	<b>2 hours</b>
Group discussion on the overall study of Capacitors, resistors and Inductors		
<b>Total Lecture hours</b>		<b>60 hours</b>

<b>Text Book(s)</b>	
1	S.Salivahanan, N.Suresh Kumar, A.Vallavaraj“ <b>Electronic Devices And Circuits</b> ”- Tata McGraw-Hill Publishing Company Limited, New Delhi. 1998.
2	B.V.Narayana Rao “ <b>Principles Of Electronics</b> ”, Wiley Eastern Limited, 1992

<b>Reference Books</b>	
1	BernardGrob“ <b>Basic Electronics</b> ”-Tata McGraw-Hill Publishing Company Limited, 9thEdition.
2	B.L.Theraja, “ <b>Basic Electronics-Solid State Devices</b> ”,S.Chand Company Ltd.2000

<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://nptel.ac.in/courses/108/104/108104139/">https://nptel.ac.in/courses/108/104/108104139/</a>
2	<a href="https://nptel.ac.in/courses/108/101/108101091/">https://nptel.ac.in/courses/108/101/108101091/</a>
3	<a href="https://www.youtube.com/playlist?list=PLFF553CED56CDE25D">https://www.youtube.com/playlist?list=PLFF553CED56CDE25D</a>
4	<a href="https://www.youtube.com/watch?v=w8Dq8blTmSA">https://www.youtube.com/watch?v=w8Dq8blTmSA</a>

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

<b>Mapping with Programme Outcomes</b>										
<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
CO1	S	S	M	L	L	L	L	M	S	M
CO2	L	L	L	L	L	M	M	S	M	S
CO3	M	M	S	L	M	S	L	L	M	M
CO4	M	L	L	L	L	S	L	L	M	S
CO5	L	L	M	M	L	L	S	M	L	M

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



# Second Semester

<b>Course code</b>	<b>23A</b>	<b>SEMICONDUCTR DEVICES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>	<b>Core</b>		<b>5</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Pre-requisite</b>	<b>Higher secondary physics</b>		<b>Syllabus Version</b>		<b>2020-2021</b>	
<b>Course Objectives:</b>						
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.						
<b>Expected Course Outcomes:</b>						
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
<b>K1-Remember;K2- Understand; K3-Apply;K4-Analyze; K5-Evaluate;K6-Create</b>						
<b>Unit:1</b>	<b>PN Junction Diode</b>				<b>10 hours</b>	
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.						
<b>Unit:2</b>	<b>Special Diodes</b>				<b>12 hours</b>	
ZenerDiode-VICharacteristics–Breakdown–BackwardDiode–VaractorDiode–StepRecovery Diode - Point Contact Diode – Scott key Diode - Tunnel Diode - Gunn Diode – Impatt Diode - PIN Diode – PNP Diode						
<b>Unit:3</b>	<b>BJT</b>				<b>12 hours</b>	
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						
<b>Unit:4</b>	<b>FET and UJT</b>				<b>12 hours</b>	
Introduction to FET - Construction and Operation of N-Channel JFET - Drain Characteristics- Comparison of JFET &BJT - Introduction to MOSFET - Enhancement MOSFET – Depletion MOSFET - FET as a Voltage Variable Resistor(VVR) - Introduction to UJT – Characteristics –UJT as Relaxation Oscillator - Introduction to PUT – SCR – TRIAC –DIAC						
<b>Unit:5</b>	<b>Optoelectronic Devices</b>				<b>12 hours</b>	
Principles,OperationandCharacteristicsOfOptoElectronicDevices:LDR–PhotoDiode-Photo Transistor – Photo Voltaic Cell – Solar Cell – Photo Emissive Sensors – Vacuum Photo Tube– Gap Filled Photo Tube – Photo Multiplexer – LED – IR Emitter – LCD – Opto–Couplers						
<b>Unit:6</b>	<b>Contemporary Issues</b>				<b>2 hours</b>	
Diodes, transistors						
<b>Total Lecture hours</b>					<b>60 hours</b>	

<b>Text Book(s)</b>	
1	S. Salivahanan, N. Suresh Kumar, A. Vallavaraj, “ <b>Electronics Devices And Circuits</b> ”, Tata Mcgraw Hill Publishing Company Limited, New Delhi, 8th Edition.
2	B. L. Theraja, “ <b>Basic Electronics – Solid State Devices</b> ”, S.Chand& Company Ltd.
<b>Reference Books</b>	
1	S. L. Kakani, K. C. Bhan Dai “ <b>A Text Book Of Electronics</b> ”.S.Chand& Company Ltd. 2000
2	BernardGrob“ <b>Basic Electronics</b> ”-Tata McGraw-Hill Publishing Company Limited, 9thEdition.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://nptel.ac.in/courses/108/108/108108122/">https://nptel.ac.in/courses/108/108/108108122/</a>
2	<a href="https://nptel.ac.in/courses/108/108/108108112/">https://nptel.ac.in/courses/108/108/108108112/</a>
3	<a href="https://nptel.ac.in/courses/115/102/115102103/">https://nptel.ac.in/courses/115/102/115102103/</a>
Course Designed By: K.Manikantan , Assistant Professor, Government Arts College ,Ooty& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty	

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

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

Course code	23P	BASIC ELECTRONICS LAB	L	T	P	C
Core/Elective/Supportive	Core practical - I		0	0	3	4
Pre-requisite	Higher secondary physics		Syllabus Version		2020-2021	
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>1. To understand the fundamental principles of circuit theory</li> <li>2. To make use of circuit laws and theorems and measuring the circuit parameters.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Apply the concept of basic circuit and theorems					K3
2	Understand the basic principles of ohms and kirchoff's laws					K2
3	Simplify the circuits using series and parallel equivalents and using Thevenin's and Norton's equivalent circuits.					K3
4	Design resonance circuits.					K4
5	Use the oscilloscope for the display and measurements of signals.					K2
<b>K1-Remember;K2- Understand; K3-Apply;K4-Analyze; K5-Evaluate;K6-Create</b>						
<ol style="list-style-type: none"> <li>1. Study of Multimeter – Checking of Components</li> <li>2. Measurement of Amplitude, Frequency &amp; Phase Difference using CRO</li> <li>3. Verification of Ohm's Law</li> <li>4. Voltage sources in Series, Parallel and Series –Parallel</li> <li>5. Resistance in Series, Parallel and Series –Parallel</li> <li>6. Voltage and Current Dividers</li> <li>7. Verification of Kirchoff's Law</li> <li>8. Wheatstone Bridge</li> <li>9. Verification of Norton's Theorem</li> <li>10. Verification of Thevenin's Theorem</li> <li>11. Verification of Millman's Theorem</li> <li>12. Verification of Superposition Theorem</li> <li>13. LCR Bridge</li> <li>14. Series Resonance Circuit</li> <li>15. Parallel Resonance Circuit</li> </ol>						

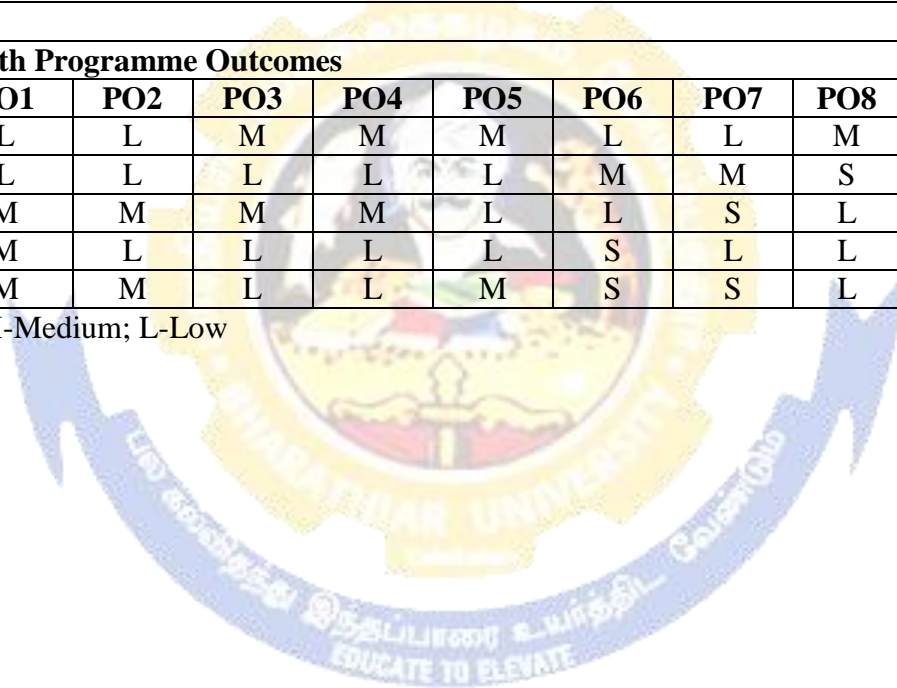


16. Transient Response of RC Circuit
17. Transient Response of RL Circuit
18. Capacitors & Inductors in Series & Parallel
19. Frequency Response of R, L & C
20. Low Pass Filter & High Pass Filter
21. Band pass and Band Rejection Filter
22. Verification of Maximum Power Transfer Theorem
23. Measurement of resistance and capacitance in series and parallel
Course Designed By: K.Manikantan , Assistant Professor, Government Arts College ,Ooty & Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty

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

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

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



Course code	23Q	SEMICONDUCTOR DEVICES LAB	L	T	P	C
<b>Core/Elective/Supportive</b>		<b>Core practical – II</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>4</b>
<b>Pre-requisite</b>		<b>Higher secondary Physics</b>	<b>Syllabus Version</b>		<b>2020-2021</b>	
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>1. To understand and experiment the basic parameters of electronic devices.</li> <li>2. To construct few applications using semiconductor devices.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Experiment the fundamental operations of the main semiconductor electronic devices.					K3
2	Design and construct electronic circuits using semiconductor devices.					K3
3	Understand the transistor characteristics					K2
4	Understand the characteristics of LDR and solar cell					K2
5	Analyse the characteristics of diodes and transistors					K4
<b>K1-Remember;K2- Understand; K3-Apply;K4-Analyze; K5-Evaluate;K6-Create</b>						
<ol style="list-style-type: none"> <li>1. Band Gap Energy of Silicon / Germanium Diode</li> <li>2. V-I Characteristics of Junction Diode</li> <li>3. V-I Characteristics of Zener Diode</li> <li>4. Transistor Characteristics of CE Configuration</li> <li>5. Transistor Characteristics of CB Configuration</li> <li>6. Transistor Characteristics of CC Configuration</li> <li>7. Clipping Circuits</li> <li>8. Clamping Circuits</li> <li>9. Measurement of Stability Factor of Fixed Bias</li> <li>10. Measurement of Stability Factor of Self Bias</li> <li>11. V-I Characteristics of JFET</li> <li>12. V-I Characteristics of UJT</li> <li>13. UJT as Oscillator</li> <li>14. FET as Voltage Variable Resistor(VVR)</li> <li>15. Characteristics of LDR</li> <li>16. Characteristics of Solar Cell</li> <li>17. Study of IR (Tx &amp; Rx)</li> <li>18. Study of LED and 7 Segment display</li> <li>19. Temperature Co-efficient of Junction Diode</li> <li>20. Zener as a Voltage regulator</li> <li>21. ON / OFF control of relay using Opto –Couplers</li> </ol>						

22. Characteristics of SCR  
23. TRIAC Characteristics

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

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



# Third Semester

<b>Course code</b>	<b>33A</b>	<b>PRINCIPLES OF COMMUNICATION SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>	<b>Core</b>		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Pre-requisite</b>	<b>Higher secondary physics</b>		<b>Syllabus Version</b>		<b>2020-2021</b>	
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>1. To understand the concept of wave propagation and its types.</li> <li>2. To acquire knowledge on Amplitude and Frequency modulation.</li> <li>3. To inculcate the principle of radio receivers and its types.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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
<b>K1-Remember;K2- Understand; K3-Apply;K4-Analyze; K5-Evaluate;K6-Create</b>						
<b>Unit:1</b>	<b>Wave Propagation</b>				<b>9 hours</b>	
EM Waves – Free Space Propagation – Surface Wave Propagation – Sky Wave Propagation – Space Wave Propagation – Troposphere Scatter Propagation – Structure Of Atmosphere – Virtual Height – MUF – LUF – Skip Distance – OWF – Ionosphere Abnormalities- Duct Propagation						
<b>Unit:2</b>	<b>Antennas</b>				<b>9 hours</b>	
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 Uda Antenna – Parabolic Antenna – Horn and Lens Antenna – Helical Antenna						
<b>Unit:3</b>	<b>Modulation Techniques</b>				<b>10 hours</b>	
Introduction to Communication Systems – Information – Transmitter – Channel – Noise – Receiver –NeedforModulationBandWidthRequirement–AmplitudeModulation: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.						
<b>Unit:4</b>	<b>Single Sideband Modulation</b>				<b>9 hours</b>	
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						
<b>Unit:5</b>	<b>Receiver</b>				<b>9hours</b>	

Introduction – Super Heterodyne Receiver – Choice of IF and Oscillator Frequencies – Image Rejection – Adjacent Channel Selectivity – Spurious Response - Tracking – AGC – Double Conversion Receiver		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2 hours</b>
Seminar on receiver, group discussion on communication systems		
<b>Total Lecture hours</b>		<b>48 hours</b>

