LEARNING OUTCOMES–BASED CURRICULUM FRAMEWORK (LOCF)

in the

UNDERGRADUATE PROGRAMME
B.Sc., ELECTRONICS AND COMMUNICATION SYSTEMS

FOR THE STUDENTS ADMITTED FROM THE
ACADEMIC YEAR 2020 - 2021 AND ONWARDS

HINDUSTHAN EDUCATIONAL AND CHARITABLE TRUST

HICAS

HINDUSTHAN COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)
(Affiliated to Bharathiar University and Accredited by NAAC)
COIMBATORE-641028
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Website: www.hindusthan.net/hicas/

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PREAMBLE

Learning Outcome Based Curriculum Framework for Undergraduate education in **B.Sc., Electronics and Communication Systems**

The learning outcomes are designed to help learners understand the objectives of studying B.Sc., Electronics and Communication Systems , that is, to examine, appreciate, understand and critically engage with learning of the subject.

HINDUSTHAN COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS)

DEPARTMENT OF ELECTRONICS

VISION

To provide world class education to the students to face global challenges and to inculcate the latest trends in technological advancement. To cater the needs of the environmental and ethical values in the mind of students to become good citizens and entrepreneurs.

MISSION

The Mission of the college is to pursue a philosophy of perpetual acquisition of knowledge. The important policy is to provide value-based education and to bring out the hidden potentials in students that equip them to approach life with optimism.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

Under Graduates of Electronics and Communication Systems program will

PEO1: Create graduates with a strong foundation in mathematics and science fundamentals to enable them to devise and deliver efficient solutions to challenging problems in Electronics, Communications and allied disciplines.

PEO2: Teach qualities of teamwork as well as social, interpersonal and leadership skills and an ability to adapt and evolving professional environments in the domains of science and technology.

PEO3: Motivate graduates to become good human beings and responsible citizens for the overall welfare of the society.

PEO4: Communicate effectively and manage resources skillfully as members and leaders of the profession.

PEO5: Be receptive to new technologies and attain professional competence through lifelong learning such as advanced degrees, professional registration, publications and other professional activities.

PROGRAM OUTCOME (PO)

PO1: Apply the knowledge of arithmetic, science fundamentals, and a communication specialization to the solution of complex scientific problems.

PO2: Design solutions for complex science 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 considerations.

PO3: 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.

PO4: 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.

PROGRAM SPECIFIC OUTCOME (PSO)

PSO1: Select and apply cutting-edge of electronics hardware and software tools to solve complex Engineering problems.

PSO2: Design, implement and test Electronics and Communication systems using analytical knowledge and applying modern hardware and software tools.

PSO3: Develop their skills to solve problems and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.

PSO4: Ability to design and implement the acquired technical knowledge with proficiency in logical programming for applications in electronics.

HINDUSTHAN COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)

COIMBATORE -641028

SCHEME OF EXAMINATIONS - CBCS & LOCF PATTERN

(For the Students admitted from the Academic year 2020-2021 and onwards)

UG PROGRAMME

Programme:B.Sc., ELECTRONICS AND COMMUNICATION SYSTEMS

Part	Course Code	Course Type	Course Title	Lecture Hours/ Week	Exam Duration (hours)	MAX. MARKS			CREDIT POINTS
						I.E	E.E	TOTAL	
Semester - I									
I	**20LAT01/ 20LAH01/ 20LAM01/ 20LAF01**	MIL	Tamil-I/ Hindi-I/ Malayalam – I/ French-I	6	3	30	70	100	3
II	**20ENG01**	AECC	English – I	6	3	30	70	100	3
III	**20ELU01**	DSC	Basic Electronics	4	3	30	70	100	4
III	**20ELU02**	DSC	Circuit Theory and Network Analysis	4	3	30	70	100	4
III	**20ELU03**	GE	**Allied:** Mathematics-I (MAT)	6	3	30	70	100	4
III	**20ELU04**	DSC	**Practical I:**Electronic Circuit Analysis	4	3	40	60	100	2
IV	**20ELUV01**	ACC	**VAC-I**	2	1	50	-	50	Grade*
IV	**20ELUJ01**	AEE	**Communicative Skills**	2	1	50	-	50	Grade*
IV	**20ELUJ02**	AEE	**Soft Skill**	2	1	50	-	50	Grade*
				36					
Semester – II									
I	**20LAT02/ 20LAH02/ 20LAM02/ 20LAF02**	MIL	Tamil-II/ Hindi-II/ Malayalam-II/ French-II	6	3	30	70	100	3
II	**20ENG02**	AECC	English – II	6	3	30	70	100	3
III	**20ELU05**	DSC	Semiconductor Devices	6	3	30	70	100	5
III	**20ELU06**	GE	**Allied:** Mathematics-II (MAT)	6	3	30	70	100	4
III	**20ELU07**	DSC	**Practical II:** Semiconductor Devices	4	3	40	60	100	2
IV	**20GSU01**	AECC	Value Education – Human Rights	2	2	100	-	100	2
IV	**20ELUV02**	ACC	**VAC-II**	2	1	50	-	50	Grade*
IV	**20ELUJ03**	AEE	**Communicative Skills**	2	1	50	-	50	Grade*
IV	**20ELUJ04**	AEE	**Soft Skill**	2	1	50	-	50	Grade*
				36					

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			Semester – III						
III	**20ELU08**	DSC	Principles of Communication System	5	3	30	70	100	5
III	**20ELU09**	DSC	Digital Electronics and its Applications	5	3	30	70	100	4
III	**20ELU10**	DSC	Electronic Circuits	5	3	30	70	100	4
III	**20ELU11**	GE	Programming in C	5	3	30	70	100	3
III	**20ELU12**	DSC	**Practical III:** Electronic Circuits	4	3	40	60	100	2
III	**20ELU13**	GE	**Practical IV:** C Programming	4	3	40	60	100	2
IV	**20GSU02**	AECC	Environmental Studies	2	2	100	-	100	2
IV	**20ELUV03**	ACC	**VAC-III**	2	1	50	-	50	1
IV	**20ELUJ05**	SEC	**Aptitude / Placement Training**	2	1	50	-	50	Grade*
IV	**20ELUJ06**	SEC	**Online Classes**	2	1	-	-	-	C/NC*
				36					
			Semester – IV						
III	**20ELU14**	DSC	Microwave and Fiber Optic Communication	5	3	30	70	100	5
III	**20ELU15**	DSC	Analog Integrated Circuits	5	3	30	70	100	5
III	**20ELU16**	DSC	Instruments and Measurements	5	3	30	70	100	4
III	**20ELU17**	SEC	Python Programming	5	3	30	70	100	4
III	**20ELU18**	DSC	**Practical V:**Digital and Analog Integrated Circuits	4	3	60	40	100	2
III	**20ELU19A**	DSE	**Practical VI:** Communication Systems	4	3	60	40	100	2
III	**20ELU19B**		**Practical VI:** Python Programming						
IV	**20GSU03**	AECC	**Skill Based Subject** Internet Security	2	2	100	-	100	2
V	**20GSU04**	AECC	Extension Activity	-	-	100	-	100	G
IV	**20ELUV04**	ACC	**VAC-IV**	2	1	50	-	50	1
IV	**20ELUJ07**	SEC	**Aptitude / Placement Training**	2	1	50	-	50	Grade*
IV	**20ELUJ08**	SEC	**Online Classes**	2	1	-	-	-	C/NC*
				36					
			Semester – V						
III	**20ELU20**	DSC	Cellular Communication System	5	3	30	70	100	5
III	**20ELU21**	DSC	Industrial and Power Electronics	5	3	30	70	100	5
III	**20ELU22A**	DSE	8051 Microcontroller	5	3	30	70	100	5
III	**20ELU22B**		PIC Microcontroller						
III	**20ELU23**	DSC	**Practical VII:** Industrial Electronics	5	3	40	60	100	2
III	**20ELU24**	DSC	**Practical VIII:** Microcontroller	5	3	40	60	100	2
III	**20ELU25A**	DSE	Medical Electronics	5	3	40	60	100	4

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III	**20ELU25B**		Consumer Electronics						
IV	**20GSU05**	AECC	**Non-Major Elective** General Awareness	-	2	100	-	100	2
V	**20GSU06**	AECC	Law of Ethics	-	2	100	-	100	2
IV	**20ELUV05**	ACC	**VAC-V**	2	1	50	-	50	1
IV	**20ELUJ09**	SEC	**Aptitude / Placement Training**	2	1	50	-	50	Grade*
IV	**20ELUJ10**	SEC	**Online Classes**	2	1	-	-	-	C/NC*
				36					
			Semester – VI						
III	**20ELU26**	DSC	Satellite and Network Communication	5	3	30	70	100	5
III	**20ELU27**	DSC	VLSI Design Tools	5	3	30	70	100	5
III	**20ELU28A**	DSE	Embedded Systems	5	3	30	70	100	5
III	**20ELU28B**		IoT and its Applications						
III	**20ELU29A**	DSE	Robotics and Automation	5	3	30	70	100	5
III	**20ELU29B**		Automotive Electronics						
III	**20ELU30A**	DSE	**Practical IX:** Embedded Systems	5	3	30	70	100	3
	20ELU30B		**Practical IX:** IoT and its Applications						
III	**20ELU31**	SEC	**Project work**	5	-	40	60	100	5
IV	**20ELUV06**	ACC	**VAC-VI**	2	1	50	-	50	1
IV	**20ELUJ11**	SEC	**Aptitude / Placement Training**	2	1	50	-	50	Grade*
IV	**20ELUJ12**	SEC	**Online Classes**	2	1	-	-	-	C/NC*
				36					
	Credits Grand Total								144

- **VAC**-Value Added Course (Extra Credit Courses)
- * Grades depends on the marks obtained

Range of marks	Equivalent remarks
80 and above	Exemplary
70 – 79	Very good
60 – 69	Good
50 – 59	Fair
40 – 49	Satisfactory
Below 40	Not Satisfactory = Not completed

- Part IV & V not included in total marks and CGPA calculation.
- **I.E**-Internal Exam
- **E.E**-External Exam
- **JOC**-Job Oriented Course
- C/NC**-Completed /Not Completed

PASSING MINIMUM

- Passing Minimum for UG 40% and for PG 50 %
- For UG : 35 % (25 marks) in EE and 40 % in Total Marks
- For PG 50 % (35 marks) in EE and 50 in Total Marks

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List of Open Elective VAC	
VAC	Mobile Phone Servicing
	PCB Design Using Electronic Tool
	Energy Science
	Photovoltaic Systems
	Basic Networking
	PC Hardware Assembling and Trouble Shooting
	Data Science
	LabView
	Objected Oriented Programming with C++
	Arduino Programming

List of Elective Papers/ DSE (Can choose any one of the papers as electives)		
	Course Code	Title
Electives/ DSE-I	20ELU19A	**Practical VI:**Communication Systems
	20ELU19B	**Practical VI:**Python Programming
Electives/ DSE-II	20ELU22A	8051 Microcontroller
	20ELU22B	PIC Microcontroller
Electives/ DSE-III	20ELU25A	Medical Electronics
	20ELU25B	Consumer Electronics
Electives/ DSE-IV	20ELU28A	Embedded Systems
	20ELU28B	IoT and its Applications
Electives/ DSE-V	20ELU29A	Robotics and Automation
	20ELU29B	Automotive Electronics

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ABSTRACT FOR SCHEME OF EXAMINATIONS

(For the Candidates admitted during the academic year 2020 - 2021 and onwards)

S.No.	Part	Course (MIL/AECC/AEE/DSC/DSE/SEC/GE/ACC)	Papers	Credit	Total Credits	Marks	Total Marks
1	Part I	MIL	2	3	6	100	200
2	Part II	AECC	2	3	6	100	200
3	Part III	GE	4	4/3/2	13	100	400
		DSC	19	5/4/2	72	100	1900
		DSE	6	5/4/3/2	24	100	600
		SEC	2	5/4	9	200	200
4	Part IV	SEC	8	G	-	50	200
		ACC	6	G/1	4	50	300
		AECC	4	2	8	100	400
		AEE	4	G	-	50	200
5	Part V	AECC	2	G/2	2	100	200
		Total	59	-	144		4800

UG Courses- Scheme of Evaluation (Internal & External Components)

(For the students admitted during the academic year 2020-2021 Only)

1. Internal Marks for all UG

Components	Marks
Test I	5
Test II	5
Model Exam	10
Assignment	5
Attendance*	5
TOTAL	30

***Split-up of Attendance Marks**

- 75-79 - 1 marks
- 80-84 - 2 marks
- 85-89 - 3 marks
- 90-94 - 4 marks
- 95-100 - 5 marks

2. a) Components for Practical I.E.

Components	Marks
Test –I	20
Test - II	20
Total	40

b) Components for Practical E.E.

