PERIYAR UNIVERSITY

Reaccredited with 'A' Grade by the NAAC
NIRF – 5 th Rank among State Universities (Arts and Science)
PERIYAR PALKALAI NAGAR
SALEM - 636 011
TAMIL NADU

DEGREE OF BACHELOR OF SCIENCE
CHOICE BASED CREDIT SYSTEM (CBCS) AND
OUTCOME BASED CREDIT SYSTEM (OBCS)

Syllabus for

B.SC. ELECTRONICS AND COMMUNICATION

(SEMESTER PATTERN)
(For Candidates admitted in the Colleges affiliated to Periyar University from 2026 – 2027 onwards)

Programme Educational Objectives (PEOs):

- **PEO1** – Fundamental Knowledge:
  To provide students with strong fundamental knowledge in Electronics, Communication Systems, Digital Electronics, Microprocessors, and related technologies for higher studies and professional careers.
- **PEO2** – Technical Skills:
  To develop analytical, problem-solving, and practical skills required for designing, testing, and maintaining electronic and communication systems.
- **PEO3** – Employability and Higher Education:
  To prepare graduates for employment in electronics, communication, IT industries, research organizations, and for pursuing higher education and competitive examinations.
- **PEO4** – Professional Ethics and Teamwork:
  To inculcate professional ethics, leadership qualities, communication skills, and teamwork abilities for successful professional practice.
- **PEO5** – Lifelong Learning and Innovation:
  To motivate students towards lifelong learning, entrepreneurship, innovation, and adaptation to emerging technologies in Electronics and Communication.

Programme Specific Outcomes:

On completion of the BSc Degree in Electronics and Communication, graduates will have acquired the knowledge, skills, and competencies required to excel in the field of electronics and communication

- **PSO 1 —** Circuit & System Design covers foundational hardware competency in both analog and digital domains, with explicit emphasis on simulation tools to validate designs before hardware implementation.
- **PSO 2 —** Communication Systems focuses on the communication aspect of ECE, covering modulation, channel behaviour, and system-level analysis.
- **PSO 3** — Embedded & VLSI Systems addresses hands-on implementation skills that are highly valued in industry**.**
- **PSO 4 —** PCB Design & Fabrication is introduced as a dedicated outcome, covering industry-standard tools such as KiCad and Eagle, along with schematic capture, routing, design rule check (DRC), and Gerber file generation for manufacturing readiness.
- **PSO 5 —** Emerging Technologies keeps the programme forward-looking toward simulation, IoT, 5G, and AI-integrated hardware**.**
- **PSO 6 —** Professional & Ethical Practice ensures graduates are industry/research-ready beyond technical skills alone.

Programme Out comes:

On completion of the B.Sc. degree the Electronics and Communication graduates will be able to

•**PO1** Utilize the basic knowledge in Mathematics, science in Electronics and Communication areas,Computer and etc.

• **PO2** Identify formulate and solve complex problems to achieve demonstrated conclusions using Mathematical principles.

• **PO3** Design system components that meet the requirement of public safety and offer solutions.

• **PO4** Apply research-based knowledge to design and conduct experiments, analyze, synthesize and interpret the data pertaining to Electronics and arrive at valid conclusions.

• **PO5** Construct, choose and apply the techniques, resources and modern tools required for Electronics applications.

• **PO6** Examine the impact of Electronics solutions in global and environmental contexts and utilize the knowledge for sustained development.

• **PO7** Develop consciousness of professional, ethical and social responsibilities as experts in the field of Electronics.

Value additions in the Revamped Curriculum:

Semester	**Newly introduced Components**	**Outcome / Benefits**
III, IV,V	**Skill Enhancement papers** (Discipline centric / Generic / Entrepreneurial)	Industry-ready graduates Skilled human resource Students are equipped with essential skills to make them employable
		Training on Computing / Computational skills enable the students gain knowledge and exposure on latest computational aspects
		Data analytical skills will enable students gain internships, apprenticeships, field work involving data collection, compilation, analysis etc.
		Entrepreneurial skill training will provide an opportunity for independent livelihood Generates self – employment Create small scale entrepreneurs Training to girls leads to women empowerment
		Discipline centric skill will improve the Technical knowhow of solving real life problems using ICT tools
V & VI	Elective papers-	V & VI

II year Vacation activity	Internship / Industrial Training	Practical training at the Industry/ Banking Sector / Private/ Public sector organizations / Educational institutions, enable the students gain professional experience and also become responsible citizens.
V	Project with Viva – voce	Self-learning is enhanced Application of the concept to real situation is conceived resulting in tangible outcome
Extra Credits: For Advanced Learners / Honors degree		To cater to the needs of peer learners / research aspirants
Skills acquired from the Courses	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill	

CHOICE BASED CREDIT SYSTEM (CBCS) AND OUTCOME BASED CREDIT SYSTEM (OBCS), Learning Outcomes Based Curriculum Framework (LOCF) Guideline Based Credit and Hours Distribution System for all UG courses including Lab Hours

First Year – Semester-I

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses- I, II & including lab (4+2+3)	10	9
Part-3	Allied – I & including lab (4+2)	4	6
Part-4	NMEC – I & Value Education (2+1)	3	3
		23	**30**

Semester-II

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	4
Part-3	Core Courses- III & Lab (5+3)	9	8
Part-3	Allied – II & & including lab (4+2)	4+2	6

Part-4	NMEC II, Disaster Management & NMSDC – I (2+2+2)	5	6
		26	**30**

Second Year – Semester-III

Part	List of Courses	Credit	No. of Hours
Part-1	Language - Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses-IV & including lab (4+3) Allied – III & including lab (4+2)	5 4	7 6
Part-4	Skill Enhancement Course -SEC-1 (Discipline / Subject Specific)	2	2
	Health & Wealth	1	1
	NMSD-II	2	2
		20	**30**

Semester-IV

Part	List of Courses	Credit	No. of Hours
Part-1	Language - Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses V, including lab (5+3) Allied – IV & including lab (4+2)	14 4+2	8 6
Part-4	Skill Enhancement Course -SEC-2 (Discipline / Subject Specific)	2	2
	NMSD-III	2	2
		30	**30**

Third Year-Semester-V

Part	List of Courses	Credit	No. of Hours
Part-3	Core Courses – VI, VII,VIII/ Project, Elective -I including lab & Elective Based lab (5+5+4+4+3+3)	18	24
Part-4	Skill Enhancement Course -SEC-3 (Discipline / Subject Specific)	2	2
Part-4	EVS	2	2
	Internship / Industrial Visit / Field Visit & NMSD-IV	2+2	2
		26	**30**

Semester-VI

Part	List of Courses	Credit	No. of Hours
Part-3	Core Courses – XI, X Elective -II,III, including lab, Elective Based lab (6+6+5+5+3+3)	24	28
Part-4	Extension Activity	1	-
	NMSD-V	2	2
		27	**30**

Consolidated Semester wise and Component wise Credit distribution

Parts	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total Credits
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	14	16	09	19	18	24	100
Part IV	3	5	5	4	8	2	27
Part V	-	-	-	-	-	1	1
Total	18	24	18	28	27	25	**152**

***Part I. II, and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programme and the other components. IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.**

CREDIT DISTRIBUTION FOR B.Sc (Elec & Comms)

3 – Year UG Programme in (B.Sc (Elec & Comm)) Credits Distribution			
		No. of Papers	**Credits**
Part I	Tamil (3 Credits)	4	12
Part II	English (3 Credits)	4	12
Part III	Core Courses (4 Credits)	10+5	100
	Elective Courses : Discipline Specific (3 Credits) Allied+lab	3+1	
		Total	**124**
Part IV	(NMEC)(2 Credits)	2	
	SkillEnhancement Courses 1,2,3 (2 Credits) Health & Wealth NMSD-5	3 1 5	21
	EVS (2 Credits)	1	2
	Value Education (1 Credits)	1	1
	Disaster Management (1 Credits)	1	1
	Summer Internship(2 Credits)	1	2
		Part IV Credits	**27**
Part V	Extension Activity (NSS / NCC / Physical Education)		1
Total Credits for the UG Programme in B.Sc. Computer Science			**152**

REGULATIONS

1.ELIGIBILITY:

Candidates seeking admission to the first year of the Bachelor of Science in Electronics and Communication programme shall have passed the Higher Secondary Examination conducted by the Government of Tamil Nadu, with **Mathematics and Physics** under the General Stream, **or Mathematics and Basic Electronics Engineering** under the Vocational Stream, or an examination accepted as equivalent thereto by the Syndicate, subject to such conditions as may be prescribed from time to time. Candidates fulfilling this requirement are permitted to appear for and qualify for the B.Sc. Electronics and Communication Degree of this University after a course of study of three academic years.

Lateral Entry (Direct Second Year Admission):

Candidates who hold a Diploma in the relevant Engineering discipline from a recognized institution are eligible for direct admission to the second year of the B.Sc. Electronics and Communication programme, subject to the conditions prescribed by the University/AICTE/State Board of Technical Education from time to time, and shall complete the remaining two academic years of study to qualify for the Degree

2.DURATION OF THE COURSE:

The course for the degree of Bachelor of Electronics and Communication shall consist of three academic years divided into six semesters. Each semester will be of of 90 working days.

3.COURSE OF STUDY:

The course of study shall comprise instruction in the following subjects under CBCS(CHOICE BASED CREDIT SYSTEM)and OBCS(outcome based credit system) pattern according to the syllabus and books prescribed from time to time.

4.FOUNDATION SUBJECTS:

PART I: Tamil / Hindi / Malayalam / French / German

PART II: English .

ALLIED SUBJECTS:

Department out of the three mentioned below; to be chosen for the study of two allied papers. In the first year one major and in the second year another major department in the list to be chosen for the study of another two allied papers.

SEMESTER	MAJOR DEPARTMENT	ALLIED SUBJECT
I / III	MATHS	ALLIED MATHEMATICS OFFERS TWO GROUPS. CHOOSE GROUP A OR GROUP B,
I / III	PHYSICS	ALLIED PHYSICS - I
I / III	COMPUTER SCIENCE	PROGRAMMING IN C++
II / IV	MATHS	ALLIED MATHEMATICS OFFERS TWO GROUPS. CHOOSE GROUP A

		OR GROUP B,
II / IV	PHYSICS	ALLIED PHYSICS - II
II / IV	COMPUTER SCIENCE	PROGRAMMING IN PYTHON
II		ALLIED LAB - I FOR ALLIED I & II MATHS(Choose Group A or Group B)/PHYSICS/C ++ & PYTHON LAB
IV		ALLIED LAB - II FOR ALLIED III & IV MATHS(Choose Group A or Group B)/PHYSICS/C ++ & PYTHON LAB

List of Elective papers (Colleges can choose any one of the paper as electives)		
Elective – I	**Group - A**	8051 Microcontroller and interfacing
	Group - A	PIC16F877 Microcontroller and interfacing
Elective – II	**Group - B**	Mobile Communication
	Group - B	AI
Elective – III	**Group - C**	PCB Design and Fabrication
	Group - C	Programming using VHDL

Elective – IV	**Group - D**	8051 Microcontroller and interfacing Lab
	Group - D	PIC16F877 Microcontroller and interfacing Lab

List of Naan Mudhalvan Course Papers for Alternative Arrear Examinations (Semester II–VI)

Paper List for Alternative Arrear Examinations of Naan Mudhalvan Courses (Semesters II–VI) for B.Sc. Electronics and Communication Students Who Were Absent or Have Arrears in the Regular Examinations Conducted under the Naan Mudhalvan Programme of the Government of Tamil Nadu.

NMSDC-I	**Competitive Skills**
NMSDC-II	**Life Development Skills**
NMSDC-III	**Audio-Video Systems**
NMSDC-IV	**Fundamentals of Cell Phone Technology**
NMSDC-V	**Fundamentals of Smartphone Servicing**

Skill Enhancement Courses Offered:

Semester	Course Category	Course Code	Course Title
III	Skill Enhancement Course (SEC)	SEC1	Power Electronics
IV	Skill Enhancement Course (SEC)	SEC2	Electronic Instruments
V	Skill Enhancement Course (SEC)	SEC3	Electronic Systems Security

INTERNSHIP

S. No.	Objectives
1	To provide students with an opportunity to gain practical experience through a new job assignment or a new learning experience within an existing workplace.
2	To enable students to apply theoretical knowledge acquired through the academic curriculum in a real-world work environment.
3	To promote professional growth, skill development, and experiential learning through industry exposure.
4	To encourage students to undertake a specific project either in an organization sponsoring the internship or within their existing workplace.
5	To foster collaboration among the student, faculty advisor, and industry supervisor through a structured internship program.
6	To develop professional work ethics, communication skills, and responsibility in meeting job requirements.
7	To ensure regular attendance, punctuality, and adherence to organizational policies during the internship period.
8	To prepare and submit a comprehensive internship report documenting the work carried out, learning outcomes, and achievements.

S. No.	Outcomes
1	Apply classroom knowledge and technical skills to real-world industrial and organizational settings.
2	Demonstrate professional behavior, teamwork, communication, and problem-solving abilities in the workplace.
3	Gain practical experience relevant to the student's academic discipline and career goals.
4	Analyze and evaluate workplace practices, technologies, and processes.
5	Develop industry-oriented skills and enhance employability.
6	Prepare professional reports and presentations based on internship experiences.
7	Integrate academic learning with practical applications, contributing to overall professional development.
8	Build confidence and readiness for future employment or higher studies through meaningful work experience.

5. SCHEME OFEXAMINATIONS

The scheme of examinations under CBCS (CHOICE BASED CREDIT SYSTEM) for different semesters shall be as follows.

	FIRST SEMESTER						
Part	**Course Code**	**Title of Course**	**Contact Hr./Week**	**Credit**	**Int. Mark**	**Ext. Mark**	**Total Mark**
I		Tamil-I / Language@	6	3	25	75	100
II		English-I:Communicative English	6	3	25	75	100
III		Core – I: Semiconductor Devices	4	5	25	75	100
		Core -II : Applied Electric Circuits	2	5	25	75	100
III		Core Practical-I: Basic Electronics Lab	3	-	-	-	-
III		Allied I: Maths Group A or B/ Programming in C++/Allied Physics - I	4	4	25	75	100
		Allied Lab -I Allied for I & II Sem	2	-	-	-	-
IV		NMEC-I & VALUE EDUCATION	2	2	25	75	100
			1	1	25	75	100
			30	**23**	**175**	525	**700**
SECOND SEMESTER							
Part	**Course Code**	**Title of Course**	**Contact Hr./Week**	**Credit**	**Int. Mark**	**Ext. Mark**	**Total Mark**
I		Tamil-II / Language@	6	3	25	75	100
II		English-II: Communicative English	6	3	25	75	100
IV		NMSDC-I	2	2	25	75	100
III		Core – III: Digital Electronics	4	5	25	75	100
III		Core Practical – I: Basic Electronics Lab	3	4	40	60	100
III		Allied II: Maths Group A or B/ Programming in Python/Allied Physics -II.	4	4	25	75	100
		Allied Lab -I Allied for I & II Sem	2	2	40	60	100
IV		NMEC-II & Disaster Mangement	2	2	25	75	100
			1	1	25	75	100
			30	**26**	**255**	**645**	**900**

THIRD SEMESTER							
Part	**Course Code**	**Title of Course**	**Contact Hr./Week**	**Credit**	**Int. Mark**	**Ext. Mark**	**Total Mark**
I		Tamil-III / Language@	6	3	25	75	100
II		English-III	6	3	25	75	100
III		Core – IV: Electronic Circuits	4	5	25	75	100
III		Core Practical – II: Electronic Circuits Lab	3	-	-	-	-
III		Core Practical – III: 8085 Microprocessor and Interfacing Lab		-	-	-	-
III		Allied III: Maths Group A or B/ Programming in C++/Allied Physics - I	4	4	25	75	100
III		Allied Lab -II Allied For III& IV Sem	2	-	-	-	-
IV		Skill Enhancement Course -SEC-1{Power Electronics)	2	2	25	75	100
IV		NMSDC-II & Health and Wellness	2 1	2 1	25 Report	75	100 100
			30	**20**	**150**	**550**	**700**
FOURTH SEMESTER							
Part	**Course Code**	**Title of Course**	**Contact Hr./Week**	**Credit**	**Int. Mark**	**Ext. Mark**	**Total Mark**
I		Tamil-IV/ Language@	6	3	25	75	100
II		English-IV	6	3	25	75	100
III		Core – V: 8085 Microprocessor and Interfacing	5	5	25	75	100
III		Core Practical – II: Electronic Circuits Lab		5	40	60	100
III		Core Practical – III: 8085 Microprocessor and Interfacing Lab	3	4	40	60	100
III		Allied IV: Maths Group A or B/ Programming in Python/Allied Physics -II	4	4	25	75	100
III		Allied Lab -II Allied For III& IV Sem	2	2	40	60	100
IV		Skill Enhancement Course -SEC-2: Electronic Instrumentation	2	2	25	75	100
IV		NMSDC-III	2	2	25	75	100

			30	**30**	**270**	**630**	**900**
FIFTH SEMESTER							
Part	**Course Code**	**Title of Course**	**Contact Hr./Week**	**Credit**	**Int. Mark**	**Ext. Mark**	**Total Mark**
III		Core – VI: Electronic Communication Systems	5	5	25	75	100
III		Core – VII: IC's & Their Applications	5	5	25	75	100
III		Core – VIII: Biomedical Instruments (or) Project with viva voce*	4	5	25	75	100
III		Elective I:From Group A:8051 Microcontroller &Interfacing/ PIC16F877 Microcontroller &Interfacing	4	3	25	75	100
III		Core Practical – IV: IC's & Communication Lab	3	-	-	-	-
III		Elective Practical – V: **From Group D (8051 Microcontroller & Interfacing Lab/16F877 Microcontroller & Interfacing Lab**	3	-	-	-	-
IV		Skill Enhancement Course -SEC-3: **Electronic Systems Security**	2	2	25	75	100
IV		Environmental Studies	2	2	25	75	100
IV		NMSDC-IV **Summer ! *Internship**	2 Minimum 15 Days during summer holidays	2 2	Report		Highly/ commanded
			30	**26**	150	450	**600**
SIXTH SEMESTER							
Part	**Course Code**	**Title of Course**	**Contact Hr./Week**	**Credit**	**Int. Mark**	**Ext. Mark**	**Total Mark**
III		Core – IX: PC Hardware Networking & Troubleshooting	6	5	25	75	100

III		Core – X: Network Communication & Security	6	5	25	75	100
III		Elective II: From Group B: Modern Television Systems//Mobile Communication & Servicing	5	3	25	75	100
III		Elective III/GEC: **From Group C (PCB Design and Fabrication/Programming using Verilog HDL/Electronic Defense Systems/Nano Electronics**	5	3	25	75	100
III		Core Practical – IV: **IC's & Communication Lab**	3	5	40	60	100
III		Core Practical – V: **From Group D (8051 Microcontroller & Interfacing Lab/16F877 Microcontroller & Interfacing Lab/ PLC Programming Lab)**	3	3	40	60	100
IV		NMSDC-V	2	2	25	75	100
V		Extension Activity	-	1	-	-	-
		Total Credits & Marks Internal Mark for Project Work Project Report Evaluation **Viva Voce Evaluation**	**30** 25 marks **60 Marks** **15 Marks**	**27** **152**	**205**	**495**	**700** **4600**

! *Internship: To be carried out 4th semester vacation period, the internship course will not meet as a regular class.