<b>Text Book(s)</b>	
1	Kennedy and Davis “ <b>Electronic Communication Systems</b> ” Tata McGraw Hill, 8th edition, 1999
2	Dennis Roddy and John Coolen, “ <b>Electronic Communications</b> ” PHI, 4th edition, 1995.
<b>Reference Books</b>	
1	K.D. Prasad and Satyaprakahan, “ <b>Antenna Wave Propagation</b> ” 3rd edition.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://swayam.gov.in/nd1_noc20_ee16/preview">https://swayam.gov.in/nd1_noc20_ee16/preview</a>
2	<a href="https://swayam.gov.in/nd1_noc19_ee47/preview">https://swayam.gov.in/nd1_noc19_ee47/preview</a>
Course Designed By: K.Manikantan , Assistant Professor, Government Arts College ,Ooty& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty	

<b>Mapping with Programme Outcomes</b>										
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/Elective/Supportive	Core		4	0	0	4
Pre-Requisite:	Higher secondary Physics		Syllabus Version		2020-2021	
<b>Course Objectives:</b>						
<b>The Main Objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>To acquire the basic knowledge of Number system, Digital logic circuits and its application.</li> <li>To outline the formal procedures for the analysis and design of combinational and sequential circuits.</li> <li>To learn the concepts of A/D, D/A conversions and their types.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Understand the basics of Number system and gates				K2	
2	Realize the operation of various logic gates and analyzing the outputs				K1	
3	Analyses and design the combinational logic circuits				K4	
4	Analyses and design the Sequential logic circuits				K4	
5	Design various synchronous and asynchronous sequential circuits				K6	
<b>K1-Remember;K2- Understand; K3-Apply;K4-Analyze; K5-Evaluate;K6-Create</b>						
<b>Unit:1</b>	<b>Number System And Codes</b>				<b>10 hours</b>	
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.						
<b>Unit:2</b>	<b>Boolean Algebra And Logic Gates</b>				<b>12 hours</b>	
Boolean logic operations – Boolean functions – Truth Tables – Basic Laws – De Morgans 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.						
<b>Unit:3</b>	<b>Combinational Logic Circuits</b>				<b>12 hours</b>	
Half Adder – Full Adder – Half Subtractor – Full Subtractor – Parallel Binary Adder – 4 bit Binary Adder / Subtractor – BCD adder – Multiplexer – Demultiplexer – Decoders – Encoders – Parity Generators / Checkers – Magnitude Comparators – VHDL Coding for Combinational Circuits						
<b>Unit:4</b>	<b>Sequential Logic Circuits</b>				<b>12 hours</b>	
Flip Flops – RS, Clocked RS, JK, JK Master Slave, D and T Flip Flops – Shift Registers and its Types–Ring Counters– RippleCounters–SynchronousCounter–UpDowncounter–Mod-3,Mod- 5 Counters – Decade Counter –Applications.						
<b>Unit:5</b>	<b>D/A and A/D Converters</b>				<b>12 hours</b>	
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.						
<b>Unit:6</b>	<b>Contemporary Issues</b>				<b>2 hours</b>	

Analysis of analog and digital circuits	
	<b>Total Lecture hours</b>
	<b>60 hours</b>
<b>Text Book(s)</b>	
1	Malvino & Leech, “ <b>Digital Principles And Applications</b> ”, Tata McGraw Hill Edition V, 2002.
2	M.MorrisMano, “ <b>Digital Logic And Computer Design</b> ”, PHI2005.
<b>Reference Books</b>	
1	Floyd and Jain, Digital Fundamentals, Prentice Hall2010
2	M. Morris Mano Charles Kime, Digital Logic and Computer Design Fundamentals, Pearson Education Limited, 2014
<b>Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]</b>	
1	<a href="https://soaneemrana.org/onewebmedia/DIGITAL%20PRINCIPLES%20AND%20APPLICATION%20BY%20LEACH%20&amp;%20MALVINO.pdf">https://soaneemrana.org/onewebmedia/DIGITAL%20PRINCIPLES%20AND%20APPLICATION%20BY%20LEACH%20&amp;%20MALVINO.pdf</a> E book, Malvino & Leech, - <b>Digital Principles And Applications</b> , Tata McGraw Hill Edition X!,2011
2	<a href="https://nptel.ac.in/courses/117/106/117106086/Introduction%20to%20digital%20circuits">https://nptel.ac.in/courses/117/106/117106086/Introduction to digital circuits</a>
3	<a href="https://www.youtube.com/watch?v=CL3ups78jrs/">https://www.youtube.com/watch?v=CL3ups78jrs/</a> Introduction to digital Design
Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College & Dr.N Om Muruga . Assistant Professor. Government Arts College .Ootv.	

**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/Elective/Supportive	Core		4	0	0	4
Pre-Requisite:	Basic Electronics		Syllabus Version	2020-2021		
<b>Course Objectives:</b>						
<b>The Main Objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>To enable the students to understand and gain the knowledge on power supplies, amplifiers and oscillators.</li> <li>To Acquaint the students with construction, theory and characteristics of the electronic amplifier circuits and types of multivibrators.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Understand the concepts of Rectifiers and regulators				K2	
2	Study about Small signal amplifiers				K1	
3	Analyze the functions of Power amplifiers				K4	
4	Analyze the performance of negative as well as positive feedback circuits				K4	
5	Design oscillators and Multivibrators				K6	
<b>K1-Remember;K2- Understand; K3-Apply;K4-Analyze; K5-Evaluate;K6-Create</b>						
<b>Unit:1</b>	<b>Rectifiers And Regulators</b>				<b>10 hours</b>	
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.						
<b>Unit:2</b>	<b>Small Signal Amplifiers</b>				<b>12 hours</b>	
CE, CB, CC amplifiers – Calculation of I/P Resistance, O/P Resistance – Current Gain - VoltageGain–PowerGain–SingleStageTransistorAmplifier–DCandACloadline–RC Coupled Amplifier – Gain Frequency Response – Bandwidth – Transformer Coupled Amplifier – Impedance Matching – FET Amplifier.						
<b>Unit:3</b>	<b>Power Amplifiers</b>				<b>12 hours</b>	
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						
<b>Unit:4</b>	<b>Feedback Amplifiers</b>				<b>12 hours</b>	
Basicconceptsoffeedback–PositiveFeedback–NegativeFeedback–EffectsofNegative Feedback on Gain, Bandwidth and Distortion – Noise – Voltage Series Feedback - Voltage Shunt Feedback – Current Series Feedback – Current Shunt Feedback.						
<b>Unit:5</b>	<b>Oscillators And Multivibrators</b>				<b>12 hours</b>	

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		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2 hours</b>
	Webinar program on electronic circuits	
<a href="https://nptel.ac.in/courses/108/102/108102097/#Introduction%20to%20Electronic%20circuits">https://nptel.ac.in/courses/108/102/108102097/#Introduction to Electronic circuits NPTEL.</a>		
<a href="https://nptel.ac.in/courses/108/102/108102095/Analog%20Electronic%20circuits">https://nptel.ac.in/courses/108/102/108102095/Analog Electronic circuits NPTEL.</a>		
<b>Total Lecture hours</b>		<b>60 hours</b>
<b>Text Book(s)</b>		
1	S.K.Sahdev, —Electronic Principles, Dhanpat Rai & Co (P) Ltd, 2nd Edition, 1998	
2	B.L.Theraja, <b>-BASIC ELECTRONICS</b> , Chand Company Ltd, 2000	
<b>Reference Books</b>		
1	V.K.Metha, Rohit Metha, <b>Principles Of Electronics</b> , S Chand, 2006 .	
2	B.Sasikala, C.Poornachandra, <b>Electronic Devices And Circuits</b> , Scitech 2003.	
<b>Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]</b>		
1	<a href="http://www.ee.iitm.ac.in/~ani/2012/ec5135/lectures.html">http://www.ee.iitm.ac.in/~ani/2012/ec5135/lectures.html</a> Lecture Notes	
2	<a href="https://nptel.ac.in/courses/108/102/108102097/#Introduction%20to%20Electronic%20circuits">https://nptel.ac.in/courses/108/102/108102097/#Introduction to Electronic circuitsNPTEL.</a>	
3	<a href="https://nptel.ac.in/courses/108/102/108102095/Analog%20Electronic%20circuits">https://nptel.ac.in/courses/108/102/108102095/Analog Electronic circuits NPTEL.</a>	
Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College & Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.		

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

<b>Course Code</b>	<b>3ZA</b>	<b>COMPUTER ARCHITECTURE AND ORGANIZATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>	<b>Skill Based Subject - I</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Pre-Requisite:</b>	<b>Higher Secondary Computer Science</b>		<b>Syllabus Version</b>	<b>2020-2021</b>		
<b>Course Objectives:</b>						
<b>The Main Objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>To enable the students to learn the newest computer technology and trends.</li> <li>To learn subject presents the Modern computer organization, Processor and memory design, Peripherals and recent system architecture.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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	Analyze 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	Identify the elements of modern instructions sets and their impact on processor design.					K5
<b>K1-Remember;K2- Understand; K3-Apply;K4-Analyze; K5-Evaluate;K6-Create</b>						
<b>Unit:1</b>	<b>Modern Computer Organization</b>					<b>9 hours</b>
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						
<b>Unit:2</b>	<b>Processor Design And Data Path</b>					<b>9 hours</b>
Introduction–ProcessorRole–ProcessorDesignGoals–ProcessorDesignProcess– Data Path Organization – Main Memory Interface – Local Storage Register File – Data Path Simple Instructions						
<b>Unit:3</b>	<b>Memory Design And Management</b>					<b>9 hours</b>
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.						
<b>Unit:4</b>	<b>Computer Peripherals</b>					<b>8 hours</b>
Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices–FloppyDiskDrive–HardDiskDrive–SpecialTypesofDiskDrives–MouseandTrack Ball–Modem–CD-ROMDrive–Scanner–DigitalCamera–DVD–SpecialPeripherals.						
<b>Unit:5</b>	<b>Advanced System Architecture</b>					<b>8 hours</b>

Introduction–HighPerformanceComputerArchitecture–RISCSys­tems–Superscalar Architecture – VLIW Architecture – EPIC Architecture –Multiprocessor Systems.										
<b>Unit:6</b>		<b>CONTEMPORARY ISSUES</b>							<b>2 hours</b>	
Interaction programme on computer architecture										
<b>Total Lecture hours</b>									<b>45 hours</b>	
<b>Text Book(s)</b>										
1	Govindarajalu.B, “ <b>Computer Architecture And Organization Design Principles And Applications</b> ” Tata McGraw-Hill, 2006.									
2	M. Moris Mano, “ <b>Computer System Architecture</b> ”, 3rd edition, Pearson/PHI, India, 2006.									
<b>Reference Books</b>										
1	William Stallings, “ <b>Computer Organization And Architecture</b> ”, Prentice Hall of India, Sixth Edition.									
2	Patterson & Hennessy, “ <b>Computer Organization And Design</b> ”, Morgan Kaufmann, 2007.									
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Website etc.]</b>										
1	<a href="https://nptel.ac.in/courses/106/102/106102062/">https://nptel.ac.in/courses/106/102/106102062/</a> Introductionto computer architecture,Nptel									
2	<a href="https://nptel.ac.in/courses/106/103/106103068/">https://nptel.ac.in/courses/106/103/106103068/</a> ComputerArchitecture andOrganization									
Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College & Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.										
<b>Mapping with Programme Outcomes</b>										
<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>P10</b>
<b>CO1</b>	S	S	M	M	M	M	S	M	M	S
<b>CO2</b>	S	M	M	M	M	M	S	L	L	L
<b>CO3</b>	S	S	S	M	M	L	L	L	M	M
<b>CO4</b>	M	M	M	S	S	S	L	L	M	M
<b>CO5</b>	M	M	S	S	M	L	M	M	S	M

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





**Fourth  
Semester**

<b>Course Code</b>	<b>43A</b>	<b>IC'S AND INSTRUMENTATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>	<b>Core</b>		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Pre-Requisite:</b>	<b>Basic Electronics</b>		<b>Syllabus Version</b>	<b>2020-2021</b>		
<b>Course Objectives:</b>						
<b>The Main Objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>1. To impart the knowledge on IC fabrication, Timer, PLL, and electronic instruments</li> <li>2. To enable the students to acquire the knowledge of Op-amp., transducers and its applications in electronic circuits and know the technique of measurements using electronic instruments</li> </ol>						
<b>Expected Course Outcomes:</b>						
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
<b>K1-Remember;K2- Understand; K3-Apply;K4-Analyze; K5-Evaluate;K6-Create</b>						
<b>Unit:1</b>	<b>IC Fabrication Technology</b>					<b>10 hours</b>
Fundamentals of Monolithic IC Technology – Basic Planar Process – Wafer Preparation – Epitaxial Growth – Oxidation – Photolithography – Diffusion of Impurities – Isolation Techniques – Metallization – Monolithic Transistors – Integrated Resistors – Integrated Capacitors – Integrated Inductors - Thin and Thick film Technology.						
<b>Unit:2</b>	<b>Timer And PLL</b>					<b>12 hours</b>
Functional Block Diagram of 555 timer – Monostable Operation – Applications: – Linear Ramp Generator – Pulse Width Modulator – Astable Operation – Applications: Schmitt Trigger – FSK Generator – Phase Locked Loop: Functional Block Diagram – Phase Detector / Comparator – Voltage Controlled Oscillator – Low Pass Filter – Applications: Frequency Multiplier / Division – AM Detection						
<b>Unit:3</b>	<b>Operational Amplifier</b>					<b>12 hours</b>
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						
<b>Unit:4</b>	<b>Transducers</b>					<b>12 hours</b>

Introduction–Electrical Transducer–Basic requirements of Transducer–Classification of Transducers – Selection of Transducers – Resistive Transducers – Potentiometers – Thermistors – Thermocouple – LVDT – RVDT – Piezoelectric Transducers – Hall Effect Transducers – Photoelectric Transducers – Digital Displacement Transducers										
<b>Unit:5</b>	<b>Electronic Instruments</b>									<b>12 hours</b>
Q Meters- CRO: Block Diagram – Cathode Ray Tube – Measurement of Frequency – Measurement of Voltage and Current – Digital Oscilloscope – Digital voltmeter: Ramp Type DVM – Dual Slope Integrating Type DVM – Digital Multimeter – Humidity and Humidity Measurement – Measurement of PH.										
<b>Unit:6</b>	<b>Contemporary Issues</b>									<b>2 hours</b>
Seminar on transducers and operational amplifier										
									<b>Total Lecture hours</b>	<b>60 hours</b>
<b>Text Book(s)</b>										
1	D.Roy Choudhury and Shahil B Jain, – <b>Linear Integrated Circuits</b> , Second Edition New Age International Publishers, 2004									
2	K.R.Botkar, – <b>Integrated Circuits</b> , 10th Edition Khanna Publishers, 2006									
<b>Reference Books</b>										
1	J.B.GUPTA– <b>A Course In Electronic and Electrical Measurements And Instrumentation</b> , 12th Edition, S.K Kataria & Sons									
2	A.K. Sawhney, <b>Electrical &amp; Electronic Measurements And Instrumentation</b> , Dhanpath Rai & Co (P) Ltd, 2004.									
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Website etc.]</b>										
1	<a href="https://nptel.ac.in/courses/108/108/108108111/Integrated%20circuits,%20op-amps%20and%20their%20applications">https://nptel.ac.in/courses/108/108/108108111/Integrated circuits, op-amps and their applications</a>									
2	<a href="https://nptel.ac.in/courses/117/106/117106030/Analog%20IC%20Design">https://nptel.ac.in/courses/117/106/117106030/Analog IC Design</a>									
Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College & Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.										

