

G.Venkataswamy Naidu College (Autonomous), Kovilpatti-628501

(Re - Accredited With “A” Grade By NAAC)

Department Of Electronics

Vision:

- To enrich our students with technical skills in electronics to meet the global challenges.

Mission:

- To equip the students compatible with recent trends in Electronic industries.
- To educate the students with strong foundations to enable them for continuing education.

Programme Outcomes - (PO) (Aligned with Graduate Attributes)

At the completion of the Undergraduate Programme, the student will be able to accomplish the following outcomes:

- PO1** Ability to apply the knowledge of mathematics & technology in solving problems and conduct Electronics experiments to analyze and interpret data.
- PO2** Identify, formulate and analyze various aspects of circuit designing in Electronics.
- PO3** Build the capacity to rectify the problems in design and manage Electronic systems.
- PO4** Ability to use techniques, skills and modern technological and scientific software tools for professional practices.
- PO5** Ability to communicate effectively in order to provide solutions for the existing problems and propose electronic system designs.
- PO6** Work as a team to identify problems in the areas of communication and embedded systems and provide efficient solutions using modern electronics practices.
- PO7** Recognize the need for change and engage students in lifelong learning.

Programme Educational Objectives (PEOs)

The objectives of this Programme is to equip/prepare the students

- PEO1** Students acquire an in depth understanding with sound background in the field of Electronics and designing new products and develop novel technology, cost effective and socially acceptable solutions for the welfare of the society.
- PEO2** To inculcate in students a desire to be innovative and passionate about excelling in the field of Electronics and transform them to pursue higher studies in the subject.
- PEO3** To develop managerial and soft skills so that they become confident and competent enough to take challenging responsibilities and leadership roles in the industry & corporate to prove themselves.

Programme Specific Outcome:

- PSO1** Design, implement and test Electronics and Communication systems using analytical knowledge with the available modern hardware and software tools.
- PSO2** Develop the skills of students in problem solving techniques and assess the social and environmental issues by embedding the ethics and manage different projects in multidisciplinary areas.
- PSO3** Ability to make use of acquired technical knowledge for successful career and qualify for the competitive examinations at the National and Global levels.

Graduates Attributes in B.Sc., Electronics

Graduates Attributes (GAs) form a set of individually assessable outcomes that are the components indicative of the graduate's potential to acquire competence to practice at the appropriate level. The Graduate Attributes of B.Sc. Electronics are listed below:

- GA1 Scholarship of Knowledge:** Acquire in-depth knowledge of electronics discipline, including wider and global perspective, with an ability to discriminate, evaluate, analyze and synthesize existing and new knowledge.
- GA2 Critical Thinking:** Provide technological input by focusing on the professional skills and widen their ability through the practical experiments on recent electronics advances and induce their critical and creative skills.
- GA3 Problem Solving:** Create stronger platform by providing original, conceptual and scientific electronic tools and there by arrive at a feasible optimal solutions in the core areas of expertise to design and manage electronic systems.
- GA4 Usage of modern tools:** Educate students with the appropriate scientific and technological resources such as Electronic Computer-Aided Design tools, Arduino IDE, etc., to understand, analyse, evaluate and create modern gadgets to solve complex activities in the field of electronics.
- GA5 Communication:** Build the confidence level of students by creating a productive learning environment to communicate with the society at large, comprehend and design necessary activities for the effective presentation and give/receive accurate information and instructions in the field of Electronics.

GA6 Collaborative and Multidisciplinary work: Build the confidence level of the students by imbibing the moral and societal responsibilities by involving them in group projects and mould them into responsible citizens to create the new inventions in Electronics.

GA7 Ethical Practices and Life-long learning: Recognize the need for, and build the ability to create the life-long learning environment and integrate the professional and intellectual skills, ethics of research and research outcomes on professional practices in the field of Electronics, to contribute to the community for the sustainable development of the society.

G. VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS), KOVILPATTI
Programme Structure for Electronics
(For those admitted from the academic year 2023-24 and onwards)

Category	Course Type	Course Code	Course Title	Contact Hours	Exam Hours	Marks			Credit
						CIA	ESE	Total Marks	
Semester - I									
PART-I	Language	U23TA1L1	Tamil– I	6	3	25	75	100	3
PART-II	English	U23EN1L1	English - I	6	3	25	75	100	3
PART-III	Core-1	U23EL101	Electronics Devices	5	3	25	75	100	5
	Core-2 (Core Lab 1)	U23ELP1	Electronics Devices Lab	3	3	40	60	100	2
	Elective Generic -1	U23EL1A1	C Programming	4	3	25	75	100	3
	Elective Generic – Lab	U23EL1AP	Programming in C Lab	2	3	40	60	100	1
PART-IV	Skill Enhancement Courses SEC1 (NME – I)	U23EL1S1	Computer Hardware	2	-	50	-	50	2
	Foundation Course FC	U23FC101	Fundamental of Electronics	2	-	50	-	50	2
TOTAL				30				700	21
Semester - II									
PART-I	Language	U23TA2L2	Tamil– II	6	3	25	75	100	3
PART-II	English	U23EN2L2	English - II	6	3	25	75	100	3
PART-III	Core-3	U23EL202	Digital Electronics	5	3	25	75	100	5
	Core-4 (Core Lab 2)	U23EL2P2	Digital Electronics Lab	3	3	40	60	100	2
	Elective Generic -2	U23EL2A2	Python Programming	4	3	25	75	100	3
	Elective Generic – Lab	U23EL2AP	Python Programming - Lab	2	3	40	60	100	1
	Comprehension - 1(Self Study Course-Online Exam)	U23EL2C1	Comprehension in Electronics – I	-	1	-	50	50	1
PART-IV	Skill Enhancement Courses SEC2 (NME – II)	U23EL2S2	Consumer Electronics	2	-	50	-	50	2
	Skill Enhancement Courses (DS) SEC3	U23EL2S3	MS Office Automation	2	-	-	50	50	2
TOTAL				30				750	22
Semester-III									
PART-I	Language	U23TA3L3	Tamil– III	6	3	25	75	100	3
PART-II	English	U23EN3L3	English - III	6	3	25	75	100	3

PART-III	Core-05	U23EL303	Electronic Circuits	4	3	25	75	100	4
	Core-06 (Core Lab 3)	U23EL3P3	Electronic Circuits - lab	4	3	40	60	100	3
	Elective Generic -3	U23EL3A3	Electronic Communication System	4	3	25	75	100	3
	Elective Generic Lab-3	U23EL3AP	Electronic Communication Lab - I	2	3	40	60	100	1
PART-IV	Skill Enhancement Courses (DS) SEC4	U23EL3S4	Basic Electrical Wiring Lab	2	-	-	50	50	2
	Ability Enhancement Compulsory Course – AECC-I	U23AE301	Environmental Studies	2	2	50	-	50	2
TOTAL				30				700	21
Semester-IV									
PART-I	Language	U23TA4L4	Tamil– IV	6	3	25	75	100	3
PART-II	English	U23EN4L4	English– IV	6	3	25	75	100	3
PART-III	Core-07	U23EL404	Linear Integrated Circuits	4	3	25	75	100	4
	Core-08 (Core Lab – 4)	U23EL4P4	LIC and PCB Simulation - Lab	4	3	40	60	100	3
	Elective Generic -4	U23EL4A4	Advanced Communication Systems	4	3	25	75	100	3
	Elective Generic Lab-4	U23EL4AP	Electronic Communication Lab - II	2	3	40	60	100	1
	Comprehension – 2 (Self Study Course- Online Exam)	U23EL4C2	Comprehension in Electronics – II	-	1	-	50	50	1
PART-IV	Internship/Indus trial Training/Mini Project	U23EL5IT	Internship/Industrial Training/Mini Project	-	-	-	-	Completi on	-
	Skill Enhancement Courses (DS) SEC5	U23EL4S5	Solar Photovoltaic System Design	2	2	-	50	50	2
	Ability Enhancement Compulsory Course – AECC-II	U23AE402	Yoga & Value Education	2	2	50	-	50	2
TOTAL				30				750	22

Semester-V									
PART-III	Core-09	U23EL505	Microprocessor and Microcontroller	5	3	25	75	100	5
	Core-10	U23EL506	Internet of Things	5	3	25	75	100	5
	Core-11 (Core Practical 5)	U23EL5P5	Microprocessor and Microcontroller - lab	5	3	40	60	100	4
	Elective Course 5	U23EL5E3A	Medical Electronics	4	3	25	75	100	3
		U23EL5E3B	Nano Electronics						
		U23EL5E3C	VLSI Technology						
	Elective Course 6	U23EL5E4A	Mathematical Concepts For Electronics	4	3	25	75	100	3
		U23EL5E4B	Computer Hardware & Networks						
U23EL5E4C		Fiber Optic Communication							
Group Project	U23EL5MP	Group Project & Viva Voce	5	3	40	60	100	5	
PART-IV	Skill Enhancement Courses (DS) SEC6	U23EL5S6	PC Hardware and Servicing Lab	2	2	-	50	50	2
	Internship/Industrial Training/Mini Project	U23EL5IT	Internship/Industrial Training/Mini Project	-	-	-	50	Completion	2
PART-V	Proficiency Enhancement Course (Self-Study Course)	U23GS5SS	General Studies	-	1	-	50	50	2
	MOOC/Spoken Tutorial (Self Study Course - online)			-	-	-	-	Completion	2
TOTAL				30				700	33
Semester-VI									
PART-III	Core-12	U23EL607	Industrial Electronics	5	3	25	75	100	5
	Core-13	U23EL608	Robotics and Automotive Electronics	5	3	25	75	100	5
	Core – 14 (Core Lab 6)	U23EL6P6	Advanced Microcontroller Lab	5	3	40	60	100	4
	Core – 15 (Core Lab 7)	U23EL6P7	Power Electronics and Measurements Lab	5	3	40	60	100	4
	Elective Course 7	U23EL6A7A	Electrical and Electronic Instrumentation	4	3	25	75	100	3
		U23EL6A7B	Digital Signal Processing						

		U23EL6A7C	Programmable Logic Control						
	Elective Course 8	U23EL7A8A	Embedded Systems	4	3	25	75	100	3
		U23EL7A8B	Photonics						
		U23EL7A8C	Principles and Utilization of Electronic Appliances						
	Comprehension – III (Self Study Course- Online Exam)	U23EL6C3	Comprehension in Electronics – III	-	-	-	50	50	1
PART-IV	Skill Enhancement Courses (SEC8) Professional Competency Enhancement	U23EL6S8	Electronic System Design Lab	2	2	-	50	50	2
	Extra Department Course Open Elective – (Self Study Course)	To be selected from the courses offered by other departments		-	-	-	100	100	3
PART-V	Extension Activities – NSS, NCC, YRC, Physical Education, Youth Welfare, Nature Club & Electoral Literacy Club			-	-	-	-	Completion	1
TOTAL				30				800	31

Open Elective offered by other Departments:

S.No	Name of the Department	Course Title	Course Code
1.	Mathematics	Mathematics for Competitive Exams	U23MA6OE
2.	Physics	Physics for Competitive Exams	U23PH6OE
3.	Chemistry	Chemistry for Competitive Exams	U23CH6OE
4.	Botany	Organic Farming	U23BY6OE
5.	Computer Science	MS-Office	U23CS6OE
6.	Electronics	Electronic Gadgets and Home appliances	U23EL6OE
7.	Costume Design & Fashion	Basic Illustration	U23CF6OE
8.	Information Technology	Fundamentals of Computer and Networking	U23IT6OE
9.	Statistics	Applied Statistics	U23ST6OE
10.	English	English for Competitive Exams	U23EN6OE
11.	Business Administration	Inspiring Leaders	U23BB6OE
12.	Commerce	Fundamentals of Stock Market	U23CO6OE
13.	Professional Accounting	Indian Business Environment	U23PA6OE
14.	Business Analytics	Business Ethics	U23BA6OE
15.	Computer Application	Computer Basics	U23CA6OE

CBCS – 2023-2024

I SEMESTER

Part-III B.Sc. Electronics / Semester – I / Core-1:

ELECTRONICDEVICES (U23EL101)

Lecture Hours	: 70	Tutorial Hours	: 05
Practical Hours	: -	No. of Credit	:05
Contact Hours per Semester:75			
Contact hours per Week	: 05		
Internal Marks	: 25		
External Marks	: 75		
Total Marks	: 100		

Objectives of the course:

- Course provides a comprehensive idea about the Semiconductor physics.
- This course also examines the knowledge and fundamentals of Electronic devices.
- The student should be able to understand the characteristics, performance and applications of semiconductor devices.
- The goal is to develop a solid understanding of the device concepts that will be needed in a broad range of areas from semiconductor to circuit design.