@ Any other language like Hindi/Malayalam/French/etc.

#$ Those who have not studied Tamil up to XII std and taken a Non-Tamil language under Part-I shall take Tamil comprising of two courses (level will be 6th standard)instead of NMEC

#$ Those who have studied Tamil up to XII std and taken a Non-Tamil language under Part-I shall take Advanced Tamil comprising of two courses instead of NMEC.

Scheme of Examination and Mark Distribution

The Theory Examination shall be conducted for a duration of 3 hours with a maximum of 75 marks, and the minimum passing requirement shall be 30 marks.

A. Question Paper Pattern

Part	Description	Marks
Part A	Answer All Questions (Three Questions from Each Unit)	15 × 1 = 15
Part B	Answer Any Two Questions (One Question from Each Unit)	5 × 2 = 10
Part C	Answer All Questions (One Question from Each Unit with Internal Choice)	5 × 10 = 50
Total		**75 Marks**

B. Theory Examination (Internal Assessment)

Particulars	Marks
Subject-Level Cycle Test and Model Examination	15
Subject-Level Assignment	5
Subject-Level Attendance	5
Total	**25 Marks**

The maximum marks for the Internal Assessment are 25, with a minimum passing requirement of 10 marks.

C. Practical Examination (External)

Particulars	Marks
Practical Examination	50
Record Note Book	10
Total	**60 Marks**

The Practical Examination shall be conducted for a duration of 3 hours with a maximum of 60 marks, and the minimum passing requirement shall be 24 marks

i. Submission of Record Note Book:

Candidates appearing for the Practical Examination must submit a duly certified

bona fide record notebook. Candidates who fail to submit the Record Note Book will not be permitted to appear for the Practical Examination.

D. Mark Distribution for Practical (Internal Assessment)

Particulars	**Marks**
Year Through Laboratory Performance	10
Model Practical Examination	20
Year Through Laboratory Attendance	10
Total	**40**

with a minimum passing requirement of 16 marks.

E. PROJECT WORK OR ONE CORE PAPER:

A Candidate can submit **SOFTWARE or HARDWARE or HARDWARE cum SOFTWARE** based project and has to demonstrate the Project with Project Report in the University Project Viva Voce Examination conducted at the end of the sixth semester.

MARK DISTRIBUTION FOR PROJECT REPORT:60 MARKS MARK DISTRIBUTION FOR VIVA VOCE: 15 MARKS AND INTERNAL MARK: 25

Instead of Project Work; Core Paper – VIII "BIOMEDICAL INSTRUMENTS" may be offered in the Vth Semester.

F. PASSING MINIMUM:

A candidate shall be declared to have passed the examination only if the candidate secures a minimum of 40% in the University examination and with an overall total of 40 out of 100.

6. RESTRICTIONS TO APPEAR FOR THE EXAMINATIONS

Candidates who fail in any of the course of Part I, II, III, IV &PartV of UG Degree examinations shall complete the course concerned within 5 years from the date of admission to the said programme and should they fail to do so, they shall take the examination in the revised syllabus prescribed for the immediate next batch of candidates.

If there is no change in the syllabus they shall appear for the examination in that course with the syllabus in vogue until there is a change in the syllabus. In the event of removal of that course consequent to change of regulation and/or curriculum after a 5-year period, the candidates shall have to take up an equivalent course in the revised syllabus as suggested by the Chairman and fulfill the requirements as per the regulation curriculum for the award of the degree.

7. IMPROVEMENT OF MARKS IN THE SUBJECTS ALREADY PASSED

Candidates desirous of improving the marks awarded in a passed subject in their first attempt shall reappear once with in a period of subsequent two semesters. The improved marks shall be considered for classification but not for ranking. When there is no improvement, there shall not be any change in the original marks already awarded.

8. CLASSIFICATION OF SUCCESSFUL CANDIDATES

A candidate who passes all the examinations in Part I to Part V securing following CGPA and Grades, shall be declared as follows for Part I or Part II or Part III.

CGPA	GRADE	CLASSIFICATION OF FINAL RESULT
9.5 - 10.0	O +	First Class -Exemplary
9.0 and above but below 9.5	O	
8.5 and above but below 9.0	D++	First Class with Distinction
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
7.0 and above but below 7.5	A++	First Class
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	Second Class
5.0 and above but below 5.5	B	
4.5 and above but below 5.0	C+	Third Class
4.0 and above but below 4.5	C	

9. RANKING

A candidate who qualifies for the UG degree course passing all the examinations in the first attempt,within the Minimum period prescribed for the course of study from the date of admission to the course and secures I or II class shall be eligible for ranking and such ranking shall be confined to10% of the total number of candidates qualified in that particular branch of study; subject to a maximum of 10 Ranks. The improved marks shall not be taken into consideration for ranking.

10. COMMENCEMENT OF THIS REGULATION:

These regulations shall take effect from the academic year 2026-2027, i.e.,for students who are to be admitted to the first year of the course during the academic year 2026-2027 and thereafter.

11. COURSE EQUIVALENCE:

The Three Year Course in the Bachelor of Science in Electronics & Communication is Equivalent to :

1. B.Sc. Electronics
2. B.Sc. Industrial Electronics
3. B.E.S.(Bachelor of Electronic Science)

12. ACADEMIC OPPORTUNITIES:

After successful completion of this course ; students can pursue higher degree courses like M.Sc., (Electronics) / M.Sc., (Electronic Science) / M.Sc., (Applied Electronics) / M.Sc., (Electronics & Instrumentation) / M.Sc., (Cyber Forensics & Information Security) M.Sc.,(Criminology & Criminal Justice Science) / M.Sc., (Computer Science) / MCA / M.Sc., (Nano Science and Technology) / M.Sc., HRD Psychology / M.Sc., (Energy Science) / M.Sc., Environmental Science)/M.Sc., Library & Information Science)/M.Sc.,YOGA/MBA/MA.,(Defense & Strategic Studies/MA.,Yoga/MA.,Public Administration /MA.,Political Science etc.

13. JOB OPPORTUNITIES:

The Students are eligible for placement in Army,Navy,Airforce, Civil Aviation Sectors, Space & Radio Astronomy Sectors, T.V. Broad Casting Stations, All India Radio, BSNL,TNEB, ITES (IT Enabled Software Services), Telecommunication Sectors, Banking and Railway Services and as Computer Hardware & Instrument Service Professionals. A Wide variety of Self – Employment Opportunities are also available.

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER I
CORE I - SEMICONDUCTOR DEVICE

L	T	P	C
3	1	-	5

Course Objectives

To provide students with a thorough understanding of electronic devices from atomic structure to advanced semiconductor devices, enabling them to analyse, compare, and apply diodes, transistors, JFETs, and MOSFETs in practical electronic circuit applications.

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	**Atom**	Structure of Atom - Atomic Number - Valence Electrons - Bonding in Conductors - Insulators - Semiconductors - Energy Band Diagram of Conductors - Insulators - Semiconductors - Intrinsic Semiconductor - Extrinsic Semiconductor - P Type Semiconductor - N type Semiconductor - Carrier Life Time.	10 Hrs.
II	**PN Junction Diode**	Theory of PN Junction Diode - Energy Band Structure - Diode Current Equation - Diode Resistance - Effect of Temperature - PN Junction Diode as a Rectifier - Zener Diode – VI characteristics - Avalanche Breakdown - Zener Breakdown - Zener Diode as a Voltage Regulator - LED and Photodiode	10 Hrs.
III	**Transistor**	Operation of PNP & NPN Transistor - CB, CE, CC Configuration and Characteristics - Transistor as an Amplifier - Derivations of current gain parameters	10 Hrs.
IV	**JFET**	Construction - Operation - Output & Transfer Characteristics of P Channel & N Channel JFET - Characteristic Parameters of the JFET - Biasing the FET - Comparison of JFET & BJT - Comparison of P Channel & N Channel JFET - Applications of JFET - JFET as a Voltage Variable Resistor.	10 Hrs.
V	**MOSFET**	Construction, Operation, Output & Transfer Characteristics of P Channel & N Channel Depletion MOSFET - Construction, Operation, Output & Transfer Characteristics P Channel & N Channel Enhancement MOSFET - Biasing the MOSFET - Comparison of P Channel MOSFET with N Channel MOSFET - Comparison of JFET with MOSFET - Handling Precautions for the MOSFET- CMOS Technology - Introduction to Integrated Circuits (ICs)	10 Hrs.
		Total Hours	50 Hrs.

Course Outcomes	On completion of this course, students will be able to	K - LEVEL
CO1	Explain the fundamental circuit elements.	K2
CO2	Apply circuit laws to solve series, parallel, and series-parallel circuits	K3
CO3	Describe the semiconductor theory and the operating principles of the diode and transistor	K3
CO4	Analyze the construction, characteristics, and working principles of opto-electronic devices	K4
CO5	Interpret the theory, characteristics, and applications of miscellaneous devices	K4

REFERENCE BOOKS:

- ElectronicDevices&Circuits-Salivahanan-TMH-2ndEdition.
- A Textbook of Applied Electronics-R.S. Sedha-S. Chand-Rs.395.

CO-PO MAPPING — SEMICONDUCTOR DEVICES													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**Avg (co-wise)**
	Engineering Knowledge	**Problem Analysis**	**Design / Dev**	**Investigation**	**Modern Tools**	**Engineer & Society**	**Environment**	**Ethics**	**Team Work**	**Communication**	**PM & Finance**	**Life-long Learning**	
O1	3	2	2	2	2	2	1	1	2	2	1	2	**1.83**
CO2	3	3	3	2	2	2	2	1	2	2	1	2	**2.08**
CO3	3	2	2	2	2	2	2	1	2	2	1	2	**1.92**
CO4	3	2	2	3	2	2	2	2	2	2	2	2	**2.17**
CO5	3	2	2	3	2	2	2	2	2	2	2	2	**2.17**
PO Avg	**3**	**2.2**	**2.2**	**2.4**	**2**	**2**	**1.8**	**1.4**	**2**	**2**	**1.4**	**2**	**2.03**

3 = High Correlation | 2 = Medium Correlation | 1 = Low Correlation | — = No Correlation.

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTR - I
CORE II: APPLIED ELECTRIC CIRCUITS

L	T	P	C
2	-	-	5

Course Objectives

To equip students with a strong foundational understanding of electrical circuit components, laws, theorems, and AC circuit behaviour, enabling them to analyse and solve a wide range of electrical and electronic circuit problems.

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	**Circuit Components**	Resistors, Capacitors & Inductors in Series and Parallel - Factors affecting the Resistance of a Resistor, Capacitor & Inductor - Colour Coding of Resistors – Variable Resistors - Energy Stored in a Capacitor - Energy Stored in an Inductor- Simple Problems	05 Hrs
II	**Circuit laws**	Ohm's Law - Kirchhoff 's Voltage Law - Kirchhoff 's Current Law - Current Division - Voltage Division - Star Connection - Delta Connection – Series & Parallel Circuits – Open Circuit - Short Circuit – Mesh Analysis	05 Hrs
III	**Theorems**	Super Position Theorem – Thevenin 's Theorem – Norton 's Theorem – Maximum Power Transfer Theorem – Millman's Theorem - Simple Problems	05 Hrs
IV	**AC circuit Basics & Circuit Design and Simulation Using Proteus**	Sinusoidal and Non-Sinusoidal Waveforms – Peak Value – Peak to Peak Value – Average Value – RMS Value – Period and Frequency Measurement – Power Factor - Real Power - Reactive Power and apparent power. Introduction to Proteus Professional (ISIS). Features and applications of Proteus software. Schematic capture using ISIS.	05 Hrs
V	**Reactance, impedance & resonance**	Capacitive Reactance – Inductive Reactance – Impedance – RL and RC in Series and Parallel – RLC in Series and Parallel – Series Resonance – Parallel Resonance – Bandwidth of a Resonant Circuit	05 Hrs
		Total Hours	25 Hrs

Course Outcomes	On completion of this course, students will be able to	K - LEVEL
CO1	Identify the basic components in series and parallel connection.	K2
CO2	Have a clear understanding of the different circuit laws.	K3
CO3	Understand various circuit theorems.	K3
CO4	Analyze RMS & Power parameters of AC circuits.	K4
CO5	Understand how RLC works and its applications.	K4

References: [Text Books]

[1] Circuits and Networks: Analysis and Synthesis - Sudhakar & Shyam Mohan - TMH - IV Edition, 2013.

[2] Basic Electronics – Bernard Grob – Mcgraw Hill, 2010.

[3] Circuit Theory – Salivahanan – S.Chand, 2014.

Websites

1.https://www.researchgate.net/publication/381260714_Basic_Electronic_Circuits_by_Proteus_Simulating_Software.

2.https://www.scribd.com/presentation/467841467/NZB.

3.https://www.scribd.com/document/847859648/Circuit-Theory-1-Lab-10-Introduction-to-Proteus-for-Electronics.

CO-PO MAPPING — APPLIED ELECTRIC CIRCUITS													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**Avg (co-wise)**
	Engineering Knowledge	**Problem Analysis**	**Design / Dev**	**Investigation**	**Modern Tools**	**Engineer & Society**	**Environment**	**Ethics**	**Team Work**	**Communication**	**PM & Finance**	**Life-long Learning**	
O1	3	2	2	2	2	2	1	1	2	2	1	2	**1.83**
CO2	3	3	3	2	2	2	2	1	2	2	1	2	**2.08**
CO3	3	2	2	2	2	2	2	1	2	2	1	2	**1.92**
CO4	3	2	2	3	2	2	2	2	2	2	2	2	**2.17**
CO5	3	2	2	3	2	2	2	2	2	2	2	2	**2.17**
PO Avg	**3**	**2.2**	**2.2**	**2.4**	**2**	**2**	**1.8**	**1.4**	**2**	**2**	**1.4**	**2**	**2.03**

L	T	P	C
2	-	-	2

NMEC- NONMAJOR ELECTIVE COURSE- I

Semester-I

GROUP A - PAPER I -BASIC ELECTRONICS- I

COURSE OBJECTIVES

- To understand the fundamental circuit elements
- To apply circuit laws to solve series, parallel, and series-parallel circuits
- To describe the semiconductor theory and the operating principles of the diode and transistor
- To analyze the construction, characteristics, and working principles of opto-electronic devices
- To interpret the theory, characteristics, and applications of miscellaneous devices

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	**Circuit Elements**	Voltage – Current - Power and Energy – The Circuit - Resistance Parameter- Capacitance Parameter - Inductance Parameter – Different types of Resistors, Capacitors and Inductors – Resistors	05 Hrs

		in Series and Parallel	
II	**Circuit laws**	Ohm's Law-Kirchhoff's Current Law- Kirchhoff's Voltage Law-Voltage Division-Current Division-Series Circuits-Parallel Circuits-Series & Parallel Circuits-Open Circuit-Short Circuit.	05 Hrs
III	**Semiconductor Theory**	Structure of semiconductor materials – Energy band theory- Types of semiconductors – Ideal diode – Basic construction and characteristics - Operation of PNP & NPN Transistor	05 Hrs
IV	**Opto-electronic Devices**	Photo emissive and photoelectric theory – Theory, construction and characteristics -Light emitting diodes – LCD – Seven segment display – Photodiode– Photo transistor – Solar cell	05 Hrs
V	**Miscellaneous Devices**	Theory, characteristics and application: UJT, DIAC, SCR, TRIAC – Thermistors - Piezo Electric Devices - LDR.	05 Hrs
		Total Hours	25 Hrs

References : [Text Book]

[1] S. Salivahanan, *Electronic Devices and Circuits*, 2nd ed. New Delhi, India: Tata McGraw-Hill, 2008.

[2] V. K. Mehta and R. Mehta, *Principles of Electronics*, 11th ed. New Delhi, India: S. Chand & Company, 2008.

[3] A. Sudhakar and S. S. Palli, *Circuits and Networks: Analysis and Synthesis*, 4th ed. New Delhi, India: Tata McGraw-Hill, 2010.

Online Resources :

https://nptel.ac.in/courses/122106025
https://www.youtube.com/playlist?list=PLgMDNELGJ1CaNcuuQv9xN07ZWkXE-wCGP
https://www.allaboutcircuits.com/textbook/?utm_source

CO	Course Outcome Statement	Units Covered	Bloom's Level	K-Level
CO1	Students will be able to identify, describe, and differentiate fundamental circuit elements such as resistors, capacitors, inductors, voltage sources, and current sources, and explain their roles and characteristics in electrical circuits.	1	**L2 – Understand**	K2

CO	Course Outcome Statement	Units Covered	Bloom's Level	K-Level
CO2	Students will be able to apply Kirchhoff's Voltage Law (KVL), Kirchhoff's Current Law (KCL), and Ohm's Law to analyze and determine voltage, current, and power in series, parallel, and series-parallel circuit configurations.	2	**L3 – Apply**	K3
CO3	Students will be able to explain semiconductor theory including intrinsic and extrinsic semiconductors, P-N junction formation, and describe the construction, biasing conditions, and operating principles of diodes and transistors	3	**L3 – Apply**	K3
CO4	Students will be able to analyze the structural design, V-I characteristics, and operational principles of opto-electronic devices such as Light Emitting Diodes (LEDs), photodiodes, phototransistors, solar cells, and optocouplers.	4	**L4 – Analyze**	K4
CO5	Students will be able to interpret the theoretical basis, operating characteristics, and practical applications of miscellaneous electronic devices and special-purpose devices used in modern electronic systems.	5	**L4 – Analyze**	K4

CO-PO MAPPING — BASIC ELECTRONICS – I													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**Avg (co-wise)**
	Engineering Knowledge	**Problem Analysis**	**Design / Dev**	**Investigation**	**Modern Tools**	**Engineer & Society**	**Environment**	**Ethics**	**Team Work**	**Communication**	**PM & Finance**	**Life-long Learning**	
CO1	3	2	2	2	2	2	1	1	2	2	1	2	**1.83**
CO2	3	3	3	2	2	2	2	1	2	2	1	2	**2.08**
CO3	3	2	2	2	2	2	2	1	2	2	1	2	**1.92**
CO4	3	2	2	3	2	2	2	2	2	2	2	2	**2.17**
CO5	3	2	2	3	2	2	2	2	2	2	2	2	**2.17**
PO Avg	**3**	**2.2**	**2.2**	**2.4**	**2**	**2**	**1.8**	**1.4**	**2**	**2**	**1.4**	**2**	**2.03**

L	T	P	C
2	-	-	2

NMEC- NONMAJOR ELECTIVE COURSE- I

Semester-I

GROUP A PAPER II -BIO MEDICAL ELECTRONICS – I

COURSE OBJECTIVES

- To understand the principles of biomedical electrodes and human physiology relevant to biomedical instrumentation.
- To analyze the working and applications of clinical measurement devices and recording instruments.
- To understand the concepts, operation, and applications of diagnostic and patient monitoring systems.
- To describe the construction, operation, and applications of operation theatre equipment and endoscopic systems.
- To explain the principles, functioning, and clinical applications of diathermy and multi-parameter monitoring systems.