<b>Mapping with Programme Outcomes</b>										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	M	M	M	M	S	M	M	S
CO2	S	M	M	M	M	M	S	L	L	L
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	MODERN TELEVISION ENGINEERING	L	T	P	C
Core/Elective/Supportive	Core		4	0	0	4
Pre-requisite:	Basic Electronics		Syllabus Version		2020-2021	
<b>Course Objectives:</b>						
<b>The Main Objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>To design of the subject is to impart the knowledge on Television standards, receiver section, and sync separator color television with advanced techniques.</li> <li>To acquire the knowledge about color television and its recent developments</li> </ol>						
<b>Expected Course Outcomes:</b>						
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	
<b>K1-Remember;K2- Understand; K3-Apply;K4-Analyze; K5-Evaluate;K6-Create</b>						
<b>Unit:1</b>	<b>Fundamentals Of Television</b>				<b>12 hours</b>	
Aspect ratio-Image continuity-Number of scanning lines-Interlaced scanning-Picture resolution-Camera tubes-Image Orthicon-Videocon-Plumb icon- Monochrome picture tubes-Composite video signal- video signal dimension-horizontal sync. Composition-verticalsync.Detailsfunctionsofverticalpulsetrain-Scanningsequencedetails-VSBtransmission-Sound signal transmission- Standard channel bandwidth.						
<b>Unit:2</b>	<b>Monochrome Television Transmitter And Receiver</b>				<b>12 hours</b>	
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						
<b>Unit:3</b>	<b>Essentials Of Colour Television</b>				<b>10 hours</b>	
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-lineandTrinitroncolourpicture tubes-Purityandconvergence-Purityandstatic and Dynamic convergence adjustments- Pincushion-correction techniques-Automatic degaussing circuit.						
<b>Unit:4</b>	<b>Colour Television Systems</b>				<b>12 hours</b>	
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.						
<b>Unit:5</b>	<b>Advanced Television Systems</b>				<b>12hours</b>	

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.		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2 hours</b>
Preparing analysis report on television and its future developments		
		<b>Total Lecture hours</b>
		<b>60 hours</b>
<b>Text Book(s)</b>		
1	R.R.Gulati, “ <b>Monochrome Television Practice, Principles, Technology And Servicing.</b> ” Third Edition 2006, New Age International (P) Publishers.	
2	R.R.Gulati, <b>Monochrome &amp; Color Television</b> , New Age International Publisher, 2003.	
<b>Reference Books</b>		
1	A.M Dhake, “ <b>Television And Video Engineering</b> ”, 2nd ed., TMH, 2003.	
2	2. R.P.Bali, <b>Color Television, Theory And Practice</b> , Tata McGraw-Hill, 1994	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Website etc.]</b>		
1	<a href="https://nptel.ac.in/courses/117/102/117102059/Introduction%20to%20communication">https://nptel.ac.in/courses/117/102/117102059/Introduction to communication</a>	
2	<a href="https://www.youtube.com/watch?reload=9&amp;v=EAYbxdgS2T4">https://www.youtube.com/watch?reload=9&amp;v=EAYbxdgS2T4</a> TV Transmission	
Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College.& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.		

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

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

<b>Course Code</b>	<b>43C</b>	<b>DIGITAL AND CELLULAR COMMUNICATIONS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>	<b>Core</b>		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Pre-Requisite:</b>	<b>Basic Electronics</b>		<b>Syllabus Version</b>	<b>2020-2021</b>		
<b>Course Objectives:</b>						
<b>The Main Objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>To enhance the knowledge in communication with digital and cellular systems</li> <li>To learn the digital and cellular technology</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the Successful completion of the course, student will be able to:						
1	Know the concepts of data transmission systems				K1	
2	Analyze the Model of Communication system				K6	
3	Familiarize Digital carrier Modulation Schemes				K4	
4	Understand pulse modulation and quantization techniques				K2	
5	Analyze the cellular system design and technical challenges.				K4	
<b>K1-Remember;K2- Understand; K3-Apply;K4-Analyze; K5-Evaluate;K6-Create</b>						
<b>Unit:1</b>	<b>Data Transmission</b>				<b>10 hours</b>	
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.						
<b>Unit:2</b>	<b>Communication System</b>				<b>12 hours</b>	
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.						
<b>Unit:3</b>	<b>Digital Carrier Modulation Schemes</b>				<b>12 hours</b>	
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.						
<b>Unit:4</b>	<b>Pulse Modulation And Quantization</b>				<b>12 hours</b>	
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						
<b>Unit:5</b>	<b>Digital Cellular Systems</b>				<b>12 hours</b>	
GSM Architecture – Layer Modeling – Transmission – Data Service – Multiple Access Scheme – Channel Coding Inter Leaving – Radio Resource Management – Mobility Management – Communication Management – Network Management – TDMA Architecture–						

Transmission and Modulation – CDMA – Terms of CDMA Systems – Call Processing – Hand Over Procedures	
<b>Unit:6</b>	<b>Contemporary Issues</b>
Seminar on cellular technology	
<b>Total Lecture hours</b>	
<b>60 hours</b>	
<b>Text Book(s)</b>	
1	Sam K. Shanmugam, “ <b>Digital And Analog Communication Systems</b> ”, John Wiley Publications, 2005
2	John G. Proakis, “ <b>Digital Communications</b> ”, Tata McGraw Hill International, 2001.
<b>Reference Books</b>	
1	W.C.Y. Lee, “ <b>Mobile Cellular Telecommunication</b> ”, McGraw Hill Publications, 1995
2	Ke-Lin Du, M.N.S. Swamy, “ <b>Wireless Communication Systems</b> ”, Cambridge University Press, 2010.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Website etc.]</b>	
1	<a href="https://nptel.ac.in/courses/106/106/106106167/Wireless%20and%20Cellular%20Communication">https://nptel.ac.in/courses/106/106/106106167/Wireless and Cellular Communication</a>
2	<a href="https://nptel.ac.in/courses/117/105/117105077/Digital%20Communication">https://nptel.ac.in/courses/117/105/117105077/Digital Communication</a>
Course Designed By: R. Archana, Assistant professor, Nehru Arts and Science College. & Dr. N. Om Muruga, Assistant Professor, Government Arts College, Ooty.	

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

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

Course Code	43P	TITLE OF THE COURSE	L	T	P	C
Core/Elective/Supportive	Digital Electronics Lab		0	0	3	4
Pre-Requisite:	Digital Electronics		Syllabus Version		2020-2021	
<b>Course Objectives:</b>						
<b>The Main Objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>To understand the logical operation of various gates and theorems</li> <li>To develop various digital circuits</li> </ol>						
<b>Expected Course Outcomes:</b>						
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
<b>K1-Remember;K2- Understand; K3-Apply;K4-Analyze; K5-Evaluate;K6-Create</b>						
<b>Digital Electronics Lab</b>					<b>90 hours</b>	
<b>(ANY 16 EXPERIMENTS)</b>						
<ol style="list-style-type: none"> <li>Verification of Basic Gates and Universal Gates</li> <li>Verification of Demorgan's Theorem</li> <li>2-bit Comparator using Gates</li> <li>Half Adder and Full Adder</li> <li>Half Subtractor and Full Subtractor</li> <li>4-bit Binary Adder</li> <li>Multiplexer and Demultiplexers</li> <li>Encoder and Decoder</li> <li>BCD to 7-Segment Display</li> <li>Study of Flip flops</li> <li>Binary to Grey and Grey to Binary Conversion</li> <li>Shift Registers and Ring Counter</li> <li>Analog to Digital Converter</li> <li>Digital to Analog Converter</li> <li>Op-Amp: Adder and Subtractor</li> <li>Op-Amp: Integrator and Differentiator</li> <li>Current to Voltage and Voltage to Current Converter</li> <li>Realize Basic gates from universal gates</li> </ol>						

19. Synchronous and Asynchronous Counter 20. Magnitude Comparator. 21. Design and Simulation of Basic Logic Gates using VHDL Coding. 22. Design and Simulation of adder using VHDL Coding. 23..Design and Simulation of Subtractor Circuit using VHDL Coding	
<b>Total Lecture hours</b>	<b>90 Hours</b>
Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College.& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.	

**Mapping with Programme Outcomes**

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

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

<b>Course Code</b>	<b>43Q</b>	<b>ELECTRONIC CIRCUITS, RADIO,TV AND INSTRUMENTATION LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core /Elective / Supportive:</b>	<b>Core Practical IV</b>		<b>0</b>	<b>0</b>	<b>3</b>	<b>4</b>
<b>Pre-Requisite:</b>	<b>Basic Electronics Lab</b>		<b>Syllabus Version</b>		<b>2020-21</b>	
<b>Course Objectives:</b>						
<b>The Main Objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>To understand the concept of working of regulated power supplies, rectifiers, amplifiers and oscillators.</li> <li>To experiment the modulation and detection techniques.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the Successful completion of the course, student will be able to:						
1	Design power supply and rectifier circuits					K6
2	Design Amplifier circuits					K6
3	Design different Oscillator circuits					K6
4	Design different Modulation circuits					K6
5	Design circuits with Transducers					K6
<b>K1-Remember;K2- Understand; K3-Apply;K4-Analyze; K5-Evaluate;K6-Create</b>						
<b>Part I</b>	<b>Electronic Circuits</b>					<b>45 hours</b>
<ol style="list-style-type: none"> <li>DC Regulated Power Supply using Zener Diode</li> <li>Voltage Doubler</li> <li>Feedback Amplifier</li> <li>Emitter Follower</li> <li>Transformer Coupled Amplifier</li> <li>Hartley Oscillator</li> <li>Colpitts Oscillator</li> <li>Phase shift Oscillator</li> <li>Wein Bridge Oscillator</li> <li>RC Coupled Amplifier</li> <li>Half Wave and Full Wave Rectifier</li> <li>Filter Circuits</li> </ol>						
<b>Part II</b>	<b>Radio, TV And Instrumentation</b>					<b>45 hours</b>
<ol style="list-style-type: none"> <li>First IF Amplifier</li> <li>AM Modulation and Detection</li> <li>FM Modulation and Detection</li> <li>Second IF amplifier</li> <li>Audio amplifier using TBA 810</li> <li>Alignment of colour TV using video pattern generator.</li> </ol>						



19. Sync separator 20. Vertical selection and horizontal 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)	
<b>Total Lecture hours</b>	<b>90 hours</b>
Course Designed By : C.N. Omprakash Anand, Assistant professor , Government Arts College, Ooty, Coimbatore & Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.	