Components	Marks
Experiments	50
Record	5
Viva	5
Total	60

3. Institutional/ Industrial Training, Mini Project and Major Project Work

Institutional /Industrial Training (I.E)		Mini Project (I.E)	Major Project Work		
Component	**Marks**	**Marks**	**Component**	**Marks**	**Total Marks**
Work diary	25	-	I.E		
Report	50	50	a)Attendance	10	
Viva-voce	25	50	b)Review/Work diary*	30	40
Total	100	100	E.E** a) Final report	40	
			b)Viva-voce	20	60
				Total	100

*Review is for Individual Project and Work Diary is for Group Projects
(group consisting of minimum 3 and maximum 5)

**Evaluation of report and conduct of viva voce will be done jointly by Internal and External Examiners

4. Components for Value Education (Part IV):

S.No.	Components	Marks
a)	Attendance 96% and above - 30 marks 91% to 95% - 25 marks 86% to 90% - 20 marks 75% to 85% - 10 marks	30 marks
b)	Participation in group activity	30 marks
c)	Assignment (2 x 10)	20 marks
d)	Test (1 hr for 20 marks) 2 out of 3 questions, 10 marks each	20 marks
	Total	100 marks

5. **Guidelines for Environmental Studies (Part IV)**

Components	Marks
Two Tests (each 2 hours) of 30 marks each [3 out of 5 descriptive questions 3 x 10 = 30 Marks]	60
Field visit and report (10 + 10) (At least one field trip should be arranged)	20
Two assignments (2 x 10)	20
Total	100

6. **Guidelines for Skill based subject - Internet Security (Part IV)**

Components	Marks
Two Tests (each 2 hours) of 40 marks each [4 out of 7 descriptive type questions 4 x 10 = 40 Marks]	80
Two assignments (2 x 10)	20
Total	100

7. **Guidelines for General Awareness (Part IV)**

Components	Marks
Two Tests (each 2 hours) of 50 marks each [50 objective type questions 50 x 1 = 50 Marks]	100

8. **Guidelines for Law of Ethics (Part V)**

Components	Marks
Two Tests (each 2 hours) of 50 marks each [5 out of 8 descriptive type questions 5 x 10 = 50 Marks]	100

9. **Guidelines for Extension Activity (Part V)**

No of Activities	Marks
2 x 50 (Each Activity for two days) (Activities may be Educating Rural Children, Unemployed Graduates, Self Help Group etc)	100

10. **Value Added Courses and Aptitude/Placement courses:**

Components	Marks
Two Test (each 1 hour) of 25 marks each QP is objective pattern (25x1=25)	50
Total	50

Guidelines:

1. The passing minimum for these items should be 40%
2. If the candidate fails to secure 40% passing minimum, he / she may have to reappear for the same in the subsequent Semesters
3. Item No's:4,5,6,7,8,9, 10 are to be treated as 100% Internal papers.
4. For item No.10, Tests conducted through online modules (Google Form/any other)

UG PATTERN

QUESTION PAPER PATTERN FOR CIA I and CIA II EXAM

Reg.No:---------- **Q.P.CODE:**

HINDUSTHAN COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

---------- DEGREE CIA-I/CIA-II EXAMINATIONS -------20—

(------- SEMESTER)

BRANCH: ----------

SUBJECT NAME: ----------

Time: Two Hours **Maximum:50 Marks**

SECTION - A (6 x 1 = 6 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

(Q.No: 1 to 6: Multiple choice/Fill up the blanks /True or False questions)

SECTION - B (4x 5 = 20 marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

(Q.No: 7 to 10 Either Or type)

SECTION - C (3x 8 = 24 marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

(Q.No: 11 to 13 : Either Or type)

QUESTION PAPER PATTERN FOR MODEL/END SEMESTER EXAMINATION

Reg.No:---------- **Q.P.CODE:**

HINDUSTHAN COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

---------- DEGREE MODEL EXAMINATIONS --------20------

(--------SEMESTER)

BRANCH : ----------

SUBJECT NAME:----------

Duration: Three Hours **Maximum: 70 Marks**

SECTION - A (10x1=10 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

(Q.No 1 to 10 Multiple choice/Fill up the blanks /True or False questions)

(Two questions from each unit)

SECTION - B (5x4=20 Marks)

Answer **ALL** Question

ALL Questions Carry **EQUAL** Marks

(Q.No 11 to 15 Either or type)

(One question from each Unit)

SECTION- C (5x8=40 Marks)

Answer **ALL** Questions

ALL Questions carry **EQUAL** Marks

(Q.No 16 to 20 Either Or type) (One question from each Unit)

Approved in 6th Academic Council meeting held on: 04-09-2020

Course Code:	20ELU01	Course Title						Batch:	2020-2021 & Onwards
		BASIC ELECTRONICS						Semester:	I
Hrs/Week:	4	L	4	T	-	P	-	Credits:	4

COURSE OBJECTIVE: Students can become familiar with fundamentals of electronic components, to learn how to use the electronic components and to design electronic circuits to perform realistic tasks.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Identify and understand the various basic electronic components.	K1
CO2	Determine the passive components and its characteristics.	K2
CO3	Analyze and get an insight about the basic electronic components, voltage and current sources.	K3
CO4	Evaluate and demonstrate the basic electronic components applications.	K4

SYLLABUS

20ELU01	BASIC ELECTRONICS	Sem: I
Unit No.	**Topics**	**Hours**
I	**RESISTORS** Resistors Specifications - Classifications of Resistors, Linear Resistors: Fixed Resistors (Carbon Composition, Thin Film, Thick Film, Wire Wound) - Variable Resistors (Wire Wound, Potentiometer, Trimmers), Non-Linear Resistors: Thermistors, Photo Resistors, Varistors, Resistance designation- Colour Coding of Resistors- Detects in Resistors - Resistors in Series and parallel Combinations.	10
II	**INDUCTORS** Inductance – Inductors- Types of Inductors: Fixed Inductors: - Air Core Inductors Variable Inductors:- Variable Ferrite Core Inductor – Self Inductance of a coil – Mutual Inductance of Coil – Inductors in Series and Parallel with Mutual Inductance – Inductive Reactance – Energy Stored by an Inductor – Coil and Core Losses – Q Factor of Inductor – Factors Affecting Inductance of a Coil – Troubles in Coil.	10
III	**CAPACITORS** Capacitance – Capacitors – Capacitor Specifications – Capacitor Action – Types of Capacitor: Fixed Capacitors: Electrolytic, Ceramic, Mica, Paper Variable Capacitors: Gang Capacitors, Trimmer & Padders, Capacitors in	10

	Series and Parallel – Factors affecting the Capacitor – Capacitive Reactance – Troubles in Capacitors.	
IV	**VOLTAGE AND CURRENT SOURCES** Batteries – Internal Resistance of a Sources – Concept of Voltage Source – Ideal Voltage source - Practical Voltage Source – VI Characteristics of Practical Voltage Source - Procedure for Determining Internal Resistance – Ideal Current Source - Practical Current Source - Equivalent Between Voltage Source and Current Source – Conversion of Voltage, Current Source	09
V	**CIRCUIT CONTROL AND PROTECTIVE DEVICE** Switches – Switching Action – Types of Switches (SPST, SPDT, DPST, DPDT, Toggle Switch, DIP, Rotary Switch) – Analog and Digital Switches - Fuses Rating, Connectors, Insulators, Circuit Breaker, Relays (Electromagnetic Relay)	09

Teaching methods: Direct Instruction, Flipped Classrooms, Kinesthetic Learning, Differentiated Instruction, Inquiry-based Learning, Expeditionary Learning, Personalized Learning, Game-based Learning, Assignment, Discussion and Demonstration.

TEXT BOOKS

Text Book:

1. R.S.Sedha, "A Text Book of Applied Electronics", S. Chand & Company Ltd, RevisedI Edition, 2008 (Unit I, II, III & V).

2. S.P.SHARMA, "Basic Radio and B/W, Colour Television", Tata Mcgraw Hill Publishing, 5th Edition, 2007, (Unit IV).

REFERENCE BOOKS

Reference Books:

1. Bernard Grob, "Basic Electronics" Mc Graw Hill, 10thEdition, 2008.

2. S.Salivahanan, N.Sureshkumar, A. Vallavaraj, "Electronic Devices and circuits", Tata Mc Graw Hill, 2nd Edition 2011.

WEB RESOURCES

Web Link:

https://nptel.ac.in/courses/122/106/122106025/
http://www.nptelvideos.in/2012/12/basic-electronics-drchitralekha-mahanta.html
https://www.mikroe.com/ebooks/components-of-electronic-devices/introduction
https://learnabout-electronics.org/Resistors/resistors_01.php

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	S	S	M
CO2	S	S	M	M
CO3	S	M	S	L
CO4	S	M	M	L

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
[SUDHA. S] Name & Signature of the Staff	Name & Signature	Name & Signature

Head of the Department
Department of Electronics
Hindusthan College of Arts & Science
Coimbatore-641 028

Course Code:	20ELU02	Course Title						Batch:	2020-2021 & Onwards
		CIRCUIT THEORY AND NETWORK ANALYSIS						Semester:	I
Hrs/Week:	4	L	4	T	-	P	-	Credits:	4

COURSE OBJECTIVE **To make the students capable of analyzing any given electrical network and to make them to learn how to synthesize an electrical network.**

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Understand the knowledge of basic circuital law and simplify the network using reduction techniques.	K1
CO2	Apply the Kirchhoff's law and Network theorems and simplify the electrical and AC circuits.	K2
CO3	Obtain the maximum power transfer to the load, and Analyze the series resonant and parallel resonant circuit.	K3
CO4	Justify the electric circuit's applications by using the network theorems.	K4

SYLLABUS

20ELU02	CIRCUIT THEORY AND NETWORK ANALYSIS	Sem: I
Unit No.	**Topics**	**Hours**
I	**ELECTRICITY** Introduction – Electric field - potential and potential difference, Unit of potential difference – Electric current – Unit of Electric current – Difference between electric charge and current - Electron and conventional current flow - Electrical resistance - Temperature coefficient of electrical resistance	10
II	**ELECTRICAL ELEMENTS** Introduction – ohms law – Kirchhoff's current law – Kirchhoff's Voltage law – Method of Branch current, Node voltage method, Method of Mesh current.	09
III	**ELECTRICAL CIRCUITS** Series circuit – resistance in series- series I.R voltage drops – series voltage divider – total power in a series circuit – opens in a series circuit – shorts in series circuit - Parallel circuit- resistance in parallel circuit – equivalent resistance of a two branched circuit – total power in a parallel circuit – opens in a parallel circuit – shorts in parallel circuit – Series parallel circuit.	10
IV	**NETWORK THEOREMS** Thevenin's theorem – Norton's theorem – Conversion of Thevenin and Norton – Super position theorem – Millman's theorem – Star to Delta and	10

	Delta to Star conversion – Maximum power transfer theorem.	
V	**AC CIRCUITS** AC Circuit with resistance alone – Circuit with XL alone – Circuit with XC alone – Series reactance and resistance – parallel reactance and resistance - Series parallel reactance and resistance – Real power – Series resonance circuit - parallel resonance circuit – Q-factor – Filters: Low pass -High pass – Band pass.	**09**

Teaching methods: Direct Instruction, Flipped Classrooms, Kinesthetic Learning, Differentiated Instruction, Inquiry-based Learning, Expeditionary Learning, Personalized Learning, Game-based Learning, Assignment, Discussion and Demonstration.

TEXT BOOKS

Text Book:

1. R.S.Sedha, "A Text Book of Applied Electronics", S. Chand & Company Ltd, RevisedI Edition, 2008 (Unit I- V).

REFERENCE BOOKS

Reference Books:

1. Bernard Grob, "Basic Electronics" Mc Graw Hill, 10thEdition, 2008.

2. Hayt W. H., Kemmerly J. E. and Durbin S. M., "Engineering Circuit Analysis", 6th Ed., Tata McGraw-Hill Publishing Company Ltd.,2008.