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

- CO1 Explain the structure of the basic electronics devices
- CO2 Understand the characteristics and operations of transistors
- CO3 Understand the characteristics and operations of FET and UJT
- CO4 Understand the characteristics and operations of SCR & MOSFET
- CO5 Understand the characteristics and operations of Opto Electronics Devices

CO-PO-PSO Mapping (Course Articulation Matrix)

POs,PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	3	3	1	2	3	2	2	3
CO2	2	3	3	3	3	3	2	2	3	3
CO3	3	3	2	3	1	3	2	3	3	2
CO4	3	3	3	3	1	3	3	3	3	3
CO5	3	3	3	2	2	2	3	3	3	3
Total Contribution of COs to POs, PSOs	13	14	14	14	8	13	13	13	14	14
Weighted Percentage of COs Contribution to POs, PSOs	86.7	93.3	93.3	93.3	53.3	86.7	86.7	86.7	93.3	93.3

1 – Low; 2 – Medium; 3 – Strong

COURSE CONTENT

UNIT I Semiconductor and Diodes

(L-14 + T-1 Hrs)

Semiconductor-Definition, classification, intrinsic and extrinsic N type & p type – drift current & diffusion current diodes – PN junction diode – forward and Reverse bias characteristics.

Zener diode construction & working Principle-characteristics - zener break down-avalanche break down- zener Diode as a voltage regulator – its applications

UNIT II Bipolar Junction Transistor

(L-14 + T-1 Hrs)

Transistor – NPN and PNP transistor – operation-transistor as an amplifier- transistor as a switch – transistor biasing – fixed bias, collector base bias, self bias – CB,CE,CC configurations – characteristics - comparison between three configurations in terms of input impedance, output impedance, current gain, voltage gain

UNIT III FET and UJT**(L-14 + T-1 Hrs)**

Field Effect Transistor – Classification of FET - construction & working principle of JFET – difference Between JFET and BJT – Construction and operation of JFET – n-channel and p-channel JFET - characteristics of JFET – Applications.

Uni Junction Transistor – construction – equivalent circuit – operation – Characteristics – UJT as a relaxation oscillator

UNIT IV SCR & MOSFET**(L-14 + T-1 Hrs)**

SCR – introduction – working – VI-characteristics -comparison between SCR and transistor – SCR as a switch – SCR Applications.

MOSFET – types & characteristics of N channel MOSFET and P channel MOSFET- Characteristics of enhancement and depletion mode MOSFET

UNIT V Opto Electronic Devices**(L-14 + T-1 Hrs)**

Classification of opto electronic devices – symbols, Characteristics, working of LDR, LED, 7 segment LED and LCD– Photo transistor – Photodiode.

Tutorial Section:

Unit	Topic	Hours
I	Biasing of a PN junction diode	1
II	Characteristics of NPN Transistor	1
III	Characteristics of UJT	1
IV	Characteristics of SCR	1
V	Characteristics of LDR	1

Text Books

1. S.Salivahanan, N.Suresh Kumar, A. Vallavaraj “**Electronic Devices And Circuits**”, 2nd Edition, Tata McGrawHill
2. R.S.Sedha “**A Text Book of Applied Electronics**”, Multicolor illustrative edition S.Chand& Company Ltd

Reference Books

1. V.K.Mehta “**Principle of Electronics**”, 10th Revised Edition, Tata McGrawHill
2. J.B.Gupta“**Electronic Devices and Circuits**”, 5 Edition, S k Kataria & sons
3. Millman, Jacob “**Electronic Devices and Circuits**”,Tata McGrawHill, 2016

Websites for Reference

1. <https://www.electronics-tutorials.ws/>
2. <https://www.electronicshub.org/tutorials/>
3. https://www.tutorialspoint.com/basic_electronics/index.htm
4. <https://www.electronics-notes.com>

**Part-III B.Sc. Electronics / Semester – I / Core-2:
Electronic Devices Lab (U23EL1P1)**

Lecture Hours	: -	Tutorial Hours	: -
Practical Hours	: 45	No. of Credit	:02
Contact Hours per Semester	: 45		
Contact hours per Week	: 03		
Internal Marks	: 40		
External Marks	: 60		
Total Marks	: 100		

Objectives of the course:

- To understand the characteristics of various semiconductor devices
- To construct circuits using semiconductor devices

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

- CO1 Learn and recognize the electronics components and examine the VI characteristics of semiconductor devices.
- CO2 Calculate various device parameters values from their iv characteristics
- CO3 Extract important information from the graphical plots of device characteristics
- CO4 Interpret the experimental data to understand the behavior of the device
- CO5 Implement the circuits using the concepts of semiconductor devices

CO-PO-PSO Mapping (Course Articulation Matrix)

COs \ POs,PSOs	POs,PSOs									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	3	3	2	2	3	2	2	3
CO2	3	3	2	3	3	3	2	3	3	2
CO3	2	3	2	3	2	2	2	2	3	2
CO4	3	2	3	3	3	3	3	3	2	3
CO5	3	2	3	2	3	2	3	3	2	3
Total Contribution of COs to POs, PSOs	13	12	13	14	13	12	13	13	12	13
Weighted Percentage of COs Contribution to POs, PSOs	86.7	80	86.7	93.3	86.7	80	86.7	86.7	80	86.7

1 – Low; 2 – Medium; 3 – Strong

List of Experiments

(Minimum 10 Experiments to be carried out)

1. Study V-I characteristics of p-n junction diode in forward and reverse bias configurations.
2. Study V-I characteristics of Zener diodes in forward and reverse bias configurations.
3. Find the Band Gap Energy of Silicon & Germanium Diode
4. Study input and output V-I characteristics of common emitter transistor configurations.
5. Study input and output V-I characteristics of common base transistor configurations.
6. Study input and output V-I characteristics of common Collector transistor configurations.
7. Study the V-I Characteristics of the UJT.
8. Study the V-I Characteristics of MOSFET
9. Study the Self Bias configuration for transistor.
10. Study the Fixed Bias configuration for transistor.
11. Study the V-I characteristics of JFET.
12. Study the Characteristics of LDR.
13. Construct the Voltage regulator circuit using Zener diode.
14. Study the Characteristics of Photo Diode.
15. Study the Characteristics of Photo Transistor.

**Part-III B.Sc. Electronics / Semester – I / Elective Generic- 1:
C PROGRAMMING (U23EL1A1)**

Lecture Hours	: 55	Tutorial Hours	: 05
Practical Hours	: -	No. of Credit	: 03
Contact Hours per Semester	: 60		
Contact hours per Week	: 04		
Internal Marks	: 25		
External Marks	: 75		
Total Marks	: 100		

Objectives of the course:

- This course provides the basic Structure of the C-language,
- To declaration and usage of variables operators, conditional, branching, iterative statements and recursion arrays, string and functions (modular programming)
- The Pointers to access arrays, strings and functions, input/output statement and library functions (math and string related functions).

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

CO1 Understand the concept of data types

CO2 Understand the concept of arrays, pointers and structures

CO3 Use concept of modular programming by writing functions and using them to form a complete program

CO4 Implement conditional branching, iteration and recursion

CO5 Develop algorithms for arithmetic and logical problems

CO-PO-PSO Mapping (Course Articulation Matrix)

POs, PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	1	1	3	2	2	2	2	1	2
CO2	2	2	3	2	2	2	3	2	2	3
CO3	3	2	2	2	3	1	2	3	2	2
CO4	2	3	2	3	2	1	2	2	3	2
CO5	2	3	3	2	2	2	1	2	3	3
Total Contribution of COs to POs, PSOs	11	11	11	12	11	8	10	11	11	12
Weighted Percentage of COs Contribution to POs, PSOs	73.3	73.3	73.3	80	73.3	53.3	66.7	73.3	73.3	80

1 – Low; 2 – Medium; 3 – Strong

COURSE CONTENT

Unit-I Data types & Operators

(L-11 + T-1 Hours)

Introduction - Data types- Constant - variables - Assignment of variables - initialization. Operators: arithmetic assignment, relational, logical, bitwise, conditional, compound assignment unary and other operators - Order of precedence and associativity of operations.

Unit-II Program Control Constructs

(L-11 + T-1 Hours)

Program Control Constructs : Conditional & multiple branching iteration, jump constructs- Console - input and output : console I/O functions – getch, putch, getchar, putchar, gets, puts, scan and print functions - formatted I/O . Functions: definition - prototype - recursion - simple programs.

Unit-III Arrays

(L-11 + T-1 Hours)

Arrays: Initializations — multidimensional arrays — dynamic 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.

Unit- IV Structures& unions**(L-11 + T-1 Hours)**

Structures & unions : Definition a structure-Declaring structure variables - structure Initialization- array of structures - array of pointers structures- pointer and structures - structures to functions - unions-bit fields.

Unit –V Files**(L-11 + T-1 Hours)**

Files: File structure - opening & closing of files - characters functions- line I/O functions- Formatted I/O functions - Block I/O functions, Preprocessor : macro substitution ,file inclusion, compiler control Directives.

Tutorial Section:

Unit	Topic	Hours
I	Order of precedence and associativity of operations	1
II	Conditional & multiple branching iteration	1
III	multidimensional arrays	1
IV	pointer and structures	1
V	opening & closing of files	1

Text Book:

1. E.Balagurusamy, “**Programming in ANSI C**”5th Edition, Tata McGraw Hill,2010.

Reference Books:

1. Byron s. Gottfried, “**Schaum’s outlines Programming with C**”2nd Edition, Tata McGraw – Hill publishing company Limited.
2. Herbert Schildt, “**The complete Reference C**”, 4th Edition, Tata McGraw-HillPublishing Company limited.
3. Asok N. Kamthane, “**Programming with ANSI and Turbo C**”, Pearson Educations.

Websites for Reference:

1. <http://www.cprogrammingnotes.com/>
2. <https://www.eskimo.com/~scs/cclass/notes/top.html>
3. <https://www.geeksforgeeks.org/c-programming-language/>

**Part-III B.Sc. Electronics / Semester – I / Elective Generic Lab:
Programming in C Lab (U23EL1AP)**

Lecture Hours	: -	Tutorial Hours	: -
Practical Hours	: 30	No. of Credit	: 01
Contact Hours per Semester	: 30		
Contact hours per Week	: 02		
Internal Marks	: 40		
External Marks	: 60		
Total Marks	: 100		

Objectives of the course:

- The course is designed to provide an introduction to the c programming language.
- The focus of the course is to provide students with an introduction to programming, I/O and visualization using the c programming language.