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

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

<b>Course code</b>	<b>4ZB</b>	<b>VISUAL PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>	<b>Skill Based Subject - II</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Pre-requisite</b>	<b>Basic computer skills and familiarity with Microsoft Windows.</b>		<b>Syllabus Version</b>		<b>2020-2021</b>	
<b>Course Objectives:</b>						
<b>The main objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>1. To provide fundamental skills in utilizing the tools of a visual environment.</li> <li>2. To implement SDI and MDI applications while using forms, dialogs, and other types of GUI components</li> <li>3. To Apply visual programming concept in software development by designing projects with menus and submenus</li> <li>4. To use visual programming environment to create simple visual applications.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create</b>						
<b>Unit:1</b>	<b>Visual Basic Overview</b>					<b>6 hours</b>
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						
<b>Unit:2</b>	<b>Visual Basic Objects</b>					<b>7 hours</b>
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						
<b>Unit:3</b>	<b>Building The User Interface</b>					<b>7 hours</b>
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						
<b>Unit:4</b>	<b>Database With Visual Basic</b>					<b>7 hours</b>
Communicating with Other Window Applications – Database Development with Visual Basic (DAO, RDO) – Building Active Controls – OLE						
<b>Unit:5</b>	<b>Debugging And Applications</b>					<b>7 hours</b>
VC++ Fundamentals – Using Visual Studio’s IDE – Menus – Writing, Compiling and Debugging Simple Programs – Building a Basic Application – Types – Overview of MFC						

<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2 hours</b>
Webinar on visual programming		
<b>Total Lecture hours</b>		<b>36 hours</b>
<b>Text Book(s)</b>		
1	Gary Cornell, “ <b>Visual Basic 6.0 From The Ground Up</b> ”, Tata McGraw Hill Company, 1999.	
2	Chris H. Pappas & William H. Murray, “ <b>The Complete Reference Visual C++ 6</b> ”, Tata McGraw Hill, Delhi.	
<b>Reference Books</b>		
1	John Paul Muller, “ <b>Visual C++ From The Ground Up</b> ”, Tata McGraw Hill, Delhi.	
2	Richard C. Leinecker and Tom Archer, “ <b>Visual C++ 6 Programming Bible</b> ”, Wiley India Pvt Ltd.	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1	<a href="https://www.youtube.com/watch?v=5nahqfJTQXs">https://www.youtube.com/watch?v=5nahqfJTQXs</a>	
2	<a href="https://www.youtube.com/watch?v=1oGpl6qNKOQ">https://www.youtube.com/watch?v=1oGpl6qNKOQ</a>	
3	<a href="https://www.youtube.com/watch?v=gcFHyVYdeFU">https://www.youtube.com/watch?v=gcFHyVYdeFU</a>	
Course Designed By: M.Baskaran, Assistant Professor , KSG College of Arts and Science & Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.		

<b>Mapping with Programme Outcomes</b>										
<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>P10</b>
<b>CO1</b>	S	S	S	M	M	M	S	L	L	S
<b>CO2</b>	S	S	S	M	M	M	S	L	L	L
<b>CO3</b>	S	S	S	M	M	L	L	S	S	M
<b>CO4</b>	M	M	M	S	S	S	L	L	M	M
<b>CO5</b>	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
<b>Core/Elective/Supportive</b>		<b>Core</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Pre-requisite</b>		<b>Requires the basic of Digital circuits and Programming languages</b>	<b>Syllabus Version</b>	<b>2020-2021</b>		
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>1. To enable the students to learn the Microprocessor Architecture.</li> <li>2. To learn the instruction set of 8085 and to develop programming skills.</li> <li>3. To know various peripheral devices and to interface them with 8085.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create</b>						
<b>Unit:1</b>	<b>Introduction To 8085</b>					<b>14 hours</b>
Pin Diagram – Architecture – Demultiplexing the Bus – Generation of Control Signals – Fetching, Decoding and Execution of Instruction – Instruction Timing and Operation Status.						
<b>Unit:2</b>	<b>Instruction Set And Addressing Modes</b>					<b>15 hours</b>
Instruction Set – Addressing Modes – Instruction Format – Simple Program – Memory Read Machine Cycle – Memory Write Machine Cycle						
<b>Unit:3</b>	<b>Interfacing Concepts</b>					<b>14 hours</b>
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						
<b>Unit:4</b>	<b>Parallel And Serial Interface</b>					<b>14 hours</b>
Introduction to Programmable Peripheral Interface 8255 – Pin Diagram – Architecture – Modes of Operation: I/O and BSR – Architecture and Operation of 8251 (USART) <b>Interrupt And Timer Logic</b> 8085 Interrupts – Architecture of Programmable Interrupt Controller 8259 – Architecture of 8254 Programmable Interval Timer / Counter – Modes of Operation of 8254 – Generating Square Wave Using 8254						
<b>Unit:5</b>	<b>Applications</b>					<b>15 hours</b>
Time Delay Program – Traffic Light Control System – Water Level Controller – Stepper Motor Control – Interfacing DAC – Interfacing ADC – Temperature Measurement						

<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2 hours</b>
Seminar on microprocessor and its applications		
	<b>Total Lecture hours</b>	<b>72 hours</b>
<b>Text Book(s)</b>		
1	R.S.Gaonkar, “ <b>Microprocessor Architecture, Program And Its Application With 8085</b> ”, New Age International (P) Ltd,	
2	S.Malarvizhi, “ <b>Microprocessor and Its Application</b> ”, - Anuradhe Agencies Publications – I edition, March 1999.	
<b>Reference Books</b>		
1	DoughlasV.Hall, “ <b>Microprocessors and Interfacing, Programming and Hardware</b> ”, TMH,2012	
2	M. Rafi Quazzaman, " <b>Microprocessors Theory and Applications: Intel and Motorola</b> ", : Prentice Hall of India, Pvt. Ltd., New Delhi, 2003.	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1	<a href="https://nptel.ac.in/courses/108/103/108103157/">https://nptel.ac.in/courses/108/103/108103157/</a>	
2	<a href="https://www.youtube.com/watch?v=t0Z8P_hpbFk&amp;v1=en">https://www.youtube.com/watch?v=t0Z8P_hpbFk&amp;v1=en</a>	
3	<a href="https://www.youtube.com/watch?v=fS7FFOaC_iQ">https://www.youtube.com/watch?v=fS7FFOaC_iQ</a>	
Course Designed By: M.Baskaran, Assistant Professor , KSG College of Arts and Science & Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.		

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

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

Course code	5ZC	INTERNET AND JAVA PROGRAMMING	L	T	P	C
Core/Elective/Supportive	Skill Based Subject - III		3	0	0	3
Pre-requisite	This course requires that the students are familiar with programming language such as C/C++ and data structures, algorithms		Syllabus Version		2020-2021	
<b>Course Objectives:</b>						
<b>The main objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>1. To design of the subject is to provide knowledge about internet, Java data types, classes and files.</li> <li>2. To learn the internet concept and Java programming systems.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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	
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create</b>						
<b>Unit:1</b>	<b>Introduction To Internet</b>				<b>7 hours</b>	
Internet – Introduction- Understanding Internet- Internet Addressing - Hardware Requirements to Connect to the Internet.						
<b>Unit:2</b>	<b>Basics Of JAVA</b>				<b>7 hours</b>	
Data Types, Arrays, Operators, Flow Control – Branching, Looping						
<b>Unit:3</b>	<b>Inheritance And Interfaces</b>				<b>7 hours</b>	
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						
<b>Unit:4</b>	<b>Exception Handling And Multithreading</b>				<b>7 hours</b>	
Exception Handling – Exception Types, Uncaught and Calling, Nested Try Statements, Java Thread Model, and Thread, Runnable, Thread Priorities, Synchronization, Deadlock						
<b>Unit:5</b>	<b>Managing I/O Operation And Applet</b>				<b>6 hours</b>	
File – Input Stream, Output Stream, and File Stream. Applets-Tag, Order of Applet Initialization, Repainting, Sizing Graphics- Introduction to AWT Programming						
<b>Unit:6</b>	<b>Contemporary Issues</b>				<b>2 hours</b>	
Webinar on programming using java, seminar on internet and its uses						
<b>Total Lecture hours</b>					<b>36 hours</b>	

<b>Text Book(s)</b>	
1	Harley Hahn, “The Internet Complete Reference”,Tata McGraw publicity,2nd Edition ,1997
2	Patrick Naughton., “ Patrick Naughton”, Then Java hand book, Tata McGraw,1997
<b>Reference Books</b>	
1	Herbert Schildt, “The Complete Reference, Java”, McGraw-Hill.
2	E.Balaguruswamy, “Programming with Java A Primer”, McGraw-Hill.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://www.youtube.com/watch?v=pWusFlk747Y">https://www.youtube.com/watch?v=pWusFlk747Y</a>
2	<a href="https://www.youtube.com/watch?v=M9G_VeQgy7I">https://www.youtube.com/watch?v=M9G_VeQgy7I</a>
3	<a href="https://www.youtube.com/watch?v=3u1fu6f8Hto">https://www.youtube.com/watch?v=3u1fu6f8Hto</a>
Course Designed By: M.Baskaran, Assistant Professor , KSG College of Arts and Science& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.	

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

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





**Sixth Semester**

<b>Course code</b>	<b>63A</b>	<b>8051 MICROCONTROLLER AND EMBEDDED SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>	<b>Core</b>		<b>5</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Pre-requisite</b>	<b>Digital Electronics8085 Microprocessor</b>		<b>Syllabus Version</b>		<b>2020-2021</b>	
<b>Course Objectives:</b>						
<b>The main objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>1. Study the architecture and addressing modes of8051.</li> <li>2. Impart knowledge about assembly language programs of8051.</li> <li>3. Helps to understand the importance of different peripheral devices &amp;their interfacing to8051.</li> <li>4. Impart knowledge of different types of external interfaces including LEDS,LCD,</li> <li>5. Keypad Matrix, Switches &amp; Seven segment display.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create</b>						
<b>Unit:1</b>	<b>Overview And Instruction Set</b>				<b>14 hours</b>	
Microcontrollers and Embedded Processors – Microcontrollers for Embedded Systems – Overview of 8051 Family – 8051 Instruction Set and Registers.						
<b>Unit:2</b>	<b>Assembly Programming And Addressing Modes</b>				<b>14 hours</b>	
Introductionto8051AssemblyProgramming–TheProgramCounterandROM–DataTypesand Directives–FlagBitsandPSWRegister–RegisterBankandStack–LoopandJumpInstructions – I/O Port Programming – Addressing Modes.						
<b>Unit:3</b>	<b>Arithmetic And Logical Operations In AIP And C</b>				<b>14 hours</b>	
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						
<b>Unit:4</b>	<b>8051 Interrupts And Peripherals</b>				<b>14 hours</b>	
Basic Registers of Timer – Programming 8051 Timer – Counter Programming – Basics of Serial Communication–8051ConnectiontoRS232–8051SerialCommunicationProgramming–8051 Interrupts – Programming External Hardware Interrupts						
<b>Unit:5</b>	<b>Real World Applications</b>				<b>14 hours</b>	
InterfacingLCDtothe8051–InterfacingADC–InterfacingSensorto8051–InterfacingStepper Motor – 8051 Interfacing to the Keyboard – Interfacing DAC to the8051						

<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2 hours</b>
An overall discussion on embedded systems and microcontrollers		
<b>Total Lecture hours</b>		<b>72 hours</b>

<b>Text Book(s)</b>	
1	Muhammad Ali Mazidi, Janice GillispieMazidi and Rolin D. McKinlay, “ <b>The 8051 Microcontroller And Embedded Systems Using Assembly And C</b> ”, PHI, 2nd edition 2006.
2	Ayala J.K., <b>The 8051 Microcontroller: Architecture, programming and applications</b> , Penram International (2005) 3rd ed.

<b>Reference Books</b>	
1	Mazidi,E. and Mazidi,F., <b>The 8051 Microcontroller And Embedded Systems</b> , Prentice-Hall of India (2004) 2nd ed.
2	Peatman J., <b>Embedded System Design Using Pic18fxxx</b> , Prentice Hall, 2003.

<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://www.youtube.com/watch?v=84YUQu8tE4w">https://www.youtube.com/watch?v=84YUQu8tE4w</a>
2	<a href="https://www.youtube.com/watch?v=GPz_mR7Flas">https://www.youtube.com/watch?v=GPz_mR7Flas</a>
3	<a href="https://www.youtube.com/watch?v=uFhDGagZzjs">https://www.youtube.com/watch?v=uFhDGagZzjs</a>

Course Designed By: M.Baskaran, Assistant Professor , KSG College of Arts and Science&  
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<b>Mapping with Programme Outcomes</b>										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	S	M	M	M	S	L	L	S
CO2	S	S	S	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	S	S	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	S	L	M	M	S	S

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

Course code	63P	Microprocessor and Microcontroller Lab	L	T	P	C
Core/Elective/Supportive	Core –Practical-VI		0	0	3	4
Pre-requisite	Requires the basic of Digital circuits and Programming languages		Syllabus Version		2020-2021	
<b>Course Objectives:</b>						
<b>The main objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>To introduces the assembly language programming of Microprocessor and Microcontroller.</li> <li>It develops the student’s Assembly language programming skills and gives practical training of interfacing the peripheral devices with the Microprocessor and Microcontroller.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Learn assembly language programming of Microprocessor and Microcontroller with interfacing the peripheral devices.					K3
2	Learn assembly language programme of microcontroller					K1
3	Understand the basic concepts of interfacing and peripheral devices					K2
4	Apply the knowledge gained into a practical exposure					K3
5	Analyze the concepts of microprocessor and microcontroller					K4
<b>K1 - Remember; K2 - Understand; K3 - Apply;</b>						
<p><b>(ANY 16 EXPERIMENTS)</b></p> <p><b>8085 MICROPROCESSOR LAB</b></p> <ol style="list-style-type: none"> <li>Addition / Subtraction of 8 / 16 bit Data</li> <li>Multiplication / Division 8 bit Data</li> <li>Block Data Transfer</li> <li>Smallest / largest of N Numbers</li> <li>To arrange in ascending / Descending Order</li> <li>Sum of N 8 bit Numbers</li> <li>1’s and 2’s Compliment of an Array (8bit)</li> <li>UP/DOWN Counter using 7 Segment Displays</li> <li>Traffic Light Control Interface</li> <li>Data Transfer using 8255 (PPI)</li> <li>Square wave generator using 8255</li> <li>ADC Interface</li> <li>DAC Interface</li> <li>Stepper Motor interface</li> </ol> <p><b>8051 MICROCONTROLLER LAB</b></p> <ol style="list-style-type: none"> <li>Arithmetic and Logical Programs</li> <li>Key Interface</li> <li>LED Interface</li> <li>Solid State Relay Interface</li> <li>Square Wave Generation</li> </ol>						