WEB RESOURCES

Web Link:

https://nptel.ac.in/courses/108/102/108102042/
https://nptel.ac.in/content/syllabus_pdf/108102042.pdf
https://www.engbookspdf.com/Circuits/Electric-Circuit-Analysis-Kumar
https://www.electrical4u.com/network-analysis/

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	S	M	S
CO2	S	M	S	M
CO3	S	S	S	L
CO4	S	S	M	L

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
K. Thangeswari Dr. K. THANGAVEL Name & Signature of the Staff	Dr. P. Chorisanlu Name & Signature	Name & Signature

Head of the Department
Department of Electronics
Hindusthan College of Arts & Science
Coimbatore-641 028

Co-ordinator
Curriculum Development Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

Course Code:	20ELU04	Course Title						Batch:	2020-2021 & Onwards
		PRACTICAL I: ELECTRONIC CIRCUIT ANALYSIS						Semester:	I
Hrs/Week:	4	L	-	T	-	P	4	Credits:	2

COURSE OBJECTIVE: The prime objective is understanding the fundamental circuit theory also to make use of circuit laws and theorems and measuring the parameter.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Recognize the concept of basic circuits and theorems.	K1
CO2	Interpret the circuits using series and parallel equivalents and using Thevenin's and Norton's equivalent circuits.	K2
CO3	Solve and design various resonance circuit problems.	K3
CO4	Evaluate and display the measurements of signals by using oscilloscope.	K4

SYLLABUS

20ELU04	PRACTICAL – I: ECTRONIC CIRCUIT ANALYSIS	Sem: I

Any 10 Experiments:

1. Measurement of Amplitude, Frequency and phase difference using CRO
2. Resistor in Series, Parallel and Series-parallel
3. Voltage sources in series, parallel and series – parallel
4. Voltage and Current divider
5. Verification of Ohm's law
6. Verification of Kirchhoff's law
7. Verification of Thevenin's Theorem
8. Verification of Norton's Theorem

9. Superposition Theorem

10. Millman's Theorem

11. Maximum power Transfer Theorems

12. Series resonance circuit

13. Parallel resonance circuit

14. Frequency response of R, L &C

15. Passive Low and High Pass Filter Design

Teaching methods: Direct Instruction, Visualization, Inquiry-based Learning, High Tech Approach to Learning, Personalized Learning, Game-based Learning, Assignment, Discussion and Demonstration.

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	S	M	M
CO2	S	S	S	S
CO3	S	M	S	L
CO4	S	M	M	L

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
K. Thanavel Dr. K. THANAVEL. Name & Signature of the Staff	Dr. P. Chandrasekar Name & Signature	Name & Signature

Head of the Department
Department of Electronics
Hindusthan College of Arts & Science
Coimbatore-641 028

Curriculum Development Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

Course Code:	20ELU05	Course Title						Batch:	2020-2021 & Onwards
		SEMICONDUCTOR DEVICES						Semester:	II
Hrs/Week:	6	L	6	T	-	P	-	Credits:	5

COURSE OBJECTIVE **To enable the students to understand and gain the knowledge on semiconductor devices and its characteristics.**

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Demonstrate knowledge on recalling the semiconductor theory concepts.	K1
CO2	Understand the change in physical and electrical properties of electron devices under the influence of various biasing.	K2
CO3	Apply the electrical properties of electron devices for achieving various applications.	K3
CO4	Analyze the change in electrical characteristics due to change in size and shape of the terminals.	K4

SYLLABUS

20ELU05	SEMICONDUCTOR DEVICES	Sem: II
Unit No.	**Topics**	**Hours**
I	**SEMICONDUCTOR** Energy band structure: Valance and Conduction Band – Conduction in solids – Hole formation and its movement - Conductors – Insulators and Semiconductors Types of Semiconductor: Intrinsic semiconductor – Extrinsic semiconductor – N type semiconductor – P type semiconductor – Majority and Minority charge carriers – Mobile charge carries and immobile Ions – Drift – Diffusion	12
II	**PN JUNCTION CHARACTERISTICS** PN junction – Formation of depletion layer - Barrier voltage – Effect of temperature on barrier voltage – VI Characteristics of PN Junction Diode. Applications: Clippers, Clampers.	12
III	**SPECIAL DIODES** Zener Diode – Zener diode as a voltage regulator – Light Emitting Diode - Backward diode – Varactor diode - Step recovery diode - Schottky diode - Tunnel diode – Gunn diode – IMPATT diode - PIN diode – LASER diode.	12

IV	**BIPOLAR JUNCTION TRANSISTOR** Construction – Transistor biasing – Operation of NPN Transistor – Operation of PNP transistor, Types of configuration: CB configuration, CE configuration, CC configuration, Current amplification factor and characteristics of CB, CE &CC – Relation among α, β & γ Applications: Transistor as a switch.	12
V	**FET & UJT** Types of FET – Construction of JFET – Operation – Characteristics of JFET – Drain & Transfer Characteristics of JFET –JFET parameters - Comparison of JFET with BJT. MOSFET: Working and Characteristics of Depletion type & Enhancement type MOSFET Construction of UJT – Characteristics of UJT-Relaxation Oscillator.	12

Teaching methods: Direct Instruction, Flipped Classrooms, Kinesthetic Learning, Differentiated Instruction, Inquiry-based Learning, Expeditionary Learning, Personalized Learning, Game-based Learning, Assignment, Discussion and Demonstration.

TEXT BOOKS

Text Book:

1. R.S.Sedha, "A Text Book of Applied Electronics", S. Chand & Company Ltd, RevisedI Edition, 2008 (Unit I- V).

REFERENCE BOOKS

Reference Books:

V. K. Metha, "Principles of Electronics", S. Chand and Company Ltd, 11thEdition, 2008.

2. Louis Nashelsky and Robert Boylestad, "Devices discrete and Integrated", PHI, I Edition, 2009.

WEB RESOURCES

https://nptel.ac.in/courses/108/108/108108122/
https://nptel.ac.in/courses/117/102/117102061/
https://www.pdfdrive.com/electronic-devices-and-circuits-e31481932.html
https://www.springer.com/gp/book/9789811502668

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	M	S	M
CO3	S	S	M	L
CO4	S	M	M	L

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
(Dr. V. BALAPRAKASH) Name & Signature of the Staff	Dr Phaisone Name & Signature	Name & Signature

Head of the Department
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Coimbatore-641 028

Course Code:	20ELU07	Course Title						Batch:	2020-2021 & Onwards
		Practical II: SEMICONDUCTOR DEVICES						Semester:	II
Hrs/Week:	4	L	-	T	-	P	4	Credits:	2

COURSE OBJECTIVE: To understand and experiment the basic parameters of electronic devices and develop skills to design clippers, clampers and rectifiers.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Construct circuits by applying theoretical knowledge gained in electronic devices.	K1
CO2	Analyze the electrical characteristics of unipolar and bipolar devices with the constructed circuits.	K2
CO3	Demonstrate the operation of half wave and full wave rectifiers.	K3
CO4	Create simple applications using electronic devices and evaluate the attained results.	K4

SYLLABUS

20ELU07	PRACTICAL – II: SEMICONDUCTOR DEVICES	Sem: II

Any 10 Experiments:

1. Junction diode characteristics.
2. Clipper circuits.
3. Clamper circuits.
4. Zener diode characteristics.
5. Zener Diode as a voltage regulator.
6. LED characteristics.
7. CB characteristics of Transistor.
8. CE characteristics of Transistor.
9. CC characteristics of Transistor.

10. Transistor as a Switch.

11. Stability factor of a transistor.

12. Emitter follower.

13. Characteristics of UJT.

14. UJT Relaxation Oscillator.

15. JFET characteristics.

Teaching methods: Laboratory Demonstration.

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	M	S	S
CO2	S	S	S	M
CO3	S	S	M	L
CO4	S	M	M	L

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
(Dr. V. BALAPRAKASH) Name & Signature of the Staff	Name & Signature	Name & Signature

Head of the Department
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Coimbatore-641 028

Course Code:	20ELU08	Course Title						Batch:	2020-2021 & Onwards
		PRINCIPLES OF COMMUNICATION SYSTEM						Semester:	III
Hrs/Week:	5	L	5	T	-	P	-	Credits:	5

COURSE OBJECTIVE:

1. Analyze communication systems in both the time and frequency domains.
2. Describe the principles of amplitude modulated and angle modulated communication systems and be able to analyze their performance in the presence of noise.
3. Describe the principles of various digital modulation systems and their properties
4. Design and analyze performance of the Super Heterodyne receiver.

COURSE OUTCOMES (CO)

S. No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Index the principles of wave propagation andcommunication system.	K1
CO2	Generalize the need of modulation and frequency spectrum ofAM & FM.	K2
CO3	Demonstrate the working of various analog, pulse and digital modulation techniques	K3
CO4	Analyze analog and digital modulation scheme for real timeknowledge transfer.	K4

SYLLABUS

20ELU08	PRINCIPLES OF COMMUNICATION SYSTEM	Sem: III
Unit No.	Topics	Hours
I	**RADIO WAVE PROPAGATION** Electromagnetic wave – Ground wave propagation–Sky wave propagation–Space wave propagation – atmospheric propagation –critical frequency and MUF – skip distance – Radio horizon – skip zone – concept of duct and tropospheric scatter propagation. Line of sight propagation – over the horizon system.	12

II	**AMPLITUDE MODULATION** Introduction – Modulation – Need for modulation – Amplitude modulation theory: Mathematical representation of AM – Frequency spectrum – Power relations in the AM wave. Generation of AM: Balanced modulator– Filter method – Phase shift method – Filter method and Third method –Independent sideband system – Vestigial side band Transmission	12
III	**FREUQENCY MODULATION** Introduction – Theory – mathematical representation of FM – Frequency spectrum of FM. Phase modulation – Noise and frequency modulation: Effects of noise on carrier – Pre-emphasis – De-emphasis – Comparison of wideband and Narrowband FM. Generation of Frequency modulation: Direct methods: Reactance Modulator, Varactor Diode Modulator, Stablished reactance modulator–AFC. Indirect Method: Armstrong method.	12
IV	**PULSE AND DIGITAL MODULATION** Introduction – Sampling – Sampling theorem – Pulse amplitude modulation– Pulse width modulation – Pulse position modulation – Pulse code modulation – Quantization Noise – Differential PCM – Delta modulation– ASK – FSK – PSK – BPSK –DPSK – QAM – QPSK.	12
V	**RADIO RECEIVERS** Introduction – Tuned Radio Frequency (TRF) receiver – Superheterodyne receiver – AM receivers: RF section and characteristics – Frequency changing and tracking – Intermediate frequencies and IF amplifiers – Detection and Automatic Gain Control (AGC). FM receivers: Block diagram– Amplitude limiting– FM demodulators –Ratio detectors– SSB receiver– ISB receiver.	12

Teaching methods: Direct Instruction, Flipped Classrooms, Kinesthetic Learning, Differentiated Instruction, Inquiry-based Learning, Expeditionary Learning, Personalized Learning, Game-based Learning, Assignment, Discussion and Demonstration.

TEXT BOOKS

Text Books:

1. *Electronic Communication System – Kennedy-TMH.*
2. *Communication System – Bruce Carson –PHI.*
3. *Principles of Communication System-Taub and schillings-PHI.*

REFERENCE BOOKS

Reference Books:

1. *Electronic and Radio Engineering- Terman M.H.*
2. *Electronic Communication –Roddy and Coolen-PHI.*

WEB RESOURCES

Web Link:

https://nptel.ac.in/courses/108/104/108104091/

https://nptel.ac.in/noc/courses/noc17/SEM2/noc17-ee17/

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	S	S	S
CO3	S	M	S	S
CO4	S	M	M	M

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
K. Thangavel Dr. K. THANGAVEL Name & Signature of the Staff	K. Thangavel Dr. K. THANGAVEL Name & Signature	Name & Signature

Co-ordinator
Curriculum Development Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

Head of the Department
Department of Electronics
Hindusthan College of Arts & Science
Coimbatore-641 028

Course Code:	20ELU09	Course Title						Batch:	2020-2021 & Onwards
		DIGITAL ELECTRONICS AND ITS APPLICATIONS						Semester:	III
Hrs/Week:	5	L	5	T	-	P	-	Credits:	4

COURSE OBJECTIVE:

1. Perform decimal, octal, hexadecimal, and binary conversions.
2. Apply Boolean algebra to solve logic functions.
3. Analyze digital multiplexing circuits.
4. To understand the Sequential Logic Circuits using Flip-Flop.