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

- CO1 Understand the concept of compiler and interpreter
- CO2 Read, understand and trace the execution of programs written in c language
- CO3 Implement programs with pointers and arrays, perform pointer arithmetic and use the pre-processor
- CO4 Write programs that perform operations using derived data types
- CO5 Develop confidence for self-education and ability for life-long learning needed for computer language

CO-PO-PSO Mapping (Course Articulation Matrix)

COs \ POs, PSOs	POs, PSOs										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	
CO1	2	1	2	2	2	1	3	2	1	2	
CO2	2	2	3	1	3	2	2	2	2	3	
CO3	2	2	2	2	2	1	2	2	2	2	
CO4	3	3	2	2	2	1	3	3	3	2	
CO5	2	3	3	1	1	2	2	2	3	3	
Total Contribution of COs to POs, PSOs	11	11	12	8	10	7	12	11	11	12	
Weighted Percentage of COs Contribution to POs, PSOs	73.3	73.3	80	53.3	66.7	46.7	80	73.3	73.3	80	

1 – Low; 2 – Medium; 3 – Strong

LIST OF PRACTICALS

(Minimum 12 Experiments to be carried out)

1. Write a C program to find the largest among the three given numbers.
2. Write a C program to print the given FIVE digit number in reverse order.
3. Write a C program to print first 50 terms of Fibonacci sequence.
4. Write a C program to find the smallest number in the given set of N numbers
5. Write a C program to find the given word is palindrome or not
6. Write a C program to sort the given set of N numbers in ascending order.
7. Write a C program to find the addition and subtraction of the given two square matrices.
8. Write a C program to find the multiplication of the given two square Matrices.
9. Write a C program to check the given number is prime or not.
10. Write a program to calculate simple Interest and Compound Interest.
11. Write a C program to find the value of $13+23+53+\dots+253$ using do... while statement.
12. Write a C program to print the grade of a student using switch... case statement.
13. Write a C program for simple calculator using switch/case loop.
14. Write a C program to prepare EB Bill using if...else if ladder.
15. Write a C program to find factorial and GCD value using recursion.
16. Write a C program to arrange the names in alphabetical order using strcmp() function.

**Part-IV B.Sc. Electronics / Semester – I / SKILL ENHANCEMENT COURSE 1:
COMPUTER HARDWARE (U23EL1S1)**

Lecture Hours	: 28	Tutorial Hours	: - 02
Practical Hours	: -	No. of Credit	: 02
Contact Hours per Semester	: 30		
Contact hours per Week	: 02		
Internal Marks	: 50		
External Marks	: 00		
Total Marks	: 50		

Objectives of the course:

- To equip the students with basic understanding in Computer Hardware Technology and devices.
- A Student should be able to install and maintain Keyboard, Printer, Mouse, Monitor etc. along with the computer system.
- The student does will get to know how various peripherals communicate with central processing unit of the computers system and pattern their respective operations.

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

- CO1 Get a clear idea about various Parts of a computer
- CO2 Understanding the Concept of Parts of a computer
- CO3 Use the Concepts tounderstand the function of Computer Hardware
- CO4 Analyze the Principles & working of every parts of the computer
- CO5 Evaluate the Operation of Motherboard, Memory, I/O Devices & OS and diagnose the effect of Viruses

CO-PO-PSO Mapping (Course Articulation Matrix)

POs, PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	2	3	3	1	2	3	2	2	3
CO2	2	3	3	3	3	3	2	2	3	3
CO3	3	2	2	2	2	3	2	3	2	2
CO4	2	3	2	3	2	3	3	2	3	2
CO5	3	3	3	2	2	2	3	3	3	3
Total Contribution of COs to POs, PSOs	11	13	13	13	10	13	13	12	13	13
Weighted Percentage of COs Contribution to POs, PSOs	73.3	86.7	86.7	86.7	66.7	86.7	86.7	80	86.7	86.7

1 – Low; 2 – Medium; 3 – Strong

COURSECONTENT

UNIT–I MOTHER BOARD COMPONENTS

(L-5 + T - 1Hrs)

Introduction: Hardware, Software and Firmware. Motherboard, IO and memory expansion slots, SMPS, Drives, front panel and rear panel connectors. Processors: Architecture and block diagram of multicore Processor, Features of new processor (Definition only)- Chipsets (Concepts only). Bus Standards: Overview and features of PCI, AGP, PCMCIA

UNIT–II MEMORY STORAGE DEVICES

(L-6Hrs)

Primary Memory:Introduction-MainMemory,Cachememory– DDR2, DDR3and DirectRDRAM.Secondary Storage: Hard Disk – Construction – Working Principle Specification ofIDE, Ultra ATA, Serial ATA; HDD Partition - Formatting.

Removable Storage: Pen drive, Memory cards Construction and reading & writing operations.

UNIT–III I/O DEVICES AND INTERFACE

(L-5 + T - 1Hrs)

Keyboard: Signals– operation of membrane and mechanical keyboards–troubleshooting; wireless Keyboard. Mouse: types, connectors, operation of Optical mouse and Troubleshooting. Printers: Introduction – Types of printers- Dot Matrix, Inkjet Laser, MFP (Multi-Function Printer) and Thermal printer–Operation, Construction and Features-Troubleshooting. I/O Ports: Serial, Parallel, USB, Game Port and HDMI. Displays: Principles of LED, LCD and TFT Displays.

UNIT–IV DESKTOP

(L-6Hrs)

Bios – Setup: Standard MOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication–upgrading BIOS, Flash BIOS-setup. POST: Definition – IPL hardware – POST Test sequence–beeps codes.

UNIT–V DIAGNOSTICS SOFTWARE AND VIRUSES (L-6Hrs)

Computer Viruses – Precautions –Anti-virus Software – identifying the signature of viruses –Firewallsandlatestdiagnosticsoftware’s.

TutorialSection

Unit	Topic	Hours
I	Motherboard	1
III	Printers	1

TextBooks:

1. B.Govindrajalu,“IBMPC and CLONES,- HardwareTroubleshooting and Maintenance”,TataMcGraw-HillPublishingCompanyLtd,
2. D.Balasubramanian,“ComputerInstallationandServicing”,TataMcGrawHill.

Referencebooks:

1. MarkMinasi,“ThecompletePCUpgradeandMaintenance”BPBPublication.
2. StephenJBigelow,“Troubleshooting,MaintainingandRepairingPCs”
TataMCGrawHillPublication
3. ScottMueller,“Upgradingandrepairinglaptops”QUEPublication

Websitesforreferences:

1. <https://www.watelectronics.com/different-types-of-sensors-with-applications/>
2. <https://www.educba.com/applications-of-sensors/>
3. https://www.instructables.com/Building-a-computer-from-parts/?amp_page=true
4. <https://baictchs09.wordpress.com/2018/10/21/installation-of-hardware-components-and-other-peripherals>

**Part-IV B.Sc. Electronics / Semester – I / FOUNDATION COURSE:
FUNDAMENTAL OF ELECTRONICS (U23ELFC1)**

Lecture Hours	: 28	Tutorial Hours	: - 02
Practical Hours	: -	No. of Credit	: 02
Contact Hours per Semester	: 30		
Contact hours per Week	: 02		
Internal Marks	: 50		
External Marks	: --		
Total Marks	: 50		

Objectives of the course:

- This Course provides a comprehensive idea about the basic concepts of Electronics.
- The student should be able to understand the characteristics, performance and applications of semiconductor physics.
- The goal is to develop a solid understanding of the basic concepts of electronics that will be needed in a broad range of areas from semiconductor to circuit design.

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

- CO1 Identify the basics of passive and active components
- CO2 Understand the concepts of semiconductor devices
- CO3 Apply the fundamental principle of semiconductor physics to study the parameters of semiconductor devices
- CO4 Analyze the functions of electrical and electronic components
- CO5 Evaluate the principle of operations of passive and active components

CO-PO-PSO Mapping (Course Articulation Matrix)

POs, PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	3	3	1	2	3	2	2	3
CO2	2	3	3	3	3	3	2	2	3	3
CO3	3	3	2	3	1	3	2	3	3	2
CO4	3	3	3	3	1	3	3	3	3	3
CO5	3	3	3	2	2	2	3	3	3	3
Total Contribution of COs to POs, PSOs	13	14	14	14	8	13	13	13	14	14
Weighted Percentage of COs Contribution to POs, PSOs	86.7	93.3	93.3	93.3	53.3	86.7	86.7	86.7	93.3	93.3

1 – Low; 2 – Medium; 3 – Strong

COURSECONTENT

UNIT I Electrical Element and Circuits

(L-6 Hrs)

Definitions: Current – Potential – Potential Difference – Power – Energy

Electric Circuit – Types of Circuit – Direct current and Alternating Current – Fundamental Concepts of AC – Comparison of AC and DC – Network Terminology - Ohm's law and its limitations – Kirchhoff's laws

UNIT II Resistors

(L-5 +T – 1 Hrs)

Active Components and Passive Components– Resistors – Resistor Color code –Factors affecting Resistance – Types of Resistors – Fixed Resistors -Variable resistors - LDR – Resistors in Series and Parallel

UNIT III Capacitors

(L-5 +T – 1 Hrs)

Capacitors – Introduction – Construction and working – Factors affecting Capacitance –Types of Capacitors – Fixed Capacitors – Non Electrolytic Capacitor – Electrolytic Capacitor –Variable Capacitors – Capacitors in Series and Parallel – Applications

UNIT IV Inductors and Transformers

(L-6 Hrs)

Inductors -Introduction – working – Factors affecting Inductance –Types – Fixed Inductors - Variable Inductors - Self Inductance and Mutual Inductance – Difference between Self & Mutual inductance – Applications of Transformers – working principle – Types – Applications.

UNIT V Semiconductor Basics

(L-6 Hrs)

Atomic structure– Bohr atom model – energy levels – energy bands –important energy band in solids- classification of solids and energy bands – Basics of Semiconductor.

TutorialSection

Unit	Topic	Hours
I	Ohms Law	1
III	Resistor Color code	1

Text Books

- 1) Study Materials prepared by the Department

Reference Books

- 1) V.K.Mehta “**Principle of Electronics**”, 10th Revised Edition, Tata McGrawHill
- 2) R.S.Sedha “**A Text Book of Applied Electronics**”, Multicolor illustrative edition S.Chand& Company Ltd

Websites for Reference

- 1) <https://www.electronics-tutorials.ws/>
- 2) <https://www.electronicshub.org/tutorials/>
- 3) https://www.tutorialspoint.com/basic_electronics/index.htm
- 4) <https://www.electronics-notes.com/>
- 5) <https://byjus.com/jee/transformer/>

II SEMESTER

Part-III B.Sc. Electronics / Semester – II / Core-3: DIGITAL ELECTRONICS (U23EL202)

Lecture Hours	: 70	Tutorial Hours	: 05
Practical Hours	: -	No. of Credit	: 5
Contact Hours per Semester	: 75		
Contact hours per Week	: 05		
Internal Marks	: 25		
External Marks	: 75		
Total Marks	: 100		

Objectives of the course:

- The design of the subject is to impart the knowledge about code conversion, Boolean algebra, logic gates.
- To bring out a clear understanding between combinational and sequential logic circuits.
- The Students can get fundamental knowledge on memory devices.

Course Learning Outcomes (for mapping with POs and PSOs):

On successful completion of course, the learner should be able to

- CO1 Identify the basic concepts of digital electronic circuits
- CO2 Understand the number systems, codes, logic gates, Boolean algebra, combinational, sequential circuits and different memory storage types
- CO3 Apply the concept of minimization techniques for designing a simplified logic circuit and memory devices
- CO4 Analyze the principle of various digital circuits
- CO5 Evaluate the functions of various digital circuits

CO-PO-PSO Mapping (Course Articulation Matrix)

POs, PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	2	2	3	1	2	3	1	2	2
CO2	1	3	3	3	1	2	3	1	3	3
CO3	3	2	3	3	2	1	3	3	2	3
CO4	2	3	2	2	2	2	2	2	3	2
CO5	2	3	2	2	2	2	2	2	3	2
Total Contribution of COs to POs, PSOs	9	13	12	13	8	9	13	9	13	12
Weighted Percentage of COs Contribution to POs, PSOs	60	86.7	80	86.7	53.3	60	86.7	60	86.7	80

1 – Low; 2 – Medium; 3 – Strong

COURSE CONTENT

UNIT I Number System and Codes

(L-14 + T-1 Hrs)

Number systems: Decimal, Binary, Octal and Hexa Decimal Numbers - Conversion -Floating Point Representation - Binary Addition, Subtraction and Multiplication - 1's and 2's Complements -Binary Coded Decimal (BCD). Weighted Codes and Non-weighted Codes: Excess Three code, Grey Code, ASCII Codes, and EBCDIC Codes.