20. ADC Interface 21. DAC Interface 22. Stepper Motor Interface 23. LCD Interface
<b>Course Designed By: M.Baskaran, Assistant Professor , KSG College of Arts and Science &amp; Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.</b>

<b>Mapping with Programme Outcomes</b>										
<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>P10</b>
<b>CO1</b>	M	M	S	S	S	M	S	M	M	S
<b>CO2</b>	S	S	S	M	M	M	S	M	L	L
<b>CO3</b>	S	S	M	M	M	L	L	L	S	M
<b>CO4</b>	S	S	M	S	S	S	L	L	S	M
<b>CO5</b>	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		0	0	3	4
Pre-requisite	Basic knowledge of Electronic Circuits or permission of instructor		Syllabus Version		2020-2021	
<b>Course Objectives:</b>						
<p><b>The main objectives of this course are to:</b></p> <ol style="list-style-type: none"> <li>To make the students to design triggering circuits of SCR.</li> <li>To understand the characteristics of power electronic devices.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Design triggering circuits of SCR					K2
2	Understand the characteristics of power electronic devices.					K3
3	Design and study of DIAC and TRIAC circuits					K3
4	Understand the basic knowledge of PCB					K2
5	Analyse the parameters of various components of electronic circuits					K4
<b>K1</b> - Remember; <b>K2</b> - Understand; <b>K3</b> - Apply;						
<b>(ANY 16 EXPERIMENTS)</b>						
<ol style="list-style-type: none"> <li>Triggering of SCR by R, C and Diac.</li> <li>Design of snubber circuit.</li> <li>Fan regulator using Triac.</li> <li>Thyristor chopper.</li> <li>TRIAC Flasher.</li> <li>Commutation Techniques.</li> <li>Speed control of DC motor using SCR.</li> <li>Automatic street light controller</li> <li>Burglar Alarm</li> <li>Sequencer Circuit.</li> <li>Power Inverter</li> <li>Switching Regulators</li> <li>Automatic Battery Charger Fire alarm</li> <li>ON / OFF relay control using opto – coupler</li> <li>Servo stabilizer</li> <li>Layout and Art Work preparation for PCB</li> <li>etching Drilling and Component mounting of PCB</li> <li>Temperature controller using AD 590/ LM 35.</li> <li>Construction of Emergency Lamp.</li> <li>Phase Control Circuit</li> <li>Cyclo converter</li> <li>Thyristor protection circuit</li> </ol>						

Course Designed By: M.Baskaran, Assistant Professor , KSG College of Arts and Science &  
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**Mapping with Programme Outcomes**

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

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



Course code	63R	Electronic Communication Lab	L	T	P	C
Core/Elective/Supportive	Core –Practical- VIII		0	0	3	4
Pre-requisite	Basic knowledge of Electronic Communication		Syllabus Version		2020-2021	
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>1. To Understand the concept of Digital Communication</li> <li>2. To experiment the Modulation and Detection techniques</li> <li>3. To study about wireless communication technologies.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Understand the concept of Digital Communication and wireless communication technologies.					K2
2	Obtain experiment knowledge about the Modulation and Detection techniques					K3
3	Understand the practical components involved in PAM					K2
4	Apply the principles into practical experience					K3
5	Analyse the practical exposre over the PAM and PWM, PCM					K4
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create</b>						
<b>(ANY 16 EXPERIMENTS)</b>						
<ol style="list-style-type: none"> <li>1. Pulse Amplitude Modulation (PAM) and Detection</li> <li>2. Pulse Width Modulation (PWM) and Pulse Position Modulation(PPM)</li> <li>3. Generation and Detection of PCM</li> <li>4. Generation of delta and Adaptive delta modulation</li> <li>5. Amplitude Shift Keying</li> <li>6. Frequency Shift Keying</li> <li>7. Phase Shift Keying</li> <li>8. QPSK</li> <li>9. DPSK</li> <li>10. Study of TDM/FDM</li> <li>11. Full duplex communication model</li> <li>12. Alignment of satellite receiver</li> <li>13. Study of GPS Handset</li> <li>14. Study of GSM Module</li> <li>15. PIN Diode Characteristics</li> <li>16. Laser Diode Characteristics</li> <li>17. Fiber Optics TX and Rx</li> <li>18. Signal Sampling and Reconstruction</li> </ol>						



<p>19. GUNN diode Oscillator</p> <p>20. Reflex Klystron Characteristics using microwave bench 21.Radiation pattern HORN antenna.</p> <p>22. Radiation pattern of Dipole &amp; Yagi Uda antennas</p> <p>23. Radiation pattern Loop &amp; array antennas</p>
<p>Course Designed By: M.Baskaran, Assistant Professor , KSG College of Arts and Science&amp; Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.</p>

**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	6ZD	VISUAL AND JAVA PROGRAMMING LAB	L	T	P	C
Core/Elective/Supportive	Skill Based Subject - V –Practical.		0	0	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		2020-2021	
<b>Course Objectives:</b>						
<p><b>The main objectives of this course are to:</b></p> <ol style="list-style-type: none"> <li>1. To design and develop Windows-based business applications using Visual Basic</li> <li>2. Emphasis on the fundamentals of structured design, development, implementation, and documentation.</li> <li>3. Gain knowledge about basic Java language syntax and semantics to write Java programs</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Develop Windows-based business applications using Visual Basic					K6
2	Understand the fundamentals of structured design, development, implementation, and documentation.					K2
3	Gain knowledge about basic Java language syntax and semantics to write Java Programs					K2
4	Create own programme on visual programming					K6
5	Create own programming on java programming					K6
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create</b>						

**Visual Programming (any 8 experiments)**

1. Building Simple Applications using Basic Tools.
2. Working with Intrinsic Control and Active X controls.
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 X control.
11. Create a Scientific calculator in VB.
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 Employee table using DAO.
  - i) Add a new Record.
  - ii) Delete a Record.
  - ii) Modify a Record.

**JAVA Programming (Any 8 Experiments)**

1. Program to print the following triangle of numbers 1 12 1231234

2. Defining a class with the following attributes 1. xname 2. Date of Birth 3. Date on which leg injection has to be given (sixty days from date of birth) 4. X date 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 E or 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 13 table.
17. Program to illustrate thread priority. Create three threads and assign three different priorities.

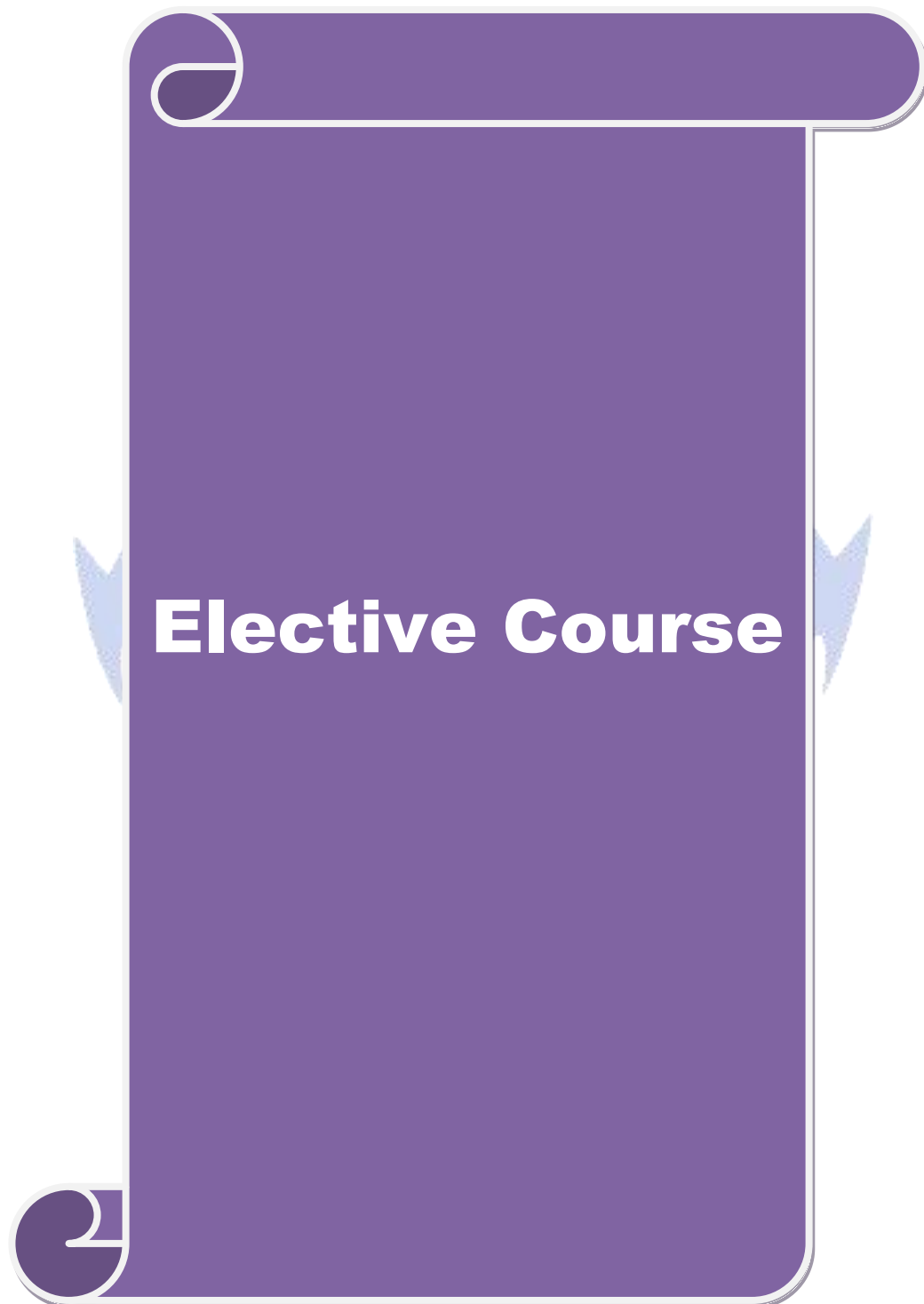
Course Designed By: M.Baskaran, Assistant Professor , KSG College of Arts and Science &  
Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.

**Mapping with Programme Outcomes**

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

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





Course Code	5EA	ASIC DESIGN	L	T	P	C
Core/Elective/Supportive		Elective I - A	6	0	0	4
Pre-requisites		Basic Electronic	Syllabus Version		2020-2021	
<b>Course Objectives:</b>						
<b>The Main Objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>To prepare the student to be an entry-level industrial standard ASIC or FPGA designer.</li> <li>To understand the issues and tools related to ASIC/FPGA design and implementation and basics of System on Chip and Platform based design.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the Successful completion of the course, student will be able to:						
1	Know the concepts of data transmission systems					K1
2	Analyze the Model of Communication system					K6
3	Familiarize Digital carrier Modulation Schemes .					K4
4	Understand pulse modulation and quantization techniques					K2
5	Analyze the cellular system design and technical challenges.					K4
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create</b>						
<b>Unit:1</b>	<b>Introduction To ASICS</b>					<b>16 hours</b>
Types of ASICS: Full-Custom ASIC–Standard Cell-Based ASIC–Gate Array Based ASIC Channeled Gate Array - Structured Gate Array – Programmable Logic Devices – FPGA, Design Flow – Case Study						
<b>Unit:2</b>	<b>CMOS Logic</b>					<b>18 hours</b>
CMOS Transistors –Design Rules – Combinational Logic Cells: Pushing Bubbles – Drive Strength–Transmission Gates–EX-OR Cell, Sequential Logic Cells: FF–Clocked Inverter, Data Path Logic Cells: Data Path Elements						
<b>Unit:3</b>	<b>ASIC Design</b>					<b>18 Hours</b>
Programmable ASICS: Antifuse – Static RAM–EPROM and EEPROM Technology- Programmable ASIC Logic Cells: Actel ACT - Xilinx LCA and Altera FLEX Architectures - Programmable ASIC I/O Cells: DC Output –DC Input, Programmable ASIC Design Software: Logic Synthesis – FPGA Synthesis.						
<b>Unit:4</b>	<b>VHDL</b>					<b>18 hours</b>
Introduction to VHDL – Behavioral, Data Flow and Structural Model - Operators – Data Objects - Data Types - Design Examples						
<b>Unit:5</b>	<b>VERILOG</b>					<b>18 hours</b>
Introduction - Language Elements- Gate-Level modeling- Data Flow- Behavioral- Structural Modeling – Modeling Examples						
<b>Unit:6</b>	<b>Contemporary Issues</b>					<b>2 hours</b>
Seminar on ASIC design, CMOS logic, Demo programme on VHDL, Verilog						
<b>Total Lecture hours</b>						<b>90 hours</b>

<b>Text Book(s)</b>										
1	Michael John Sebastian Smith, “ <b>Application Specific Integrated Circuits</b> ”, Addition-Wesley, 2nd reprint, 2000.									
2	Bhasker. J, " <b>VHDL Primer</b> ", BS Publications, 2001									
3	Bhasker.J. " <b>A Verilog HDL Primer</b> ", BS Publications, 2001									
<b>Reference Books</b>										
1	Charles .J.Roth, “ <b>Digital System Design Using VHDL</b> ”, PWS Publishing (Thomson learning), 2002.									
2	Stephen Brown, Zvonko Vranesic, “ <b>Fundamentals Of Digital Logic With VHDL Design</b> ” Tata McGraw-Hill, 2002									
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Website etc.]</b>										
1	<a href="https://nptel.ac.in/courses/106/105/106105161/">https://nptel.ac.in/courses/106/105/106105161/</a> VLSI Physical Design									
Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College.& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty, C. N Omprakash Anand , Assistant Professor, Government Arts College,Ooty.										
<b>Mapping with Programme Outcomes</b>										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	M	M	M	M	S	M	M	S
CO2	S	M	M	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	L	M	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	M	L	M	M	S	M