COURSE OUTCOMES (CO)

S. No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Label the basics of Digital Electronics and different number systems and conversion between them.	K1
CO2	Characterize the various digital ICs and understand their operation.	K2
CO3	Illustrate the working of several logic gates and Boolean theorems.	K3
CO4	Analyze the sequential, A/D and D/A principles for real time knowledge transfer.	K4

SYLLABUS

20ELU09	DIGITAL ELECTRONICS AND ITS APPLICATIONS	Sem: III
Unit No.	Topics	Hours
I	**NUMBER SYSTEM AND CODES** Binary Number System – Binary-to-decimal Conversion – Binary-to- decimal Conversion – Decimal-to-binary Conversion – Octal Numbers – Hexadecimal Numbers – Alphanumeric Codes: ASCII Code – EBCDIC Code– Hollerith Code. Weighted Codes: Reflective and Sequential Codes. The Excess-3 Code – The Gray Code– Parity Method for Error Detection and Correction– Hamming Code - Floating point number representation - 1's and 2's complement representation.	12

II	**LOGIC GATES AND BOOLEAN ALGEBRA** Basic Logic Gates – Universal Logic Gates – AND-OR-Invert Gates – Positive and Negative Logic – Boolean Laws and Theorems – SOP – Karnaugh Map– Karnaugh Map Simplifications– Don't care Conditions - POS – POS Simplification. Simplification by quine- McClusky method –Static and Dynamic Hazards.	12
III	**ARITHMETIC AND COMBINATIONAL CIRCUITS** **Arithmetic Circuits:** Binary Addition – Binary Subtraction – Unsigned Binary Numbers- Sign-magnitude Numbers – 2's Complement Representation – 2's Complement Arithmetic. **Combinational Circuits:** Adder - Subtractor – Arithmetic Logic Unit – Binary Multiplication and Division– Multiplexers– Magnitude comparator – De-multiplexers – Decoder– Encoder-Parity generator/Checker	12
IV	**SEQUENTIAL LOGIC CIRCUITS** Flip Flops: RS, Clocked RS, D, JK, JK Master Slave and T Flip Flops. Counters: Asynchronous counter – Synchronous counter – Up/Down counter– Modulus counters – Decade counter. Shift Registers: Serial In/Serial Out – Serial In/Parallel Out – Parallel In/Serial Out – Parallel In/Parallel Out.	12
V	**D/A AND A/D CONVERTERS** Digital to Analog converters: Weighted Resistor Method – R-2R Ladder Method – Accuracy and Resolution of DAC. Analog to Digital converters: Simultaneous converter – Counter type converter – Continuous type converter –Successive approximation type converter – Ramp type A/D converter – Dual slope converter – FlashAccuracy and resolution of ADC.	12

Teaching methods: Direct Instruction, Flipped Classrooms, Kinesthetic Learning, Differentiated Instruction, Inquiry-based Learning, Expeditionary Learning, Personalized Learning, Game-based Learning, Assignment, Discussion and Demonstration.

TEXT BOOKS

Text Books:

1. *A. S. Salivahanan, S. Arivazhagan, "Digital Electronics", Vikas Publishing House Pvt. Ltd.,First Edition, 2010.*
2. *Donald P. Leach, Albert Paul Malvino & Goutam Saha, "Digital Principles and Applications", Tata McGrawHill, 7th Edition, 2011.*

REFERENCE BOOKS

Reference Books:

1. *Thomas L. Floyd & R.P.Jain, "Digital Fundamentals", Pearson Education, 8th Edition, 2005.*
2. *M.Morris Mano, "Digital Logic and Computer Design", PHI, 2005.*

WEB RESOURCES

Web Link:

https://nptel.ac.in/courses/117/106/117106086/

https://nptel.ac.in/courses/108/105/108105113/

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	M	S	M
CO2	S	S	M	S
CO3	S	M	S	M
CO4	S	M	M	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
MRS. S. SATHIYADEEPA Name & Signature of the Staff	DR. K. THANGAVEL Name & Signature	Co-ordinator Curriculum Development Cell Hindusthan College of Arts & Science Coimbatore-641 028. Name & Signature

Head of the Department
Department of Electronics
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Coimbatore-641 028

Course Code:	20ELU10	Course Title						Batch:	2020-2021 & Onwards
		ELECTRONIC CIRCUITS						Semester:	III
Hrs/Week:	5	L	5	T	-	P	-	Credits:	4

COURSE OBJECTIVE:

1. Visualize the clear consistent picture of the internal physical behavior of Diode and its application.
2. To present a clear consistent picture of the internal physical behavior of Transistor and its Biasing.
3. Compute the AC analysis of transistor and its application as a feedback amplifier.
4. Contrast transistor Application as a power Amplifier

COURSE OUTCOMES (CO)

S. No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Recall basic knowledge on the working of variousamplifiers, oscillators and multivibrator.	K1
CO2	Describe analysis capability in rectifiers, filters and voltageregulators.	K2
CO3	Demonstrate the competence in power and feedback amplifiers.	K3
CO4	Layout of various amplifier circuits for practicalapplications.	K4

SYLLABUS

20ELU10	ELECTRONIC CIRCUITS	Sem: III
Unit No.	Topics	Hours
I	**RECTIFIERS, FILTERS AND VOLTAGE REGULATORS** Half wave, Full wave and bridge rectifiers – RMS value – Average value - Ripple Factor– Rectification Efficiency – Filters: Inductor Filter– Capacitor Filter – LC Filter – π-Filter – Voltage Regulation – Zener Diode Shunt Regulator – Transistor Shunt and Series Regulator – DC Power Supply - Clipper and Clamper circuits.	12
II	**SINGLE AND MULTISTAGE TRANSISTOR AMPLIFIERS** Transistor as an Amplifier – Common Emitter, Common Base and Common Collector Amplifiers - Gain of Multistage Amplifiers – RC Coupled Amplifier– Impedance Coupled Amplifier – Transformer Coupled Amplifier – Direct Coupled Amplifier – Frequency response - Darlington pair Amplifier - Advantages, disadvantages and Applications.	12

III	**POWER AMPLIFIERS** Performance parameter and AC load line – Classifications – Class A power Amplifier – Class B Power Amplifier – Class B Push-Pull Amplifier – Crossover Distortion – Class C Amplifiers – Characteristics and overall efficiency of Class A, Class B and Class C Power Amplifiers.	12
IV	**FEEDBACK AMPLIFIERS** Principle of Feedback amplifiers – Types – Effect of Negative Feedback on gain - Gain stability – Bandwidth– Distortion – Noise - Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedbacks – Comparison of feedback connections – Negative Feedback in transistor amplifier – CE amplifier without emitter bypass capacitor – Emitter Follower – Negative feedback in multistage amplifiers.	12
V	**OSCILLATORS AND MULTIVIBRATORS** Classification - Barkhausen Criterion – Hartley Oscillator – Colpitt's Oscillator– Clapp Oscillator – Quartz crystal – RC Phase Shift – Wien Bridge Oscillators – Astable, Monostable and Bistable Multivibrators – Schmitt Trigger.	12

Teaching methods: Direct Instruction, Flipped Classrooms, Kinesthetic Learning, Differentiated Instruction, Inquiry-based Learning, Expeditionary Learning, Personalized Learning, Game-based Learning, Assignment, Discussion and Demonstration.

TEXT BOOK

Text Book:

1. Salivahanan, S., Suresh Kumar, N., & Vallavaraj A. Electronic Devices and Circuits, Tata Mc Graw Hill publishing Company Limited, 4th Edition, 2013.

REFERENCE BOOKS

Reference Books:

1. *B.L.Theraja, "Basic Electronics Solid State", S.Chand Company Ltd., 2006.*
2. *R.S. Sedha, "A Text Book of Electronic Circuits", 3rd Revised Edition, S.Chand, 2010.*
3. *S.K. Sahdev, "Electronic Principles", Dhanpat Rai &Co (P) Ltd, 2nd Edition, 1998.*

WEB RESOURCES

Web Link:

https://nptel.ac.in/courses/108/102/108102112/
https://nptel.ac.in/courses/117/103/117103063/

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	S	M	S
CO3	S	M	S	M
CO4	S	M	M	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
Dr. R. PREMA Name & Signature of the Staff	Dr. K. THAVGAVEL Name & Signature	Name & Signature

Head of the Department
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Co-ordinator
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Course Code:	20ELU11	Course Title						Batch:	2020-2021 & Onwards
		PROGRAMMING IN C						Semester:	III
Hrs/Week:	5	L	5	T	-	P	-	Credits:	3

COURSE OBJECTIVE:

1.Understanding a functional hierarchical code organization.

2. To define and manage data structures based on problem subject domain.

3.Ability to work with textual information, characters and strings.

4. Contrast to work with arrays of complex objects.

COURSE OUTCOMES (CO)

S. No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Index algorithms to solve simple programming problems.	K1
CO2	Contrast programming problems to choose when regularloops should be used and when recursion will produce abetter program	K2
CO3	Demonstrate, implement, test and debug programs that use different data types, such as simple variables, arrays, andstructures.	K3
CO4	Explore the programming skills in real time applications.	K4

SYLLABUS

20ELU11	PROGRAMMING IN C	Sem: III
Unit No.	Topics	Hours
I	**INTRODUCTION** Overview of C– Names – Data types and Qualifiers – Constant – variables – Assignment of variables – Variable Initialization. Operators: Arithmetic, Assignment, Relational, Logical, Bitwise, Conditional, Compound assignment, Unary and other operators – Order of precedence and associativity of operators.	12
II	**PROGRAM CONTROL CONSTRUCTS** Conditional & multiple branching iteration – Jump constructs – Console input and output: Console I/O Functions – getch, putch, getchar, putchar, gets, puts, printf and scanf functions – Formatted I/O Functions: Definition– prototype – recursion – simple programs.	12

III	**ARRAYS** Initializations – Multidimensional arrays – character arrays. Pointers: Declaration and initialization of pointer variables – Pointers and Functions – Pointers and arrays – Pointers and strings – Arrays of pointers and pointer to an array – Command line arguments – Dynamic memory allocation.	12
IV	**STRUCTURES & UNIONS** Definition & initializing structure variables – Array of structures – Pointer to structures – Array of pointers structures – Passing structures to functions – bit fields – Union.	12
V	**FILES** File structure – Opening & closing of files – Character functions – Line I/O functions – Formatted I/O functions – Block I/O functions. Preprocessor directive: file inclusion – Macro substitution – Conditional compilation.	12

Teaching methods: Direct Instruction, Flipped Classrooms, Kinesthetic Learning, Differentiated Instruction, Inquiry-based Learning, Expeditionary Learning, Personalized Learning, Game-based Learning, Assignment, Discussion and Demonstration.

TEXT BOOK

Text Book:

1. *E.Balagurusamy, "Programming in ANSI C", Tata McGraw-Hill, 2004.*

REFERENCE BOOKS

Reference Books:

1. *Yashavant P. Kanetkar, "Let us C", BPB Publications, 14th Edition, 2016.*
2. *Stephen G. Kochan, "Programming in C", Addison-Wesley, Fourth Edition, 2015.*
3. *Rajaraman.V, "Computer Programming in C", Prentice-Hall of India Private Limited, Sixteenth Printing, 2006.*

WEB RESOURCES

Web Link:

https://nptel.ac.in/courses/106/104/106104128/

https://nptel.ac.in/courses/106/105/106105085/

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	S	M	M
CO2	S	S	M	S
CO3	S	M	S	S
CO4	S	M	M	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
Dr. V. BALAPRAKASH Name & Signature of the Staff	Dr. K. THANGAVEL Name & Signature	Name & Signature

Head of the Department
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Co-ordinator
Curriculum Development Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

Course Code:	20ELU12	Course Title						Batch:	2020-2021 & Onwards
		PRACTICAL III: ELECTRONIC CIRCUITS						Semester:	III
Hrs/Week:	4	L	-	T	-	P	4	Credits:	2

COURSE OBJECTIVE:

1. Understand the working and operational characteristics of Semiconductor devices.
2. Verify practically the response of various special purpose electronic devices.
3. Design and evaluate the rectifiers, power supply and filters.
4. Understand the frequency response of amplifiers.

COURSE OUTCOMES (CO)

S. No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Recall the electronic circuit starting with a givenSpecifications.	K1
CO2	Elaborate the optimum design out of many availableoptions.	K2
CO3	Determine values and specifications of the componentsrequired for a design.	K3
CO4	Identify and examine the designed circuit to check its performance.	K4

SYLLABUS

20ELU12	PRACTICAL –III: ELECTRONIC CIRCUITS	Sem: III

Any 10 Experiments:

1. Half Wave Rectifier.
2. Full Wave Rectifier.
3. Filter Circuits.
4. DC Power Supply Design using IC 78XX and 79XX Series.
5. Voltage Doubler.

6. Transistor Biasing Circuit.
7. RC Coupled Amplifier.
8. Emitter Follower.
9. Class B Power Amplifier.
10. Class AB Power Amplifier.
11. RC Phase Shift Oscillator using BJT.
12. Astable Multivibrator using BJT.
13. Monostable Multivibrator using BJT.
14. Bi-stable Multivibrator using BJT
15. Schmitt Trigger using BJT.

Teaching methods: Direct Instruction, Visualization, Inquiry-based Learning, High Tech Approach to Learning, Personalized Learning, Game-based Learning, Assignment, Discussion and Demonstration.

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	S	S	M
CO3	S	M	S	S
CO4	S	M	M	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
Dr. R. PREMA Name & Signature of the Staff	Dr. K. THANGAVEL Name & Signature	Name & Signature

Head of the Department
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Hindusthan College of Arts & Science
Coimbatore-641 028

Co-ordinator
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Coimbatore-641 028.

Course Code:	20ELU13	Course Title						Batch:	2020-2021 & Onwards
		PRACTICAL IV: C PROGRAMMING						Semester:	III
Hrs/Week:	4	L	-	T	-	P	4	Credits:	2

COURSE OBJECTIVE:

1. Read, understand and trace the execution of programs written in C language.
2. Write the C code for a given algorithm.
3. Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
4. Write programs that perform operations using derived data types.