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	**Introduction**	Introduction to Human Physiology – Micro Electrodes – Skin Surface Electrodes – Needle Electrodes – Reference Electrodes.	05 Hrs
II	**Meters & recorders**	Digital Thermometer – Sphygmomanometer - Electronic Stethoscope – ECG - EEG – EMG	05 Hrs
III	**Cardio Tocography**	Cardiotocography - Electro Oculography - Electro Retinography - Poly Somnography Blood Flow Meter - Doppler – Audiometer	05 Hrs
IV	**Operation theatre equipment's**	Upper Endoscope - Lower Endoscope- ENT Endoscope	05 Hrs
V	**Diathermy**	Diathermy - Surgical Diathermy- Microwave Diathermy - Multipara Patient Monitor.	05 Hrs
		Total Hours	25 Hrs

References : [Text Book]

[1] A. Natarajan, *Biomedical Instrumentation & Measurements*. New Delhi, India: PHI Learning Pvt. Ltd.

[2] L. Cromwell, *Biomedical Instrumentation and Measurements*, 2nd ed. New Delhi, India: PHI Learning Pvt. Ltd.

[3] M. Arumugam, *Bio-Medical Instrumentation*, 2nd ed. Coimbatore, India: Anuradha Agencies.
[4] R. S. Khandpur, *Handbook of Biomedical Instrumentation*. New Delhi, India: Tata McGraw-Hill Publishing Co. Ltd.
[5] J. G. Webster, *Medical Instrumentation: Application and Design*, 3rd ed. New Delhi, India: Wiley Eastern Ltd.
[6] S. Ananthi, *A Textbook of Medical Instruments*. New Delhi, India: New Age International Publishers.

Online Resources :
https://www.khanacademy.org/science/health-and-medicine
https://nptel.ac.in/courses/108/105/108105097/
https://www.sciencedirect.com/topics/engineering/biomedical-electrode
https://ocw.mit.edu/courses/biological-engineering/
https://www.coursera.org/learn/physiology

CO	Course Outcome Statement	Units Covered	Bloom's Level	K-Level
CO1	Students will be able to explain the fundamental concepts of biomedical electrodes and human physiology.	1	**L1 – Remember**	K1
CO2	Students will be able to analyze the working principles and applications of clinical meters and recording instruments.	2	**L2 – Understand**	K2
CO3	Students will be able to describe the design and functionality of diagnostic and patient monitoring systems.	3	**L3 – Apply**	K3
CO4	Students will be able to illustrate the operation and components of operation theatre equipment and endoscopic systems.	4	**L3 – Apply**	K3
CO5	Students will be able to evaluate the principles of diathermy and the parameters involved in multi-parameter monitoring systems.	5	**L4 – Analyze**	K4

CO-PO MAPPING — BIO MEDICAL ELECTRONICS – I													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**Avg (co-wise)**
	Engineering Knowledge	**Problem Analysis**	**Design / Dev**	**Investigation**	**Modern Tools**	**Engineer & Society**	**Environment**	**Ethics**	**Team Work**	**Communication**	**PM & Finance**	**Life-long Learning**	

CO1	3	2	2	2	3	2	1	2	1	2	1	2	**1.92**
CO2	3	3	2	3	3	2	1	2	1	2	1	2	**2.08**
CO3	3	3	2	3	3	2	1	2	1	2	1	2	**2.08**
CO4	3	2	3	2	3	2	1	2	1	2	2	2	**2.08**
CO5	3	3	2	2	3	2	1	2	1	2	1	3	**2.08**
PO Avg	**3**	**2.6**	**2.2**	**2.4**	**3**	**2**	**1**	**2**	**1**	**2**	**1.2**	**2.2**	**2.05**

L	T	P	C
2	-	-	2

NMEC- NONMAJOR ELECTIVE COURSE- I

Semester-I

GROUP A- PAPER III - CELLULAR PHONES

COURSE OBJECTIVES

- To understand the basic working principles of a telephone system.
- To comprehend the concepts of cellular mobile wireless networks.
- To explain the various multiple access techniques employed in wireless communication.
- To apply the knowledge of 2G GSM network architecture in communication systems.
- To analyze the evolution and characteristics of 3G mobile systems**.**

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	**Basics**	Working of a Telephone - Local Exchange - Initiating a call - Calling a Number - Making a Connection - Answering a Call – Conversation - Ending a Call -Hook Switch – Transmitter – Receiver – Ringer -Cellular Mobile Telephone System	05 Hrs
II	**Cellular Mobile Wireless Networks**	Introduction - Cellular Structure - Cell Cluster - Frequency Reuse – Co-channel and Adjacent Channel Interference - Cell Splitting – Cell Sectoring.	05 Hrs
III	**Multiple Access Techniques**	Introduction - Frequency Division Multiple Access - Time Division Multiple Access -Space Division Multiple Access - Code Division Multiple Access.	05 Hrs
IV	**2G Architecture**	GSM Network Architecture - GPRS - GPRS Applications - EDGE	05 Hrs
V	**3G Architecture**	Introduction - UMTS Architecture - HSPA – Applications of 3G - Step towards 4G.	05 Hrs

		Total Hours	25 Hrs

References : [Text Book]

[1] M. Lotia, *Modern Mobile Phone Introduction & Servicing*. New Delhi: BPB Publications. (UNIT – I)

[2] SahaMisra, *Wireless communication and Networks- 3G and Beyond,* Tata McGraw Hill Education Private Limited, 2010. (UNIT – II,III, IV, V).

Online Resources :
https://dokumen.pub/qdownload/wireless-communications-and-networks-3g-and-beyond-2nbsped-9781259062735.html
https://archive.nptel.ac.in/courses/117/102/117102062/
https://onlinecourses.nptel.ac.in/noc21_ee66/preview

CO	Course Outcome Statement	Units Covered	Bloom's Level	K-Level
CO1	Students will be able to recall the basic working principles and components of a telephone system.	1	**L1 – Remember**	K1
CO2	Students will be able to explain the fundamental concepts and architecture of cellular mobile wireless networks.	2	**L2 – Understand**	K2
CO3	Students will be able to describe the various multiple access techniques used in mobile communication systems.	3	**L2 – Understand**	K2
CO4	Students will be able to apply the knowledge of 2G GSM network architecture to understand call processing and network components.	4	**L3 – Apply**	K3
CO5	Students will be able to analyze the evolution, features, and technological advancements of 3G mobile systems.	5	**L4 – Analyze**	K4

CO-PO MAPPING — CELLULAR PHONES													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**Avg (co-wise)**
	Engineering Knowledge	**Problem Analysis**	**Design / Dev**	**Investigation**	**Modern Tools**	**Engineer & Society**	**Environment**	**Ethics**	**Team Work**	**Communication**	**PM & Finance**	**Life-long Learning**	

CO1	**3**	**1**	**1**	**1**	**1**	**2**	**1**	**1**	**1**	**2**	**1**	**2**	**1.42**
CO2	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**2**	**1**	**3**	**1.92**
CO3	**3**	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**2**	**2**	**1**	**3**	**1.83**
CO4	**3**	**3**	**3**	**2**	**3**	**2**	**1**	**1**	**2**	**2**	**2**	**3**	**2.25**
CO5	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**1**	**2**	**2**	**2**	**3**	**2.33**
PO Avg	**3**	**2.2**	**2**	**2**	**2.2**	**1.8**	**1.4**	**1**	**1.6**	**2**	**1.4**	**2.8**	**1.95**

L	T	P	C
2	1	1	5

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER II
CORE III: APPLIED DIGITAL ELECTRONICS

Course Objectives

- To acquire the basic knowledge of digital logic levels and apply it to understand digital electronic circuits.
- To prepare students to perform analysis and design of various digital electronic circuits.
- To learn the design process of registers, counters, and analog-to-digital/digital-to-analog conversion.

Syllabus

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	Hours of Instruction
I	**Number systems**	Binary Signals – Binary Number System – Decimal Number System - Octal Number System – Hexadecimal Number System – Conversion from One Number System to Another Number System - BCD – Gray code – Excess – 3 Code – ASCII code.	10
II	**Boolean algebra**	Binary Addition, Subtraction, Multiplication & Division - 1's and 2's Complement Subtraction - 9's & 10's Complement Subtraction - Basic laws of Boolean Algebra - Duality Theorem – De Morgan's Theorem - Sum of Products – Product of Sum - Two Variable, Three Variable & Four Variable Karnaugh Maps .	10
III	**Combinational Elements**	Logic Gates: AND, OR, NOT, EX-OR, EX-NOR, NAND & NOR - Logic Gates using Discrete Components - NAND & NOR as Universal Gates - Half & Full Adder – Half & Full Subtractor - Encoder - Decoder - Multiplexer - Demultiplexer - Implementation using 74147, 7442, 74153 & 74155 IC's.	10
IV	**Sequential Elements**	Flip Flops: RS - Clocked RS - JK - Master Slave JK - D & T Flip Flops – Shift Registers: SIPO – SISO – PIPO – PISO – Shift Left – Shift Right - Ring counter – Twisted Ring Counter. Counters: Hexadecimal Up - Hexadecimal Down - Modulo Up - Modulo Down - UP/DOWN Counters - Implementation Using 7476, 7495, 7493 & 7490 IC's.	10

V	**A/D AND D/A Conversion**	Parallel Comparator Type of ADC - Counter Ramp Type of ADC - Successive Approximation Type of ADC - Dual Slope Type of ADC - ADC Accuracy and Resolution - Binary weighted Resistor type of DAC - R-2R Ladder Type of DAC - DAC Accuracy and Resolution - Implementation using ADC 0809 & DAC 0800 IC's.	10

CO	Course Outcome Statement	Bloom's Level	K-Level
CO1	Explain motherboard architecture, memory organization, BIOS/UEFI functions, and PC Assembly concepts.	L2 – Understand	K1, K2
CO2	Apply hardware installation, configuration, and troubleshooting techniques for memory and motherboard components.	L3 – Apply	K3
CO3	Analyze input device and storage device issues and perform basic troubleshooting procedures.	L4 – Analyze	K4
CO4	Utilize storage devices, display devices, and printers through installation, configuration, and maintenance procedures.	L3 – Apply	K3
CO5	Demonstrate network setup, resource sharing, and basic network security practices including malware protection and safe internet usage.	L3 – Apply	K3, K4

Text books:

1. ModernComputerHardwareCourse-ManoharLotia-BPB-Rs.360/-
2. K.L.James – Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance.
3. B.Ram – Computer Fundamentals
4. UpgradingandRepairingPC's-ScottMueller–Pearson-18th-Edition.

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1	1	1	-	-	-	1
CO2	3	3	3	2	1	1	-	-	-	1
CO3	3	3	2	2	2	2	-	1	-	1
CO4	3	3	2	2	3	2	-	1	-	2
CO5	3	2	3	3	3	3	-	1	-	2

L	T	P	C
2	-	-	2

NMEC- NON-MAJOR ELECTIVE COURSE- II

Semester-II

GROUP B- PAPER I - BASICELECTRONICS –II

COURSE OBJECTIVES

- Explain the fundamentals of number systems and binary arithmetic.
- Apply binary arithmetic and complement techniques to perform subtraction operations.
- Simplify and evaluate Boolean expressions using algebraic laws.
- Design and analyze combinational logic circuits based on given requirements.
- Demonstrate the use of electronic instruments for measurement, testing, and troubleshooting**.**

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	**Number systems**	Binary Number System - Octal Number System - Decimal Number System - Hexadecimal Number System	05 Hrs
II	**Digital Arithmetic Operations**	Binary Addition - Binary Subtraction - Binary Multiplication - Binary Division - 1's & 2's Complement Subtraction - 9's & 10's Complement Subtraction	05 Hrs
III	**Logic GATES**	Logic GATES - NAND as a UNIVERSAL GATE - NOR as a UNIVERSAL GATE - Basis Laws of Boolean Algebra - Principle of Duality – De Morgan's Theorem.	05 Hrs
IV	**Combinational elements**	Half Adder – Full Adder – Half Subtractor – Full Subtractor - Encoder – Decoder – Multiplexer - Demultiplexer.	05 Hrs
V	**Electronic instruments**	Use of Multimeter - Resistance Measurement - AC & DC Voltage Measurement - AC & DC Current Measurement-Testing of Diodes & Transistors -Use of CRO frequency and Amplitude Measurement - Use of: Strip Board, Bread board, Soldering Rod - Function Generator - Power supplies - Resistance Box - Capacitance Box - Inductance Box	05 Hrs
		Total Hours	25 Hrs

References : [Text Book]

[1] S. Salivahanan and S. Arivazhagan, *Digital Circuits and Design*, 3rd ed. New Delhi, India: Vikas Publishing House, 2004.

[2] S. Salivahanan, N. S. Kumar, and A. Vallavaraj, *Electronic Devices and Circuits*, 2nd ed. New Delhi, India: Tata McGraw-Hill, 2008.

[3] V. K. Mehta and R. Mehta, *Principles of Electronics*, 11th ed. New Delhi, India: S. Chand & Company, 2008.

Online Resources :
https://www.youtube.com/@nesoacademy?utm_source
https://www.allaboutcircuits.com?utm_source
https://nptel.ac.in/courses/108106165?utm_source
https://nptel.ac.in/courses/117106086?utm_source.

CO	Course Outcome Statement	Units Covered	Bloom's Level	K-Level
CO1	Students will be able to recall and explain the fundamental concepts of number systems and perform binary arithmetic operations	1	**L2 – Understand**	K2
CO2	Students will be able to apply binary arithmetic techniques and complement subtraction methods to solve numerical problems.	2	**L3 – Apply**	K3
CO3	Students will be able to simplify and minimize Boolean expressions by applying algebraic laws and theorems	3	**L4 – Analyze**	K4
CO4	Students will be able to analyze, design, and implement combinational logic circuits for given functional requirements	4	**L3 – Apply**	K3
CO5	Students will be able to identify, examine, and operate electronic instruments for measurement and testing purposes	5	**L3 – Apply**	K3

CO-PO MAPPING — BASICELECTRONICS –II													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**Avg (co-wise)**
	Engineering Knowledge	**Problem Analysis**	**Design / Dev**	**Investigation**	**Modern Tools**	**Engineer & Society**	**Environment**	**Ethics**	**Team Work**	**Communication**	**PM & Finance**	**Life-long Learning**	
CO1	3	2	1	1	2	—	—	1	—	—	1	1	**1.5**

CO2	3	3	2	2	2	1	—	—	—	1	1	—	**1.88**
CO3	3	3	2	1	2	—	—	—	1	—	1	—	**1.86**
CO4	3	3	3	2	2	—	—	—	1	1	1	—	**2**
CO5	2	2	1	3	3	1	1	1	1	2	1	2	**1.67**
PO Avg	**2.8**	**2.6**	**1.8**	**1.8**	**2.2**	**1**	**1**	**1**	**1**	**1.33**	**1**	**1.5**	**1.59**

L	T	P	C
2	-	-	2

NMEC- NON-MAJOR ELECTIVE COURSE- II

Semester-II

GROUP B- PAPER II -BIO MEDICAL ELECTRONICS –II

COURSE OBJECTIVES

- To familiarize students with the working principles, block diagrams, and components of intensive care equipment.
- To develop an understanding of the operating principles and clinical applications of biomedical instruments.
- To provide knowledge of the working principles and functionalities of modern medical imaging systems.
- To enable students to apply concepts of advanced medical imaging and therapeutic systems in clinical practice.
- To develop the ability to analyze and evaluate electrical safety standards in biomedical equipment and healthcare facilities.

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	**Intensive care equipment's**	Pulse Oximeter - Block Diagram & Sensor – Ventilator – Cardiac Monitor - ECG Holder – Defibrillator	05 Hrs
II	**Bio instruments**	PaceMaker: Implantable and External Pacemakers – Infant Warmer – Infant Incubator – Baby Phototherapy – Nebulizer	05 Hrs
III	**Modern imaging systems**	Ultrasound Scanner - Colour Doppler -X-Ray Machine	05 Hrs
IV	**Medical applications**	C-Arm - CT Scan – MRI Scan – Angiography - LASER in Medical Applications	05 Hrs
V	**Electrical safety of medical instruments**	Radiation safety - Physiological Effects Due to 50 Hertz Current Passage - Micro Shock - Macro Shock - Electrical Accidents in Hospitals - Devices to Protect Against Electrical Hazards - SMPS in Medical Equipments	05 Hrs

		Total Hours	25 Hrs

References : [Text Book]

[1] A. Natarajan, *Biomedical Instrumentation & Measurements*. New Delhi: PHI Learning.
[2] L. Cromwell, *Biomedical Instrumentation and Measurements*, 2nd ed. New Delhi: PHI Learning.
[3] M. Arumugam, *Bio-Medical Instrumentation*, 2nd ed. Coimbatore: Anuradha Agencies.
[4] R. S. Khandpur, *Handbook of Biomedical Instrumentation*. New Delhi: Tata McGraw-Hill (TMH).
[5] J. G. Webster, *Medical Instrumentation: Application and Design*, 3rd ed. New York: Wiley.
[6] S. Ananthi, *A Textbook of Medical Instruments*. New Delhi: New Age International.

Online Resources :
https://nptel.ac.in/courses/102106669
https://nptel.ac.in/courses/102105090
https://onlinecourses.nptel.ac.in/noc25_bt49/preview

CO	Course Outcome Statement	Units Covered	Bloom's Level	K-Level
CO1	Students will be able to recall and describe the working principles, block diagrams, and key components of intensive care equipment	1	**L1 - Remember**	K1
CO2	Students will be able to explain the operating principles and clinical significance of biomedical instruments used in patient monitoring and diagnosis	2	**L2 – Understand**	K2
CO3	Students will be able to describe and interpret the working mechanisms of modern medical imaging systems	3	**L3 – Apply**	K3
CO4	Students will be able to apply the knowledge of advanced medical imaging and therapeutic systems to evaluate their functional and clinical applications	4	**L3 – Apply**	K3
CO5	Students will be able to examine and assess electrical safety standards and protocols to ensure safe operation of biomedical equipment	5	**L4 – Analyze**	K4

CO-PO MAPPING — BIO MEDICAL ELECTRONICS – II

CO	PO1 Engineering Knowledge	PO2 Problem Analysis	PO3 Design / Dev	PO4 Investigation	PO5 Modern Tools	PO6 Engineer & Society	PO7 Environment	PO8 Ethics	PO9 Team Work	PO10 Communication	PO11 PM & Finance	PO12 Life-long Learning	Avg (co-wise)
CO1	3	2	2	2	2	1	1	1	1	1	1	2	1.58
CO2	3	3	2	3	2	2	1	2	2	2	1	2	2.08
CO3	3	3	3	3	3	2	1	1	2	2	1	3	2.25
CO4	3	3	3	3	3	2	2	2	2	2	2	3	2.5
CO5	2	3	2	3	2	3	3	3	2	2	1	2	2.33
PO Avg	2.8	2.8	2.4	2.8	2.4	2	1.6	1.8	1.8	1.8	1.2	2.4	2.15

L	T	P	C
2	-	-	2

NMEC- NON-MAJOR ELECTIVE COURSE- II

Semester-II

GROUP B- PAPER III

Smartphone Technology and Servicing

COURSE OBJECTIVES

CO1: To understand the evolution, features, basic operations, connectivity parameters, and configuration procedures of modern smartphones.