UNIT II Boolean algebra And Logic Gates

(L-14 + T-1 Hrs)

Boolean logic operations: Basic Laws of Boolean algebra – De-Morgans Theorem -Sum of Products and Products of Sums – Karnaugh map. – Three variables and four variables.

Logic Gates: OR, AND, NOT, NAND, NOR, EX-OR and EX-NOR Gates

UNIT III Combinational Logic Circuits (L-14 + T-1 Hrs)

Half Adder - Full Adder - Half Subtractor - Full Subtractor - Parallel Binary Adder /Subtractor - Multiplexer - Demultiplexer - Decoders - Encoders - Code Conversion - Parity Generators / Checkers.

UNIT IV Sequential Logic Circuits (L-14 + T-1 Hrs)

Flip Flops: RS, Clocked RS, D and T Flip Flops. ShiftRegisters: Serial in Serial out Shift registers. Counters: Synchronous Counter, Asynchronous Counters - Ring Counters.

UNIT V Memory Devices (L-14 + T-1 Hrs)

Classification of Memory: Volatile & Non Volatile Memory. Non Volatile Memory: ROM, PROM, EPROM, EEPROM. Volatile Memory: RAM - Static RAM, Dynamic RAM. Programmable Logic Devices: Programmable Logic Array (PLA) - Programmable Array Logic (PAL) - Field Programmable Gate Arrays (FPGA).

TutorialSection

Unit	Topic	Hours
I	Grey Code, ASCII Codes, EBCDIC Codes	1
II	Karnaugh map	1
III	Parity Generators / Checkers	1
IV	Shift Registers	1
V	Field Programmable Gate Arrays (FPGA)	1

Text Books

1. S.Salivahanan,S.Arivazhagan“Digital Circuits And Design”, 4th edition,Vikas Publishing House Pvt Ltd,2012.
2. P.Raja, “Digial Electronics”,Scitech Publications (India) Pvt Ltd,2010.

Reference Books

1. Malvino& Leech, “Digital Principles And Applications”, 7th edition Tata McGraw Hill
2. Thomas L.Floyd “Digital Fundamentals”, Prentice Hall
3. M.Morris Mano “Digital Design” PHI 2005

Websites for Reference:

1. https://www.tutorialspoint.com/digital_circuits/index.htm
2. <https://www.javatpoint.com/digital-electronics>
3. <https://www.electronics-tutorials.ws/>
4. <https://www.electronicshub.org/tutorials/>

**Part-III B.Sc. Electronics / Semester – II / Core 4:
DIGITAL ELECTRONICS LAB (U23EL2P2)**

Lecture Hours	: -	Tutorial Hours	: -
Practical Hours	: 45	No. of Credit	: 02
Contact Hours per Semester	: 45		
Contact hours per Week	: 3		
Internal Marks	: 40		
External Marks	: 60		
Total Marks	: 100		

Objectives of the course:

- To get Hands on experience in Digital electronic circuits
- To get clear idea about shift registers and counters

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

- CO1 Acquire knowledge on logic gates, combinational and sequential circuits
- CO2 Apply the minimization techniques to design different logic circuit
- CO3 Analyze and prepare the report on the experiments carried out
- CO4 Verify the output of the digital experiments
- CO5 Design application oriented various digital circuits

CO-PO-PSO Mapping (Course Articulation Matrix)

POs, PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	1	3	2	1	3	2	2	1	3
CO2	3	1	3	3	1	3	2	3	1	3
CO3	2	3	3	3	2	3	1	2	3	3
CO4	3	2	2	2	2	2	2	3	2	2
CO5	3	2	2	2	2	2	2	2	2	2
Total Contribution of COs to POs, PSOs	13	9	13	12	8	13	9	12	9	13
Weighted Percentage of COs Contribution to POs,PSOs	86.7	60	86.7	80	53.3	86.7	60	80	60	86.7

1 – Low; 2 – Medium; 3 – Strong

List of Experiments

(Minimum 12 Experiments to be carried out)

1. Design and verify Basic Gates.
2. Design and verify Basic Gates using NAND Gate.
3. Design and verify Basic Gates using NOR Gate.
4. Convert a Boolean expression into logic gate circuit and assemble it using logic gate ICs.
5. Verify the De-Morgan's Theorem
6. Design the logic circuit for Half Adder and Full Adder.
7. Design the logic circuit for Half Subtractor and Full Subtractor.
8. Design and Verify the Code conversion.
9. Design and Verify the Multiplexer.
10. Design and Verify the De-Multiplexer.
11. Design and Verify the Encoder.
12. Design and Verify the Decoder.
13. Study the various types of Flip-Flop.
14. Study the various types of Shift registers.
15. Design a counter using D/T/JK Flip-Flop.
16. Construct 4-bit Binary Adder circuit.

Part-III B.Sc. Electronics / Semester – II / Elective Generic-2:

PYTHON PROGRAMMING (U23EL2A2)

Lecture Hours	: 55	Tutorial Hours	: - 5
Practical Hours	: -	No. of Credit	: 03
Contact Hours per Semester	: 60		
Contact hours per Week	: 04		
Internal Marks	: 25		
External Marks	: 75		
Total Marks	: 100		

Objectives of the course:

- The course is designed to provide an introduction to the python programming language.
- The focus of the course is to provide students with an introduction to programming, I/O and visualization using the python programming language.

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

- CO1 Understand the basic concept of the python programming
- CO2 Understand and analyze the concepts of the file I/O using python programming
- CO3 Develop a skill to implement python programming
- CO4 Develop a skill to implement string operations and tuples in python programming language
- CO5 Create and execute the python programs

CO-PO-PSO Mapping (Course Articulation Matrix)

POs, PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	1	2	2	1	1	1	2	1	1
CO2	2	1	1	1	2	2	2	2	1	1
CO3	2	1	2	2	1	1	2	2	1	2
CO4	3	2	2	2	2	3	2	3	2	1
CO5	2	2	2	2	1	2	2	2	1	1
Total Contribution of COs to POs, PSOs	11	7	9	9	7	9	9	11	6	6
Weighted Percentage of COs Contribution to POs, PSOs	73.3	46.7	60	60	46.7	60	60	73.3	40	40

1 – Low; 2 – Medium; 3 – Strong

COURSE CONTENT:

UNIT – I Getting started with Python

(L-11 + T-1 Hrs)

Introduction – advantages of Python & disadvantage –Features of Python - installing python- Working with modes of Python (Interactive & Script mode) – simple program to print (“Hello world”) - Analyzing a problem, -Designing algorithms and representation of algorithm using flowchart.

UNIT – II Python Programming Fundamental

(L-11 + T-1 Hrs)

Variables & assignments(Creating a variables, Multiple assignment) - Data types of Python (Numbers- None - string, list, tuples- dictionary) – Tokens- Identifiers: valid identifiers and invalid identifiers - Keywords- Literals: string literals, Numeric literals- Boolean literals- special literal-s Delimiters - Operators & types: Arithmetic operators, Relational Operators, Logical Operators, Membership operators , Assignment Operators. Identity Operators- Expression (Evaluating expression) - operators and their precedence- mutable and immutable in Python –user input – working with function (user defined, inbuilt function, functions of some standard modules)

UNIT – III Conditional and Iterative Statement**(L-11 + T-1 Hrs)**

Types of statements - Conditional statements: if, if-else, if-elif-else, Nested if statement - iterative / looping statement: for loop, while loop: Jump statement: continue, break, pass, null statement – range function -Simple programs using statements

UNIT – IV Manipulation of Sequences and Working with Dictionaries (L-11 + T-1 Hrs)

Strings in Python : Traversal a strings – string Operators –strings slices- String functions and methods – Lists in Python : creating and accessing list – list operators – working with list – list functions and methods – Tuples in Python : creating and accessing tuples – Tuple operators - working with tuples – tuple functions with methods.

Dictionaries: creation, accessing and characteristics of dictionaries- working with dictionary – dictionary functions with methods – simple program for using types of sequence and dictionaries

UNIT – V Applications of Python**(L-11 + T-1 Hrs)**

File handling : Data files(text file, binary file)– opening and closing file –reading with writing files – Data visualization with Pyplot: using pyplot of matplotlib library – installing and importing matplotlib- working with pyplot methods – creating charts with matplotlib library’s pyplot interface : Line chart , Bar chart and Pie chart

Tutorial Section

Unit	Topic	Hours
I	Designing algorithms	1
II	Operators	1
III	Conditional statements	1
IV	dictionary functions with methods	1
V	creating charts	1

Text Books

1. Jake Vander Plas, Python Data Science Handbook - Essential Tools for Working with Data, O'Reilly Media, Inc, 2016
2. Zhang, Y., An Introduction to Python and Computer Programming, Springer Publications, 2016

Reference Books

1. Joel Grus, Data Science from Scratch First Principles with Python, O'Reilly Media, 2016.
2. T.R. Padmanabhan, Programming with Python, Springer Publications, 2016
3. Wes McKinney. Python for Data Analysis. O'Reilly Media, 2013.
4. Grus, Joel. Data Science from Scratch: First Principles with Python. O'Reilly Media, 2015.

Web References:

1. <https://stanfordpython.com/#overview>.
2. <https://cognitiveclass.ai/courses/python-for-data-science>
3. <https://www.edureka.co/blog/learn-python-for-data-science>
4. <https://www.w3schools.com/python/default.asp>

**Part-III B.Sc. Electronics / Semester – II / Elective Generic-2:
PYTHON PROGRAMMING Lab (U23EL2AP)**

Lecture Hours	: -	Tutorial Hours	: -
Practical Hours	: 30	No. of Credit	: 01
Contact Hours per Semester	: 30		
Contact hours per Week	: 02		
Internal Marks	: 40		
External Marks	: 60		
Total Marks	: 100		

Objectives of the course:

- This course focuses on developing the python programming to do a variety of programming tasks where the students are encouraged to develop application in various field.
- At the end of the course the student will be developing adequate skills in programming and will be known to understand the implementation of various applications using python

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

- CO1 Acquire practical knowledge of working with python
- CO2 Write, test and debug python programs
- CO3 Implement conditionals and loops for python programs
- CO4 Use functions and represent compound data using lists, tuples and dictionaries
- CO5 Create an own program using the skilled learned

CO-PO-PSO Mapping (Course Articulation Matrix)

POs, PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	1	2	2	1	1	1	1	2	1
CO2	2	1	1	1	2	2	2	1	2	2
CO3	2	1	2	2	1	1	2	1	2	1
CO4	3	2	2	2	2	3	2	2	3	2
CO5	2	2	2	2	1	2	2	1	2	1
Total Contribution of COs to POs, PSOs	11	7	9	9	7	9	9	6	11	7
Weighted Percentage of COs Contribution to POs, PSOs	73.3	46.7	60	60	46.7	60	60	40	73.3	46.7

1 – Low; 2 – Medium; 3 – Strong

List of Practical's:

(Minimum 15 programs to be carried out)

1. Write a Python program code to input any number from user and calculate factorial of that number
2. Write a Python program code to calculate the simple interest.
3. Write a Python program code to Input three numbers and display the largest/ smallest number among them.
4. Write a Python program code to find whether the given number is ODD or EVEN number.
5. Write a Python program code to check whether the given string is vowel or not a vowel
6. Write a Python program code to implement simple mathematical calculator.
7. Write a Python program code to check whether strings is palindrome or not a palindrome.
8. Write a Python program code to input any number from user and check whether its prime number or not a prime number
9. Write a Python program code to remove all ODD number from the list
10. Write a Python program code to find the sum of element of list.
11. Write a python program code to find the largest and smallest element of a tuple

12. Write a Python program code to input any number from user and display its multiplication table
13. Write a Python program code to calculate n^{th} term of Fibonacci series
14. Write a Python function to count the number of Upper case and lower case character present in a string
15. Write a Python function to count the number of vowels present in a text file "POEM.txt".
16. Write a Python function COUNTISALL () to count the number "is" and "are" present in a text file "BOOK.txt"
17. Write a Python code to create a phone dictionary for the students of classmates and print their index.
18. Write a Python program code to create and add values to the binary file.
19. Write a Python program code to update the employee salary of the binary file "EMP.dat"
20. Write a Python program to plot simple line graph using two list values.