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



Course Code	5EB	REMOTE SENSING	L	T	P	C
Core/Elective/Supportive		Elective I - B	6	0	0	4
Pre-requist:		Basic Electronics	Syllabus Version		2020-2021	
<b>Course Objectives:</b>						
<b>The Main Objectives of this course are to:</b>						
1. To design fully equipped with concepts, methodologies and applications of Remote Sensing Technology.						
2. To Define and describe remote sensing and explain its applications, history, electromagnetic spectrum and interactions with various types of media.						
<b>Expected Course Outcomes:</b>						
On the Successful completion of the course, student will be able to:						
1	Know the concepts of data transmission systems				K1	
2	Analyze the Model of Communication system				K6	
3	Familiarize Digital carrier Modulation Schemes .				K4	
4	Understand pulse modulation and quantization techniques				K2	
5	Analyze the cellular system design and technical challenges.				K4	
<b>K1:Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create</b>						
<b>Unit:1</b>	<b>Principles Of Remote Sensing</b>				<b>16 hours</b>	
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						
<b>Unit:2</b>	<b>Platforms And Sensors</b>				<b>18 hours</b>	
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 – Hyper spectral Sensors - Different Satellite and Sensor Combinations: LANDSAT – SPOT - IRS Series of Satellites and Sensors.						
<b>Unit:3</b>	<b>Image Characteristics And Interpretation</b>				<b>18 hours</b>	
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.						
<b>Unit:4</b>	<b>Digital Image Processing</b>				<b>18 hours</b>	
Image Transformations - Subtraction – Rationing - NDVI and PCA - Thematic ClassificationandClusteringtoIncludeUnsupervisedandSupervisedClassificationBased on Minimum Distance and Maximum Likelihood Classification - Accuracy Assessment of Classification - Concepts of Hyper spectral Image Analysis						
<b>Unit:5</b>	<b>ANCILLARY DATA SOURCES AND INTEGRATION</b>				<b>18 hours</b>	
GroundTruth-GeographicandRadiometric-IntroductionofGIS-IntegrationofRemote Sensing and GIS -Digital Terrain Models - GPS and its Role to Remote Sensing Data.						

<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2 hours</b>
Group discussion on Digital Image Processing, Image interpretation		
		<b>Total Lecture hours</b>
		<b>90 hours</b>
<b>Text Book(s)</b>		
1	Lillesand, T.M. and Kiefer, R.W., <b>REMOTE Sensing And Image Interpretation.</b>	
2	Curran, Paul J., <b>Principles Of Remote Sensing</b>	
3	Campbell, J.B., <b>Introduction Of Remote Sensing</b>	
<b>Reference Books</b>		
1	Sabins,F.F., <b>Remote Sensing: Principles And Interpretations</b>	
2	Reddy, M. Anji, <b>Remote Sensing And Geographic Information System</b>	
<b>Related Online Contents [MOOC, SWAYAM, NPEL, Website etc.]</b>		
1	<a href="https://www.coursera.org/lecture/gis-applications/remote-sensing-basics-wr6Kd">https://www.coursera.org/lecture/gis-applications/remote-sensing-basics-wr6Kd</a> Remote sensing Basics	
Course Designed By: R.Archana, Assistant professor , Nehru Arts and Science College.& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty, C. N Omprakash Anand , Assistant Professor, Government Arts College, Ooty		

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

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

Course Code	5EC	MOBILE COMPUTING	L	T	P	C
Core/Elective/Supportive		Elective I - C	6	0	0	4
Pre-Requisite:		Basic Electronics	Syllabus Version		2020-2021	
<b>Course Objectives:</b>						
<b>The Main Objectives of this course are to:</b>						
1. To Learn the context of wireless network systems such as 2G/3G/4G mobile telephony, Data networks, and other wireless networks and infrastructure.						
2. To emphasize the interface between mobile computing devices and programming those devices						
<b>Expected Course Outcomes:</b>						
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	
<b>K1:Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create</b>						
<b>Unit:1</b>	<b>Introduction</b>				<b>16 hours</b>	
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						
<b>Unit:2</b>	<b>Wireless Networks</b>				<b>18 hours</b>	
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						
<b>Unit:3</b>	<b>Mobile Network Layer</b>				<b>18 hours</b>	
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						
<b>Unit:4</b>	<b>Mobile Transport Layer</b>				<b>18 hours</b>	
Traditional TCP- Indirect TCP- Snooping TCP- Mobile TCP - Fast Retransmit/ Fast Recovery- Transmission/Timeout Freezing – Selective Retransmission- Transaction Oriented TCP						
<b>Unit:5</b>	<b>WAP</b>				<b>18 hours</b>	
Architecture – Datagram Protocol- Transport Layer Security- Transaction Protocol- Session Protocol-Application Environment-Wireless Telephony Application						
<b>Unit:6</b>	<b>Contemporary Issues</b>				<b>2 hours</b>	
Workshop on wireless networks, mobile network						
<b>Total Lecture hours</b>					<b>90 hours</b>	

<b>Text Book(s)</b>	
1	J.Schiller, <b>Mobile Communication</b> , Addison Wesley, 2000.
2	William Stallings, <b>Wireless Communication And Networks</b> , Pearson Education, 2003.
<b>Reference Books</b>	
1	William C.Y.Lee, <b>Mobile Communication Design Fundamentals</b> , John Wiley, 1993.
2	Singhal, <b>WAP-Wireless Application Protocol</b> , Pearson Education,2003.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Website etc.]</b>	
1	<a href="https://nptel.ac.in/courses/106/106/106106147/Mobile%20Computing">https://nptel.ac.in/courses/106/106/106106147/Mobile Computing</a>
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

<b>Course code</b>	<b>5ED</b>	<b>INDUSTRIAL AND POWER ELECTRONICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>	<b>ELECTIVE 1-D</b>		<b>6</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Pre-requisite</b>	<b>Basic knowledge of Electronic Circuits or permission of instructor</b>		<b>Syllabus Version</b>	<b>2020-2021</b>		
<b>Course Objectives:</b>						
<b>The main objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>To presents the principles and applications of industrial and power electronics.</li> <li>To enable the students to learn and design industrial &amp; power electronic circuits.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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
<b>K1:Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create</b>						
<b>Unit:1</b>	<b>Introduction</b>					<b>14 hours</b>
Principles of Single Phase Inverter, Converter, Cyclo Converter And DCC Chopper – UPS – HVDC Static Circuit Breaker – Battery Charging Circuit – SCR Current Limiting Circuit Breaker – Static AC and DC Switches – Flasher Circuits – Time Delay Circuits – Fan Regulator using TRIAC Thyristor Protection Circuits: Over Current Protection – Over Voltage Protection – Gate Protection						
<b>Unit:2</b>	<b>Welding And Heating</b>					<b>14 hours</b>
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						
<b>Unit:3</b>	<b>Waves And Measurement</b>					<b>14 hours</b>
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						
<b>Unit:4</b>	<b>Application In Industrial Systems</b>					<b>14 hours</b>
Thermistor Control Of Quench Oil Temperature – Proportional Mode Pressure Control System – Strip Tension Controller – Automatic Weighing System – Control Of Relative Humidity In A Textile Moistening Process – Warehouse Humidity Controller						

<b>Unit:5</b>	<b>Industrial Robotic Systems</b>	<b>14 hours</b>
Parts of Robotic Systems – Classifications of Robotic Systems – Robotic System Configurations Degrees of Freedom of Robotic System – Programming Robotic Systems – Motions of Robotic Systems– Sensor for Robotic Systems – Mechanical Parts – Control Systems. Microprocessor Based Industrial Applications: Speed Control of DCMotor–Measurement of Physical Quantities Water Level Indicator – Firing Angle Control of Thyristor		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2 hours</b>
Seminar on Robotics and its applications		
<b>Total Lecture hours</b>		<b>72 hours</b>
<b>Text Book(s)</b>		
1	Harish C Rai, “ <b>Industrial and Power Electronics</b> ” 10th edition, Umesh publications 2002	
2	Timothy J Maloni, “ <b>Industrial Solid State Electronic Devices and Circuits</b> ” 2nd edition 1986	
<b>Reference Books</b>		
1	P S Bimbhra, “Power Electronics”, Khanna Publishers.	
2	M.H. Rashid, “Power Electronics Circuits, Devices & Applications , Pearson Education.	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1	<a href="https://www.youtube.com/watch?v=1Auay7ja2oY">https://www.youtube.com/watch?v=1Auay7ja2oY</a>	
2	<a href="https://www.youtube.com/watch?v=oqnLQVFaqYI">https://www.youtube.com/watch?v=oqnLQVFaqYI</a>	
3	<a href="https://www.youtube.com/watch?v=naxnRkOfh2Q">https://www.youtube.com/watch?v=naxnRkOfh2Q</a>	
Course Designed By: M.Baskaran, Assistant Professor , KSG College of Arts and Science & Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty, C. N Omprakash Anand , Assistant Professor, Government Arts College ,Ooty.		

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

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

<b>Course Code</b>	<b>5EE</b>	<b>ROBOTICS AND AUTOMATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>	<b>Elective II - E</b>		<b>6</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Pre-requisite:</b>	<b>Basic Electronics</b>		<b>Syllabus Version</b>		<b>2020-2021</b>	
<b>Course Objectives:</b>						
<b>The Main Objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>To learn the concepts of Robots.</li> <li>To know about the sensors, actuators used in Robots designing.</li> <li>To familiarize the students with the applications of Robots.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the Successful completion of the course, student will be able to:						
1	Study the fundamentals of robots and components				K1	
2	Illustrate sensors and vision systems.				K3	
3	Apply programming techniques in Automation.				K6	
4	Familiarize programmable Logic Controllers.				K2	
5	Analyze Computer Numerical Control				K4	
<b>K1:Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create</b>						
<b>Unit:1</b>	<b>Classification Of Robotic Systems</b>				<b>10 hours</b>	
Basic Structure of a Robot - Classification of Robots: Cartesian, Cylindrical, Spherical, Articulated -. Accuracy, Resolution and Repeatability of Robots - Robot Application in Manufacturing: Material Transfers - Machine Loading and Unloading - Processing Operations- Assembly and Inspection. Drives and Control Systems: Hydraulic and Pneumatic Systems: Cylinders, Control Valves, Hydro Moto - Robot End Effectors.						
<b>Unit:2</b>	<b>Sensors And Vision Systems</b>				<b>9 hours</b>	
Types of Sensors: Tactile Sensors- Proximity Sensors- Speed Sensors- Encoder, Resolvers. Vision Systems: Image Processing And Analysis – Segmentation - Feature Extraction - Object Recognition .						
<b>Unit:3</b>	<b>Robot Programming &amp; Automation</b>				<b>10 hours</b>	
Lead through Programming - Textual Programming - Programming Examples – Social and Economic Aspects of Robots - Typical Layouts of Robots in Industries. <b>Automation:</b> Advantages of Automation- Building Blocks of Automation. Automatic Feeding Lines - Material-Handling Devices – ASRS - Transfer Lines - Automatic Inspection - Intelligent Automation. Introduction to Artificial Intelligence						

<b>Unit:4</b>	<b>Programmable Logic Controllers ( PLC)</b>	<b>9 hours</b>
Basics of PLC - Architecture of PLC – Advantages - Types of PLC - Types of Programming- SimpleProcessControlProgram'sUsingRelayLadderLogic.Introduction to PLC Networking - Introduction to HMI - DCs and SCADA Systems		
<b>Unit:5</b>	<b>Computer Numerical Control (CNC)</b>	<b>9 hours</b>
Block Diagram of ACNC Control System–Advantages–Power Supply–CPU–CNC and PLC Interfacing - Control Loops - Feedback Devices in CNC Machine - Analog and Digital CNC Systems - Introduction to FMS		
<b>Unit:6</b>	<b>Contemporary issues</b>	<b>2 hours</b>
Workshop on Robotic automation		
<b>Total Lecture hours</b>		<b>48 Hours</b>

**Text Book(s)**

1	Mikell P. Groover, “ <b>Automation Production Systems And Computer Integrated Manufacturing</b> ”, Prentice-Hall India, New Delhi, 1987. / Pearson Education, New Delhi
2	K.S. Fu, R.C. Gonzalez and C S G Lee, “ <b>Robotics: Control, Sensing, Vision And Intelligence</b> ”, McGraw Hill, New Delhi, 1987

**Reference Books**

1	W. Bolton, “ <b>Mechatronics</b> ”, Pearson Education Asia, 2002.
2	Mikell P. Groover, “ <b>Industrial Robotics - Technology, Programming And Applications</b> ”, McGraw Hill, New Delhi, 1986

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

1	<a href="https://npTEL.ac.in/Courses/112/101/112101098/ROBOTICS">HTTPS://NPTEL.AC.IN/COURSES/112/101/112101098/ROBOTICS</a>
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**Course Designed By:**

R.Archana, Assistant professor , Nehru Arts and Science College &  
 Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty,  
 C. N Omprakash Anand , Assistant Professor, Government Arts College, Ooty.