CO2: To understand the architecture and functionality of smartphone hardware components.

CO3: To understand the software environment and operating systems used in smartphones.

CO4: To apply security measures, authentication techniques, and troubleshooting methods for effective smartphone management.

CO5: To analyze smartphone faults and develop practical skills in smartphone servicing and maintenance.

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	**Introduction to Smartphone's**	Introduction of Smartphones – Features of Smart phone - History of Smartphones - Basic Smartphone operations – Connectivity and Performance – Setup and Configuration	05 Hrs
II	**Hardware**	CPU, RAM, and Internal memory - Difference between RAM and	05 Hrs

		ROM - Display technologies (LCD, LED, etc.) - Camera and Sensors - Battery - Power management – Audio devices	
III	**Software**	Operating system basics (Android, iOS, etc.) - User interface and navigation- App management and installation- Smartphone Data Management - Data synchronization, backup, Recovery - Security and Privacy	05 Hrs
IV	**Security and Maintenance**	Smartphone security threats and protection- Authentication - Basic troubleshooting techniques (heating, connectivity drops, Lags) - Best practices for Smartphone maintenance – Factory reset procedure	05 Hrs
V	**Servicing and Trouble shooting**	Smartphone repair tools and equipment - Common Smartphone issues - Screen replacement - Battery replacement – Charging port and Power issues – Camera repair – Speaker repair –Water damage recovery - Safety precautions and best practices	05 Hrs
		Total Hours	25 Hrs

References : [Text Book]

[1] R. S. Khandpur, *Mobile Phone Repairing and Maintenance*. New Delhi, India: Tata McGraw-Hill, 2007.

[2] B. Phillips and C. Stewart, *Android Programming: The Big Nerd Ranch Guide*. Atlanta, GA, USA: Big Nerd Ranch Guides, 2013.

[3] H. L. Davidson, *Troubleshooting and Repairing Smart Phones*. New York, NY, USA: McGraw-Hill, 2012.

[4] N. Elenkov, *Android Security Internals: An In-Depth Guide to Android's Security Architecture*. San Francisco, CA, USA: No Starch Press, 2014.

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Online Resources :

https://www.ifixit.com/Device/Android_Phone
https://developer.android.com/guide
https://www.coursera.org/learn/cyber-security-mobile-security
https://mophoneparts.com/the-internal-components-of-smartphones-in-2024-a-complete-guide/

CO	Course Outcome Statement	Units Covered	Bloom's Level	K-Level
CO1	Students will be able to recall and describe the evolution, features, basic operations, connectivity parameters, and configuration procedures of modern smartphones	1	**L1 - Remember**	K1
CO2	Students will be able to explain the architecture and functionality of smartphone hardware components and their interrelationships	2	**L2 – Understand**	K2
CO3	Students will be able to interpret and describe the software environment of smartphones, including operating systems, applications, and firmware	3	**L2 – Understand**	K2
CO4	Students will be able to apply appropriate security measures, authentication techniques, and troubleshooting methods to resolve smartphone operational issues	4	**L3 – Apply**	K3
CO5	Students will be able to diagnose smartphone faults systematically and perform hands-on servicing and repair tasks using appropriate tools and techniques	5	**L4 – Analyze**	K4

CO-PO MAPPING — SMARTPHONE FUNDAMENTALS AND SERVICING													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**Avg (co-wise)**
	Engineering Knowledge	**Problem Analysis**	**Design / Dev**	**Investigation**	**Modern Tools**	**Engineer & Society**	**Environment**	**Ethics**	**Team Work**	**Communication**	**PM & Finance**	**Life-long Learning**	
CO1	3	2	2	2	3	2	1	2	2	2	1	2	**2**
CO2	3	3	2	2	3	2	1	2	2	2	1	2	**2.08**
CO3	3	2	2	2	3	2	1	2	2	2	1	3	**2.08**
CO4	3	3	2	3	3	2	1	2	2	2	1	2	**2.17**
CO5	3	3	3	3	3	2	1	2	2	2	1	3	**2.33**
PO Avg	**3**	**2.6**	**2.2**	**2.4**	**3**	**2**	**1**	**2**	**2**	**2**	**1**	**2.4**	**2.13**

L	T	P	C
-	1	2	5

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER I & II
CORE PRACTICAL I - BASIC ELECTRONICS LAB
(ANY HARDWARE BASED SIMULATION TOOL MAY ALSO BE USED)
(Any 20 Experiments)

COURSE OBJECTIVES

- To familiarize students with basic electronic components, instruments, and laboratory practices.
- To understand the characteristics and applications of semiconductor devices such as diodes, transistors, and thyristors.
- To verify fundamental electrical network theorems and circuit laws through practical experiments.
- To develop knowledge of digital electronics, logic gates, combinational circuits, and sequential circuits.
- To enhance practical skills in designing, constructing, and testing basic electronic circuits using hardware or simulation tools.

Syllabus

S. No.	Name of the Experiment
1.	PN Junction Diode Characteristics
2.	Zener Diode Characteristics
3.	CE Input Characteristics
4.	CE Output Characteristics
5.	DC Regulated Power Supply Using Zener Diode
6.	Verification of Ohm's Law
7.	Verification of Kirchhoff's Current Law
8.	Verification of Kirchhoff's Voltage Law
9.	Verification of Thevenin's Theorem / Norton's Theorem
10.	Verification of Millman's Theorem
11.	Verification of Maximum Power Transfer Theorem
12.	Inductance Calculation Using Series / Parallel Resonance
13.	Transient Response of an RC Circuit

14.	Truth Table Verification of Basic Gates (Any Two)
15.	Logic Gates Using Discrete Components
16.	NAND or NOR as a Universal Gate
17.	Verification of DeMorgan's Theorem
18.	Truth Table Verification of Half Adder & Full Adder
19.	Truth Table Verification of Half Subtractor & Full Subtractor
20.	Multiplexer Using 74153 IC
21.	Demultiplexer Using 74155 IC
22.	MS JK Flip-Flop Using 7476 IC
23.	Parallel In Parallel Out Shift Register Using 7495 IC
24.	Up Counter Using 7490 IC or 7493 IC
25.	Clock Generation Using NAND or NOR Gate

CO	Course Outcome Statement	Experiments Covered	Bloom's Level	K-Level
CO1	Recall and understand the characteristics and working principles of semiconductor devices (PN junction, Zener, BJT in CE configuration) and verify experimentally.	Exp 1–4	**L2 – Understand**	**K2**
CO2	Apply circuit laws (Ohm's, KCL, KVL) and network theorems (Thevenin's, Norton's, Millman's, MPTT) to design and verify DC circuits experimentally.	Exp 5–11	**L3 – Apply**	**K3**
CO3	Analyze AC circuit behavior by measuring resonance conditions, inductance values, and transient response of RC networks under different inputs.	Exp 12–13	**L4 – Analyze**	**K4**
CO4	Verify truth tables of basic and universal logic gates, implement them using discrete components, and apply DeMorgan's theorem to simplify Boolean expressions.	Exp 14–17	**L3 – Apply**	**K3**
CO5	Design and verify the operation of combinational	Exp 18–21	**L3 – Apply**	**K3**

	circuits such as adders and subtractors (half and full) and implement data routing circuits using MUX/DEMUX ICs.			
CO6	Analyze and implement sequential logic circuits including flip-flops, shift registers, and counters using standard ICs, and design a clock generation circuit.	Exp 22–25	**L4 – Analyze**	**K4**

REFERENCES

- Electronic Devices and Circuit Theory – Robert L. Boylestad & Louis Nashelsky, Pearson Education, 11th Edition, 2013.
- Electronic Principles – Albert Malvino & David J. Bates, McGraw-Hill Education, 8th Edition, 2015.
- Digital Principles and Applications – Albert Paul Malvino, Donald P. Leach & Goutam Saha, McGraw-Hill Education, 8th Edition, 2014.
- Integrated Electronics – Jacob Millman & Christos C. Halkias, McGraw-Hill Education, 2nd Edition, 2010 Reprint.
- Modern Digital Electronics – R. P. Jain, McGraw-Hill Education, 4th Edition, 2010.
- Basic Electronics – B. L. Theraja & A. K. Theraja, S. Chand Publishing, Multicolor Illustrated Edition, 2019.
- Op-Amps and Linear Integrated Circuits – Ramakant A. Gayakwad, Pearson Education, 4th Edition, 2015.
- Microelectronic Circuits – Adel S. Sedra & Kenneth C. Smith, Oxford University Press, 7th Edition, 2015.

Websites

1.https://www.researchgate.net/publication/381260714_Basic_Electronic_Circuits_by_Proteus_Simulating_Software.

2.https://www.scribd.com/presentation/467841467/NZB.

3.https://www.scribd.com/document/847859648/Circuit-Theory-1-Lab-10-Introduction-to-Proteus-for-Electronics.

CO-PO Mapping Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	Engineering Knowledge	Problem Analysis	Design / Dev	Investigation	Modern Tools	Engineer & Society	Environment	Ethics	Team Work	Communication	PM & Finance	Life-long Learning
CO1	3	2	1	3	1	—	—	—	1	1	—	2

CO2	3	3	2	3	2	—	—	—	1	2	—	2
CO3	3	3	2	3	2	—	—	—	1	2	—	3
CO4	3	2	2	2	1	—	—	—	1	1	—	2
CO5	3	3	3	2	2	—	—	1	2	2	—	3
CO6	3	3	3	3	2	—	—	1	2	2	—	3
Avg	3.0	2.7	2.2	2.7	1.7	—	—	—	1.3	1.7	—	2.5

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B.SC. ELECTRONICS AND COMMUNICATION

L	T	P	C
2	-	-	2

SEMESTER II

NMSD COURSE I

COMPETITIVE SKILLS

Candidates who were absent or failed to clear this paper in the regular examinations conducted under the Naan Mudhalvan Programme of the Government of Tamil Nadu shall be eligible to appear for the examination in the subsequent semester.

COURSEOBJECTIVES:

To provide students with solid foundation in CSE so that they are able to use this knowledge in getting jobs and maintaining their jobs. To develop students with professional and ethical attitude, effective communication skills and the attitude of working in group/with people for successful careers.

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	Verbal reasonin g	Analogy – Classification – Direction Sense Test– Logical Sequence of Words – Inserting The Missing Character – Situation Reaction Test.	05 Hrs
II	Nonverbal reasoning	Analytical Reasoning – Mirror Images–Water Images-Completion of In complete Pattern–Cubes and Dice.	05 Hrs
III	Arithmetical, ability	Average–Problem son Age–Percentage–Profit & Loss–Ratio & Proportion–Chain Rule–Time & Work.	05 Hrs
IV	Logarithms	Pipes & Cistern – Time & Distance– Problems on Trains - Boats & Streams– Simple Interest Compound Interest–Logarithms.	05 Hrs
V	Charts	Area– Calendar – Clock s– Heights & Distances–Bar Graphs–Pi eCharts.	05 Hrs
		Total Hours	25 Hrs

References		**REFERENCES BOOKS:** 1. A Modern Approach toVerbal&NonVerbal Reasoning –Revised Edition–R.S. Aggarwal – S. Chand.(Units:I&II)–Rs.750/- 2 QuantitativeAptitude-RevisedEdition-R.S.Aggarwal– S.Chand.Units:III,IV&V)–Rs.440/ 3 An Advanced Approach to Data Interpretation-R.S.Aggarwal– S.Chand. 4 Advanced Objective GeneralKnowledge-R.S.Aggarwal– S.Chand 5 Objective GeneralEnglish-R.S.Aggarwal–S.Chand

Course Outcomes:

	On completion of this course, student will be able to	**K level**
Course Outcomes	**CO1 :** The ability to analyze a problem and to identify the appropriate Verbal reasoning	K2
	CO2 : The ability to apply non verbal reasoning.	K3
	CO3 : An understand in go professional, ethical and social responsibilities.	K3
	CO4 : The ability to communicate effectively with arrange of audiences.	K4
	CO5 : The ability to succeed in competitive exams	K4

CO-PO MAPPING MATRIX

CO	PO1 Engineering Knowledge	PO2 Problem Analysis	PO3 Design / Dev	PO4 Investigation	PO5 Modern Tools	PO6 Engineer & Society	PO7 Environment	PO8 Ethics	PO9 Team Work	PO10 Communication	PO11 PM & Finance	PO12 Life-long Learning	Avg
CO1	3	2	1	2	-	2	-	-	-	-	-	2	2
CO2	3	3	2	2	2	2	-	1	-	-	-	2	2.12
CO3	3	3	2	3	2	2	-	1	1	-	-	2	2.11
CO4	3	2	3	2	3	2	1	2	1	-	-	2	2.1
CO5	3	2	2	2	2	3	1	2	-	1	-	2	2
PO Avg	3	2.4	2	2.2	2.25	2.2	1	1.5	1	1	0	2	

L	T	P	C
3	1	-	5

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER III
CORE IV - ELECTRONIC CIRCUITS

Course Objective

- Understand the operation and performance characteristics of rectifiers, filters, and voltage regulator circuits used in DC power supplies.
- Explain transistor biasing techniques, bias stabilization methods, and wave-shaping circuits used in electronic signal processing applications.
- Analyze the working principles, characteristics, and performance of various power amplifiers and multistage amplifier configurations.
- Understand the concepts of negative feedback, its types, and its effects on amplifier performance parameters such as gain, bandwidth, distortion, and stability.
- Describe the principles of sinusoidal oscillators and multivibrators, and analyze their applications in waveform generation and timing circuits.

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	**Rectifiers & Regulators**	Half Wave Rectifier- Full Wave Rectifier- Bridge Rectifier- Average value- RMS value- Form factor-Peak factor - Ripple factor - Efficiency -TUF - PIV - Filters: C, L, LC, CLC, CRC – Voltage. Regulators: Series Regulators- Shunt Regulators IC Voltage Regulators(78XX&79XX)..	10 Hrs
II	**Transistor biasing**	Bias Stability - Thermal runaway - Methods of transistor Biasing - Bias compensation – Wave Shaping Circuits – RC & RL Circuits – Clipping & Clamping Circuits – Voltage Doubler – Tripler – Quadrupler.	10 Hrs
III	**Types of amplifiers**	Class A Amplifier - Class B Amplifier - Class AB Amplifier - Push Pull Amplifier – Complementary symmetry Push Pull Amplifier - Class C Amplifier – Multistage Amplifiers: RC Coupled Amplifier - Transformer Coupled Amplifier - Direct Coupled Amplifier.	10 Hrs
IV	**Feedback**	Basics concepts of Feedback - Effects of negative feedback on gain, Bandwidth, Distortion, Noise, Input Impedance and Output Impedance Types of Negative Feedback-Voltage Series-Voltage Shunt-Current Series and Current Shunt Feedback	10 Hrs
V	**Oscillators**	Classification of Oscillators-Barkhausen Criterion- Hartley Oscillator–Colpitt's Oscillator-Clapp Oscillator- Phase Shift Oscillator - Wein Bridge – Crystal Oscillator - Frequency stability of Oscillators - Astable Multivibrator - Monostable Multivibrator Bistable Multivibrator - Schmitt Trigger.	10 Hrs
			50 Hrs

		Total Hours	

Course Outcomes	On completion of this course, students will be able to	K - LEVEL
CO1	Understand the basics of electrical energy and practical implementation of electrical fundamentals.	K2
CO2	Solve design problems on rectifiers, filters and power supply circuits.	K2
CO3	Understand various types of amplifier.	K3
CO4	Examine the basic components of feedback &its types.	K4
CO5	Acquire the knowledge about oscillators, Multivibrators and Wave shaping circuits.	K4

References : [Text Book]

[1] S. Salivahanan, N. Suresh Kumar, and A. Vallavaraj, Electronic Devices and Circuits, 2nd ed. New Delhi, India: Tata McGraw-Hill Publishing Company Ltd., 2008.

[2] R. S. Sedha, A Textbook of Electronic Devices and Circuits, 1st ed. New Delhi, India: S. Chand & Co. Ltd., 2008.

[3] A. K. Theraja, A Textbook of Applied Electronics, 12th ed. New Delhi, India: S. Chand & Co. Ltd., 2004.

Online Resources:
https://www.circuitbread.com/
https://www.electronics-notes.com/
https://www.electronics-tutorials.ws/

CO-PO MAPPING — ELECTRONIC CIRCUITS													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**Avg (co-wise)**
	Engineering Knowledge	**Problem Analysis**	**Design / Dev**	**Investigation**	**Modern Tools**	**Engineer & Society**	**Environment**	**Ethics**	**Team Work**	**Communication**	**PM & Finance**	**Life-long Learning**	
CO1	3	2	3	2	2	2	2	1	2	2	1	2	**2.00**
CO2	3	2	3	2	2	2	2	2	2	3	1	3	**2.25**
CO3	3	1	3	2	2	3	1	2	3	2	1	2	**2.08**
CO4	3	3	3	1	2	2	3	2	3	3	1	2	**2.33**
CO5	3	3	3	2	3	3	1	2	3	2	1	2	**2.33**

PO Avg	**3**	**2.2**	**3**	**1.8**	**2.2**	**2.4**	**1.8**	**1.8**	**2.6**	**2.4**	**1**	**2.2**	**2.20**

L	T	P	C
2	-	0	2

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER III
SKILL ENHANCEMENT COURSE
SEC-1 POWER ELECTRONICS

Course Objectives

- To introduce the construction, characteristics, and operation of power semiconductor devices such as SCR, DIAC, TRIAC, and UJT.
- To provide knowledge of various SCR triggering and commutation techniques used in power electronic circuits.
- To develop an understanding of protection schemes and series/parallel operation of SCRs in practical applications.
- To explain the operation and applications of AC and DC static switches and solid-state relays.
- To impart knowledge of switched-mode, resonant, and bidirectional power supplies used in modern power electronic systems.