**Part-IV B.Sc. Electronics / Semester – II / SKILL ENHANCEMENT COURSE 2:
CONSUMER ELECTRONICS (U23EL2S2)**

Lecture Hours	: 28	Tutorial Hours	: - 02
Practical Hours	: -	No. of Credit	: 02
Contact Hours per Semester	: 30		
Contact hours per Week	: 02		
Internal Marks	: 50		
External Marks	: --		
Total Marks	: 50		

Objectives of the course:

- The demand of Consumer Electronic appliances is increasing day by day.
- It is constantly making our day to day life easy and smart. The aim of the course is to help the student to attain depth knowledge of electronic household or office devices.
- This course will introduce the students with working principles, main features and care and Maintenance of the consumer electronics appliances used in everyday life.

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

- CO1 Identify the principles of consumer electronic appliances like microwave ovens, photocopier, CCTV & DTH etc.
- CO2 Understand the fundamental concepts of household and office devices
- CO3 Interpret the main features of electronic appliances
- CO4 Analyze the care and maintenance of electronic home and office devices
- CO5 Evaluate the working principles of the consumer electronics appliances

CO-PO-PSO Mapping (Course Articulation Matrix)

POs, PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	2	3	2	3	2	3	1	2	3
CO2	2	3	3	3	1	3	2	2	3	3
CO3	3	2	2	1	1	2	2	3	2	2
CO4	2	1	2	3	2	1	2	2	1	2
CO5	3	2	2	1	1	2	3	3	2	2
Total Contribution of COs to POs, PSOs	11	10	12	10	8	10	12	11	10	12
Weighted Percentage of COs Contribution to POs, PSOs	73.3	66.7	80	66.7	53.3	66.7	80	73.3	66.7	80

1 – Low; 2 – Medium; 3 – Strong

COURSECONTENT

UNIT I Microwave ovens

(L-6 Hrs)

Introduction – Block diagram – LCD timer with alarm – Single chip controllers – Types – Microwave cooking – Wiring and Safety instructions – Care and Cleaning.

UNIT II Washing Machines

(L-6 Hrs)

Introduction– Electronic controller for Washing machines –Washing Machine hardware – washing cycle – Types – Fuzzy logic washing machines – Features

UNIT III Air Conditioners and Refrigerators

(L-6 + T- 1 Hrs)

Air Conditioners: Air Conditioning – Components of air conditioning systems – All water air conditioning systems – All air air conditioning systems

Refrigerators: Refrigeration - Refrigerants – Refrigeration systems – Domestic Refrigerators

UNIT IV Office Digital Devices

(L-5+T-1Hrs) Facsimile

machine: Block diagram – Basic fax machine operations – **Cellular phones:** Operating principle – Block diagram – **Cordless phones:** Block diagram of Base unit – Block diagram of Handset - **Photocopier:** Parts – Working – **CCTV:** Block diagram

UNIT V Digital Access Services

(L-5 Hrs)

DTH: Working – **Set Top boxes**–**Barcode:** Barcode Scanner and decoder – **Automated Teller Machines (ATMs):** Electronic Fund Transfer – **The Internet:** Applications – Email

Tutorial Section

Unit	Topic	Hours
III	Air Conditioning	1
IV	Cellular phones	1

Text Books

1. S.P.Bali “**Consumer Electronics**”, First edition, PEARSON, 2008
2. Dr.J.S Chode “**Consumer Electronics**”, First edition, Seventh reprint 2014, Technical Publication

Reference Books

1. Dr.B R Gupta and V. Singhal “**Consumer Electronics**”, 10th Revised Edition, S K Kataria & sons, 2013
2. R.G. Gupta “**TV Engineering& Video Systems**”, 2nd Edition, Tata MaGraw Hill Education Pvt. Ltd, 2017
3. Bali R & Bali S.P, “**Audio video systems: principle practices & troubleshooting**”, Khanna Book Publishing Co. (P) Ltd., India 2010
4. J.Rangarajan “**Television and Video engineering**”, Charulatha Publications, 2014.

Websites for Reference

1. <https://www.slideshare.net/>
2. <https://www.scienceabc.com/>
3. <https://www.lecturenotes.in/>
4. <https://www.electronics-notes.com/>

**Part-IV B.Sc. Electronics / Semester – II / SKILL ENHANCEMENT COURSE III:
MS OFFICE AUTOMOTION (U23EL2S3)**

Lecture Hours	: 28	Tutorial Hours	: - 02
Practical Hours	: -	No. of Credit	: 02
Contact Hours per Semester	: 30		
Contact hours per Week	: 02		
Internal Marks	: --		
External Marks	: 50		
Total Marks	: 50		

Objectives of the course:

- Course provides a comprehensive idea about the office Automation.
- This course also examines the knowledge and fundamentals of office Automation.
- The student should be able to understand applications of office Automation

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

- CO1 Get a clear idea about office automation
- CO2 Understanding the principles of Word, Excel
- CO3 Examines the principles and operations of MS office Automation
- CO4 Apply the gained knowledge in designing of spread sheets
- CO5 Experiments the Power point & Access

CO-PO-PSO Mapping (Course Articulation Matrix)

POs, PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	3	3	2	2	2	3	1	3	3
CO2	1	2	3	2	3	2	3	1	2	3
CO3	2	2	3	2	3	1	3	2	2	3
CO4	3	3	3	2	2	2	3	3	3	3
CO5	3	1	2	2	1	1	2	1	1	2
Total Contribution of COs to POs, PSOs	10	11	14	10	11	8	14	8	11	14
Weighted Percentage of COs Contribution to POs, PSOs	66.7	73.3	93.3	66.7	73.3	53.3	93.3	53.3	73.3	93.3

1 – Low; 2 – Medium; 3 – Strong

COURSECONTENT

Unit I - Microsoft Word

(L-6 Hrs)

Introducing the Microsoft Office User interface – Microsoft Office features.

New features in Word – Starting Microsoft Word– Creating a new blank word document – Applying Basic formatting: - changing the font and font size – applying the Bold, Italic and Underline styles – changing the text color – Aligning the text – Applying Bulleted and Numbered lists – Using Cut, Copy and Paste Commands – Using Find, Replace and Go To Commands – Printing a Word document – Opening an existing word document – Closing a word document – Exiting Microsoft Word.

Unit II – Working with Tables

(L-5 + T – 1 Hrs)

Working with Tables: – Adding a table to a document – Adding Columns and Rows – Merging the Cells in a table – Adding a table Border – Inserting Headers and Footers – Inserting Footnotes and Endnotes – Performing Spelling and Grammar check – Marking a document as Final

Unit III – Microsoft Excel

(L-5 + T – 1 Hrs)

New features in Excel – Creating a New Blank Excel Workbook – Saving an Excel Workbook – Adding Data to Cells – Inserting and deleting Cells, Rows, Columns and Worksheet – Renaming a Worksheet – Opening an existing Excel Workbook – Printing a Worksheet – Closing an Excel Worksheet – Exiting Microsoft Excel – Working with Chart – Working with Formula and Functions.

Unit IV – Microsoft PowerPoint**(L-6 Hrs)**

New features in PowerPoint – Creating a Blank Presentation – Saving Presentation – Adding and Removing Slides – Opening an Existing Presentation - Closing Presentation – Exiting Microsoft PowerPoint.

Unit V – Microsoft Access**(L-6 Hrs)**

Introduction to tables in Microsoft Access: - creating a table – Saving a table – Working with fields in a table – Entering records in a table –Introducing query types – Creating a Query – Saving a Query.

Tutorial Section

Unit	Topic	Hours
II	Inserting Headers and Footers	1
III	Working with Formula and Functions.	1

Text Book:

1. Kogent“**Learning Solutions inc., Office 2010 in Simple Steps**”, Dreamtech Press, Edition 2011.

Reference Books

1. Bittu Kumar “**Mastering MS Office**”, V&S Publishers, 2017
2. Weverka“**Microsoft Office 2021 All-In-One For Dummies New**”, Wiley India

Websites for Reference

1. <https://www.slideshare.net/>
2. <https://www.scienceabc.com/>
3. <https://www.lecturenotes.in/>

III SEMESTER

Part-III B.Sc. Electronics / Semester – III / Core-5:

ELECTRONIC CIRCUITS (U23EL303)

Lecture Hours	: 55	Tutorial Hours	: 05
Practical Hours	: -	No. of Credit	: 04
Contact Hours per Semester: 60			
Contact hours per Week : 04			
Internal Marks	: 25		
External Marks	: 75		
Total Marks	: 100		

Objectives of the course:

- Course provides a comprehensive idea about the Electronic Circuits. This course also examines the knowledge and fundamentals of electronic circuits.
- The student should be able to understand applications of Electronic Circuits. The goal is to develop a solid understanding of the circuit concepts.

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

CO1 Identify the circuit concepts

CO2 Get a clear idea about designing wave shaping, switching circuits & waveform generators

CO3 Illustrate the principles and operations of wave shaping, switching circuits & waveform generators

CO4 Use the gained knowledge in evaluate the electronic circuits

CO5 Apply the gained knowledge in electronic circuits to design circuits of their own

CO-PO-PSO Mapping (Course Articulation Matrix)

POs,PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	1	2	3	3	2	3	3
CO2	2	3	3	2	3	1	2	3	1	2
CO3	3	3	3	3	2	2	3	2	2	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	2	2	3	3	3	3	3	3	3
Total Contribution of COs to POs, PSOs	14	14	14	12	13	12	14	13	12	14
Weighted Percentage of COs Contribution to POs, PSOs	93.3	93.3	93.3	80	86.6	80	93.3	86.6	80	93.3

1 – Low; 2 – Medium; 3 – Strong

COURSE CONTENT

UNIT I Wave shaping Circuits

(L-11 + T-1 Hrs)

Rectifier-Half-wave, Full-wave and Bridge Rectifiers – Average Value – RMS Value – Ripple Factor – Rectification Efficiency.

Filters: Capacitors, Inductors, LC and π filters – Regulated Power Supplies – Block diagram – Regulated Power Supplies using ICs – Variable Voltage Regulators using ICs.

UNIT II Amplifiers

(L-11 + T-1 Hrs)

Transistor Amplifier (Common Emitter) – Multistage Amplifiers: RC Coupled Amplifier –Transformer Coupled Amplifier – Power Amplifiers: Classification of Power Amplifier – Class A Power Amplifier – Class B Power Amplifier – Push Pull Amplifier – Class A Push Pull Amplifier.

UNIT III Feedback Amplifiers

(L-11 + T-1 Hrs)

Basic concept – Types of feedback – Positive feedback – Negative feedback – Effect of Negative feedback on gain – Stability – Bandwidth – Distortion and noise – Voltage series feedback – Voltage shunt feedback – Current series feedback – Current shunt feedback.