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	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



<b>Course code</b>	<b>5EF</b>	<b>PROGRAMMABLE LOGIC CONTROL</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>	<b>Elective II - F</b>		<b>6</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Pre-requisite</b>	<b>Digital Electronics and computer Architecture and Organization</b>		<b>Syllabus Version</b>	<b>2020-2021</b>		
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>To provide knowledge levels needed for PLC programming and operating input and output modules.</li> <li>To train the students to create ladder diagrams from process control description and understand various types of PLC registers</li> <li>Apply PLC Timers and Counters for the control of industrial processes, PLC functions and Data Handling Functions.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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
5	Analyze the PLC components					K4
<b>K1:Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create</b>						
<b>Unit:1</b>	<b>Introduction To PLC</b>				<b>9 hours</b>	
Programmable Logic – Introduction - Programmable Logic Structures - Programmable Logic Arrays (PLAS), Programmable Array Logic (Pals), Programmable Gate Arrays (PGAS), Field Programmable Gate Arrays(FPGAS) - Sequential Network Design with Programmable Logic Devices (PLDs) -Design of Sequential Networks Using ROMs and Flash -Traffic Light Controller Using PAL						
<b>Unit:2</b>	<b>Hardware And Software Components</b>				<b>9 hours</b>	
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						
<b>Unit:3</b>	<b>Instructions And Relays</b>				<b>9 hours</b>	
PLC Programming -Simple Instructions - Programming EXAMINE ON And EXAMINE OFF Instructions -Electromagnetic Control Relays -Motor Starters -Manually Operated Switches -Mechanically Operated and Proximity Switches - Output Control Devices - Latching Relays - PLC Ladder Diagram - Converting Simple Relay Ladder Diagram into PLC Relay Ladder Diagram						
<b>Unit:4</b>	<b>Counter And Timer</b>				<b>9hours</b>	
Timer Instructions ON DELAY Timer And OFF DELAY Timer - Counter Instructions - Up/Down Counters -Timer and Counter Applications - Program Control Instructions - Data Manipulating Instructions - Math Instructions						

<b>Unit:5</b>	<b>Applications</b>	<b>9hours</b>
Applications of PLC - Simple Materials Handling Applications - Automatic Control of Warehouse Door - Automatic Lubricating Oil Supplier Conveyor Belt - Motor Control Automatic Car Washing Machine - Bottle Label Detection - Process Control Application		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2 hours</b>
Workshop on PLC and its applications		
<b>Total Lecture hours</b>		<b>48hours</b>

<b>Text Book(s)</b>	
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 ".
<b>Reference Books</b>	
1	1. William I. Fletcher "An Engineering Approach to Digital Design ", Prentice, Hall of India Ltd., New Delhi, 1999.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://unitronicsplc.com/what-is-plc-programmable-logic-controller/">https://unitronicsplc.com/what-is-plc-programmable-logic-controller/</a>
Course Designed By: K.Manikantan , Assistant Professor, Government Arts College ,Ooty & Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty, C. N Omprakash Anand , Assistant Professor, Government Arts College ,Ooty	

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

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

Course code	5EG	AUTOMOTIVE ELECTRONICS	L	T	P	C
Core/Elective/Supportive		Elective II –G	6	0	0	4
Pre-requisite		Concepts of Automotive Electronics	Syllabus Version		2020-2021	
<b>Course Objectives:</b>						
<b>The main objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>1. To understand the concepts of Automotive Electronics and its evolution and Trends automotive systems &amp; subsystems overview.</li> <li>2. To understand sensors and sensor monitoring mechanisms aligned to automotive Systems, different signal conditioning techniques, interfacing techniques and actuator</li> <li>3. To understand, design and model various automotive control systems using Model based development technique.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Obtain an overview of automotive components and subsystems.					K2
2	Interface automotive sensors and actuators with microcontrollers					K3
3	Understand the design cycles, communication protocols and safety systems employed in today's automotive industry.					K2
4	Understand the engine management systems					K4
5	Apply the knowledge of electronic instrument systems					K3
<b>K1:Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create</b>						
<b>Unit:1</b>	<b>Introduction</b>					<b>9 hours</b>
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						
<b>Unit:2</b>	<b>Ignition Systems</b>					<b>10 hours</b>
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						
<b>Unit:3</b>	<b>Instrumentation Systems</b>					<b>10 hours</b>
Introduction to Instrumentation Systems, Various Sensors Used for Different Parameters, Sensing Driver Instrumentation Systems, Vehicle Condition Monitoring Trip Computer, Different Types of Visual Display						
<b>Unit:4</b>	<b>Electronic Control Of Braking And Traction</b>					<b>9 hours</b>
Introduction and Description Control Elements and Control Methodology, Electronic Control of Automatic Transmission: Introduction and Description Control of Gear Shift and Torque Converter Lockup, Electric Power Steering, Electronic Clutch						
<b>Unit:5</b>	<b>Engine Management Systems</b>					<b>10 hours</b>

Combined Ignition and Fuel Management Systems, Exhaust Emission Control, Digital Control Techniques, Complete Vehicle Control Systems, Artificial Intelligence and Engine Management, Automotive Microprocessor Uses. Lighting and Security Systems: Vehicles Lighting Circuits, Signaling Circuit, Central Locking and Electric Windows Security Systems, Airbags and Seat Belt Tensioners, Miscellaneous Safety and Comfort Systems		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2 hours</b>
An interactive session on ignition system, engine management systems		
<b>Total Lecture hours</b>		<b>48 hours</b>
<b>Text Book(s)</b>		
1	TOM DENTON, <b>Automobile Electrical and Electronic Systems</b> , Edward Arnold pb., 1995	
<b>Reference Books</b>		
1	1.DON KNOWLES, <b>Automotive Electronic and Computer controlled Ignition Systems</b> , Don Knowles, Prentice Hall, Englewood Cliffs, New Jersey 1988.	
2	WILLIAM, T.M., <b>Automotive Mechanics</b> , McGraw Hill Book Co.,	
3	WILLIAM, T.M., <b>Automotive Electronic Systems</b> , Heiemann Ltd., London, 1978.	
4	Ronald K Jurgen, <b>Automotive Electronics Handbook</b> , McGraw Hill, Inc, 1999.	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1	<a href="https://nptel.ac.in/courses/107/103/107103084/">https://nptel.ac.in/courses/107/103/107103084/</a>	
2	<a href="https://nptel.ac.in/courses/107/106/107106088/">https://nptel.ac.in/courses/107/106/107106088/</a>	
3	<a href="https://www.youtube.com/watch?v=vJ4EfyGXehg">https://www.youtube.com/watch?v=vJ4EfyGXehg</a>	
4	<a href="https://www.youtube.com/watch?v=BG4N2dBgJrQ">https://www.youtube.com/watch?v=BG4N2dBgJrQ</a>	
Course Designed By: K.Mnikantan , Assistant Professor, Government Arts College ,Ooty& Dr.N Om Muruga , Assistant Professor, Government Arts college, Ooty.		

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

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

<b>Course Code</b>	<b>5EH</b>	<b>SATELLITE COMMUNICATIONS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive:</b>	<b>Elective II-H</b>		<b>6</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Pre-requisite:</b>	<b>PRINCIPLES OF COMMUNICATION</b>		<b>Syllabus version</b>		<b>2020-21</b>	
<b>Course Objectives:</b>						
<b>The objectives of this course are:</b>						
<ol style="list-style-type: none"> <li>1. To provide knowledge on fundamentals of Advanced Computer design.</li> <li>2. To understand the concept of instruction level parallelism, pipelining and memory hierarchy associated with it.</li> <li>3. To enhance the knowledge on advanced processors.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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
<b>K1:Remember;K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate;K6-Create</b>						
<b>Unit: 1</b>	<b>Satellite Systems - Overview</b>				<b>9 Hours</b>	
Introduction- Basic concepts of Satellite communications- Frequency allocations for satellite systems. Advantages and applications of satellite communications over other communications						
<b>Unit: 2</b>	<b>Orbital Aspects Of Satellite Systems</b>				<b>9 Hours</b>	
Orbital Mechanics- look angle determination- orbit perturbations- Orbital determination- launches and launch vehicles- orbital effects in communication systems performance.						
<b>Unit: 3</b>	<b>The Space Segment</b>				<b>10 Hours</b>	
Introduction- spacecraft subsystems- attitude and orbit control systems- Telemetry- tracking and command- power systems- communication subsystems.						
<b>Unit: 4</b>	<b>Satellite Link Design</b>				<b>9 Hours</b>	
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.						
<b>Unit: 5</b>	<b>Applications Of Satellite Systems</b>				<b>9 Hours</b>	
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.						
<b>Unit: 6</b>	<b>Contemporary Issues</b>				<b>2 Hours</b>	
Seminar on satellite communication, satellite systems						
<b>Total Lecture Hours</b>					<b>48 Hours</b>	
<b>Text Books</b>						
1	Timothy Pratt, Charles Bostian, Jeremy Allnutt, <b>Satellite Communications</b> , 2 <sup>nd</sup> edition, John					

	willey, 2006.
2	W. L. Pritchard, H. G. Suyderhoud and R. A. Nelson, <b>Satellite Communication systems Engineering</b> , 2 <sup>nd</sup> edition, Pearson educational publishers, New Delhi, 2003.
<b>Reference Books</b>	
1	Dennis Roddy, <b>Satellite Communications</b> , 3 <sup>rd</sup> edition, Mc Graw Hill, International, 2001.
2	Dr D.C. Agrwal, <b>Satellite Communications</b> , 4 <sup>th</sup> edition, Khanna Publications, New Delhi, 2001.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://nptel.ac.in/courses/117/105/117105131/">https://nptel.ac.in/courses/117/105/117105131/</a>
2	<a href="https://www.youtube.com/watch?v=hXa3bTcIGPU">https://www.youtube.com/watch?v=hXa3bTcIGPU</a>
3	<a href="https://www.youtube.com/watch?v=Bvj1BpP4zU8">https://www.youtube.com/watch?v=Bvj1BpP4zU8</a>
Course Designed by: Dr.S.Vijayakumar, Associate Professor in ECE, Sreenivasa Institute of Technology and Management Studies, Autonomous, Chittoor.& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty, C. N Omprakash Anand , Assistant Professor, Government Arts College ,Ooty.	

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

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

<b>Course Code :</b>	<b>6EI</b>	<b>INTERNET OF THINGS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive:</b>		<b>Elective III-I</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Pre-Requisite:</b>		<b>Basic Electronics</b>	<b>Syllabus Version</b>	<b>2020-21</b>		
<b>Course Objectives:</b>						
<b>The Main Objectives of this course are to:</b>						
1. To enable the students to learn about IoT and also to understand the concept of embedded devices and Interfacing sensors.						
<b>Expected Course Outcomes:</b>						
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
<b>K1:Remember;K2-Understand; K3-Apply;K4-Analyze; K5-Evaluate;K6-Create</b>						
<b>Unit:1</b>	<b>IOT Fundamentals</b>					<b>16 hours</b>
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						
<b>Unit:2</b>	<b>Design Principles For Connected Devices</b>					<b>18 hours</b>
Introduction-IoT/M2m systems - Communication Technologies - Data management, data consolidation and Device management - Ease of Designing and Affordability.						
<b>Unit:3</b>	<b>Programming Fundamentals With C Using Arduino IDE</b>					<b>18 hours</b>
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.						
<b>Unit:4</b>	<b>Sensors And Actuators</b>					<b>18 hours</b>
Analog and Digital Sensors – Interfacing temperature sensor, ultrasound sensor and infrared (IR) sensor with Arduino – Interfacing LED and Buzzer with Arduino.						
<b>Unit:5</b>	<b>Sending Sensor Data Over Internet</b>					<b>18 hours</b>
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 .						
<b>Unit:6</b>	<b>Contemporary Issues</b>					<b>2 hours</b>
Workshop on IoT and its applications						



<b>Total Lecture hours</b>										<b>90 hours</b>
<b>Text Book(s)</b>										
1	Arshdeep Bahga, Vijay Madiseti, “ <b>Internet of Things: A Hands-On Approach</b> ”, 2014. ISBN: 978-0996025515									
2	Boris Adryan, Dominik Obermaier, Paul Fremantle, “ <b>The Technical Foundations Of Iot</b> ”, Artech Houser Publishers, 2017.									
<b>Reference Books</b>										
1	Michael Margolis, “ <b>Arduino Cookbook</b> ”, O’Reilly, 2011									
2	Marco Schwartz, “ <b>Internet of Things with ESP8266</b> ”, Packt Publishing, 2016									
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Website etc.]</b>										
1	<a href="https://nptel.ac.in/courses/106/105/106105166/">https://nptel.ac.in/courses/106/105/106105166/</a> Introduction to IoT Part I – Lecture 1									
2	<a href="https://ocw.cs.pub.ro/courses/iot/courses/02">https://ocw.cs.pub.ro/courses/iot/courses/02</a> Electronics for Internet of Things – Lecture II									
3	<a href="https://nptel.ac.in/courses/106105166/">https://nptel.ac.in/courses/106105166/</a> 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.										
<b>Mapping with Programme Outcomes</b>										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
CO1	S	S	M	M	M	M	S	M	M	S
CO2	S	M	M	M	M	M	S	L	L	L
CO3	S	S	S	M	M	L	L	L	M	M
CO4	M	M	M	S	S	S	L	L	M	M
CO5	M	M	S	S	M	L	M	M	S	M