COURSE OUTCOMES (CO)

S. No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Recall and trace the execution of programswritten in C language.	K1
CO2	Compute C code for a given algorithm.	K2
CO3	Sequence the programs with pointers and arrays, performpointer arithmetic, and use the pre-processor.	K3
CO4	Illustrate the C language program skills and write programsthat perform operations using derived data types.	K4

SYLLABUS

20ELU13	PRACTICAL –IV: C PROGRAMMING	Sem: III

Any 10 Experiments:

1. Find the sum, average, standard deviation for a given set of numbers.
2. Generate n prime numbers.
3. Generate Fibonacci series.
4. Find the greatest among the Three Numbers.
5. Check Whether the Given Number is Armstrong Number or Not.
6. Find the Sum of Given All Digits.
7. Find the Given Number is Prime or not.

8. Find the given number is odd or even.

9. Matrix Addition, Subtraction and Multiplication.

10. Sort the given set of numbers in ascending order.

11. Check whether the given string is a palindrome or not using Pointers.

12. Count the number of Vowels in the given sentence.

13. Find the factorial of a given number using recursive function.

14. Print the students Mark sheet assuming roll no, name, and marks in five subjects in a structure. Create an array of structures and print the mark sheet in the university pattern.

15. Write a function using pointers to add two matrices.

Teaching methods: Direct Instruction, Visualization, Inquiry-based Learning, High Tech Approach to Learning, Personalized Learning, Game-based Learning, Assignment, Discussion and Demonstration.

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	S	S	M
CO3	S	M	M	S
CO4	S	M	M	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
DR. V. BALAPRAKASH Name & Signature of the Staff	DR. K. THANGAVEL Name & Signature	Name & Signature

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Course Code:	20ELU14	Course Title						Batch:	2020-2021 & Onwards
		MICROWAVE AND FIBER OPTIC COMMUNICATION						Semester:	IV
Hrs/Week:	5	L	5	T	-	P	-	Credits:	5

COURSE OBJECTIVE:

1.Understand the theory of microwave and fiber optic communication.
2. Discuss the working of microwave amplifiers, oscillators and devices.
3. Design and analyze the microwave amplifiers, oscillator and devices.
4. Recognize the basics of Radar technology.

COURSE OUTCOMES (CO)

S. No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Recall the basic concepts of microwave andelectromagnetic theory.	K1
CO2	Elaborate the waveguides, microwave components, instruments and microwave tubes.	K2
CO3	Illustrate the working of optical fibers and their properties.	K3
CO4	Investigate the microwave and fiber optic concepts for real timeapplications.	K4

SYLLABUS

20ELU14	MICROWAVE AND FIBER OPTIC COMMUNICATION	Sem: IV
Unit No.	Topics	Hours
I	**MICROWAVE AND ELECTROMAGNETICS** Microwave region and band designations - Advantages & Applications of Microwave – Electro Magnetic wave principles – Maxwell's Equations: Amperes Law –Faraday's Law– Gauss's Law – Wave Equations – TEM/TE/TM/HE wave definitions	12
II	**WAVEGUIDES** Propagation of Waves and Rectangular waveguide – Propagation of TEM waves – TE and TM Modes – Propagation of TM waves and Rectangular waveguide – Propagation of TE waves and Rectangular waveguide – TE, TM modes in rectangular waveguide.	12

III	**MICROWAVE COMPONENTS, INSTRUMENTS AND MICROWAVE TUBES** Overview of Microwave Components, Measurement devices and instruments – Two Cavity Klystron Amplifier– Multicavity Klystron – Two Cavity Klystron Oscillator – Reflex Klystron – Travelling Wave Tube– Backward Wave Oscillator – Magnetrons.	12
IV	**OPTICAL FIBERS ND THEIR PROPERTIES** Introduction to Optical Fiber – Basic Structure of Optical Fiber – Total Internal Reflection – Principles of light propagation – Types of fibers: Step Index & Graded Index fibers. Modes of Propagation: Single and Multimode fibers – Acceptance Angle – Numerical Aperture – Advantage and Application.	12
V	**LIGHT SOURCES & PHOTO DETECTORS** Light Sources: LED - Fiber LED Coupling – LASERS. Photo Detectors: Characteristics – Photo Emissive Type – Photo Conductive – Photo Voltaic Devices – PIN Photo diode – Avalanche Photo Diode. Application: ADM – CATV – Digital Video Transmission.	12

Teaching methods: Direct Instruction, Flipped Classrooms, Kinesthetic Learning, Differentiated Instruction, Inquiry-based Learning, Expeditionary Learning, Personalized Learning, Game-based Learning, Assignment, Discussion and Demonstration.

TEXT BOOKS

Text Books:

1. M.Kulkarni, "Microwave and Radar Engineering", Umesh Publications, 2nd Edition, 2009.
2. Subir Kumar Sarkar, "Optical Fibers and Fiber Optic Communication Systems", S. Chand Publication, 2 nd Edition 2001.

REFERENCE BOOKS

Reference Books:

1. Annapurna Das & Sisir K. Das, "Microwave Engineering", Tata McGraw Hill Publications, 2nd Edition, 2009.
2. Gerd Keiser, "Optical Fiber Communications", TMH, 4th Edition, 10th Reprint, 2011.
3. Samuel Y. Liao, "Microwave Devices and Circuits", Pearson Education, Third Edition, 2008.

WEB RESOURCES

Web Link:
https://www.pdfdrive.com/electronic-devices-and-circuits-e31481932.html
https://www.springer.com/gp/book/9789811502668

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	S	M	M
CO2	S	S	S	S
CO3	S	M	S	S
CO4	S	M	M	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
MS. MAHIJAMOHAN Name & Signature of the Staff	DR. K. THANGAVEL Name & Signature	Co-ordinator Curriculum Devetopment Cell Hindusthan College of Arts & Science, Coimbatore-641 028. Name & Signature

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Course Code:	20ELU15	Course Title						Batch:	2020-2021 & Onwards
		ANALOG INTEGRATED CIRCUITS						Semester:	IV
Hrs/Week:	5	L	5	T	-	P	-	Credits:	5

COURSE OBJECTIVE:

1. To give the idea about fundamental properties of integrated circuits.
2. To prepare students to perform the analysis of any Analog electronics circuit.
3. To empower students to understand the design and working of Operational Amplifier.
4. To prepare the students for advanced courses in Communication system Circuit Design.

COURSE OUTCOMES (CO)

S. No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Review the fundamentals of integrated circuits anddesigning electronic circuits.	K1
CO2	Contrast the ability to apply the practice of AnalogIntegrated Circuits in real-world problems.	K2
CO3	Construct, layout, and testing of Op Amps and otheranalog circuits.	K3
CO4	Characterize, formulate, and solve engineering problems inAnalog Integrated Circuit Design.	K4

COURSE OUTCOMES (CO)

20ELU15	ANALOG INTEGRATED CIRCUITS	Sem: IV
Unit No.	Topics	Hours
I	**IC Fabrication Technology** Introduction – 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.	12
II	**OPERATIONAL AMPLIFIERS** Analysis of difference amplifiers, Monolithic IC operational amplifiers, specifications, frequency compensation, slew rate and methods of improving slew rate, Linear and Nonlinear Circuits using operational amplifiers and their analysis, Inverting and Non inverting Amplifiers.	12

III	**APPLICATIONS OF OPERATIONAL AMPLIFIERS** Differentiator, Integrator Voltage to Current convertor, Instrumentation amplifier, Sine wave Oscillators, Low pass and band pass filters, comparator, Multivibrator and Schmitt trigger, Triangle wave generator, Precision rectifier, Log and Antilog amplifiers, Non-linear function generator.	12
IV	**ANALOG MULTIPLIER AND PLL** Analysis of four quadrant and variable trans-conductance multipliers, Voltage controlled Oscillator, Closed loop analysis of PLL, AM, PM and FSK modulators and demodulators. Frequency synthesizers, Compander ICs	12
V	**SIGNAL GENERATORS & WAVEFORM SHAPING CIRCUITS** Wave shaping circuits, Multivibrator- Monostable & Bistable, Schmitt Trigger circuits, IC 555 Timer, Application of IC 555, Switched capacitor filter, Frequency to Voltage converters.	12

Teaching methods: Direct Instruction, Flipped Classrooms, Kinesthetic Learning, Differentiated Instruction, Inquiry-based Learning, Expeditionary Learning, Personalized Learning, Game-based Learning, Assignment, Discussion and Demonstration.

TEXT BOOKS

Text Book:

1. *Sergio Franco, " Design with operational amplifiers and analog integrated circuits ", McGraw Hill, 2002, ISBN 0070530440, 9780070530447*
2. *Ramakant A. Gayakwad, " OP – AMP and Linear IC's ", 4th Edition, Prentice Hall, 2000, ISBN 0132808684, 9780132808682*

REFERENCE BOOKS

Reference Books:

1. *Botkar K.R., " Integrated Circuits ", Khanna Publishers, 1996.*
2. *Taub and Schilling, " Digital Integrated Electronics ", Tata McGraw-Hill Education, 2004, ISBN 0070265089, 9780070265080*
3. *Millman J. and Halkias C.C., " Integrated Electronics ", McGraw Hill, 2001, ISBN 0074622455, 9780074622452*

WEB RESOURCES

Web Link:

https://nptel.ac.in/courses/117/106/117106030/
https://nptel.ac.in/courses/108/106/108106068/

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	M	S	M
CO3	S	S	M	S
CO4	S	M	M	M

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

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Course Code:	20ELU16	Course Title						Batch:	2020-2021 & Onwards
		INSTRUMENTS AND MEASUREMENTS						Semester:	IV
Hrs/Week:	5	L	5	T	-	P	-	Credits:	4

COURSE OBJECTIVE

1. Describe mathematically and physically the designed measuring instruments and their use for Measurements
2. Express the integration of transducers with analog and digital hardware and use of software to achieve required output for measurement system.
3. Analyze the design of instruments and measurement of parameters using instruments.
4. Design a variety of electronic instruments and measuring systems used in different field

COURSE OUTCOMES (CO)

S. No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Index the performance characteristics of each instrument	K1
CO2	Summarize basic meters and explain about different types ofsignal analyzers	K2
CO3	Examine the basic features of oscilloscope and differenttypes of oscilloscopes	K3
CO4	Illustrate the complete knowledge of various electronics instruments/transducers to measure the physical quantities in the field of science, engineering and technology	K4

SYLLABUS

20ELU16	INSTRUMENTS AND MEASUREMENTS	Sem: IV
Unit No.	**Topics**	**Hours**
I	**TRANSDUCERS:** Classification of transducers – Strain Gauge – Gauge factor ,Gauge configuration – Bonded &Unbonded Strain gauge - Displacement transducer – Capacitive, Inductive, Piezoelectric , Potentiometric and velocity transducer – resistance thermometer- Thermocouple – Thermistor **PHOTO SENSITIVE DEVICE** :Phototubes - Photoconductive cells – Photovoltaic cells – Phototransistor – Photo diode – Optically coupled isolators	12
II	**MEASURING INSTRUMENTS** PMMC meter – Digital voltmeter – Electronic multi meter – Distortion factor meter – Q meter – CRO: Block diagram – CRT – Horizontal and vertical deflection systems – Amplitude, Frequency and Phase shift measurements – Storage oscilloscopes – CRT Screen.	12

III	**SIGNAL GENERATION AND WAVE ANALYSIS** Pulse and square wave generator – Audio frequency signal generator – Function generator – video pattern generator – Sweep generator – Marker generator –Spectrum Analyzer -Frequency Selective analyzer – Heterodyne wave analyzer.	12
IV	**DATA ACQUISTION SYSTEMS** Factors involved in designing a data acquisition system – Single channel system – Multi Channel system – Isolation amplifier – Digital to Analog multiplexing - Analog to Digital multiplexing – Spatial encoder – Sample and Hold systems – Introduction to PC based data acquisition systems.	12
V	**DIGITAL INSTRUMENTATION** Digital clock – Washing machine – Microwave oven - Installation & Maintenance of Electronic ignition systems – Photo copier – Hearing aid – Electronic calculator – Frequency counter – Organization of programmable logic controllers (PLC).	12

Teaching methods: Direct Instruction, Flipped Classrooms, Kinesthetic Learning, Differentiated Instruction, Inquiry-based Learning, Expeditionary Learning, Personalized Learning, Game-based Learning, Assignment, Discussion and Demonstration.