UNIT IV Oscillators

(L-11 + T-1 Hrs)

Oscillator– Comparison between Oscillator and Amplifier – Classification of oscillators – Condition for Oscillation – Hartley oscillator – Colpitt's Oscillator – Clapp Oscillator – Phase-Shift Oscillator – Wien Bridge Oscillator

UNIT V Multivibrators

(L-11 + T-1 Hrs)

Multivibrator: Introduction – Classification – Astable Multivibrator and its applications – Monostable Multivibrator and its applications – Bistable Multivibrator and its applications – Schmitt Trigger - Clipping, Clamping Circuits.

Tutorial Section:

Unit	Topic	Hours
I	Rectifiers	1
II	Class A Power Amplifiers	1
III	Analysis of voltage feedback amplifier	1
IV	Phase Shift Oscillator	1
V	Clipper & Clamper	1

Text Books

1. Salivaghanan, Suresh Kumar, Vallavaraj, “**Electronic Devices and Circuits**”, New Delhi: Tata Mc-Graw Hill Publication. [Unit I, II, III, V]
2. Mehta. V. K., “**Principles of Electronics**”, New Delhi: S. Chand & Co, Second Edition. [Unit IV]

Reference Books

1. B.L.Theraja, “**Basic Electronics Solid State**”, 5th Edition, S.Chand & Company Limited, 2007.
2. R.S.Sedha “**A Text Book of Applied Electronics**”, Multicolor illustrative edition S.Chand & Company Ltd

Websites for Reference

1. <https://www.electronics-tutorials.ws/>
2. <https://www.electronicshub.org/tutorials/>
3. https://www.tutorialspoint.com/basic_electronics/index.htm
4. <https://www.electronics-notes.com>

**Part-III B.Sc. Electronics / Semester – III / Core-6:
ELECTRONIC CIRCUITS - LAB (U23EL3P3)**

Lecture Hours	: -	Tutorial Hours	: -
Practical Hours	: 60	No. of Credit	: 03
Contact Hours per Semester	: 60		
Contact hours per Week	: 04		
Internal Marks	: 40		
External Marks	: 60		
Total Marks	: 100		

Objectives of the course:

- To learn to assemble various types of amplifiers and oscillators.
- To construct and understand the performance characteristics of electronic circuits.

Course Learning Outcomes (for mapping with POs and PSOs)

- On successful completion of course, the learner should be able to
- CO1 Recognize the usage of electronic devices and circuits.
 - CO2 Demonstrate power supplies, wave shaping circuits, amplifiers and oscillators effectively.
 - CO3 Analyze and test the electronic circuits with modern tools.
 - CO4 Evaluate and troubleshoot with the technical skills learned and design circuits.
 - CO5 Work in a team to build circuits of their own and interpret data.

CO-PO-PSO Mapping (Course Articulation Matrix)

POs,PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	2	3
CO2	3	3	2	3	2	3	2	2	3	2
CO3	3	2	3	3	2	3	3	3	3	2
CO4	3	3	2	3	3	2	3	2	3	3
CO5	2	2	2	3	2	2	3	2	3	2
Total Contribution of COs to POs, PSOs	14	13	12	14	12	13	14	12	14	12
Weighted Percentage of COs Contribution to POs, PSOs	93.3	86.6	80	93.3	80	86.6	93.3	80	93.3	80

1 – Low; 2 – Medium; 3 – Strong

List of Experiments

(Minimum 12 Experiments to be carried out)

1. Half-wave rectifier
2. Full-wave rectifier
3. Low pass, high pass filters using passive components
4. Variable power supply using IC's
5. Clipping circuits
6. Clamping circuits
7. Schmitt trigger using transistor
8. RC Coupled Amplifier
9. Feedback Amplifier
10. Emitter Follower
11. Hartley Oscillator
12. Colpitt's Oscillator
13. Phase-shift Oscillator
14. Wien Bridge Oscillator
15. Astable Multivibrator using Transistor
16. Monostable Multivibrator using Transistor
17. Bistable Multivibrator using Transistor

**Part-III B.Sc. Electronics / Semester – III / Elective Generic- 3:
ELECTRONIC COMMUNICATION SYSTEM (U23EL3A3)**

Lecture Hours	: 55	Tutorial Hours	: 05
Practical Hours	: -	No. of Credit	: 03
Contact Hours per Semester	: 60		
Contact hours per Week	: 04		
Internal Marks	: 25		
External Marks	: 75		
Total Marks	: 100		

Objectives of the course:

- This course is to provide students with an overview of the concepts and fundamentals of communication systems with noise theory & radio receiver, antenna and electromagnetic wave propagation.

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

- CO1 Understand the basic concepts, requirement specifications and designs in communication system.
- CO2 Apply the adequate electronics communication skills and design noise-free analog communication systems.
- CO3 Analyze and test the analog electronic communication systems for given specifications.
- CO4 Work in a team using technical knowhow, common tools and environments to achieve project objectives.
- CO5 Evaluate the technical skills and engage them in lifelong learning and become a skilled person.

CO-PO-PSO Mapping (Course Articulation Matrix)

POs, PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	3	3	3	3	3
CO2	3	3	2	3	2	3	2	3	3	2
CO3	3	2	3	2	2	3	3	3	2	3
CO4	3	3	2	3	2	2	2	3	3	2
CO5	2	2	2	2	2	3	2	2	2	2
Total Contribution of COs to POs, PSOs	14	13	12	13	10	14	12	14	13	12
Weighted Percentage of COs Contribution to POs, PSOs	93.3	86.6	80	86.6	66.6	93.3	80	93.3	86.6	80

1 – Low; 2 – Medium; 3 – Strong

COURSE CONTENT

Unit-I Introduction to Communications System

(L-11 + T-1 Hours)

Information – Transmitter – Receiver – Need for modulation – Amplitude modulation theory – Frequency spectrum of AM wave – Representation of AM wave – Frequency modulation theory - Frequency spectrum of FM wave – Comparison of amplitude and frequency modulations.

Unit-II Radiation and Propagation of Waves

(L-11 + T-1 Hours)

Radiation: Electromagnetic radiation – Fundamentals of electromagnetic waves: Radiation and reception – Attenuation and absorption
Propagation of Waves: Basic concept of Ground waves, Sky waves and Space waves.

Unit-III Antennas

(L-11 + T-1 Hours)

Basic consideration – Electromagnetic radiation – Gain and effective radiated power – Radiation measurement and field intensity – Antenna resistance – Bandwidth – Beam width – Polarization – Effects of antenna height.

Unit- IV Radio Transmitters

(L-11 + T-1 Hours)

CW transmitter – AM transmitter – FM transmitter – Speech Processing: Benefits of speech processing – Analog speech processing – Digital speech processing

Unit –V Radio Receivers

(L-11 + T-1 Hours)

Tuned radio frequency receiver – Super heterodyne receiver – AM receiver: RF section and characteristics – Reasons for use RF amplifier – Functions of RF amplifier – FM receiver: Common circuits – Operation of amplitude limiter – Radio detector: Basic radio detector circuit – Balanced radio detector circuit.

Tutorial Section:

Unit	Topic	Hours
I	Frequency modulation theory	1
II	Propagation of waves	1
III	Electro Magnetic Radiation	1
IV	Digital speech processing	1
V	Super heterodyne receiver	1

Text Book:

1. George Kennedy & Bernard Davis, “**Electronic Communication Systems**”, Fourth Edition, TMH, New Delhi.
2. Louis E.Frenzel, “**Communication Electronics: Principles and Applications**”, Third Edition, New Delhi

Reference Books:

1. Dr.K.S.Srinivasan, “**Communication Theory**”, Reprint 2013, Anuradha Publications, Chennai

Websites for Reference

1. <https://www.electronics-tutorials.ws/>
2. <https://www.electronicshub.org/tutorials/>
3. https://www.tutorialspoint.com/basic_electronics/index.htm
4. <https://www.electronics-notes.com>

**Part-III B.Sc. Electronics / Semester – III / Elective Generic Lab3:
ELECTRONIC COMMUNICATION LAB - I (U23EL3AP)**

Lecture Hours	: -	Tutorial Hours	: -
Practical Hours	: 30	No. of Credit	: 01
Contact Hours per Semester	: 30		
Contact hours per Week	: 02		
Internal Marks	: 40		
External Marks	: 60		
Total Marks	: 100		

Objectives of the course:

- To introduce the working idea about analog, pulse analog and digital modulation techniques.
- To introduce the concept of bending losses in optical fibers.
- To introduce the concept of Automatic Gain Control, filter design and phase locked loop.

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

- CO1 Understanding the basic need for various types of modulation schemes.
- CO2 Apply the learned skilled to identify the modulator and demodulator circuits.
- CO3 Analyze the necessity of choosing specific modulation schemes for the application.
- CO4 Analyze the concept behind PLL, AGC and bending losses in optical fibers and its implementation in modulation techniques.
- CO5 Create an ability to choose appropriate modulation scheme depends on applications.

CO-PO-PSO Mapping (Course Articulation Matrix)

POs, PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	3	2	2	2	3
CO2	2	3	3	3	2	3	2	3	2	3
CO3	2	2	2	2	3	2	2	2	3	2
CO4	2	3	3	3	3	2	2	3	3	2
CO5	3	3	2	2	3	3	3	2	3	3
Total Contribution of COs to POs, PSOs	12	14	13	12	13	13	11	12	13	13
Weighted Percentage of COs Contribution to POs, PSOs	80	93.3	86.6	80	86.6	86.6	73.3	80	86.6	86.6

1 – Low; 2 – Medium; 3 – Strong

LIST OF PRACTICALS

(Minimum 6 Experiments to be carried out)

1. Amplitude Modulation (AM) and Demodulation.
2. Frequency Modulation (FM) and Demodulation.
3. Pulse Width Modulation (PWM) and Demodulation.
4. Pulse Position Modulation (PPM) and demodulation
5. Pulse Amplitude Modulation (PAM) and demodulation
6. Directional characteristics of microphone and loudspeakers
7. Voltage to frequency converter
8. Study of Automatic Gain Control
9. Study of Intermediate Amplifier

**Part-IV B.Sc. Electronics / Semester – III / SKILL ENHANCEMENT
COURSE 4:**

BASIC ELECTRICAL WIRING LAB (U23EL3S4)

Lecture Hours	: -	Tutorial Hours	: -
Practical Hours	: 30	No. of Credit	:
Contact Hours per Semester	: 30		
Contact hours per Week	: 02		
Internal Marks	: -		
External Marks	: 50		
Total Marks	: 50		

LIST OF PRACTICALS

1. Introduction of tools, electrical materials, symbols and Abbreviations.
2. To study the One Lamp Controlled by One Switch
3. To study the Stair case wiring.
4. To study the Godown wiring.
5. To study the fluorescent tube light.
6. To study the One Lamp Controlled by Regulator.
7. To study circuit and working of UPS
8. To study fuses MCBs and importance of Earthing.

**Part-IV B.Sc. Electronics / Semester – III / ABILITY ENHANCEMENT
COMPULSORY COURSE (AECC) - I:
ENVIRONMENTAL STUDIES (U23AE301)**

Lecture Hours	: 30	Tutorial Hours	: -
Practical Hours	: -	No. of Credit	: 02
Contact Hours per Semester	: 30		
Contact hours per Week	: 02		
Internal Marks	: 50		
External Marks	: --		
Total Marks	: 50		

Objectives of the course:

- Students acquire knowledge on the basic concepts, components and importance of environment.