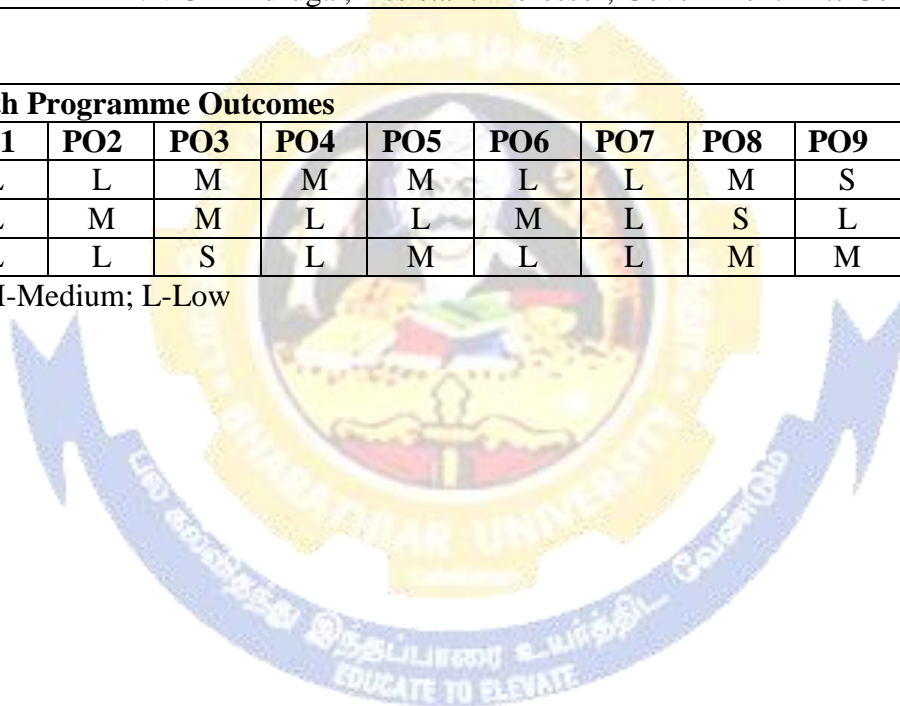
\*S-Strong; M-Medium; L-Low

Course code	6EJ	VIRTUAL INSTRUMENTATION	L	T	P	C
Core/Elective/Supportive		Elective III –J	4	0	0	4
Pre-requisite		Digital Electronics, Microprocessor and Computer fundamentals	Syllabus Version		2020-2021	
<b>Course Objectives:</b>						
<p><b>The main objectives of this course are to:</b></p> <ol style="list-style-type: none"> <li>To provide basic concepts in virtual instruments</li> <li>To know about the programming methods in software used in virtual instrumentation</li> <li>To familiarize the students with the applications of virtual instrumentation</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Understand the basics concepts and programming in virtual instrumentation					K2
2	Apply virtual instrumentation tool set for a given problem					K3
3	Apply virtual instrumentation concept for a given applications					K3
4	Understand the LabVIEW concepts					K2
5	Learn the programming structure					K1
<b>K1</b> - Remember; <b>K2</b> - Understand; <b>K3</b> - Apply; <b>K4</b> - Analyze; <b>K5</b> - Evaluate; <b>K6</b> – Create						
<b>Unit:1</b>	<b>Introduction</b>					<b>9 hours</b>
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						
<b>Unit:2</b>	<b>Software Overview</b>					<b>9 hours</b>
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						
<b>Unit:3</b>	<b>Programming Structure</b>					<b>10 hours</b>
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. <b>OPERATING SYSTEM AND HARDWARE OVERVIEW:</b> PC Architecture, Current Trends, Operating System Requirements, Drivers – Interface Buses – PCI Bus– Interface Cards – Specification – Analog and Digital Interfaces – Power, Speed and timing Considerations						
<b>Unit:4</b>	<b>Hardware Aspects</b>					<b>9 hours</b>
Installing hardware, Installing Drivers - Configuring the Hardware - Addressing the hardware in LabVIEW - Digital and Analog I/O function - Data Acquisition - Buffered I/O - Real time						
<b>Unit:5</b>	<b>LABVIEW Applications</b>					<b>9 hours</b>
Data logging (DAQ) – OPC -Hardware in loop -Data base system -user interface for the control applications						
<b>Unit:6</b>	<b>Contemporary Issues</b>					<b>2 hours</b>

Analysis over the software and hardware on virtual instrumentation	
<b>Total Lecture hours</b>	
<b>48 hours</b>	
<b>Text Book(s)</b>	
1	Garry M Johnson, " <b>Labview Graphical Programming</b> ", Tata McGraw Hill, New Delhi, 2nd Edition, 1996
2	<b>Labview : Basics I &amp; II Manual, National Instruments, 2005</b>
<b>Reference Books</b>	
1	Lisa K Wells, " <b>Labview for Everyone</b> ", Prentice Hall of India, New Delhi, 1996
2	Barry Paron, " <b>Sensor, Transducers and Labview</b> ", Prentice Hall, New Delhi, 2000
Course Designed By: K.Manikantan , Assistant Professor, Government Arts College ,Ooty & Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.	

<b>Mapping with Programme Outcomes</b>										
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

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



Course code	6EK	BIOMEDICAL INSTRUMENTATION	L	T	P	C
Core/Elective/Supportive		Elective III – K	4	0	0	4
Pre-requisite		Higher secondary biology	Syllabus Version		2020-2021	
<b>Course Objectives:</b>						
<b>The main objectives of this course are to:</b>						
<ol style="list-style-type: none"> <li>To presents various bio-potentials and working principles of medical instruments</li> <li>To enable the students to learn about bio-potentials and medical instruments</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Understand t h e Concept of bio-potential					K2
2	Understand the concept of medical instruments					K4
3	Develop the troubleshooting Skills of medical instruments					K3
4	Understand the concepts of signal conditioners & diagnostic equipments					K2
5	Apply the knowledge gained on transducers and electrodes					K3
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create</b>						
<b>Unit:1</b>	<b>Basic Physiology</b>				<b>9 hours</b>	
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						
<b>Unit:2</b>	<b>Electrodes And Transducers</b>				<b>9 hours</b>	
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						
<b>Unit:3</b>	<b>Signal Conditioners &amp; Diagnostic Equipments</b>				<b>9 hours</b>	
Instrumentation Amplifiers - Current Amplifiers - Isolation Amplifier - Need for Filters - Low Pass, High Pass and Band Pass Active Filters - Notch Filters - Heated Stylus and Ink Pen Recorders. DIAGNOSTIC EQUIPMENTS: Typical Electrocardiogram (ECG) - Electrocardiograph - Bipolar and Unipolar Leads - Einthoven Triangle - Electrical Activities of the Brain - Electroencephalogram (EEG) - Muscle Response - Electromyograph(EMG)						
<b>Unit:4</b>	<b>Diagnostic Equipments &amp; Biotelemetry</b>				<b>10 hours</b>	
X-ray Imaging - Radio Fluoroscopy - Image Intensifiers - Angiography - Endoscopy – Diathermy. BIOTELEMETRY AND PATIENT SAFETY: Need for Biotelemetry - Elements of Telemetry System - Radio Telemetry System - Physiological Signals used in Telemetry - TDM and FDM – Implantable Units						
<b>Unit:5</b>	<b>Physiological Assist Devices</b>				<b>9 hours</b>	
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						

<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2 hours</b>
Seminar on diagnostic equipments and physiological assist devices		
<b>Total Lecture hours</b>		<b>48 hours</b>

<b>Text Book(s)</b>	
1	Joseph J. Carr and John M. Brown, “ <b>Introduction to Biomedical Equipment Technology</b> ”, Pearson Education Asia, New Delhi, 4th Edition, 2001
2	Leslie Cromwell., FredJ. Webell., Erich A. Pfeffer., “ <b>Bio-medical Instrumentation and Measurements</b> ”, Prentice Hall of India, New Delhi, 1990

<b>Reference Books</b>	
1	Khandpur, “ <b>Handbook on Biomedical Instrumentation</b> ”, Tata McGraw Hill Company, New Delhi, 1989
2	Ohn G Webster, Ed., “ <b>Medical Instrumentation Application and Design</b> ”, Third Edition, John Wiley & Sons, Singapore, 1999
3	Arumugam. M, “ <b>Biomedical Instrumentation</b> ”, Anuradha Agencies Publishers, Chennai, 1992

<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://www.youtube.com/watch?v=i2mZylgP1Fk">https://www.youtube.com/watch?v=i2mZylgP1Fk</a>
2	<a href="https://www.youtube.com/watch?v=4ldv98F7Zng">https://www.youtube.com/watch?v=4ldv98F7Zng</a>
3	<a href="https://nptel.ac.in/courses/108/105/108105101/">https://nptel.ac.in/courses/108/105/108105101/</a>
4	<a href="https://nptel.ac.in/courses/108/105/108105091/">https://nptel.ac.in/courses/108/105/108105091/</a>

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

<b>Mapping with Programme Outcomes</b>										
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

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

Course Code	6EL	VLSI DESIGN	L	T	P	C
Core/Elective/Supportive:		Elective –III-L	4	0	0	4
Pre-requisite:		Digital Principles and Applications	Syllabus version		2020-21	
<b>Course Objectives:</b>						
<b>The objectives of this course are:</b>						
<ol style="list-style-type: none"> <li>To provide knowledge on Fabrication Process of NMOS, PMOS, CMOS AND BICMOS, Super integration concepts.</li> <li>To develop the skill to analyze the electrical properties of MOS transistor, design stick diagrams and layout diagrams for MOS transistors, contacts and wires.</li> <li>To investigate the effect of floor planning, placement, routing and power delay estimation in physical design of digital circuits and memory design.</li> <li>To apply the concept of Combinational and Sequential Circuit Testing.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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
<b>K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create</b>						
<b>Unit: 1</b>	<b>VLSI Technology</b>				<b>9 hours</b>	
Fabrication sequence – process flow – Testing – Super integration concepts – Integrated Passive components – MOS Resistors and capacitors – Crossovers – NMOS – PMOS – CMOS – BICMOS fabrication processes – comparison.						
<b>Unit: 2</b>	<b>Electrical Properties Of MOS Devices</b>				<b>9 hours</b>	
Drain to source current ( $I_{ds}$ ) versus Drain to source voltage ( $V_{ds}$ ) relationships – MOS transistor threshold voltage ( $V_t$ ) – MOS transistor trans-conductance $g_m$ and output conductance $g_{ds}$ – figure of merit ( $\omega_0$ ) – pass transistor- pull – up to pull – down ratio.						
<b>Unit: 3</b>	<b>Design Processes</b>				<b>10 hours</b>	
VLSI design flow - stick diagram design rules with examples - Design rules for Layout diagrams of digital circuits– sheet resistance $R_s$ –standard unit of capacitance – Inverter delays – Propagation delays- scaling of MOS circuits – limitations of scaling.						
<b>Unit: 4</b>	<b>VLSI Physical Design And Styles</b>				<b>9 hours</b>	
<b>PHYSICAL DESIGN:</b> Floor Planning – Placement – Routing – Power Delay Estimation – Clock Routing – Power Routing.						
<b>VLSI DESIGN STYLES:</b> Full Custom – Semi custom – Standard Cells – Gate Arrays – FPGAs – CPLDs.						
<b>Unit: 5</b>	<b>Testing Of VLSI Circuits</b>				<b>9 Hours</b>	
Test Principles-BIST-Test Bench- Combinational Circuit Testing, Sequential Circuit Testing, Test						

Bench Techniques.	
<b>Unit: 6</b>	<b>Contemporary Issues</b>
<b>2 Hours</b>	
Seminar on VLSI system and technology	
<b>Total Lecture Hours</b>	
<b>48 Hours</b>	
<b>Text Books</b>	
1	<b>Basic VLSI Design</b> , Douglas ,3rd Edition, A. Pucknell, Kamran Eshraghian, PHI, New Delhi, 2011.
2	<b>Modern VLSI design</b> , Wayne Wolf, 3rdEdition, Pearson Education, New Delhi, 4th impression 2008.
<b>Reference Books</b>	
1	<b>Introduction to VLSI Circuits and Systems</b> , John .P. Uyemura, John Wiley, Student Edition, New Delhi, Reprint 2006.
2	<b>Principles of CMOS VLSI Design</b> , 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.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://nptel.ac.in/courses/117/101/117101058/">https://nptel.ac.in/courses/117/101/117101058/</a>
2	<a href="https://www.youtube.com/watch?v=9SnR3M3CIm4">https://www.youtube.com/watch?v=9SnR3M3CIm4</a>
3	<a href="https://www.youtube.com/watch?v=Y8FvzcocT4">https://www.youtube.com/watch?v=Y8FvzcocT4</a>
Course Designed by: Dr.S.Vijayakumar, Associate Professor in ECE, Sreenivasa Institute of Technology and Management Studies, Autonomous, Chittoor.& Dr.N Om Muruga , Assistant Professor, Government Arts College ,Ooty.	

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

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



# Annexure



**BHARATHIAR UNIVERSITY: COIMBATORE 641046**  
**DEPARTMENT OF ELECTRONICS AND**  
**COMMUNICATION SYSTEMS**

**MISSION**

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

<b>List of Elective papers (Colleges can choose any one of the paper as electives)</b>		
<b>Elective – I</b>	A	ASIC Design
	B	Remote Sensing
	C	Mobile Computing
	D	Industrial and Power Electronics
<b>Elective – II</b>	E	Robotics and Automation
	F	Programmable Logic Control
	G	Automotive Electronics
	H	Satellite Communications
<b>Elective – III</b>	I	Internet of Things
	J	Virtual Instrumentation
	K	Biomedical Instrumentation
	L	VLSI Design