TEXT BOOKS

Text Books:

1. *C.S.Rangan, G.R.Sarma&V.S.Mani, :" INSTRUMENTATION DEVICES & SYSTEMS " TMH II Ed*
2. *D.Cooper& Albert D.Helfrick , " MODERN ELECTRONIC INSTRUMENTATION & MEASUREMENT TECHNIQUES ", Prentice Hall of India , 2001.*

REFERENCE BOOKS

Reference Books:

1. *R.G.Gupta , " ELECTRONIC INSTRUMENTATION & SYSTEMS ", TataMcGraw Hill 2001.*
2. *Tokheim, 'DIGITAL ELECTRONICS – PRINCIPLE & APPLICATION "TMH - VI edition.*

WEB RESOURCES

Web Link:

https://nptel.ac.in/courses/112/107/112107242/

https://www.youtube.com/watch?v=d2Mi2HGBs6o

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	M	S	M
CO3	S	S	M	M
CO4	S	M	M	M

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
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Course Code:	20ELU17	Course Title						Batch:	2020-2021 & Onwards
		PYTHON PROGRAMMING						Semester:	IV
Hrs/Week:	5	L	5	T	-	P	-	Credits:	4

COURSE OBJECTIVE:

1. To understand why Python is a useful scripting language for developers.
2. Learn how to design and program Python applications.
3. To learn how to use lists, tuples, and dictionaries in Python programs.
4. Identify Python object types.

COURSE OUTCOMES (CO)

S. No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Tabulate the pros and cons on scripting languages vs.classical programming Languages (at a high level).	K1
CO2	Interact the object-oriented programming, create andexecute Python programs	K2
CO3	Examine data using appropriate Python visualization libraries.	K3
CO4	Figure out python programming skills in real life applications.	K4

SYLLABUS

20ELU17	PYTHON PROGRAMMING	Sem: IV
Unit No.	Topics	Hours
I	**ALGORITHMIC PROBLEM SOLVING** Algorithms-building blocks of algorithms (statements, state, control flow, functions)- notation (pseudo code, flow chart, programming language) - algorithmic problem solving - simple strategies for developing algorithms (iteration, recursion) - Illustrative problems: find minimum in a list - insert a card in a list of sorted cards - guess an integer number in a range - Towers of Hanoi.	12
II	**DATA, EXPRESSIONS, STATEMENTS** Python interpreter and interactive mode - values and types: int – float – Boolean – string - and list; variables – expressions – statements - tuple assignment - precedence of operators - comments; modules and functions - function definition and use – flow of execution - parameters and arguments; Illustrative programs: exchange the values of two variables - circulate the values of n variables - distance between two points.	12

III	**CONTROL FLOW, FUNCTIONS** Conditionals: Boolean values and operators - conditional (if) - alternative (if-else) - chained conditional (if-elif-else) - Iteration: state – while – for – break – continue – pass - Fruitful functions: return values – parameters - local and global scope - function composition – recursion - Strings: string slices – immutability - string functions and methods - string module - Lists as arrays - Illustrative programs: square root – gcd - exponentiation - sum an array of numbers - linear search - binary search.	12
IV	**LISTS, TUPLES, DICTIONARIES** Lists: list operations - list slices - list methods - list loop – mutability – aliasing - cloning lists - list parameters - Tuples: tuple assignment - tuple as return value - Dictionaries: operations and methods - advanced list processing – list comprehension - Illustrative programs - selection sort - insertion sort – merge sort - histogram.	12
V	**FILES, MODULES, PACKAGES** Files and exception: text files - reading and writing files - format operator - command line arguments - errors and exceptions - handling exceptions – modules –packages - Illustrative programs - word count - copy file.	12

Teaching methods: Direct Instruction, Flipped Classrooms, Kinesthetic Learning, Differentiated Instruction, Inquiry-based Learning, Expeditionary Learning, Personalized Learning, Game-based Learning, Assignment, Discussion and Demonstration.

TEXT BOOKS:

Text Books:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3,Shroff/O 'Reilly Publishers, 2016 (http://greenteapress.com/wp/thinkpython/)

2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2,Network Theory Ltd., 2011.

REFERENCE BOOKS:

Reference Books:

1. John V Guttag, —Introduction to Computation and Programming Using Python '', Revised and expanded Edition,MIT Press, 2013

2. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-disciplinaryApproach, Pearson India Education Services Pvt. Ltd., 2016.

3. Timothy A. Budd, —Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd.,2015.

4. Kenneth A. Lambert, —Fundamentals of Python: First Programs‖, CENGAGE Learning,2012.

Computational Problem-Solving Focus, Wiley India Edition, 2013.
5. *Paul Gries, Jennifer Campbell and Jason Montojo, —Practical Programming: An Introduction to Computer Scienceusing Python 3|, Second edition, Pragmatic Programmers, LLC, 2013.*

WEB RESOURCES

Web Link:

https://nptel.ac.in/courses/106/106/106106182/

https://nptel.ac.in/courses/115/104/115104095/

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	S	M	S
CO2	S	S	S	M
CO3	S	M	S	S
CO4	S	M	M	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
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Coimbatore-641 028

Course Code:	20ELU18	Course Title						Batch:	2020-2021 & Onwards
		Practical V: DIGITAL AND ANALOG INTEGRATED CIRCUITS						Semester:	IV
Hrs/Week:	4	L	-	T	-	P	4	Credits:	2

COURSE OBJECTIVE:

1 . Enable the students to understand the various types of combinational circuits

2. Understand the various types of sequential circuits

3. Study the Operational amplifier characteristics and applications

4. To elaborate the concept of synthesis of sequential circuits.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Review the principles of analog and digital IC's	K1
CO2	Visualize the various digital ICs and understand theiroperation	K2
CO3	Manipulate the function of Boolean expressions, operational amplifiers and multiplexers.	K3
CO4	Illustrate Boolean laws and K-map to simplify the digitalcircuits.	K4

SYLLABUS

20ELU18	PRACTICAL – V: DIGITAL AND ANALOG INTEGRATED CIRCUITS	Sem: IV

Any 10 Experiments:

1. Verification of Basic Logic Gates and Universal Gates.
2. Verification of Boolean Laws and Demorgan's Theorem.
3. Parity Generator and Checker.
4. Half Adder and Full Adder.
5. Half Subtractor and Full Subtractor.

6. Multiplexer and De multiplexers.

7. Encoder and Decoder.

8. Flip Flops.

9. Analog to Digital Converter.

10. Digital to Analog Converter.

11. Inverting and Non-inverting Amplifier using Op-Amp.

12. Adder and Subtractor using Op-Amp.

13. Instrumentational Amplifier using Op-Amp.

14. Notch filter using Op-Amp.

15. Square Wave Generator using Op-Amp.

Teaching methods: Assignment, Discussion and Demonstration.

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	M	S	S
CO2	S	S	S	M
CO3	S	S	M	S
CO4	S	M	M	M

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
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Course Code:	20ELU19A	Course Title						Batch:	2020-2021 & Onwards
		Practical VI: COMMUNICATION SYSTEMS						Semester:	IV
Hrs/Week:	4	L	-	T	-	P	4	Credits:	2

COURSE OBJECTIVE:

1. To study the basic concept of communication and different modulation system based on basic parameters.
2. To study the concept of noise, properties & its effects.
3. To study the AM, FM, PM process & compute modulation Index.
4. To study the fundamentals of AM and FM Receivers.

COURSE OUTCOMES (CO)

S. No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Study the principles of wave propagation andcommunication system.	K1
CO2	Discuss the need of modulation and frequency spectrum ofPAM, PWM, & PPM.	K2
CO3	Demonstrate the practical knowledge about theories of analog &digital communication.	K3
CO4	Examine the analog and digital modulation scheme for real time knowledge transfer.	K4

SYLLABUS

20ELU19A	PRACTICAL – VI: COMMUNICATION SYSTEMS	Sem: IV

Any 10 Experiments:

1. Amplitude Modulation and Demodulation.
2. Frequency Modulation LM565/NE565.
3. PAM Modulation and Demodulation.
4. PWM Modulation and Demodulation.
5. PPM Modulation and Demodulation.
6. Voltage Controlled Oscillator using Timer.
7. ASK Generation and Detection.

8. FSK Generation and Detection.

9. PSK Generation and Detection.

10. BPSK & DPSK Generation and Detection.

11. QAM Generation and Detection.

12. Pulse Code Modulation and Demodulation.

13. Delta & Adaptive Delta Modulation and Demodulation.

14. Establishment of Analog Fiber Optic Link.

15. Establishment of Digital Fiber Optic Link.

Note: Practical Internal Examination: 40, External examination: 60, Total marks: 100.
Teaching methods: Assignment, Discussion and Demonstration.

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	S	M	S
CO2	S	S	S	M
CO3	S	M	S	S
CO4	S	M	M	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
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Coimbatore-641 028

Course Code:	20ELU19B	Course Title						Batch:	2020-2021 & Onwards
		Practical VI: PYTHON PROGRAMMING						Semester:	IV
Hrs/Week:	4	L	-	T	-	P	4	Credits:	2

COURSE OBJECTIVE:

1. Write, Test and Debug Python Programs
2. Implement Conditionals and Loops for Python Programs
3. Use functions and represent Compound data using Lists, Tuples and Dictionaries
4. Read and write data from & to files in Python and develop Application using PyCharm

COURSE OUTCOMES (CO)

S. No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Recognize the basics of Object-Oriented Skills in Python	K1
CO2	Elaborate the concepts of object-oriented programming as used in Python: classes, subclasses, inheritance, and overriding	K2
CO3	Manipulate the concepts of Object-oriented programming as used in Python using encapsulation, polymorphism and inheritance.	K3
CO4	Illustrate the capabilities of Python regular expression for data verification and utilize matrices for building performance efficient Python programs.	K4

SYLLABUS

20ELU19B	PRACTICAL – VI: PYTHON PROGRAMMING	Sem: IV

Any 10 Experiments:

1. Write Python program to print Hello World.
2. Write Python program to Hello World using string variable.
3. Write Python program to store data in list and then try to print them.
4. Write Python program to do basic trim and slice on string.

5. Write Python program to print list of numbers using range and for loop.

6. Write Python program to store strings in list and then print them.

7. Write Python program to let user enter some data in string and then verify data and print welcome to user.

8. Write Python program in which a function is defined and calling that function prints Hello World.

9. Write Python program in which a function(with single string parameter) is defined and calling that function prints the string parameters given to function.

10. Write Python program in which a class is define, then create object of that class and call simple print function define in class.

11. Find the maximum of a list of numbers.

12. Write a Python program to multiply matrices.

13. Write a Python program to find first n prime numbers.

14. Write a Python Program to perform selection sort.

15. Write a Python Program to perform Merge sort.

Teaching methods: Assignment, Discussion and Demonstration.

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4
CO1	S	M	S	S
CO2	S	S	M	S
CO3	S	M	S	S
CO4	S	M	M	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations

Course Designed by	Verified by HOD	Approved by CDC Coordinator
Mrs. S. SATHYADEVAN Name & Signature of the Staff	Dr. K. THANGAVEL Name & Signature	Name & Signature

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Hindusthan College of Arts & Science,
Coimbatore-641 028.

Course Code:	20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	Course Title						Batch:	2020-2021 & Onwards
		VAC: Mobile Phone Servicing						Semester:	I /II/III/IV/V/VI
Hrs/Week:	2	L	2	T	-	P	-	Credits:	1 / G

COURSE OBJECTIVE

The Course has been designed to provide knowledge on Mobile Phone Repair & Maintenance.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Understand the basic servicing skills and concept of mobile phones.	K1
CO2	Apply the electronics basic knowledge and service skills in mobile phone servicing.	K2
CO3	Analyze and find the common mobile phone problems.	K3
CO4	Implement the service knowledge in problem solving skills.	K4

SYLLABUS

20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	VAC: Mobile Phone Servicing	Sem: I/II/III/IV/V/VI
Unit No.	**Topics**	**Hours**
I	Introduction to mobile phones - Generations of mobile phones - Handset Specificoperating systems - Handset features & applications - working principle of mobile handset - Components used in mobile handsets.	6
II	Tools - equipment used for repairing - maintenance of mobile handsets - types ofpower supply – batteries - boosting a battery - Troubleshooting basics.	6
III	Network problems - Power failure (dead) - Mobile phone hardware troubleshooting (water damage – hanging - charging & keypad problems), Handsets assembly - disassembly - Soldering & desoldering.	6
IV	BGA IC's - Basics of Computer - Installation of software – Flashing - PC baseddiagnostic tools – mobile sets formatting – use of secret codes.	6
V	Mobile software's - Data cable - Card reader - Mobile display -Remove/replace Component & Mobile phone hardware troubleshooting (Troubleshooting through circuit diagram, transmission -transmitter filter – microphone –reception - Antenna - RF power amplifier - local oscillator - Audio IC – speaker and charger.	6

Teaching methods: < Lecturing, Lecture imposed with questions, PowerPoint Projection through LCD, Assignment, Discussion, Seminar, Buzzles and Quiz>

TEXT BOOKS

1. *Mobile Communication- Jochen Schiller- Person Education Ltd. (UNIT I, II&III)*
2. *Modern Mobile Phone Repair: Using Computer Software and Service Devices- M. Lotia, Pradeep Nair- BPB Publications. (UNIT IV &V).*