Course Learning Outcomes (for mapping with POs and PSOs)

- On successful completion of course, the learner should be able to
- CO1 Define the structure and functions of ecosystem
 - CO2 Explain the benefits of biodiversity conservation
 - CO3 Summarise the sources, effects and control measures of various types of Pollutants
 - CO4 Perceive the environment legislations in India for sustainable development.
 - CO5 Evaluate appropriate Techniques, Resources & Modern Instruments & Equipment's to control the pollutants

COURSECONTENT

Unit I: (L-6 Hours)

Definition and Scope of Environmental Studies – Ecology and Ecosystem – Structure of an Ecosystem – Types & Function of Ecosystem - Food chains, food webs, energy flow and ecological pyramids.

Unit II: (L-6 Hours)

Environmental problems and Management: Causes, effects and Control measures of: Air Pollution – Water Pollution – Noise Pollution – Nuclear Hazards. Solid waste management and Waste Disposal methods.

Unit III: (L-6 Hours)

Biodiversity and its conservation: Introduction-definition, Types of diversity: genetic, species and ecosystem biodiversity. Value of biodiversity: Consumptive use, productive use, social, ethical and aesthetic values. Bio diversity at global, national and local levels.

Unit IV:**(L-6Hours)**

Environment protection Act, Wildlife protection Act, Forest conservation Act, Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Environment Impact Assessment (EIA).

Unit V:**(L-6 Hours)**

Climate change and Global Warming causes and Measures. Disaster management: floods, earthquake, cyclone and landslides. Social issues and the Environment: Rain water harvesting, watershed management.

Text Books

1. P.D.Sharma.2003. Ecology and Environment.Rastogi Publication.
2. N. Arumugam and V. Kumaresan.Environmental Studies.Saras Publication.

Reference Books

- 1.Agarwal. K.C. 2001.Environmental Biology, Nidi Publications Limited, Bikaner.
- 2.A.K.De. 1999. Environmental Chemistry, Wiley Eastern Limited, India.
- 3.Jadhav,H. and Bhosale, V.M.1995. Environmental Protection and Laws, Himalaya Publishing House, Delhi. pp284.
4. Odum, E.P.1971. Fundamentals of Ecology, W.B.Saunders Co., USA.pp.574.

E-References

Biodiversity: <https://www.pmfias.com/biodiversity-hotspots-india/>

<https://byjus.com/free-ias-prep/biodiversity/>

Pollution: <https://www.livescience.com/22728-pollution-facts.html>

<https://sciencing.com/types-pollutants-5270696.html>

Wildlife Protection Act:

https://www.indiacode.nic.in/handle/123456789/1726?view_type=browse&sam_handle=123456789/1362

<https://byjus.com/free-ias-prep/wildlife-protection-act-1972/>

IV SEMESTER

Part-III B.Sc. Electronics / Semester – IV / Core-7: LINEAR INTEGRATED CIRCUITS (U23EL404)

Lecture Hours	: 55	Tutorial Hours	: 05
Practical Hours	: -	No. of Credit	: 4
Contact Hours per Semester	: 60		
Contact hours per Week	: 04		
Internal Marks	: 25		
External Marks	: 75		
Total Marks	: 100		

Objectives of the course:

- Course provides a comprehensive idea about the Linear Integrated Circuits.
- This course also examines the knowledge and fundamentals of Linear Integrated Circuits.
- The student should be able to understand the basic building blocks and the applications of linear circuits
- The goal is to develop a solid understanding of the principle of operational amplifier and special function IC's.

Course Learning Outcomes (for mapping with POs and PSOs):

On successful completion of course, the learner should be able to

- CO1 Study and understand the basic working principle of linear IC
- CO2 Apply the op-amp and its characteristics to design circuits.
- CO3 Analyze the parameters in the applications of op-amp
- CO4 Evaluate different circuits using op-amp and gain a thorough knowledge in troubleshooting.
- CO5 Build circuits with different applications using op-amp IC

CO-PO-PSO Mapping (Course Articulation Matrix)

POs, PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	2	2	3	2	3
CO2	3	3	2	2	3	2	2	3	3	3
CO3	3	3	2	2	2	2	2	3	3	2
CO4	3	2	3	2	3	2	3	3	2	3
CO5	2	3	2	2	3	3	3	2	3	3
Total Contribution of COs to POs, PSOs	14	13	12	10	14	11	12	14	13	14
Weighted Percentage of COs Contribution to POs, PSOs	93.3	86.6	80	66.6	93.3	73.3	80	93.3	86.6	93.3

1 – Low; 2 – Medium; 3 – Strong

COURSE CONTENT

UNIT I BASIC OPERATIONAL AMPLIFIER (L-11 + T-1 Hrs)

Ideal Op-Amp and its Characteristics, Block Diagram of Op - Amp (IC 741), Op Amp Parameters. Concept of Differential Amplifiers (Dual Input Balanced and Unbalanced Output), Current Mirror, Level Translator.

UNIT II OP-AMP CIRCUITS AND APPLICATIONS (L-11 + T-1 Hrs)

Open and Closed Loop Configuration, Frequency Response, Inverting, Non-Inverting, Summing and Difference Amplifiers, Integrator, Differentiator, Voltage to Current and Current to Voltage Converter.

UNIT III SIGNAL CONDITIONING CIRCUITS (L-11 + T-1 Hrs)

Sample and Hold Systems, Active Filters, First and Second Order Low Pass and High Pass Filters, Band Pass Filter, Band Reject Filter, All Pass Filter.

UNIT IV COMPARATORS AND SIGNAL GENERATORS (L-11 + T-1 Hrs)

Basic Comparator, Level Detector, Schmitt Trigger - Concept of Sinusoidal and Relaxation Type, Phase Shift Oscillator, Wien Bridge Oscillator, Square Wave Generator, Triangle Wave Generator, Saw Tooth Wave Generator.

UNIT V TIMER CIRCUITS

(L-11 + T-1 Hrs)

Multivibrators (IC 555), Functional Block Diagram, Astable and Monostable Multivibrator Circuits and Applications, Phase Locked Loops (PLL), Block Diagram, Phase Detectors, IC565, Voltage Controlled Oscillator (IC566).

Tutorial Section

Unit	Topic	Hours
I	Op Amp Parameters	1
II	Inverting and Non-Inverting amplifiers	1
III	Low Pass Filter	1
IV	Phase Shift Oscillator	1
V	Astable Multivibrators	1

Text Books

1. Ramakant A. Gayakwad “**Op-Amps and Linear Integrated Circuits**”, Prentice Hall of India Private Limited, 4th Edition, August 2011

Reference Books

1. D. Roy Choudhury and Shail B Jain, “**Linear Integrated Circuits**”, 4th Edition, New Age International Ltd, New Delhi, 1997.

Websites for Reference:

1. <https://www.electronicshub.org/tutorials/>
2. <https://www.electronics-notes.com/>
3. <https://www.slideshare.net/>

**Part-III B.Sc. Electronics / Semester – IV / Core 8:
LIC AND PCB SIMULATION - LAB (U23EL4P4)**

Lecture Hours	: -	Tutorial Hours	: -
Practical Hours	: 60	No. of Credit	: 03
Contact Hours per Semester : 60			
Contact hours per Week	: 4		
Internal Marks	: 40		
External Marks	: 60		
Total Marks	: 100		

Objectives of the course:

- To introduce the basic building blocks of linear circuits.
- To develop the special functions of integrated circuits.
- To design circuits in simulation software.

Course Learning Outcomes (for mapping with POs and PSOs)

- On successful completion of course, the learner should be able to
- CO1 Learn and recognize the basic needs in constructing circuits using op-amp.
 - CO2 Demonstrate power supplies, wave shaping circuits and wave generators with effective communication.
 - CO3 Associate the op-amp characteristics and parameters to implement circuits with simulation software.
 - CO4 Work in a team and evaluate the op-amp application circuits with the known concepts.
 - CO5 Engage in lifelong learning and build circuits using the gained knowledge with op-amp IC.

CO-PO-PSO Mapping (Course Articulation Matrix)

POs, PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3	2	3	3	3
CO2	3	3	3	3	2	3	2	3	3	3
CO3	3	2	2	2	3	3	2	2	2	2
CO4	2	3	3	3	3	2	2	3	3	3
CO5	3	2	2	3	2	2	3	2	3	3
Total Contribution of COs to POs, PSOs	14	12	13	14	12	13	11	13	14	14
Weighted Percentage of COs Contribution to POs,PSOs	93.3	80	86.6	93.3	80	86.6	73.3	86.6	93.3	93.3

1 – Low; 2 – Medium; 3 – Strong

List of Experiments

(Minimum 12 Experiments to be carried out in which 6 experiments should be done in simulation)

1. Characteristics of Op–Amp
2. Inverting and Non- Inverting Amplifier using OP-AMP
3. Adder and Subtractor using OP-AMP
4. Integrator and Differentiator using OP-AMP
5. High pass, Low pass filters using op amp.
6. Bandpass filter using op amp.
7. Square wave and Triangular wave generator using Op-amp
8. Astable multivibrator using OP-AMP.
9. Monostable multivibrator using OP-AMP.
10. Phase shift oscillator using OP-AMP.
11. Wien Bridge oscillator using OP-AMP.
12. Digital to Analog Converter.
13. Analog to Digital Converter.
14. Astable Multivibrator using IC555.
15. Monostable Multivibrator using IC555.
16. Schmitt Trigger using OP-AMP
17. Comparator using OP-AMP.

Part-III B.Sc. Electronics / Semester – IV / Elective Generic-4:

ADVANCED COMMUNICATION SYSTEMS (U23EL4A4)

Lecture Hours	: 55	Tutorial Hours	: 5
Practical Hours	: -	No. of Credit	: 03
Contact Hours per Semester : 60			
Contact hours per Week : 04			
Internal Marks	: 25		
External Marks	: 75		
Total Marks	: 100		

Objectives of the course:

- This course is to provide students with an overview of the concepts and fundamentals of advanced communication systems.
- Topics to be covered include: technologies involved in Wireless communication, Digital modulation techniques, Satellite and multiple access techniques involved in advanced communications.

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

- CO1 get a clear idea about wireless communication concepts
- CO2 analyze the advantages & disadvantages of Wireless LAN and system architecture
- CO3 study the digital modulation techniques
- CO4 explore the concepts of satellite communication
- CO5 examine the space & earth segments of a satellite

CO-PO-PSO Mapping (Course Articulation Matrix)

POs, PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	3	2	2	2	3	2	3	2
CO2	2	2	3	3	2	2	2	2	3	3
CO3	2	2	2	3	3	2	2	2	2	3
CO4	2	3	2	3	2	2	2	3	2	3
CO5	3	3	2	2	3	3	3	3	2	2
Total Contribution of COs to POs, PSOs	11	12	12	13	12	11	12	12	12	13
Weighted Percentage of COs Contribution to POs, PSOs	73.3	80	80	86.6	80	73.3	80	80	80	86.6

1 – Low; 2 – Medium; 3 – Strong

COURSE CONTENT:

UNIT – I Wireless Communication (L-11 + T-1 Hrs)

Frequencies for radio transmission - Signals – Signal Propagation – Path loss of radio signals – Multiplexing: Space division multiplexing, Frequency division multiplexing, Time division multiplexing, Code division multiplexing.

UNIT – II Wireless LAN (L-11 + T-1 Hrs)

Introduction – Advantages – Disadvantages – Infra red Vs radio transmission – Infrastructure and ad-hoc networks – IEEE 802.11 – System architecture – Protocol architecture – Physical layer – Frequency hopping spread spectrum – Direct sequence spread spectrum – Infra red.

UNIT – III Digital Modulation Techniques (L-11 + T-1 Hrs)

Frequency Shift Keying Transmitter – FSK receiver - Binary Phase Shift Keying Transmitter – BPSK receiver – Quadrature Phase Shift Keying Transmitter – QPSK receiver – Differential Binary Phase Shift Keying Transmitter – DBPSK receiver.