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	Thyristor Characteristics	Simple Theory & Characteristics of SCR - DIAC, TRIAC - UJT. UJT as an Oscillator.	05 Hrs
II	Methods of Turn ON & Turn OFF	AC gate Triggering - R Triggering - RC Triggering - DC gate Triggering - Pulse gate Triggering – Natural Commutation - Force Commutation – Self - Impulse - Resonant - Complementary - External -Load side - Line Side.	05 Hrs
III	Triggering SCR	Triggering of series connected SCR's - Triggering of Parallel Connected SCR's – Current & Voltage Protection - Snubber Circuit.	05 Hrs
IV	Static Switches	Single Phase AC Switches - Three Phase AC Switches - Three Phase Reversing Switches - AC Switches for Bus Transfer - DC Switches - Solid State Relays.	05 Hrs
V	Power Supplies	Switched mode DC Power Supplies - Resonant DC Power Supplies - Bidirectional Power Supplies - Switched mode AC Power Supplies - Resonant AC Power Supplies - Bidirectional AC Power Supplies.	05 Hrs
		Total Hours	25 Hrs

Course Outcomes	On completion of this course, students will be able to	K - LEVEL
CO1	Ability to express characteristics of SCR, TRIAC, DIAC and UJT	K2
CO2	Acquire knowledge about fundamental concepts and methods to turn ON and turn OFF the thyristor.	K3
CO3	Understand the design principle of triggering circuit of SCR	K3
CO4	Explain the switching principle and applications	K4
CO5	Remember the working principle of various types of power supplies.	K4

References : [Text Book]

[1] Muhammed H. Rashid, Power Electronics,2nd ed, PHI Learning, New Delhi,2012

[2] V,Jaganathan, Power Electronics: Devices and Circuits**,**2nd ed, PHI Learning, New Delhi,2011

[3] G.K. Mithal, Industrial electronics and control, 18th ed, Tata Mcgraw hill , Newdelhi,2000

[4] B. L Theraja, A.K. Theraja., Electrical Technology, 1st ed, S.Chand, Newdelhi. 2003,

Online Resources :

https://ocw.mit.edu/courses/6-622-power-electronics-spring-2023/video_galleries/video-lectures/
https://www.tutorialspoint.com/power_electronics/index.htm
https://github.com/GaetanoLongo/PowerElectronics.

CO-PO MAPPING — POWER ELECTRONICS													
CO	PO1 Engineering Knowledge	PO2 Problem Analysis	PO3 Design / Dev	PO4 Investigation	PO5 Modern Tools	PO6 Engineer & Society	PO7 Environment	PO8 Ethics	PO9 Team Work	PO10 Communication	PO11 PM & Finance	PO12 Life-long Learning	Avg (co-wise)
CO1	3	2	3	2	2	2	1	1	2	2	1	2	**1.92**
CO2	3	3	3	3	2	2	2	2	2	1	1	3	**2.25**
CO3	3	1	2	2	1	3	1	1	3	2	1	2	**1.83**
CO4	3	2	2	3	2	2	2	2	2	1	1	3	**2.08**

CO5	3	2	3	3	1	3	1	2	3	2	1	2	**2.17**
PO Avg	**3**	**2**	**2.6**	**2.6**	**1.6**	**2.4**	**1.4**	**1.6**	**2.4**	**1.6**	**1**	**2.4**	**2.05**

L	T	P	C
2	-	-	2

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER III
NMSD COURSE II
LIFE DEVELOPMENT SKILLS

Candidates who were absent or failed to clear this paper in the regular examinations conducted under the Naan Mudhalvan Programme of the Government of Tamil Nadu shall be eligible to appear for the examination in the subsequent semester.

COURSE OBJECTIVES:

This course is designed to enhance the employability and maximize the potential of the students by introducing them to the principles that underly personal and professional success, and help them acquire the skills needed to apply these principles in their lives and careers. Prerequisite

SYLLABUS:

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	**Self analysis**	Self Analysis and Self Concept–Understanding Self: Attitude, Aptitude and Self Esteem –Assertiveness – Confidence Building – Motivation: Concept, Theories and Importance.	05 Hrs
II	**Self development**	Introduction – Goal Setting : Concept, Setting Smart Goals – Emotion : Concept, Types, Emotional Intelligence–Creativity: Concept and Factors Enhancing Creativity–Stress Management– Health Management : Importance, Dietary Guidelines and Exercises – Time Management : Importance and process	05 Hrs
III	**Looking for a job**	Identifying Different Sources Announcing Job Vacancies – Skimming, Scanning and Reading Advertisements in Detail – Writing Effective CVs – Covering Letters that Accompany CVs - Techniques of Writing Job Application Letters/Covering Letters–Preparing for a Job Interview.	05 Hrs
IV	**Non – Verbal skill**	Graphic Communication – Non Verbal Communication – Aspects of body Language – Formal Written Communication– Memos(Memoranda)–E-mails– Netiquette–Business Correspondents.	05 Hrs
V	**Telephone**	Understanding Telephone Communication–Types of calls–Handling Calls–Leaving a Message–Making Requests – Asking for and Giving	05 Hrs

	skills	Information – Giving Instructions – Agreeing and Disagreeing – Making or Changing Appointments – Reminding – Making Complaints and Handling Complaints – Telephone Etiquette.	
		Total Hours	25 Hrs
References		**REFERENCEBOOKS:** 1. DevelopmentOfLifeSkillsAndProfessionalPractice–ShaliniVerma–Vikas Publishing House Pvt Ltd.,Rs.200/-(Units:I&II) 2. DevelopmentOfLifeSkills–II–ShaliniVerma–VikasPublishingHousePvtLtd., Rs. 225/- (Units : III & IV) 3. A Course In Communication Skills - P.Kiranmai Dutt – Cambridge University Press IndiaPvt.Ltd.,FoundationBooks,CambridgeHouse,4381/4,AnsariRoad,Daryaganj, NewDelhi-110002.(Unit:V)	
Teaching-Learning Process		Chalk and Talk Power point presentation Audio, Video tools Quiz	
Assessment Methods		Problem based assignment Oral presentation, including seminar presentation	

Course Outcomes:

	On completion of this course, student will be able to	**K level**
Course Outcomes	**CO1 :** Define and Identify different life skills required in personal and professional life	K2
	CO2 : Develop an awareness of these lf and apply well-defined techniques to cope with Emotions and stress	K3
	CO3 : Develop an Preparing for a Job Interview	K3
	CO4 : Understand the basics of team work and leadership	K4
	CO5 : The basic mechanics of effective communication.	K4

CO-PO MAPPING MATRIX

CO	PO1 Engineering Knowledge	PO2 Problem Analysis	PO3 Design / Dev	PO4 Investigation	PO5 Modern Tools	PO6 Engineer & Society	PO7 Environment	PO8 Ethics	PO9 Team Work	PO10 Communication	PO11 PM & Finance	PO12 Life-long Learning	Avg
CO1	3	2	2	2	-	2	-	-	-	-	-	2	2.16

CO2	3	3	2	2	2	2	-	1	-	-	-	2	2.12
CO3	3	3	2	3	2	2	-	1	1	-	-	2	2.11
CO4	3	2	3	2	3	2	1	2	2	-	-	2	2.2
CO5	3	2	2	2	2	3	2	2	-	1	-	2	2.1
PO Avg	3	2.4	2.2	2.2	2.25	2.2	1.5	1.5	1.5	1	0	2	

L	T	P	C
4	1	-	5

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER IV
CORE V- 8085 MICROPROCESSOR & INTERFACING

COURSE OBJECTIVES

After completing this course, the students will be able to:

- To understand the architecture, pin functions, instruction set, and operation of the 8085 microprocessor.
- To develop assembly language programs using various addressing modes and instruction formats.
- To analyze machine cycles, timing diagrams, and interrupt mechanisms of the 8085 microprocessor.
- To understand peripheral devices and programmable interface chips used with microprocessor systems.
- To design and implement interfacing circuits for memory and I/O devices in microprocessor-based applications.

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	Hours of Instruction	Programme Specific Qualification Attributes (K1, K2, K3, K4)
I	Introduction	Pin functions of 8085 – Architecture of 8085 –	10	K1,K2

		Status register -Demultiplexing the address and data bus - Generating Control signals for memory and I/O interface—Interfacing of 2k×8 EPROM - Interfacing of 2k×8 RAM.		
II	Instruction set	Data Transfer – Arithmetic – Logical – Branching - Machine Control Instructions - Stack & Stack related Operations - Addressing Modes of 8085 - Instruction format - Simple Programs -Addition - subtraction-multiplication and division - simulation of program using software tools.	10	K3
III	Timing Diagram & Interrupts	T state-Machine cycle - Instruction cycle - Memory Read Machine Cycle- - Memory Write Machine Cycle -Timing diagram for MOV B, A & MVI A, 25H instructions - Timing Diagram of IN & OUT Instruction - Interrupt System of 8085.	10	K4
IV	Time delay and Peripheral devices	Time Delay Program – Delay calculations-8255 Programmable peripheral interface -8279 Programmable keyboard/Display interface- 8254 Programmable interval timer - Direct memory Access- 8257 DMA controller	10	K3
V	Interfacing I/O Devices	Hex Keyboard - LED - Single & Multiple Seven Segment Display - ADC 0809 - DAC 0800 – Stepper Motor - Traffic Light Control System.	10	K4

CO	Course Outcome Statement	Bloom's Level	K-Level
CO1	**Explain the architecture, pin functions, registers, control signals, and memory organization of the 8085 microprocessor.**	L2 – Understand	K1,K2
CO2	**Apply 8085 instruction sets, addressing modes, and assembly language programming techniques to solve computational problems.**	L3 – Apply	K3
CO3	**Analyze machine cycles, instruction cycles, timing diagrams, and interrupt handling mechanisms in 8085-based systems.**	L4 – Analyze	K4
CO4	**Utilize programmable peripheral devices such as 8255, 8279, 8254, and 8257 for data transfer, timing, and control applications.**	L3 – Apply	K3
CO5	**Design and implement memory and I/O interfacing circuits using ADC, DAC, displays, keyboards, and stepper motors for embedded applications.**	L6 – Create	K4

Text books:

1. Fundamentals of microprocessor 8085 architecture, programming & interfacing- V Vijayendran – S.Viswananthan (Printers & Publishers) PVT.Ltd., 2012
2. Microprocwessor architecture, programming and applications with 8085/8080A – Ramesh S Gaonkar- New age international publishers -second edition

CO-PO MAPPING — 8085 Microprocessor													
CO	**PO1**	**PO2**	**PO3**	**PO 4**	**PO5**	**PO6**	**PO7**	**PO 8**	**PO9**	**PO1 0**	**PO 11**	**PO1 2**	**Avg (co-wise)**
	Engineering Knowledge	**Problem Analysis**	**Design / Dev**	**Investigation**	**Modern Tools**	**Engineer & Society**	**Environment**	**Ethics**	**Team Work**	**Communication**	**PM & Finance**	**Life-long Learning**	
CO1	3	2	2	2	2	2	1	1	2	2	1	2	**1.8**
CO2	3	3	3	2	3	2	1	2	2	1	1	2	**2.1**
CO3	3	3	3	3	2	2	1	2	2	1	1	2	**2.1**
CO4	3	2	3	2	3	2	1	1	2	1	1	2	**1.9**
CO5	3	3	3	3	3	2	1	1	2	2	1	2	**2.2**
PO Avg	**3**	**2.6**	**2.8**	**2.4**	**2.6**	**2**	**1**	**1.4**	**2**	**1.4**	**1**	**2**	**2**

L	T	P	C
5	5	0	4

B.Sc. ELECTRONICS AND COMMUNICATION
SEMESTER IV
SEC 2 - ELECTRONIC INSTRUMENTS

COURSEOBJECTIVES:

- To introduce the fundamental electronic instrumentation things.
- To expose the students to upgrade their knowledge in industry side.
- To get familiarize with recent instrumentation technologies.

SYLLABUS

Unit	**Unit Title**	**Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)**	**No. of Hours**
I	**Electro**	DC Ammeter - DC Voltmeter - Voltmeter Sensitivity - AC	5 Hrs

	mechanical indicating instruments	Voltmeter - Considerations in Analog Voltmeter – Series & Shunt Type Ohm meter-Calibration of DC Instruments–Study of a Typical Digital Multi meter.	
II	**Bridges**	Wheatstone Bridge - Balance Equation of General AC Bridges – Capacitance & Inductance Comparison Bridge - Maxwell – Hay - Schering - Wien- Kelvin & Kelvin‘s Double Bridge.	5 Hrs
III	**Oscilloscope**	Block diagram - CRT - Vertical Deflection System - Delay line - Horizontal Deflection System - CRT screens & Graticules - Oscilloscope Probes – Measurement of Frequency ,Amplitude & Phase- Lissajou‘s Patterns.Protocols.	5 Hrs
IV	**Signal generation & signal analysis**	Sample & Hold Circuit - Instrumentation Amplifier - Function Generator - Pulse Generator - Q Meter - Vector Impedance Meter - Wave Analyzer – Harmonic Distortion Analyzer.	5 Hrs
V	**Transducers**	Resistive Transducers – Inductive Transducers - Capacitive Transducers - Piezo Electric Transducer Thermo Electric Transducers–Temperature Transducers–Microphones&LoudSpeakers.	5 Hrs
		Total Hours	50 Hrs
References		**REFERENCES BOOKS:** 1. Electronic Instrumentation-H.S.Kalsi-TMH. 2. Modern ElectronicInstrumentation&MeasurementTechniques- Cooper - PHI. 3. ElectronicMeasurements&Instrumentation–Salivahanan–S.Chand **4.** Elements of Electronic Instrumentation and Measurement by Joseph J. Carr	
Assessment Methods		Problem based assignment Oral presentation, including seminar presentation	

Course Outcomes:

	On completion of this course, student will be able to	**K level**
Course Outcomes	**CO1:** Gain knowledge in the fundamental principle of electromechanical instruments.	K2
	CO2 : Become familiar with Bridges Network circuits	K3
	CO3 : Acquire the knowledge in different types of oscilloscopes.	K4
	CO4 : Understand the signal generation techniques.	K3
	CO5 : Understand the working function and application of transducer.	K3

CO-PO MAPPING MATRIX													
Subject: Cellular Phones | Correlation: 3 = High | 2 = Medium | 1 = Low | — = No Correlation													
CO	**PO1 Engineering Knowledge**	**PO2 Problem Analysis**	**PO3 Design / Dev**	**PO4 Investigation**	**PO5 Modern Tools**	**PO6 Engineer & Society**	**PO7 Environment**	**PO8 Ethics**	**PO9 Team Work**	**PO10 Communication**	**PO11 PM & Finance**	**PO12 Life-long Learning**	**Avg**
CO1	3	2	3	2	-	2	-	-	-	2	-	2	2.2
CO2	3	3	-	2	2	2	-	-	-	-	-	3	2.5
CO3	3	2	2	2	3	1	-	-	1	-	-	2	2
CO4	2	3	3	3	3	-	-	2	1	-	1	2	2.22
CO5	2	2	-	3	3	3	2	2	-	1	-	2	2.22
PO Avg	2.6	2.4	2.6	2.4	2.75	2	2	2	1	1.5	1	2.2	

L	T	P	C
-	1	2	5

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER II
CORE PRACTICAL II - ELECTRONIC CIRCUITS LAB
(ANY HARDWARE BASED SIMULATION TOOL MAY ALSO BE USED)
(Any 20 Experiments)

COURSE OBJECTIVES

- To understand the basic operation and characteristics of analog electronic components and circuits through practical experimentation.
- To study the working principles of rectifiers, filters, voltage multipliers, regulators, clipping and clamping circuits using semiconductor devices.
- To analyze the performance of oscillators, multivibrators, amplifiers, and transistor-based switching circuits through hands-on laboratory practice.
- To develop practical skills in the design, construction, testing, and troubleshooting of electronic circuits using transistors, ICs, SCRs, UJTs, and power devices.
- To familiarize students with measurement instruments such as CRO and apply them for waveform, amplitude, and frequency analysis.
- To gain knowledge in power electronics and control applications.

- To enhance experimental, analytical, and technical documentation skills required for higher studies and industrial applications in electronics.

Syllabus

S. No.	Name of the Experiment
1.	Amplitude and Frequency Measurement Using CRO
2.	Half Wave Rectifier with Capacitor Filter
3.	Full Wave Rectifier with Capacitor Filter
4.	Bridge Rectifier with Capacitor Filter
5.	Regulated Dual Power Supply Using 78XX & 79XX
6.	Positive and Negative Clipping at 0V
7.	Positive and Negative Clamping at 0V
8.	Voltage Doubler / Voltage Tripler / Voltage Quadrupler
9.	Basic Differentiator and Basic Integrator
10.	Hartley Oscillator Using Transistor
11.	Colpitt's Oscillator or Clapp Oscillator Using Transistor
12.	Phase Shift / Wein Bridge Oscillator Using Transistor
13.	Crystal Oscillator Using Transistor
14.	UJT as a Relaxation Oscillator
15.	Astable Multivibrator Using Transistors
16.	Monostable Multivibrator Using Transistors
17.	Bistable Multivibrator Using Transistors
18.	Schmitt Trigger Using Transistors
19.	Single Stage RC Coupled Amplifier
20.	Two Stage RC Coupled Amplifier
21.	Emitter Follower

22.	Push Pull Complementary Symmetry Emitter Follower
23.	Power Amplifier Using LM380 IC
24.	Firing Angle Control Using SCR (Half Cycle / Full Cycle)
25.	Lamp Dimmer

CO No.	Course Outcome Statement	Experiments Covered	Bloom's Level	K-Level
CO 1	**Recall and understand the operation of CRO, rectifier circuits, filter circuits, and regulated power supplies through experimental verification.**	**Exp 1–5**	**L2 – Understand**	**K2**
CO 2	**Apply the principles of clipping, clamping, voltage multiplier, differentiator, and integrator circuits for waveform shaping applications.**	**Exp 6–9**	**L3 – Apply**	**K3**
CO 3	**Analyze the frequency generation and performance characteristics of transistor and UJT-based oscillator circuits.**	**Exp 10–14**	**L4 – Analyze**	**K4**
CO 4	**Construct and verify the operation of multivibrators and trigger circuits using transistor configurations.**	**Exp 15–18**	**L3 – Apply**	**K3**
CO 5	**Analyze and evaluate the performance characteristics of RC coupled amplifiers, emitter followers, and power amplifier circuits.**	**Exp 19–23**	**L4 – Analyze**	**K4**
CO 6	**Design and implement SCR-based power control and application circuits such as firing angle control and lamp dimmer circuits.**	**Exp 24–25**	**L6 – Create**	**K6**

References

1. Electronic Devices and Circuit Theory, Pearson Education.
2. Integrated Electronics, McGraw Hill Education.
3. Electronic Principles, McGraw Hill Education.
4. Linear Integrated Circuits, New Age International Publishers.
5. Op-Amps and Linear Integrated Circuits, Prentice Hall of India.
6. Pulse, Digital and Switching Waveforms, McGraw Hill Education.
7. Power Electronics, Khanna Publishers.
8. Electronic Devices and Circuits, McGraw Hill Education.