REFERENCE BOOKS

1. Mobile Computing Technology, Application And Service Creation – AsokeKTalukder,RoopaR. Yavagal.

WEB RESOURCES

Web Link:

1. https://nptel.ac.in/courses/106/105/106105166/
2. https://nptel.ac.in/content/storage2/courses/106105080/pdf/M5L9.pdf

MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	S	M	M
CO3	S	S	M	S
CO4	S	M	S	L

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of internal assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
MS. MAHISHAMOHAN Name & Signature of the Staff	Dr. K. THANGAVEL Name & Signature	Name & Signature

Head of the Department
Department of Electronics
Hindusthan College of Arts & Science
Coimbatore-641 028

Coordinator
Curriculum Development Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

Course Code:	20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	Course Title						Batch:	2020-2021 & Onwards
		VAC: PCB Design Using Electronic Tool						Semester:	I /II/III/IV/V/VI
Hrs/Week:	2	L	2	T	-	P	-	Credits:	1 / G

COURSE OBJECTIVE

To enable the students to learn the design concept of PCB and become familiarize in PCB fabrication

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Understand the steps involved in schematic, layout, fabrication and assembly process of PCB design.	K1
CO2	Understand concepts of layout planning, basic printing process.	K2
CO3	Analyze and Design (schematic and layout) PCB for analog circuits, digital circuits and mixed circuits.	K3
CO4	Design (schematic and layout) and fabricate PCB for simple circuits.	K4

SYLLABUS

20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	VAC: PCB Design Using Electronic Tool	Sem: I/II/III/IV/V/VI
Unit No.	**Topics**	**Hours**
I	Single sided board – double sided – Multilayer boards – Plated through -holes technology – Benefits of Surface Mount Technology (SMT).	6
II	Layout Planning – General rules of Layout – Resistance, Capacitance andInductance – Conductor Spacing – Supply and Ground Conductors.	6
III	Manufacture of copper clad laminates – Properties of laminates – Types of Laminates – Manual cleaning process – Basic printing process for double sided PCB's – Photo resists.	6
IV	Introduction – Etching machine – Etchant system. Soldering: Principles of Solder connection – Solder joints – Solder alloys – Soldering fluxes Soldering Tools: Soldering, Desoldering tools and Techniques	6

V	Reflection – Crosstalk – Ground and Supply line noise – Electromagnetic interference from pulse type EM fields and automation – Automated artwork drafting – CAD.	6

Teaching methods: < Lecturing, Lecture imposed with questions, PowerPoint Projection through LCD, Assignment, Discussion, Seminar, Buzzles and Quiz>

TEXT BOOKS

1. Printed circuit Board – Design & Technology by Walter C. Bosshart, Tata McGraw Hill(UNIT-1-IV)

2.Printed Circuit Board –Design, Fabrication, Assembly & Testing, R.S. Khandpur, TATA McGrawHill Publisher. (UNIT-V)

REFERENCE BOOKS

1.Clyde F.Coombs "Printed Circuits Handbook" McGrawhill , 7th Edition, 2016.

2.R.G.Gupta "Electronic instruments and system" Tata McGraw Hill Publication. NewDelhi, 2001.

WEB RESOURCES

1. *https://www.ee.iitb.ac.in/~pcpandey/courses/ee616/pcblayout_c_aug07.pdf*
2. *https://www.coursera.org/lecture/tinkering-circuits/making-circuit-boards-ZMJYT*

MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	M	S
CO2	S	M	M	M
CO3	S	S	M	M
CO4	S	M	S	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of internal assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
MRS. S SATHYADEVAN Name & Signature of the Staff	DR. K. THANGAVEL Name & Signature	Name & Signature

Coordinator
Curriculum Development Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

Head of the Department
Department of Electronics
Hindusthan College of Arts & Science
Coimbatore-641 028

Course Code:	20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	Course Title						Batch:	2020-2021 & Onwards
		VAC: Energy Science						Semester:	I /II/III/IV/V/VI
Hrs/Week:	2	L	2	T	-	P	-	Credits:	1 / G

COURSE OBJECTIVE

To make the students to understand the different form of energy and the sources.

COURSE OUTCOMES (CO)

S. No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Understand the concept of energy and sources	K1
CO2	Analyze and convert the different form of energy	K2
CO3	Interpret the features of Electromagnetic energies and functions	K3
CO4	Student can able to apply knowledge over the energy conversion process and machines	K4

SYLLABUS

20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	VAC: Energy Science	Sem: I/II/III/IV/V/VI
Unit No.	**Topics**	**Hours**
I	**Energy and its Usage:** Units and scales of energy Mechanical energy and transport -**Heat energy**: Conversion between heat and mechanical energy.	6
II	**Electromagnetic energy:** Storage – Conversion - Transmission and radiation - AC and DC - **Solar Energy:** Introduction to solar energy - Fundamentals of solarradiation and its measurement aspects	6
III	**Energy in chemical systems and processes:** flow of CO_2 - Entropy and temperature -carnot and Stirling heat engines - **Phase change:** Energy conversion - Refrigeration and heat pumps - Internal combustion engines - Steam and gas power cycles.	6
IV	**Conventional & non-conventional energy source:** Biological energy sources and power in the wind - Available resources – fluids – Viscosity - Types of fluid flow - Wind turbine dynamics and design - Wind farm - Geothermal power	6

V	**Energy needs:**Overview of World Energy Scenario - Nuclear radiation - Fuel cycles - Waste and proliferation - Climate change - Energy storage - Energy conservation.	6

Teaching methods: < Lecturing, Lecture imposed with questions, PowerPoint Projection through LCD, Assignment, Discussion, Seminar, Buzzles and Quiz>

TEXT BOOKS

1. *Energy and the Challenge of Sustainability, World Energy Assessment, UNDP, New York, (2000).*
2. *Physics of Solar Cells: From Basic Principles to Advanced Concepts by Peter Wurfel, John Wiley &Sons, 2016.*

REFERENCE BOOK

1. *Energy Conversion by D. Yogi Goswami, Frank Kreith - CRC Press, 2017.*

WEB RESOURCES

Web Link: *https://www.energy.gov/eere/education/eere-energy-101-video-series*

MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	S	S	M
CO3	S	S	M	S
CO4	S	M	S	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
Dr. R. PREMA Name & Signature of the Staff	Dr. K. THANGAVEL Name & Signature	Name & Signature

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Coordinator
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Hindusthan College of Arts & Science
Coimbatore-641 028.

Course Code:	20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	Course Title						Batch:	2020-2021 & Onwards
		VAC: Photovoltaic Systems						Semester:	I /II/III/IV/V/VI
Hrs/Week:	2	L	2	T	-	P	-	Credits:	1 / G

COURSE OBJECTIVE

Identify common types of PV system applications for both stand-alone and utility interactive systems with andwithout energy storage.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Identify the various safety hazards associated with both operation and nonoperation PV systems and components.	K1
CO2	Understand the meaning of basic electrical parameters including electrical charge, current, voltage, and power.	K2
CO3	Interpret and analyze the difference between electrical power (rate of work performed) and energy (total work performed).	K3
CO4	Demonstrate and determine the requirements for charge control in battery-based PV systems, based on system voltages.	K4

SYLLABUS

20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	VAC: Photovoltaic Systems	Sem: I /II/III/IV/V/VI
Unit No.	**Topics**	**Hours**
I	Photovoltaic Introduction-Fossil Fuel Energy Usage - Global Warming - Role ofRenewable Energy in Sustainable Development - Renewable Energy Sources - Global Potential For Solar Electrical Energy Systems - Solar Radiation.	6
II	Solar Radiation-Extra-Terrestrial and Terrestrial Solar Spectrum - Clear Sky Direct-Beam Radiation - Total Clear Sky Insulation on A Collecting Surface - Radiation on The Collector in Tracking Systems - Calculation of Average Monthly Insolation from Measured Data.	6
III	Photovoltaic cell and its simple model - i-v and p-v characteristics - pv modules and arrays - effect of shading - use of bypass and blocking diodes - influence oftemperature - types of solar cells and their performance.	6
IV	Grid-connected single phase pv inverter schemes and control - power processing schemes based on single string - multi-string and ac module technologies - typesof grid interface - power electronic converters used in single phase pv systems.	6

V	Power processing schemes and control for stand-alone applications - batteries for energy storage – types – charging -battery sizing and turn-around efficiency -other types of energy storage for pv systems.	**6**

Teaching methods: < Lecturing, Lecture imposed with questions, PowerPoint Projection through LCD, Assignment, Discussion, Seminar, Buzzles and Quiz>

TEXT BOOKS

1. *StudyoftheMPPtrackingalgorithms: Focusing the numeric al method techniques. A.Amira, A.Amira, JSelvaraja, N.A.Rahima. .(UNIT I,II &III)*
2. *Overview of Maximum Power Point Tracking Techniques for Photovoltaic Energy Production Systems.Ekoutrolis,Fblaabjerg. (UNIT IV & V)*

REFERENCE BOOKS

1. *Planning and installation photovoltaic system. Earthscan expert handbook.*

WEB RESOURCES

1. **https://nptel.ac.in/courses/117/108/117108141/**
2. https://onlinecourses.nptel.ac.in/noc20_ee57/preview

MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	M	M	S
CO2	S	S	S	M
CO3	S	S	M	M
CO4	S	M	S	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of internal assessment, suggested in the regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
Dr. K. THANGAVEL Name & Signature of the Staff	Dr. K. THANGAVEL Name & Signature	Name & Signature

Co-ordinator
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Head of the Department
Department of Electronics
Hindusthan College of Arts & Science
Coimbatore-641 028

Course Code:	20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	Course Title						Batch:	2020-2021 & Onwards
		VAC: Basic Networking						Semester:	I /II/III/IV/V/VI
Hrs/Week:	2	L	2	T	-	P	-	Credits:	1 / G

COURSE OBJECTIVE

This Course has been designed to provide knowledge on computer networks.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Understand the basics of OSI Model and network topologies.	K1
CO2	Analyze the requirements for a given organizational structure and its appropriate networking architecture and technologies.	K2
CO3	Apply the basic knowledge of the use of cryptography and network security.	K3
CO4	Evaluate and understand the issues surrounding Mobile and Wireless Networks.	K4

SYLLABUS

20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 //	VAC: Basic Networking	Sem: I /II/III/IV/V/VI
Unit No.	**Topics**	**Hours**
I	Photovoltaic Introduction-Fossil Fuel Energy Usage - Global Warming - Role of Renewable Energy in Sustainable Development - Renewable Energy Sources - Global Potential for Solar Electrical Energy Systems - Solar Radiation.	6
II	Solar Radiation-Extra-Terrestrial and Terrestrial Solar Spectrum - Clear Sky Direct-Beam Radiation - Total Clear Sky Insulation on A Collecting Surface - Radiation on The Collector in Tracking Systems.	6
III	Photovoltaic cell and its simple model - i-v and p-v characteristics - pv modulesand arrays - effect of shading - use of bypass and blocking diodes - influence of temperature - types of solar cells and their performance - schemes for maximum power point tracking - solar pv concentrators.	6
IV	Grid-connected single phase pv inverter schemes and control - power processing schemes based on single string - multi-string and ac module technologies - types of grid interface - power electronic converters used in single phase pv systems.	6
V	Power processing schemes and control for stand-alone applications - batteries forenergy storage – types – charging -battery sizing and turn-around efficiency - other types of energy storage for pv systems- grid connected schemes with standby energy storage.	6

Teaching methods: < Lecturing, Lecture imposed with questions, PowerPoint Projection through LCD, Assignment, Discussion, Seminar, Buzzles and Quiz>

TEXT BOOKS

1. *Behrouz and Forouzan, "Data Communications and Networking", 2nd Edition, Tata McGraw Hill, 2007.(UNIT I-IV).*
2. *Andrew.S.Tenenbaum, "Computer Networks" ,4th Edition, Prentice Hall of India, 2008. (UNIT V).*

REFERENCE BOOKS

1. *WilliamStallings, "Data and Computer Communication ", 6th Edition, Pearson Education.*

WEB RESOURCES

1. *https://nptel.ac.in/courses/106/105/106105183/*
2. *https://nptel.ac.in/courses/106/106/106106091/*

MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	M	M	S
CO2	S	S	S	M
CO3	S	S	M	M
CO4	S	M	S	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of internal assessment, suggested in the regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
Mr. M. KUMARESAN Name & Signature of the Staff	Dr. K. THANGAVEL Name & Signature	Name & Signature

Head of the Department
Department of Computer Sciences
Hindusthan College of Arts & Science
Coimbatore-641 028

Co-ordinator
Curriculum Development Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

Course Code:	20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	Course Title						Batch:	2020-2021 & Onwards
		VAC: PC Hardware Assembling and Trouble Shooting						Semester:	I /II/III/IV/V/VI
Hrs/Week:	2	L	2	T	-	P	-	Credits:	1 / G