UNIT – IV Satellite Communication (L-11 + T-1 Hrs)

Kepler's Laws – Definitions of terms of earth orbiting satellites – Apogee and Perigee heights – The Geostationary orbit – Near Geostationary orbits – Earth eclipse of satellite – Sun transit outage.

UNIT – V The Space & Earth Segment Of A Satellite (L-11 + T-1 Hrs)

The Space Segment: Station keeping, Thermal control, TT&C subsystem, Transponders
The Earth Segment: Receive only home TV systems – The outdoor unit – The indoor unit – Master antenna TV system – Community antenna TV system – Transmit-Receive earth stations.

Tutorial Section

Unit	Topic	Hours
I	Signal Propagation	1
II	IEEE 802.11	1
III	Differential Binary Phase Shift Keying	1
IV	The Geostationary orbit	1
V	TT&C subsystem	1

Text Books

1. Jochen Schiller, "Mobile Communication", Pearson, Second Edition.
2. Wayne Tomasi, "Advanced Electronic Communications Systems", PHI, Sixth Edition.
3. Dennis Roddy, "Satellite Communications", McGrawHill, Fourth Edition.

Reference Books

1. Mishra, "**Wireless communications and Networks**", McGraw Hill, 2/e, 2013.
2. Nathan, "**Wireless communications**", PHI, 2012.
3. Singal, "**Wireless communications**", Mc Graw Hill, 2010.
4. W.C.Y.Lee, "**Mobile Cellular Telecommunication**", McGraw Hill, 2010.

Web References:

1. <https://www.electronicshub.org/tutorials/>
2. <https://www.electronics-notes.com/>
3. <https://www.slideshare.net/>

**Part-III B.Sc. Electronics / Semester – IV / Elective Generic-4:
ELECTRONIC COMMUNICATION LAB - II (U23EL4AP)**

Lecture Hours	: -	Tutorial Hours	: -
Practical Hours	: 30	No. of Credit	: 01
Contact Hours per Semester	: 30		
Contact hours per Week	: 02		
Internal Marks	: 40		
External Marks	: 60		
Total Marks	: 100		

Objectives of the course:

- To introduce the working idea about analog, pulse analog and digital modulation techniques.
- To introduce the concept of bending losses in optical fibers.
- To introduce the concept of Automatic Gain Control, filter design and phase locked loop.

Course Learning Outcomes (for mapping with POs and PSOs)

- On successful completion of course, the learner should be able to
- CO1 Understanding the basic need for various types of modulation schemes.
 - CO2 Apply the learned skilled to identify the modulator and demodulator circuits.
 - CO3 Analyze the necessity of choosing specific modulation schemes for the application.
 - CO4 Analyze the concept behind PLL, AGC and bending losses in optical fibers and its implementation in modulation techniques.
 - CO5 Create an ability to choose appropriate modulation scheme depends on applications.

CO-PO-PSO Mapping (Course Articulation Matrix)

POs, PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	3	2	2	2	3
CO2	2	3	3	3	2	3	2	3	2	3
CO3	2	2	2	2	3	2	2	2	3	2
CO4	2	3	3	3	3	2	2	3	3	2
CO5	3	3	2	2	3	3	3	2	3	3
Total Contribution of COs to POs, PSOs	12	14	13	12	13	13	11	12	13	13
Weighted Percentage of COs Contribution to POs, PSOs	80	93.3	86.6	80	86.6	86.6	73.3	80	86.6	86.6

1 – Low; 2 – Medium; 3 – Strong

List of Practical's:

(Minimum 7 Experiments to be carried out)

1. Amplitude Shift Keying modulation and demodulation
2. Frequency Shift Keying modulation and demodulation
3. Phase Locked Loop
4. Frequency multiplier
5. Time Division Multiplexing
6. PSK Modulation and Demodulation
7. DPSK Modulation and Demodulation
8. QPSK Modulation and Demodulation
9. PCM modulation and demodulation.
10. Delta / Adaptive Delta Modulation and Demodulation.

**Part-IV B.Sc. Electronics / Semester – IV / SKILL ENHANCEMENT
COURSE 5:**

SOLAR PHOTOVOLTAIC SYSTEM DESIGN (U23EL4S5)

Lecture Hours	: 28	Tutorial Hours	: - 02
Practical Hours	: -	No. of Credit	: 02
Contact Hours per Semester	: 30		
Contact hours per Week	: 02		
Internal Marks	: -		
External Marks	: 50		
Total Marks	: 50		

Objectives of the course:

- Course provides a comprehensive idea about the Solar Photovoltaic System Design.
- This course also examines the knowledge and fundamentals of Construction & Working of Photovoltaic.

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

- CO1 Get a clear idea about Solar Photovoltaic System Design
- CO2 Understand the concept of Photovoltaic Cell
- CO3 Implement the Photovoltaic Cell in electronics circuits
- CO4 Analyze the installation methods and maintenance of solar panel
- CO5 Gain knowledge in designing Solar Photovoltaic System Design.

CO-PO-PSO Mapping (Course Articulation Matrix)

POs, PSOs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	2	3	2	3	2	3	2	3	2
CO2	2	3	3	3	2	3	2	3	3	3
CO3	3	2	2	1	2	2	2	2	2	1
CO4	2	2	2	3	2	1	2	2	2	3
CO5	2	2	2	1	2	2	3	2	2	1
Total Contribution of COs to POs, PSOs	10	11	12	10	11	10	12	11	12	10
Weighted Percentage of COs Contribution to POs, PSOs	66.7	73.3	80	66.7	73.3	66.7	80	73.3	80	66.7

1 – Low; 2 – Medium; 3 – Strong

COURSE CONTENT

UNIT–I Introduction to Solar Energy (L-5 + T - 1Hrs)

Introduction, Advantages and Disadvantages of Solar Panel, Utilization of Solar Power Supply System in the Indian Railways, Application of Solar Powered System for Signaling & Telecommunications, Advantages of Solar Powered System for Signaling

UNIT–II Construction & Working Of Photovoltaic (L-6Hrs)

Photo Voltaic effect, Solar Cell: Construction & Working, Solar Photo Voltaic (SPV) Module, Solar Panel, Main Components of Solar Photo Voltaic System - Solar Array, Battery Bank, Solar Charge Controller, Field Junction Box (FJB), Solar Module Mounting Structure, Earthing kit, Cables, Operation, Types of Solar Panels.

UNIT–III Designing A Solar Photovoltaic System (L-5 + T - 1Hrs)

Definitions - Solar Cell, Solar Module, Solar Panel, Solar Array, Solar irradiation, Insolation, Peak sun Hours, Conversion Efficiency, General & Technical requirements for Solar Photo Voltaic Module-General Requirements, Technical requirements, Primary phases of designing an SPV system, Planning, Collection of Information/data - Load/ Application, Climatic conditions, User compatibility, Load calculation - For DC Loads, For AC Loads, Sizing Solar Array, Deciding Battery capacity, Selection of Charge Controller-Salient feature of Charge controller, Module mounts, Structure, Wiring, Sample system design-detailed steps, Solar Panel Requirement for IPS System at PI Station in Non-RE Area.

UNIT–IV Installation Of Solar Panel (L-6Hrs)

Introduction, Testing before installation, IV curve of a 35-Watt Solar Module, Installation guidelines - Mounting the Solar Modules, Sketch showing Panel Height, spacing between adjacent rows and angle of tilt, Electrical Interconnections – Cables, Connections to the Solar module, Interconnections between Charge controller and Solar Modules.

UNIT–V Maintenance & Troubleshooting (L-6Hrs)

Computer Viruses – Precautions –Anti-virus Software – identifying the signature of viruses – Firewalls and latest diagnostic software’s.

Tutorial Section

Unit	Topic	Hours
I	Application of Solar Powered System	1
III	Primary phases of designing an SPV system	1

Text Books:

1. Material prepared by Department of Electronics.
2. “Handbook on Installation & Maintenance of Solar Panel” Indian Railways Centre for Advanced Maintenance Technology.

Reference books:

9. Rabindra Kumar Satpathy, Venkateswarlu Pamuru“ Solar PV Power: Design, Manufacturing and Applications from Sand to Systems”, Academic Press Inc, 2020
10. Solanki C.S “Solar Photo voltaic Technology and Systems: A Manual for Technicians, Trainers and Engineers”, Prentice Hall India Learning Private Limited, 2013.

Website references:

1. <https://www.watelectronics.com/different-types-of-sensors-with-applications/>
2. <https://www.educba.com/applications-of-sensors/>
3. https://www.instructables.com/Building-a-computer-from-parts/?amp_page=true
4. <https://baictchs09.wordpress.com/2018/10/21/installation-of-hardware-components-and-other-peripherals>

**Part-IV B.Sc. Electronics / Semester – IV / ABILITY ENHANCEMENT
COMPULSORY COURSE (AECC) II:
YOGA & VALUE EDUCATION (U23AE402)**

Lecture Hours	: 30	Tutorial Hours	: -
Practical Hours	: -	No. of Credit	: 02
Contact Hours per Semester	: 30		
Contact hours per Week	: 02		
Internal Marks	: 50		
External Marks	: -		
Total Marks	: 50		

Objectives of the course:

- The Human beings are facing enormous problems in this 21st century and thus leading a meaningful life is really challenging.
- It is both the internal and external factors that prevent one not to have a peaceful living.
- It is the need of the hour to impart the ways and means of holistic living to the student learners.

Course Learning Outcomes (for mapping with POs and PSOs)

On successful completion of course, the learner should be able to

- CO1 Understand the scientific basis of yoga, importance of practice of yoga and holistic living.
- CO2 Get motivated to develop moral values and empathic feeling
- CO3 Identify the tools for a positive self-development
- CO4 Apply the gained knowledge in designing of spread sheets
- CO5 Gain a realistic understanding about various social evils and measures to overcome it.

COURSE CONTENT

Unit: I Science Of Yoga

(T: 03 P: 10Hours)

Science of Yoga: Meaning - Panchakosha - Types of yoga: Karma yoga – Bakthi Yoga - Jnana yoga - Raja yoga - Paths of Yoga: Yama - Niyama - Asana - Pranayama - Prathyahara - Dharana - Dhyana - Samadhi.

(Practice: SukhmaVyama – Surya Namaskar – Basic set of Asanas, Pranayama & yogickriyas)

Unit: II- Values For Life

(T: 04Hours)

Human Values: Definition - Nature –Types-Process and Significance - Social Consciousness and responsibility- Holistic living

Unit: III -Moral Development

(T: 04 Hours)

Morality: Moral Development - Inherent difficulties in acquiring moral Values - Truth – Commitment - Honesty and Integrity - Forgiveness and Love - Empathy and ability to sacrifice

Unit: IV- Self Development

(T: 04Hours)

Self-Development: Meaning - Growth mindset - Self-soothing mechanism - Developing resilience – Body Language - Good Manners and Etiquette

Unit: V –Social Evils

(T: 05Hours)

Social Evils: Meaning - Domestic violence - Corruption - Terrorism - Measures to eradicate social evils.

REFERENCES

1. Study Material: The work book compiled by the TEAM of GVN College
2. Yoga: (Asanas, Pranayama, Mudra, Kriya) Vivekananda Kendra(1977), Vivekananda Prakasan Trust, Chennai.

E-References

1. <https://www.mea.gov.in/in-focus-article.htm?25096/Yoga+Its+Origin+History+and+Development>
2. <https://www.incredibleindia.org/content/incredibleindia/en/blogs/india-the-land-of-yoga.html>
3. <https://www.artofliving.org/in-en/yoga/yoga-for-beginners/science-behind-yoga>
4. <https://www.livescience.com/35129-yoga-increases-brain-function-bone-density.html>
5. <https://kripalu.org/presenters-programs/science-yoga>