CO-PO Mapping Matrix

CO	PO1 Engineering Knowledge	PO 2 Problem Analysis	PO3 Design / Development	PO4 Investigation	PO 5 Modern Tools	PO6 Engineer & Society	PO7 Environment	PO 8 Ethics	PO 9 Team Work	PO10 Communication	PO 11 PM & Finance	PO 12 Life-long Learning
CO 1	3	2	1	3	1	—	—	—	1	1	—	2
CO 2	3	3	2	3	2	—	—	—	1	2	—	2
CO 3	3	3	2	3	2	—	—	—	1	2	—	3
CO 4	3	2	2	2	1	—	—	—	1	1	—	2
CO 5	3	3	3	2	2	—	—	1	2	2	—	3
CO 6	3	3	3	3	2	—	—	1	2	2	—	3
Average	3.0	2.7	2.2	2.7	1.7	—	—	—	1.3	1.7	—	2.5

L	T	P	C
2	1	2	4

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER III & IV
CORE PRACTICAL III
8085 MICROPROCESSOR & INTERFACING LAB
(ANY EMBEDDED BASED SIMULATION TOOL MAY ALSO BE USED)
(Any 20 Experiments)

COURSE OBJECTIVES

- To understand the architecture, instruction set, and programming concepts of microprocessors and interfacing devices.
- To develop assembly language programs for arithmetic, logical, data conversion, sorting, and data manipulation operations using 8-bit and 16-bit numbers.
- To acquire practical knowledge in implementing data transfer, block operations, complement operations, and multi-byte arithmetic programs.
- To analyze and execute programming techniques for number system conversions, BCD arithmetic operations, and array processing applications.

- To understand the interfacing techniques of peripheral devices such as ADC, DAC, stepper motors, switches, LEDs, seven-segment displays.
- To generate waveforms and control external hardware devices using DAC and microprocessor interfacing techniques.
- To design and implement real-time embedded applications.

Syllabus

S. No.	Name of the Experiment
1.	Addition & Subtraction of Two 8-Bit Numbers
2.	Multiplication of Two 8-Bit Numbers
3.	Division of Two 8-Bit Numbers
4.	BCD Addition
5.	BCD Subtraction
6.	Fill Operation
7.	Block Move
8.	1's and 2's Complement of an 8/16-Bit Number
9.	Smallest of N Numbers
10.	Largest of N Numbers
11.	Ascending Order of N Numbers
12.	Descending Order of N Numbers
13.	3-Digit Decimal to Two-Digit Hexadecimal Conversion
14.	Two-Digit Hexadecimal to 3-Digit Decimal Conversion
15.	Sum of N 8-Bit Numbers
16.	Multi Byte Addition
17.	ADC Interface
18.	Waveform Generation Using DAC
19.	Stepper Motor Interface

20.	Interface with Switches and Interface with LEDs
21.	Hex Keyboard Interface
22.	Interface with Single Seven Segment Display
23.	Interfacing with Multiple Seven Segment Displays
24.	Moving Display
25.	Traffic Light Control

CO No.	Course Outcome Statement	Experiments Covered	Bloom's Level	K-Level
CO1	Recall and apply arithmetic operations such as addition, subtraction, multiplication, division, and BCD operations using assembly language programming	**Exp 1–5**	**L3 – Apply**	**K3**
CO2	Develop assembly language programs for data transfer, complement operations, sorting, and array processing techniques**.**	**Exp 6–12**	**L3 – Apply**	**K3**
CO3	Analyze and perform number system conversion techniques between decimal and hexadecimal representations	**Exp 13–14**	**L4 – Analyze**	**K4**
CO4	Interface ADC, DAC, and stepper motor devices with microprocessor systems and verify their operation experimentally	**Exp 15–18**	**L3 – Apply**	**K3**
CO5	Design and implement interfacing circuits using switches, LEDs, keyboards, seven segment displays**.**	**Exp 19–24**	**L3 – Apply**	**K3**
CO6	Develop real-time embedded applications.	**Exp 25**	**L6 – Create**	**K6**

References

1. Microprocessor Architecture, Programming and Applications with the 8085, Penram International Publishing.
2. Microprocessors and Interfacing, McGraw Hill Education.
3. Advanced Microprocessors and Peripherals, McGraw Hill Education.
4. The 8085 Microprocessor: Architecture, Programming and Interfacing, Pearson Education.
5. Microprocessor and Microcontroller Fundamentals, Pearson Education.
6. Fundamentals of Microprocessors and Microcontrollers, Dhanpat Rai

Publications.
7. 8085 Microprocessor and Its Applications, McGraw Hill Education.
8. Microprocessors and Digital Systems, Tata McGraw Hill.

CO-PO Mapping

CO	PO1 Engineering Knowledge	PO 2 Problem Analysis	PO3 Design / Development	PO4 Investigation	PO 5 Modern Tools	PO6 Engineer & Society	PO7 Environment	PO 8 Ethics	PO 9 Team Work	PO10 Communication	PO 11 PM & Finance	PO 12 Life-long Learning
CO 1	3	2	1	2	2	—	—	—	1	1	—	2
CO 2	3	3	2	2	2	—	—	—	1	2	—	2
CO 3	3	3	2	3	2	—	—	—	1	2	—	3
CO 4	3	2	3	2	3	—	—	—	1	1	—	2
CO 5	3	3	3	3	3	—	—	1	2	2	—	3
CO 6	3	3	3	3	3	1	—	1	2	2	—	3
Average	3.0	2.7	2.3	2.5	2.5	—	—	0.3	1.3	1.7	—	2.5

B.SC. ELECTRONICS AND COMMUNICATION

L	T	P	C
2	-	-	2

SEMESTER IV

NMSD COURSE III

AUDIO & VIDEO SYSTEMS

Candidates who were absent or failed to clear this paper in the regular examinations conducted under the Naan Mudhalvan Programme of the Government of Tamil Nadu shall be eligible to appear for the examination in the subsequent semester.

Course objectives :

To equip students with theoretical knowledge and practical skills in audio transducers, sound reproduction systems, amplification, stereophonic technology, and audio-video equipment servicing.

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours

I	**Microphone's & loudspeakers**	Characteristics and Requisites - Types (Any 3) – Comparison - Special Microphones – Precautions . **Loudspeakers** : Characteristics – Types (Any 2) – Comparison – Line Source Speakers – Woofers & Tweeters – Crossover Networks .	05 Hrs
II	**Audio Amplifiers & Public address systems**	Types - Characteristics – Amplifier Circuits – PMPO - **Public Address Systems:** Need and Use – Block Diagram - Requirements of a PA System - Installation Planning for Various Occasions (Any 3).	05 Hrs
III	**Stereophony**	Meaning – Stereophony in Human System of Hearing – Differences between Stereophony and Monophony – Ideal Stereo System – Practical Stereo System – Quadraphonic and Surround Sound Systems – Stereo Recording on Tape and Reproduction – Hi-fi Stereo Reproducing System Stereo Controls.	05 Hrs
IV	**Trouble shooting in audio systems**	Maintenance Policy - Maintenance Aids for Fault Diagnosis – Servicing and Maintenance Procedure – Shielding and Grounding - Fault Location – Faulty Component Identification – Common Faults – Intermittent Faults - Troubleshooting : Power supply – Public Address System .	05 Hrs
V	**Colour tv receiver alignment and servicing**	TV Test Charts – Colour TV Receiver Alignment & Servicing – Modern Colour TV Receivers – Preliminary Trouble Shooting – Safety Precautions.	05 Hrs
		Total Hours	25 Hrs
References		**REFERENCES BOOK**S 1. Audio & Video Systems – R G Gupta - TMH – II Edition. 2. Modern Television Practice – R R Gulati - NAI – III Edition. 3.Audio and Video Systems - M.L. Anand - Khanna Book Publishing / Routledge	
Teaching-Learning Process		Chalk and Talk Power point presentation Audio, Video tools Quiz	
Assessment Methods		Problem based assignment Oral presentation, including seminar presentation	

	On completion of this course, student will be able to	**K level**
Course Outcomes	**CO1:** Gain knowledge in the fundamental principle of microphone &loudspeakers.	K2
	CO2: Acquire the knowledge in different types of audio amplifiers and	K3

	functioning	
	CO3: Understand the stereo sound technology	K4
	CO4: Get exposure on audio components servicing	K3
	CO5: Helpful for knowing colour TV basic concepts & troubleshooting	K3

CO-PO MAPPING MATRIX

CO	PO1 Engineering Knowledge	PO2 Problem Analysis	PO3 Design / Dev	PO4 Investigation	PO5 Modern Tools	PO6 Engineer & Society	PO7 Environment	PO8 Ethics	PO9 Team Work	PO10 Communication	PO11 PM & Finance	PO12 Life-long Learning	Avg
CO 1	3	3	2	2	1	1	-	-	-	-	-	2	2.1
CO 2	3	2	2	2	2	2	2	1	-	2	-	2	2.1
CO 3	3	3	2	2	2	1	-	-	2	1	-	2	2.0
CO 4	3	3	2	3	2	-	-	-	-	-	-	2	2.5
CO 5	3	2	2	3	2	2	-	-	-	1	-	2	2.1
PO Avg	3	2.6	2	2.2	1.8	1.5	2	1	2	1.3	0	2	

L	T	P	C
4	1	0	4

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER V
CORE VI: ELECTRONIC COMMUNICATION SYSTEMS

COURSE OBJECTIVES

- Understand the principles of electromagnetic wave propagation and the mechanisms of ground wave, sky wave, and space wave communication.
- Analyze the generation and transmission of amplitude-modulated (AM) signals, including modulation techniques, transmitter design, and single sideband (SSB) communication.
- Explain the concepts of frequency modulation (FM), evaluate its performance in the presence of noise, and understand FM generation and transmission methods.
- Study and compare AM and FM receiver architectures, including signal detection, frequency conversion, automatic gain control, and receiver performance characteristics.
- Understand pulse modulation and digital communication techniques, including PAM, PWM, PPM, PCM, and digital modulation schemes such as ASK, FSK, BPSK, QPSK, and DPSK.

- Develop the ability to analyze and design basic communication systems for efficient transmission and reception of analog and digital signals.

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	Hours of Instruction	Programme Specific Qualification Attributes (K1, K2, K3, K4)
I	Propagation of radio waves	Introduction to EM waves – Reflection and refraction of radio waves at the surface of the earth – Ground wave propagation-Sky wave propagation – Space wave propagation – Structure of the Atmosphere – Critical frequency - Skip distance – Maximum Usable frequency (MUF) – Virtual height.	10	K1,K2
II	AM generation & transmission	Need for modulation – Amplitude modulation– Frequency Spectrum of the AM Wave - Modulation Index – Power relations in the AM Wave – AM generation – AM Transmitter - Forms of Amplitude Modulation – Evolution of SSB – Balanced Modulator – Methods of SSB Generation – Vestigial side band Transmission.	10	K4
III	FM generation & transmission	Frequency Modulation - Frequency Spectrum of the FM Wave – Modulation Index – Effect of Noise – Adjacent & Co-Channel Interference – Wide Band & Narrow Band FM-FM Generation – Direct and Indirect methods - FM Transmitter – Pre-Emphasis.	10	K3
IV	AM & FM Receiver	AM Receiver – TRF Receiver – Super Heterodyne Receiver – Image Frequency Rejection – Frequency Changing & Tracking – Choice of IF – AM Detection – AGC – SSB Detection. FM Receiver – Amplitude Limiter – De-Emphasis – FM Detection – Balanced Slope Detector – Phase Discriminator – Ratio Detector.	10	K4
V	Pulse modulation	PAM Modulation & Detection – PWM Modulation & Detection - PPM Modulation & Detection - Sampling Theorem – Quantization & Quantization Error – PCM Modulation & Detection - Companding - ASK – FSK – BPSK – QPSK – DPSK	10	K3

CO	Course Outcome Statement	Bloom's Level	K-Level
CO1	**Explain radio wave propagation mechanisms and atmospheric effects on communication systems.**	L2 – Understand	K1,K2
CO2	**Analyze AM and SSB generation, transmission, and power relations.**	L4 – Analyze	K4
CO3	**Apply FM generation techniques and evaluate the effects of noise and interference.**	L3 – Apply	K3
CO4	**Analyze the operation and performance of AM and FM receivers and detection circuits.**	L4 – Analyze	K4
CO5	**Apply pulse and digital modulation techniques such as PCM, ASK, FSK, BPSK, QPSK, and DPSK.**	L3 – Apply	K3

REFERENCE BOOKS:

1. Electronic Communication Systems-Kennedy-TMH–IVEd
2. Electronic Communication Systems - Roddy & Collen –PHI – IVEd
3. Electronic Communications –Sanjeev Gupta–Khanna Publications.
4. Principles of Communication Engineering–Anokh Singh–S.Chanda

CO-PO Mapping

CO-PO MAPPING — ELECTRONICS COMMUNICATION SYSTEM													
CO	**PO1**	**PO 2**	**PO 3**	**PO4**	**PO 5**	**PO6**	**PO7**	**PO8**	**PO 9**	**PO10**	**PO 11**	**PO1 2**	**Avg (co-wise)**
	Engineering Knowledge	**Problem Analysis**	**Design / Dev**	**Investigation**	**Modern Tools**	**Engineer & Society**	**Environment**	**Ethics**	**Team Work**	**Communication**	**PM & Finance**	**Life-long Learning**	
CO1	3	2	2	2	2	2	1	1	1	2	1	2	**1.8**
CO2	3	3	3	3	2	2	1	1	1	2	1	2	**2**
CO3	3	3	2	2	3	2	1	1	1	2	1	2	**1.9**
CO4	3	3	3	3	2	2	1	1	2	2	1	2	**2.1**
CO	3	3	3	3	3	2	1	1	2	2	1	2	**2.2**

5													
POAvg	**3**	**2.8**	**2.6**	**2.6**	**2.4**	**2**	**1**	**1**	**1.4**	**2**	**1**	**2**	**2**

L	T	P	C
4	1	-	5

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER V
CORE VII: IC'S AND THEIR APPLICATIONS

COURSEOBJECTIVES:

This course elaborates the production methods of IC's and various application of them including logic, OP- AMPs**.**

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	**IC fabrication process**	Introduction-Basic Planar Process-Fabrication of a Typical Circuit - Active and Passive Components - Fabrication of FET, MOSFET & CMOS.	10 Hrs
II	**Logic Family's**	Characteristics of IC's-Diode Logic-Transistor Logic-RTL-DCTL-IIL-DTL-HTL-TTL-CMOS–ECL-Comparison of Logic Families.	10 Hrs
III	**OP-AMP'S**	Introduction - The ideal OP-AMP - OP-Amp Stages - OP-Amp Parameters - Inverting &Non Inverting Amplifier-Adder-Subtractor-Multiplier-Divider-Integrator-Differentiator-V to I Converter-I toV Converter.	10 Hrs
IV	**Filters**	Low Pass Filter – High Pass Filter – Band Pass Filter – Band Reject Filter-Solving of Simultaneous Equations – Solving of Differential Equations.	10 Hrs
V	**555Timer& 565PLL**	555: Functional Diagram –Astable Operation- Monostable Operation-Linear Ramp Generator .PLL: Basic Principle – 565 PLL - Frequency Translation - Frequency Multiplier - Frequency Divider – AM Detection–FM Detection.	10 Hrs
		Total Hours	50 Hrs
References		**REFERENCEBOOKS:** 1) LinearIC's–RoyChoudhury–NAI–4thEdition.(UNITI) 2) Electronic Circuits–Salivahanan–TMH-IIEdition(UNITII) 3) OP-Amps-Gayakwad-PHI-4thEdition-(UNITIII,IV&V) 4) Linear Integrated Circuits: Analysis, Design & Applications	

		by B. Somanathan (UNIT I)
Teaching-Learning Process		Chalk and Talk Power point presentation Audio, Video tools Quiz
Assessment Methods		Problem based assignment Oral presentation, including seminar presentation

Course Outcomes:

	On completion of this course, student will be able to	**K level**
Course Outcomes	**CO1 :** Understand the method of IC's fabrication Techniques.	K1
	CO2 : Study the various circuits of Logic operations using ICs.	K2
	CO3 : Get the knowledge of various OP-Amp circuits	K3
	CO4 : Study the principle of Filter.	K3
	CO5 : Study the principle of Timer & Phase lock doop circuits.	K4

CO-PO MAPPING MATRIX

CO	PO1 Engineering Knowledge	PO2 Problem Analysis	PO3 Design / Dev	PO4 Investigation	PO5 Modern Tools	PO6 Engineer & Society	PO7 Environment	PO8 Ethics	PO9 Team Work	PO10 Communication	PO11 PM & Finance	PO12 Life-long Learning	Avg
CO1	3	2	1	2	-	2	-	-	-	-	-	2	2
CO2	3	3	2	2	2	2	-	1	-	-	-	2	2.12
CO3	3	3	2	3	2	2	-	1	1	-	-	2	2.11
CO4	3	2	3	2	3	2	1	2	1	-	-	2	2.1
CO5	3	2	2	2	2	3	1	2	-	1	-	2	2
PO Avg	3	2.4	2	2.2	2.25	2.2	1	1.5	1	1	0	2	

L	T	P	C
3	1	0	4

B.Sc. ELECTRONICS AND COMMUNICATION
SEMESTER V
CORE VIII-BIO MEDICAL ELECTRONICS/PROJECT

COURSE OBJECTIVES:

- To Illustrate origin of bio potentials and its propagations
- To understand the different types of electrodes and its placement for various recordings
- To understand various physiological recordings and its measurements
- To learn the medical imaging equipment and techniques for surgeries.
- To summarize therapeutic equipment and Patient monitoring techniques for biological operations.