COURSE OBJECTIVE

The Course has been designed to provide knowledge on PC, laptop repair & Maintenance.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Understand and explain the basic concepts associated with the different branches of hardware (motherboard, printer, memory).	K1
CO2	Understand and be able to describe the differences between the various parts used in motherboard.	K2
CO3	Analyze and implement the assembling and troubleshooting procedures.	K3
CO4	Design and implement the pc hardware and software.	K4

SYLLABUS

20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	VAC: PC Hardware Assembling and Trouble Shooting	Sem: I /II/III/IV/V/VI
Unit No.	**Topics**	**Hours**
I	Introduction to Computer Hardware - Common PC errors (Interactive discussion) -Types of Personal computers -Identifying key parts of a Personal Computer -Basic Software components -Overview of PC Operation.	6
II	CPU case and power supply - Types of PC case - Functions of a CPU Case Front Panel connectors - Removing CPU Case - Cleaning the PC case PC Cooling System.	6
III	The processor - CPU socket/slot types - Comparing different types of CPU (AMD / INTEL) - How to identify CPUs physically - Physical installation of CPU - Installing CPU fan - CPU Benchmarking.	6
IV	The motherboard- Types of motherboards - Motherboard layout, form factors -Motherboard Identification - Motherboard components - ROM BIOS - Motherboard BUSSES.	6
V	PC hardware servicing -PC Troubleshooting strategy - Designing a Determining common causes of failures - Finding and isolating the board with the problem.	6

Teaching methods: < Lecturing, Lecture imposed with questions, PowerPoint Projection through LCD, Assignment, Discussion, Seminar, Buzzles and Quiz>

TEXT BOOKS

1. *Vishnu P. Sing, Computer Hardware and Networking, Computech Publications, 2ND edition.*
2. *ManaharLotia, Pradeep Nair and PayalLotia, Modern Computer Hardware Course, BPB Publications; Second Revised & Updated Edition 2007 edition.*

REFERENCE BOOKS

1. *Arihant Experts, Objective Computer Awareness, Arihant Publication; Eight edition.*
2. *B N Bennoach, How to Build a Computer: Building Your Own PC - The Easy, Step-By-Step Guide to Building the Ultimate, Custom Made PC.*

WEB RESOURCES

1. https://nptel.ac.in/courses/106/105/106105194/
2. https://nptel.ac.in/courses/106/106/106106092/

MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	S	S	M
CO3	S	S	M	S
CO4	S	M	S	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
Mrs. S. SATHYADEEPA Name & Signature of the Staff	Dr. K. THANGAVEL Name & Signature	Name & Signature

Head of the Department
Department of Electronics
Hindusthan College of Arts & Science
Coimbatore-641 028

Curriculum Development Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

Course Code:	20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	Course Title						Batch:	2020-2021 & Onwards
		VAC: Data Science						Semester:	I /II/III/IV/V/VI
Hrs/Week:	2	L	2	T	-	P	-	Credits:	1 / G

COURSE OBJECTIVE

This course describes and introduce R as a programming language and mathematical foundations required for datascience.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Understand the basics of data science.	K1
CO2	Analyze and interpret data using an ethically responsible approach.	K2
CO3	Interpret and analysis, assess the quality of input, derive insight from results, and investigate potential issues.	K3
CO4	Apply computing theory, languages, and algorithms, and statistical models, in data analyses.	K4

SYLLABUS

20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	VAC: Data Science	Sem: I /II/III/IV/V/VI
Unit No.	**Topics**	**Hours**
I	Introduction to R – Variables and data types in R - Data frames – recasting and Joining of data frames- Arithmetic, Logical and Matrix operations in R. – Controlstructures.	6
II	Linear algebra and Data science - Solving linear equations – Linear algebra Distance – Hyperplanes – Half spaces – Eigenvalues - Eigenvectors.	6
III	Statistical modelling - Random variables and probability mass/ density functions – Sample statistics – Hypothesis testing.	6
IV	Multivariate optimization with equality constraints - Multivariate optimization with inequality constraints – Solving data analysis problems.	6
V	Linear regression – Model assessment – Diagnostic to improve linear model fit – Simple linear regression model building - Simple linear regression model assessment – Multiple linear regression	6

Teaching methods: < Lecturing, Lecture imposed with questions, PowerPoint Projection through LCD, Assignment, Discussion, Seminar, Buzzles and Quiz>

TEXT BOOKS

1. *Roger D. Peng, "R Programming for Data Science", Lean Publishing, (2015), ISBN:9781365056826, 1365056821.*
2. *Winston Chang, "R Graphics Cookbook", O'Reilly Media, Inc., (2012), ISBN:9781449363086.*

REFERENCE BOOK

1. *Using R for Introductory Statistics by John Verzani, CRC Press, 2004.*

WEB RESOURCES

1. *https://nptel.ac.in/courses/106/106/106106179/*
2. *https://nptel.ac.in/courses/106/106/106106212/*

MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	M	S	S
CO2	S	S	S	S
CO3	S	S	M	M
CO4	S	M	S	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of internal assessment, suggested in the regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
MS. MOHITHA MOHAN Name & Signature of the Staff	Dr. K. THANGAVEL Name & Signature	Name & Signature

Head of the Department
Department of Electronics
Hindusthan College of Arts & Science
Coimbatore-641 028

Co-ordinator
Curriculum Development Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

Course Code:	20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	Course Title						Batch:	2020-2021 & Onwards
		VAC: Lab View						Semester:	I /II/III/IV/V/VI
Hrs/Week:	2	L	2	T	-	P	-	Credits:	1 / G

COURSE OBJECTIVE

To enable the student on how to approach for solving Engineering problems using simulation tools and to preparethe students to use LABVIEW in their project works.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Understand the concept of Programming.	K1
CO2	Analyze and synthesize the programming methodologies and data types.	K2
CO3	Interpret the features of functions and Structures.	K3
CO4	Design and implement simple programs on Constructors, Inheritance and Pointers.	K4

SYLLABUS

20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	VAC: Lab View	Sem: I /II/III/IV/V/VI
Unit No.	**Topics**	**Hours**
I	Lab view introduction - The LabVIEW Programming Environment - Controls/ Indicators Programming Structures and Examples – Auto indexing - Creating Subvi's – Debugging - Timing issues (counters).	6
II	Importing pictures – Structures - GPIB setup / IBIC - 488 vs. 488.2 commandsStrings - GPIB serial poll byte - Timing of VI's - Testing Device Status - File I/O.	6
III	RS 232 - Attribute nodes (graphs) - Saving front panels - Turning on / off controls/ indicators – Menus - Idiot proofing.	6
IV	DAQ boards analog I/O - DAQ boards digital I/O - Real-Time ControlSystems - Guest Lecturer: Prof. Timothy Chang.	6
V	LabVIEW Advanced Topics (ActiveX) - Advanced Topics – FFT - FrequencyFilters - Time Domain Filters - Final Project.	6

Teaching methods: < Lecturing, Lecture imposed with questions, PowerPoint Projection through LCD, Assignment, Discussion, Seminar, Buzzles and Quiz>

TEXT BOOKS

1. *Chapra, Steven C. (2018). Applied Numerical Methods with MATLAB for Engineers and Scientists (4th ed.). McGraw-Hill Education. (UNIT-I-IV)*
2. *Fausett, Laurene V. (2009). Applied Numerical Analysis Using MATLAB. Pearson.India.(UNIT-V)*

REFERENCE BOOK

1. Jain, M. K., Iyengar, S. R. K., & Jain R. K. (2012). Numerical Methods for Scientific

WEB RESOURCES

1. https://nptel.ac.in/courses/103/106/103106118/
2. https://nptel.ac.in/content/storage2/courses/103106118/Week%20-%201/1_MATLAB_Basics.pdf

MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	S	S	M
CO3	S	S	M	S
CO4	S	M	S	S

S-Strong, M- Medium, L – Low ,

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
Dr. R. PREMA Name & Signature of the Staff	Dr. K. THANGAVEL Name & Signature	Name & Signature

Co-ordinator
Curriculum Development Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

Head of the Department
Department of Electronics
Hindusthan College of Arts & Science
Coimbatore-641 028

Course Code:	20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	Course Title						Batch:	2020-2021 & Onwards
		VAC: Object Oriented Programming with C++						Semester:	I /II/III/IV/V/VI
Hrs/Week:	2	L	2	T	-	P	-	Credits:	1 / G

COURSE OBJECTIVE

To import the concepts of Object-Oriented Programming using C++ and equip the students to develop programming skills.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Understand the concept of Programming.	K1
CO2	Analyze and synthesize the programming methodologies and data types.	K2
CO3	Interpret the features of functions and Structures.	K3
CO4	Design and implement simple programs on Constructors, Inheritance and Pointers.	K4

SYLLABUS

20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 //	VAC: Object Oriented Programming with C++	Sem: I /II/III/IV/V/VI
Unit No.	**Topics**	**Hours**
I	Evolution of Programming Methodologies-Introduction to OOP and its basic features - Basic components of a C++ - Program and program structure - Compiling and Executing C++ Program - Selection control statements in C++.	6
II	Data types - Expression and control statements - Iteration statements in C++ - Introduction to Arrays -Multidimensional Arrays – Strings.	6
III	Functions - Passing Data to Functions - Scope and Visibility of variables in Functions - Structures in C++.	6
IV	Classes objects - Data members - Member functions - Friends - Friend Functions - Friend Classes - Friend Scope -Static Functions.	6
V	Constructors and Destructors - Static variables and Functions in class - Operator Overloading in C++ - Inheritance - Pointers.	6

Teaching methods: < Lecturing, Lecture imposed with questions, PowerPoint Projection through LCD, Assignment, Discussion, Seminar, Buzzles and Quiz>

TEXT BOOK

1. E.Balagurusamy , "Object-oriented programming with C++" , Tata McGraw Hill Publication, 2nd Edition. (Unit–I to V)

REFERENCE BOOK

1. Robert Lafore , "Object-oriented programming in Turbo C++", Galgotia Publication, 4th Edition.

WEB RESOURCES

1. https://nptel.ac.in/courses/106/101/106101208/
2. https://onlinecourses.nptel.ac.in/noc19_cs39/preview

MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	S	S	M
CO3	S	S	M	S
CO4	S	M	S	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
Mr. M. Kumaresan Name & Signature of the Staff	Dr. K. Thangavel Name & Signature	Name & Signature

Curriculum Development Cell
Hindusthan College of Arts & Science
Coimbatore-641 028.

Course Code:	20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 /	Course Title						Batch:	2020-2021 & Onwards
		VAC: Arduino Programming						Semester:	I /II/III/IV/V/VI
Hrs/Week:	2	L	2	T	-	P	-	Credits:	1 / G

COURSE OBJECTIVE

To import the concepts of Sensors and Program the Arduino with latest applications and equip the programming skills.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Understand the concept of sensors.	K1
CO2	Analyze and amalgamate the programming methodologies	K2
CO3	Interpret the features of. Sensors with Arduino	K3
CO4	Design and implementation various applications	K4

SYLLABUS

20ELUV01 / 20ELUV02 / 20ELUV03/ 20ELUV04 / 20ELUV05 / 20ELUV06 //	VAC: Arduino Programming	Sem: I /II/III/IV/V/VI
Unit No.	**Topics**	**Hours**
I	Microcontroller - Install the Software - The Integrated Development Environment (IDE) - Our first circuit-Updated Circuit-Our First Program-Comments- Gotchas	7
II	"Blinky" - IF Statements - ELSE Statements- WHILE statements - What is truth(true) - Combinations - FOR statements - Our New Circuit - Introducing Arrays	7
III	Input - Pushbuttons- Potentiometers - RGB LEDs- Sound Circuit - Simple note -Music - Music with functions – Making a digital thermometer - Serial Monitor - Measuring the temperature - Hooking up the LCD - Talking to the LCD - Bringing it all together	6
IV	Introduction - Photo Cell (Light Sensor) - Tilt Sensor Reed Switch (MagneticField Detector) - Piezo Element (Vibration sensor)	6
V	One Servo - Joystick Pan/Tilt bracket - Adding a firing mechanism	4

Teaching methods: < Lecturing, Lecture imposed with questions, PowerPoint Projection throughLCD, Assignment, Discussion, Seminar, Buzzles and Quiz>

TEXT BOOK

1. "Introduction to "Arduino", Alan G. Smith,2011, ISBN: 1463698348 and ISBN-13: 978-1463698348. .(Unit–I to V)

REFERENCE BOOK

1.Beginning C for Arduino, Second Edition: Learn C Programming for the Arduino 2nd ed. Editionby Jack Purdu

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WEB RESOURCES

1. *https://store.arduino*

MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	S	S	M
CO3	S	S	M	S
CO4	S	M	S	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of internal assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Coordinator
Mrs. M. KUMARESAN Name & Signature of the Staff	Dr. K. THANGAVEL Name & Signature	Name & Signature

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