Syllabus

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	Hours of Instruction
I	Introduction	Introduction to Human Physiology – Micro Electrodes – Skin Surface Electrodes – Needle Electrodes – Reference Electrodes.	10
II	Meters & recorders	Digital Thermometer – Sphygmomanometer - Electronic Stethoscope – ECG - EEG – EMG	10
III	Cardio Tocography	Cardiotocography - Electro Oculography - Electro Retinography - Poly Somnography Blood Flow Meter - Doppler – Audiometer	10
IV	Medical Imaging	Endoscopes – Types – X ray- CT scan – MRI scan – PET scan	10
V	Diathermy	Diathermy - Surgical Diathermy- Micro Wave Diathermy - Multipara Patient Monitor.	10

COURSE OUTCOMES: After completion of this course, student able to

CO1	Differentiate different bio potentials and its propagations.
CO2	Illustrate different electrodes and its placement for bio potentials recordings and measurements
CO3	Demonstrate various electrophysiological recordings and measurements
CO4	Explain medical imaging equipment's used in surgeries
CO5	Demonstrate different therapeutic equipment's and Patient monitoring techniques

REFERENCE BOOKS :

1. Biomedical instrumentation & Measurements–Anandanatarajan–PHI-
2. Biomedical instrumentation and measurements-Leslie cromwell-PHI-2nd edition.
3. Bio-medicalinstrumentation-Dr.M.Arumugam-Anuradha Agencies-2nd edition
4. Handbook of biomedical linstrumentation-R.S.Khandpur-TMH
5. Medical instrumentation,application and design–Johng.Webster–WEL-3rd edition

6. A text book of medical instruments–Ananthi–New AgeInternational–
7. Internet :additional reference for all units.

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	CO Average
CO	*Foundational Knowledge*	*Problem Solving*	*System Design*	*Research & Expt.*	*Modern Tools*	*Societal Impact*	*Ethics & Responsibility*	Avg across POs
CO1	**3**	**2**	**1**	**3**	**1**	**1**	**1**	**1.71**
CO2	**2**	**2**	**2**	**3**	**2**	**1**	**1**	**1.86**
CO3	**2**	**2**	**3**	**3**	**3**	**1**	**1**	**2.14**
CO4	**2**	**2**	**3**	**3**	**3**	**2**	**1**	**2.29**
CO5	**2**	**2**	**3**	**3**	**3**	**2**	**2**	**2.43**
PO Average	**2.20**	**2.00**	**2.40**	**3.00**	**2.40**	**1.40**	**1.20**	**2.09**

L	T	P	C
4	1	-	3

B.Sc. ELECTRONICS AND COMMUNICATION
SEMESTER V
ELECTIVE I-Group-A
8051MICROCONTROLLER AND INTERFACING

COURSE OBJECTIVES:

- Understand the architecture, memory organization, and peripheral features of the 8051 Microcontroller.
- Apply instruction sets, addressing modes, timers, interrupts, and serial communication techniques in microcontroller programming.
- Interface the 8051 Microcontroller with common input and output devices.
- Design and implement microcontroller-based applications using ADC, DAC, and motor control interfaces.
- Analyze different memory devices and their roles in embedded system applications.

Syllabus

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	Hours of Instruction
I	**8051** Microcontroller	Features - Signals - Architecture - RAM Structure - SFR's - Power Saving Modes - Interrupt logic - Timer Logic - Serial Logic	10
II	Instruction set	Data transfer-Arithmetic–Logical–Bit manipulation–Branching Instructions–Stack & Stack Operations–Addressing Modes- Simple Programs .	10

III	Interfacing with I/O	Interfacing With: Switches & Matrix Keyboard - LED'S - Single & Multiple Seven Segment Displays – LCD.	10
IV	Interfacing with Application	Interfacing With: ADC0809IC–DAC0800 IC Stepper Motor–DC Motor– Traffic Light Control System- Introduction to Arduino.	10
V	Memory	ROM – PROM – EPROM(2764) - EEPROM – NVRAM - Static RWM (6264)- Dynamic RWM (TC511000)- RWM Refreshing– Pseudo static RWM.	10

Course Outcomes	On completion of this course, students will be able to	K - LEVEL
CO1	Understand the hardware details of 8051. microcontroller with the related signals and their implications.	K2
CO2	Learn the programming and interfacing of 8051.	K2
CO3	Interface various input / output devices with microcontroller	K4
CO4	Interface LCD, Keyboard, ADC, DAC, Sensors, Relays, DC motor and Stepper motor with 8051 microcontroller.	K4
CO5	Learn about various types of memory and their applications	K2

Textbooks

1. Introduction to Embedded Systems, Shibu K. Velayudhan, Second Edition, McGraw-Hill Education, 2017.
2. Embedded Systems: Architecture, Programming and Design, Raj Kamal, Third Edition, McGraw-Hill Education, 2017.
3. The 8051 Microcontroller and Embedded Systems: Using Assembly and C, Second Edition, Pearson Education.

Reference Books

1. Real-Time Concepts for Embedded Systems, CMP Books, 2003.
2. Embedded Systems Design: A Unified Hardware/Software Introduction, Second Edition, Wiley India, 2017.

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	CO Average
CO	*Foundational Knowledge*	*Problem Solving*	*System Design*	*Research & Expt.*	*Modern Tools*	*Societal Impact*	*Ethics & Responsibility*	Avg across POs
CO1	3	2	2	2	2	1	1	1.86

CO2	2	3	2	2	3	1	1	2.00
CO3	2	3	3	3	3	1	1	2.29
CO4	2	2	3	3	3	2	1	2.29
CO5	2	3	3	3	3	2	2	2.57
PO Average	2.20	2.60	2.60	2.60	2.80	1.40	1.20	2.20

L	T	P	C
4	1	-	3

B.Sc. ELECTRONICS AND COMMUNICATION
SEMESTER V
ELECTIVE I-Group-A
PIC16F877 MICROCONTROLLER AND INTERFACING

COURSE OBJECTIVES

- CO1: Understand the architecture, memory organization, and peripheral features of the PIC 16F877 Microcontroller.
- CO2: Apply instruction sets, addressing modes, timers, interrupts, and serial communication techniques in microcontroller programming.
- CO3: Interface PIC 16F877 Microcontroller with common input and output devices.
- CO4: Design and implement microcontroller-based applications using ADC, DAC, and motor control interfaces.
- CO5: Analyze different memory devices and their roles in embedded system applications.

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	PIC16f877 Microcontroller	Features – Signals - Architecture – Memory Organization – Watch Dog Timer – Reset Types – Oscillator Types – Power Down Modes – I/O Ports – CCP Module – SSP Module. (USART, SPI, I2C & ICSP)	10 Hrs
II	Instruction set	Byte Oriented–Bit Oriented Literal & Control Instructions– Stack &Stack Operations-Addressing Modes– Simple Programs - Timer logic – interrupt logic – Serial Logic – ADC.	10 Hrs
III	Interfacing with I/O	Interfacing With: Switches & Matrix Keyboard - LED'S - Single & Multiple Seven Segment Displays – LCD.	10 Hrs

IV	Interfacing with Application	InterfacingWith:ADC0809IC–DAC0800IC Stepper Motor–DC Motor– Traffic Light Control System.	10 Hrs
V	Memory	ROM – PROM – EPROM(2764) - EEPROM – NVRAM - Static RWM (6264)- Dynamic RWM(TC511000)-RWM Refreshing– Pseudostatic RWM.	10 Hrs
		Total Hours	50 Hrs

Course Outcomes	**On completion of this course, students will be able to**	K - LEVEL
CO1	Understand the hardware details of PIC16F877 microcontroller with the related signals and their implications.	K2
CO2	Learn the programming and interfacing of PIC16F877.	K2
CO3	Interface various input / output devices with microcontroller	K4
CO4	Interface LCD, Keyboard, ADC, DAC, Sensors, Relays, DC motor and Stepper motor with PIC16F877 microcontroller.	K4
CO5	Learn about various types of memory and their applications	K2

References : [Text Book]

[1] Microchip Technology Inc., PIC16F877 Data Sheet. Chandler, AZ, USA: Microchip Technology Inc., 2003.

[2] R. S. Gaonkar, Fundamentals of Microcontrollers and Applications in Embedded Systems (with the PIC18 Microcontroller Family). New Delhi, India: Prentice-Hall of India (PHI), 2009.

[3] J. B. Peatman, Design with PIC Microcontrollers. Upper Saddle River, NJ, USA: Pearson Education, 1998.

[4] A. P. Mathur, Introduction to Microprocessors, 3rd ed. New Delhi, India: Tata McGraw-Hill Publishing Company Ltd., 2003.

Online Resources :

https://pic-microcontroller.com/pic16f877-based-projects-pic-microcontroller-downloadable/

https://www.microchip.com/en-us/product/pic16f877

CO-PO MAPPING — PIC16F877 MICROCONTROLLER AND INTERFACING													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**Avg (co-wise)**
	Engineering Knowledge	**Problem Analysis**	**Design / Dev**	**Investigation**	**Modern Tools**	**Engineer & Society**	**Environment**	**Ethics**	**Team Work**	**Communication**	**PM & Finance**	**Life-long Learning**	

CO1	3	2	3	2	2	2	1	2	2	2	1	2	**2.00**
CO2	2	2	3	2	2	2	1	2	3	2	1	3	**2.08**
CO3	3	2	3	2	3	3	1	1	3	2	1	2	**2.17**
CO4	2	3	3	3	2	2	2	2	2	1	1	3	**2.17**
CO5	3	1	3	2	3	3	1	2	3	2	1	3	**2.25**
PO Avg	**2.6**	**2**	**3**	**2.2**	**2.4**	**2.4**	**1.2**	**1.8**	**2.6**	**1.8**	**1**	**2.6**	**2.13**

L	T	P	C
2	-	-	2

B.Sc. ELECTRONICS AND COMMUNICATION

SEM-V

SEC–3- ELECTRONIC SYSTEMS SECURITY

COURSE OBJECTIVES

- To explain the fundamental concepts, principles, and objectives of Information Security.
- To identify and analyze various security threats, vulnerabilities, malware, and cyber-attacks.
- To apply basic cryptographic techniques for securing information and communication.
- To demonstrate knowledge of network, web, cloud, and endpoint security mechanisms.
- **CO5:** To evaluate information security policies, privacy issues, cyber laws, and ethical practices.

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	Fundamentals of Information Security	Introduction to Information Security - Need for Information Security - CIA Triad – Authentication – Authorization - Security Policies, Standards and Procedures	05 Hrs
II	Threats, Vulnerabilities and Cyber Attacks	Threats and Vulnerabilities- Malware – Phishing and Social Engineering - Password Attacks - DoS/DDoS - Incident Response.	05 Hrs
III	Cryptography and Data Security	Introduction to Cryptography - Symmetric and Asymmetric Cryptography - Hash Functions - Digital Signatures - Public Key Infrastructure - Secure Communication.	05 Hrs

IV	Network and Web Security	Firewalls – IDS – VPN - Web Security – XSS - SQL Injection - Wireless Security - Cloud Security Basics.	05 Hrs
V	Cyber Laws	Information Security Governance - Security Policies and Compliance - Information Privacy Concepts - Personal Data Protection - Cyber Ethics - Cyber Laws and IT Act	05 Hrs
		Total Hours	25 Hrs

Course Outcomes	**On completion of this course, students will be able to**	K – LEVEL
CO1	Explain the fundamental concepts, principles, and objectives of Information Security.	K1
CO2	Identify and analyze various security threats, vulnerabilities, malware, and cyber-attacks.	K2
CO3	Apply basic cryptographic techniques for securing information and communication.	K3
CO4	Demonstrate knowledge of network, web, cloud, and endpoint security mechanisms.	K3
CO5	Evaluate information security policies, privacy issues, cyber laws, and ethical practices	K4

References : [Text Book]

[1] M. E. Whitman and H. J. Mattord, *Principles of Information Security*, 7th ed. Boston, MA, USA: Cengage Learning, 2021.

[2] W. Stallings and L. Brown, *Computer Security: Principles and Practice*, 5th ed. New York, NY, USA: Pearson, 2024.

[3] C. P. Pfleeger and S. L. Pfleeger, *Security in Computing*, 6th ed. Upper Saddle River, NJ, USA: Pearson, 2022.

[4] W. Stallings, *Cryptography and Network Security: Principles and Practice*, 9th ed. New York, NY, USA: Pearson, 2024.

[5] N. Daswani, C. Kern, and A. Kesavan, *Foundations of Security: What Every Programmer Needs to Know*. Berkeley, CA, USA: Apress, 2021

.

[6] J. Andress, *The Basics of Information Security*, 3rd ed. Amsterdam, Netherlands: Elsevier, 2023.

[7] N. Gruschka and M. Jensen, *Cloud Security: Concepts and Practices*. Cham, Switzerland: Springer, 2022.

Online Resources :

https://nptel.ac.in/courses/106105031
https://nptel.ac.in/courses/106106129
https://www.youtube.com/c/NetworkChuck
https://www.coursera.org/specializations/ibm-cybersecurity-analyst

CO-PO MAPPING — BASIC ELECTRONICS – I													
CO	PO1 Engineering Knowledge	PO2 Problem Analysis	PO3 Design / Dev	PO4 Investigation	PO5 Modern Tools	PO6 Engineer & Society	PO7 Environment	PO8 Ethics	PO9 Team Work	PO10 Communication	PO11 PM & Finance	PO12 Life-long Learning	Avg (co-wise)
CO1	3	3	2	2	2	2	1	2	2	2	1	3	2.08
CO2	3	3	2	3	2	2	1	2	2	2	1	3	2.17
CO3	3	2	3	2	3	1	1	2	1	2	1	3	2
CO4	3	3	3	2	3	2	1	2	2	2	1	3	2.25
CO5	2	2	1	2	1	3	2	3	2	3	1	2	2
PO Avg	2.8	2.6	2.2	2.2	2.2	2	1.2	2.2	1.8	2.2	1	2.8	2.1

L	T	P	C
2	-	0	2

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER V
NMSD COURSE IV
FUNDENMENTAL OF CELL PHONES

Candidates who were absent or failed to clear this paper in the regular examinations conducted under the Naan Mudhalvan Programme of the Government of Tamil Nadu shall be eligible to appear for the examination in the subsequent semester.

COURSE OBJECTIVES

- To understand the basic working principles of a telephone system.
- To comprehend the concepts of cellular mobile wireless networks.
- To explain the various multiple access techniques employed in wireless communication.
- To apply the knowledge of 2G GSM network architecture in communication systems.
- To analyze the evolution and characteristics of 3G mobile systems.

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	**Basics**	Working of a Telephone - Local Exchange - Initiating a call - Calling a Number - Making a Connection - Answering a Call – Conversation - Ending a Call -Hook Switch – Transmitter – Receiver – Ringer -Cellular Mobile Telephone System	05 Hrs
II	**Cellular Mobile Wireless Networks**	Introduction - Cellular Structure - Cell Cluster - Frequency Reuse – Co-channel and Adjacent Channel Interference - Cell Splitting – Cell Sectoring.	05 Hrs
III	**Multiple Access Techniques**	Introduction - Frequency Division Multiple Access - Time Division Multiple Access -Space Division Multiple Access - Code Division Multiple Access.	05 Hrs
IV	**2G Architecture**	GSM Network Architecture - GPRS - GPRS Applications - EDGE	05 Hrs
V	**3G Architecture**	Introduction - UMTS Architecture - HSPA – Applications of 3G - Step towards 4G.	05 Hrs
		Total Hours	25 Hrs

Course Outcomes	On completion of this course, students will be able to	K - LEVEL
CO1	Remember the basic working principles of a telephone system	K1
CO2	Understand the concepts of cellular mobile wireless networks	K2
CO3	explain the various multiple access techniques	K2
CO4	Apply the knowledge of 2G GSM network architecture	K3
CO5	analyze the evolution of 3G mobile systems	K4

References : [Text Book]

[1] M. Lotia, *Modern Mobile Phone Introduction & Servicing*. New Delhi: BPB Publications. (UNIT – I)

[2] SahaMisra, *Wireless communication and Networks- 3G and Beyond,* Tata McGraw Hill Education Private Limited, 2010. (UNIT – II,III, IV, V).

Online Resources :

https://dokumen.pub/qdownload/wireless-communications-and-networks-3g-and-beyond-2nbsped-9781259062735.html
https://archive.nptel.ac.in/courses/117/102/117102062/
https://onlinecourses.nptel.ac.in/noc21_ee66/preview

CO-PO MAPPING — CELLULAR PHONES													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Avg (co-wise)
	Engineering Knowledge	Problem Analysis	Design / Dev	Investigation	Modern Tools	Engineer & Society	Environment	Ethics	Team Work	Communication	PM & Finance	Life-long Learning	
CO1	3	1	1	1	1	2	1	1	1	2	1	2	1.42
CO2	3	2	2	2	2	2	2	1	1	2	1	3	1.92
CO3	3	2	2	2	2	1	1	1	2	2	1	3	1.83
CO4	3	3	3	2	3	2	1	1	2	2	2	3	2.25
CO5	3	3	2	3	3	2	2	1	2	2	2	3	2.33
PO Avg	3	2.2	2	2	2.2	1.8	1.4	1	1.6	2	1.4	2.8	1.95

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER VI
CORE IX: PC HARDWARE NETWORKING & TROUBLESHOOTING

L	T	P	C
2	1	2	4

COURSE OBJECTIVES

After completing this course, the students will be able to:

- To provide fundamental knowledge of computer hardware components, motherboard architecture, memory systems, and BIOS/UEFI Operations.
- To develop skills in the installation, configuration, assembly, and maintenance of personal computer systems.
- To enable students to identify, diagnose and troubleshoot common hardware problems related to input, storage, display, and printing devices.
- To familiarize students with modern storage technologies, peripheral interfaces, and hardware maintenance procedures.
- To introduce basic networking concepts, resource sharing, malware protection, and network security practices for secure computer operation.

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	Hours of Instruction
I	Mother Board	Components - Support Circuits – Modern Connectors (SATA, PCIe, USB 3.x, USB-C, M.2) -Installation - Troubleshooting – BIOS & UEFI Basics – Modern Motherboard Architecture (Architecture, Chipset, PCIe, NVMe Support) - Form Factor - PC Assembly - Cabinet Form Factor .	10
II	Memory systems	Memory Modules (including DDR4/DDR5) - Cache Memory- VirtualMemory-Common Memory Errors - Battery (CMOS Battery)-	10

		BIOS Functions (BIOS and UEFI Functions)-BIOS Setup (BIOS and UEFI Setup & Confg.) –BIOS/UEFI Update process. Or Mordern Firmware Concepts)	
III	Input device Troubleshooting	KEYBOARD:Organization – Ergonomics - Wired/Wireless Keyboards/connectivity – Installation & Troubleshooting MOUSE:Connection-Resolution (DPI)-Wired & Wireless connectivity - Installation-Troubleshooting. INPUT DEVICES: Touchpad – Touchscreen-webcam- Device Drivers – Basic Troubleshooting	10
IV	Output device Troubleshooting	STORAGE DEVICES:FormFactor-StorageCapacity-HDD and SSD – Storage Interfacing (SATA, NVMe)–Installation Formatting&Troubleshooting. PRINTER:Types,Interface. DISPLAY DEVICES: LCD – LED – Basic Troubleshooting	10
V	Networking	NETWORKING: Setting-up a Network–Preparation for Network Installation–Network Configuration – Sharing Computer–Sharing Printer–Troubleshooting Networking. NETWORK SECURITY: Malware (VIRUS:Types-Working-Symptoms-Antivirus. Worm, Trojan, Ransomware) – Antivirus software – Safe Internet Practices. Introduction to AI based security & Emerging Technologies	10

CO	Course Outcome Statement	Bloom's Level	K-Level
CO1	Explain motherboard architecture, memory organization, BIOS/UEFI functions, and PC Assembly concepts.	L2 – Understand	K1,K2
CO2	Apply hardware installation, configuration, and troubleshooting techniques for memory and motherboard components.	L3 – Apply	K3
CO3	Analyze input device and storage device issues and perform basic troubleshooting procedures.	L4 – Analyze	K4
CO4	Utilize storage devices, display devices, and printers through	L3 – Apply	K3

	installation, configuration, and maintenance procedures.		
CO5	Demonstrate network setup, resource sharing, and basic network security practices including malware protection and safe internet usage.	L3 – Apply	K3, K4

Text books:

1. ModernComputerHardwareCourse-ManoharLotia-BPB-Rs.360/-
2. K.L.James – Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance.
3. B.Ram – Computer Fundamentals
4. UpgradingandRepairingPC's-ScottMueller–Pearson-18th-Edition.

CO-PO Mapping

CO-PO MAPPING — 8085 Microprocessor													
CO	**PO1**	**PO2**	**PO3**	**PO 4**	**PO5**	**PO6**	**PO7**	**PO 8**	**PO9**	**PO1 0**	**PO 11**	**PO1 2**	**Avg (co-wise)**
	Engineering Knowledge	**Problem Analysis**	**Design / Dev**	**Investigation**	**Modern Tools**	**Engineer & Society**	**Environment**	**Ethics**	**Team Work**	**Communication**	**PM & Finance**	**Life-long Learning**	
CO1	3	2	2	3	2	2	1	1	2	1	1	2	1.8
CO2	2	3	2	3	3	2	1	1	2	1	2	2	2.0
CO3	3	3	2	3	2	2	1	1	2	2	1	2	2.0
CO4	3	2	3	3	3	2	1	1	2	1	1	2	2.0
CO5	3	3	3	3	3	1	1	1	2	2	2	2	2.1
PO Avg.	2.8	2.6	2.4	3	2.6	1.8	1	1	2	1.4	1.4	2	2.0

L	T	P	C
2	1	2	4

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER VI
CORE X: NETWORK COMMUNICATION & SECURITY

COURSE OBJECTIVES

After completing this course, the students will be able to:

- Describe fundamentals of computer networks, communication systems and transmission methods.
- Explain various network topologies, network architectures and networking devices used in modern communication systems.
- Understand the OSI and TCP/IP reference models and the functions of different network protocols.

- Illustrate the concepts of LAN, MAN, WAN, wireless networks and Internet access technologies.
- Introduce network security concepts including firewalls, VPNs, cryptography and AI-based security applications

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	Hours of Instruction
I	**Transmission methods**	Digital Signal Analog Transmission – Baud Rate and bit rate - Analog Signal Digital Transmission – Parallel & Serial Communication – Asynchronous & Synchronous Communication – Communication Modes : Simplex – Half Duplex - Full Duplex – Multiplexing - De-multiplexing - Types of Multiplexing . Introduction to Modern Serial Interfaces: USB, UART and I2C.	10
II	**Network topologies**	Mesh Topology – Star Topology – Tree Topology – Ring – Bus – Hybrid – Basics of Switching – Router & Routing – Internet Topology – Architecture of an ISP –Physical & Logical Types of Topology. Introduction to Wireless Networks (Wi-Fi and Mobile Networks).	10
III	**Network protocols**	OSI Model – Physical Layer – Data Link Layer – Network Layer – Transport Layer – Session Layer – Presentation Layer – Application Layer TCP/IP Model – comparison of OSI and TCP/IP models– Overview of Network Protocols (HTTP, HTTPS, FTP, SMTP, DNS)	10
IV	**LAN technologies**	Introduction – LAN Hardware – Implementing LAN – Ethernet LANs - Fast Ethernet and Gigabit Ethernet- Wireless LANs (Wi-Fi)– Virtual LANS- Extending LANS — MAN – WAN	10
V	**Internet access & network security**	Introduction to Internet access– Broadband access Leased lines – DSL - Cable Modems – Optical Fiber Communication – DTE – DCE Interface – RS-232 . NETWORK SECURITY : Introduction – Types of Computer Attacks – Firewall – Virtual Private Network-Cryptography - Network security best practices – Introduction to Cloud Computing and AI based Threat Detection and Network Security.	10

Course Outcome

CO	Course Outcome Statement	Bloom's Level	K-Level
CO1	Identify the components and characteristics of transmission methods and communication networks	L1 – Understand	K1,
CO2	Explain network topologies, network architectures, switching, routing and Internet technologies.	L2 – Understand	K2
CO3	Understand the OSI and TCP/IP models and analyze the functions of various network protocols.	L4 – Analyze	K4
CO4	Describe LAN, MAN, WAN, VLAN and wireless networking technologies used in modern communication systems.	L3 – Apply	K3
CO5	Apply fundamental network security concepts including firewalls, VPNs, cryptography and AI-based threat detection techniques.	L6 – Analyze	K4

Text books:

1. DataCommunication&Networks-Achyut.S.Godbole&AtulKahate–TMH–2ED
2. ComputerNetworks–ANDREW.S.TANENBAUM–PHI.
3. Computer Networks: A Top Down Approach – James F. Kurose & Keith W. Ross, Pearson.
4. ComputerNetworks–UYLESSBLACK–PHI-IINDEDITION.
5. CommunicationProtocolEngineering-PallapaVenkataramandS.S.Manvi-PHI.
6. NetworkingConceptsAndNetware–Anand–HimalayaPublications
7. AdvancedComputerNetworking(ConceptsandApplications)-SatishJain–BPB–Rs.195/-(Unit:IV&V)
8. DataCommunicationAndNetworking(UPDATEDEDITION)–SatishJain–BPBPublications.Rs.270/-

CO-PO Mapping
Correlation Level:

CO-PO MAPPING — Network Communication & Security													
CO	**PO1**	**PO2**	**PO3**	**PO 4**	**PO5**	**PO6**	**PO7**	**PO 8**	**PO9**	**PO1 0**	**PO 11**	**PO1 2**	**Avg (co-wise)**
	Engineering Knowledge	**Problem Analysis**	**Design / Dev**	**Investigation**	**Modern Tools**	**Engineer & Society**	**Environment**	**Ethics**	**Team Work**	**Communication**	**PM & Finance**	**Life-long Learning**	
CO1	3	2	1	1	2	1	1	1	2	1	1	2	**1.5**
CO2	3	3	2	2	3	1	1	2	2	2	2	2	**2.1**

CO3	3	3	2	3	2	2	1	1	2	1	1	3	**2.0**
CO4	2	2	2	2	3	1	1	1	2	2	2	2	**1.8**
CO5	3	3	3	3	3	2	1	2	2	1	2	3	**2.3**
PO Avg	**2.8**	**2.6**	**2**	**2.2**	**2.6**	**1.4**	**1**	**1.4**	**2**	**1.4**	**1.6**	**2.4**	**2.0**

L	T	P	C
4	1	-	3

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER VI
Group-B-ELECTIVE-II
MOBILE COMMUNICATON & SERVICING

COURSE OBJECTIVES

- To understand the basic working principles of a telephone system.
- To comprehend the concepts of cellular mobile wireless networks.
- To explain the various multiple access techniques employed in wireless communication.
- To apply the knowledge of 2G GSM network architecture in communication systems.
- To analyze the evolution and characteristics of 3G mobile systems**.**

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	Mobile data communicati on	Introduction – Cellular Radio – Elements of a Cellular Network – Cellular Telephony – Radio Propagation – Speech Coding – Error Coding and Error Correction.	10 Hrs
II	Mobility Management	Mobility Management - Hand Off Management – Hard Hand Off – Soft Hand Off – Switching and Authentication – MTSO Interconnections- Circuit Switched and Packet Switched Data Services on Cellular Networks.	10 Hrs
III	Multiple access technologies	Introduction - Frequency division multiple access – Time division multiple access - Code Division Multiple Access – Spread Spectrum Techniques.	10 Hrs
IV	Mobile servicing	Hardware/Software Repairing - Various Locks - Installation of : UFS Driver, UFS Suite & Flashing Files - IMEI Number Detection – Mobile Utility Codes.	10 Hrs
V	Other mobile service tools	Ultrasonic Cleaner - Computer Connectors - SIM Card Reader - Memory Card Reader - Mobile Virus - Virus Prevention – Removing Virus - Health Hazards with Mobiles - SAR.	10 Hrs
		Total Hours	50 Hrs

Course Outcomes	On completion of this course, students will be able to	K - LEVEL
CO1	Understand the fundamental concepts of Cellular system.	K2
CO2	Acquire the knowledge in basic principle of BTS transmission.	K2
CO3	Understand the different accessing technology.	K3
CO4	Practice the chip level software servicing of mobile	K4
CO5	Acquire the knowledge to service the mobile phone	K4

References : [Text Book]

[1] S. Jain, *Wireless Communications and Networking Made Simple*. New Delhi, India: BPB Publications, 2004.
[2] M. Lotia, *Modern Mobile Phone Repair Using Computer Software and Service Devices*. New Delhi, India: BPB Publications, 2006.
[3] M. Lotia, *Modern Mobile Phone Unlocking and Utility Codes for GSM and CDMA Phones*. New Delhi, India: BPB Publications, 2005.
[4] W. C. Y. Lee, *Mobile Cellular Telecommunications*, 2nd ed. New York, NY, USA: McGraw-Hill (TMH International Edition), 1995.
[5] J. Schiller, *Mobile Communications*, 2nd ed. Harlow, England: Pearson Education, 2003.
[6] W. Stallings, *Wireless Communications and Networks*, 2nd ed. Upper Saddle River, NJ, USA: Pearson Education, 2005.
[7] R. Pandya, *Mobile and Personal Communication Systems and Services*. New Delhi, India: Prentice Hall of India (PHI), 2000.

Online Resources :

https://www.mobileserviceacademy.com/basics-of-mobile-repairing/
https://oasis.col.org/server/api/core/bitstreams/4c85494b-2f9a-49b6-9f1f-c2db2f0da268/content
https://nptel.ac.in/courses/106106167

CO-PO MAPPING — MOBILE COMMUNICATON & SERVICING													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Avg (co-wise)
	Engineering Knowledge	Problem Analysis	Design / Dev	Investigation	Modern Tools	Engineer & Society	Environment	Ethics	Team Work	Communication	PM & Finance	Life-long Learning	
CO1	3	2	2	2	2	2	2	2	2	3	1	2	**2.08**
CO2	3	2	2	2	2	3	1	2	2	3	1	3	**2.17**
CO3	2	3	3	2	2	3	1	1	3	3	1	2	**2.17**
CO4	3	3	3	3	3	2	1	1	2	3	2	3	**2.42**
CO5	3	3	3	3	3	3	1	2	3	3	2	3	**2.67**
PO	**2.8**	**2.6**	**2.6**	**2.4**	**2.4**	**2.6**	**1.2**	**1.6**	**2.4**	**3**	**1.4**	**2.6**	**2.30**

Avg													

L	T	P	C
4	1	-	3

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER VI
Group-B-ELECTIVE-II
ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES:

- To understand the basics of AI and Intelligent Agents
- To learn basics of problem solving using search techniques
- To know the logical implications in computational intelligence
- To learn different knowledge representation techniques in AI and tools.
- To understand the applications of AI in different domains.

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	Hours of Instruction
I	**Basics of Artificial Intelligence**	Introduction of AI - History and foundations of AI - Types of AI - Building AI System, Intelligent Agents, Agents and Environments – Good Behavior: The Concepts of Rationality – The Nature of Environments – The Structure of Agents.	10
II	**Problem Solving by Search**	Uninformed: Breadth-first search, Depth-first search, Hill-climbing search - Informed (Heuristic) search - A* Search - Adversarial Search and Games, Optimal Decisions in Games, Alpha–Beta Pruning - Constraint satisfaction problems (CSP)	10
III	**Knowledge Reasoning& Planning**	Logical Agents - Knowledge-Based Agents - Logic - Propositional Logic Agents based on Propositional Logic - First Order Logic – Inference – Classical Planning – Planning in real world.	10
IV	**Reasoning under Uncertainty**	Acting under uncertainty - Probability and Bayes' Theorem, Representing knowledge in uncertain domain – Semantics of Bayesian networks – Exact and approximate inference in Bayesian networks.	10
V	**AI Applications**	Radar for target detection, Automated ECG Noise Detection and Classification, Traffic prediction and	10

		classification, AI in Cognitive Radio Network (CRN).	

COURSE OUTCOMES: After completion of this course, student able to

CO1	Explain the basic concepts of Artificial intelligence
CO2	Apply the search techniques to real-time problems.
CO3	Apply the reasoning techniques to real world problems.
CO4	Infer knowledge in uncertain environments
CO5	Apply AI techniques in developing real world applications.

Text Books

1. "Artificial Intelligence: A Modern Approach (AIMA)", Stuart J. Russell and Peter Norvig, Prentice Hall, 2020 (4th Ed.)
2. "Artificial Intelligence and Machine Learning", Vinod Chandra S. S was published by PHI Learning in 2014.

Reference Books

1. "Artificial Intelligence by Example: Acquire advanced AI, machine learning, and deep learning design skills", Denis Rothman, 2nd Edition Paperback,2020.
2. "Artificial Intelligence and Machine Learning", Iresh A.,DhotreanamitraDeshmukh - Nimbalkar, Technical Publications, Pune, 2022.

Websites

https://www.udemy.com/courses/search/?src=ukw&q=PYTHON

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	CO Average
CO	*Foundational Knowledge*	*Problem Solving*	*System Design*	*Research & Expt.*	*Modern Tools*	*Societal Impact*	*Ethics & Responsibility*	Avg across POs
CO1	3	2	1	2	2	1	1	1.71
CO2	2	3	2	3	3	1	1	2.14
CO3	2	3	2	3	2	2	1	2.14
CO4	2	3	2	3	3	2	1	2.29
CO5	2	3	3	3	3	2	2	2.57
PO Average	2.20	2.80	2.00	2.80	2.60	1.60	1.20	2.17

L	T	P	C
4	-	-	3

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER VI
Group- C-ELECTIVE-III
PCB Design and Fabrication

COURSE OBJECTIVES:

Understand the need for PCB and steps involved in PCB Design and Fabrication process. PCB (Printed Circuit Board) designing is an integral part of each electronics products and this program is designed to make students capable to design their own projects PCB up to industrial grade.

Syllabus

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	Hours of Instruction
I	PCB Introduction	What is a PCB?-The PCB design process-Fabrication-Surface Mount and Through hole – Prototyping - Get KiCad for your operating system- KiCad Project Manager-Paths and Libraries-Create a new project from scratch-Create a new project from a template.	8
II	KiCad - Schematic Design	Introduction to schematic design -Start Eeschema, setup Sheet - Add symbols-Arrange, annotate, associate - Wiring-Nets-The Electrical Rules Check-Comments with text and graphics	10
III	KiCad - Layout	Introduction to layout design-Start Pcbnew, import footprints-Outline and constraints (edge cut)-Move footprints in place-Route (add tracks)-Refine the outline-Silkscreen (text and graphics)-Design rules check-Export Gerbers and order	10
IV	KiCAD - Library Creation	Schematic symbols on the Internet - create a custom symbol - associate a symbol with a footprint - Net classes - Global labels-Electrical rules and customization Footprint sources on the Internet - install footprint libraries - Filled zones - Keep-out zones - Create a new library and footprint - Fabrication layer, Pads, Courtyard layer and Silkscreen layer - 3D shape for a footprint - export and test Gerber files	12
V	Environmental concerns	Pollution Control in PCB Industry – polluting Agents – Recycling of Water – Recovery Techniques – Air Pollution – Recycling of PCB's – Environmental Standards – Safety Precautions – Toxic Chemicals.	10

COURSE OUTCOMES: At the end of course, student will be able to :

CO1	Appreciate the necessity and evolution of PCB, types and classes of PCB.
CO2	Understand the steps involved in schematic, layout, fabrication and assembly process of PCB design.
CO3	Familiarize Schematic and layout design flow using CAM Tools.
CO4	This is a basic course for designing of PCB using software. Design (schematic and layout) and fabricate PCB for simple circuits.
CO5	Understand the environmental concerns

REFERENCE BOOKS :

1. "KiCad Like a Pro", 3rd Edition - Dr Peter Dalmaris, Tech Explorations Publishing, ISBN (PDF) : 978-1-68489-093-4

2. "Printed Circuit Boards DESIGN, FABRICATION,AND ASSEMBLY" -R. S. Khandpur, McGraw-Hill - ISBN - 0070588147, 9780070588141.

CO-PO Mapping

Subject: PCB Design

CO / PO	PO1 Engineering Knowledge	PO2 Problem Analysis	PO3 Design / Development	PO4 Investigation	PO5 Modern Tool Use	PO6 Engineer & Society	PO7 Environment	PO8 Ethics	PO9 Individual & Teamwork	PO10 Communication	PO11 Project Mgmt	PO12 Life-long Learning
Unit I – PCB Fundamentals & KiCad Introduction												
CO1 Describe PCB fabrication, SMT vs through-hole, and set up KiCad	H	M	M	L	H	M	L	–	L	M	L	M
Unit II – Schematic Design												
CO2 Create schematics with symbols, wiring, nets and ERC	H	H	H	M	H	M	–	–	M	H	M	H
Unit III – PCB Layout												
CO3 Perform PCB layout,	H	H	H	H	H	M	L	–	M	H	M	H

CO / PO	PO1 Engineering Knowledge	PO2 Problem Analysis	PO3 Design / Development	PO4 Investigation	PO5 Modern Tool Use	PO6 Engineer & Society	PO7 Environment	PO8 Ethics	PO9 Individual & Teamwork	PO10 Communication	PO11 Project Mgmt	PO12 Life-long Learning
routing, DRC and export Gerber files												
Unit IV – Library Creation												
CO4 Create custom symbols, footprints, 3D shapes and net classes	H	H	H	M	H	L	–	–	M	M	M	H
Unit V – Environmental Concerns												
CO5 Assess pollution, recycling, standards and safety in PCB industry	M	M	L	M	L	H	H	H	M	M	L	M
Average Correlation	2.8	2.6	2.6	2.0	2.6	2.0	1.3	1.5	1.8	2.4	1.6	2.4

L	T	P	C
4	1	-	3

B.SC. ELECTRONICS AND COMMUNICATION
SEMESTER VI
Group- C-ELECTIVE-III
VERILOG AND VHDL

COURSE OBJECTIVES:

- Understand the role and importance of Hardware Description Languages (HDL) in modern digital design.
- Learn and apply the fundamental syntax and constructs of Verilog HDL for digital circuit design.
- Learn and apply the fundamental syntax and constructs of VHDL for digital circuit design.
- Design and simulate combinational and sequential circuits using both Verilog and VHDL.
- Understand the process of RTL design, logic synthesis, and FPGA implementation.
- Develop practical skills by implementing real digital circuits on FPGA boards.

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	Hours of Instruction

I	What is HDL and Why Do We Use It?	What is a Hardware Description Language (HDL)? - Why Verilog and VHDL are used in the electronics industry - Difference between software programming (C/Java) and hardware programming - How a digital design goes from code to simulation to chip (Design Flow) - Getting started with free EDA tools: ModelSim / Xilinx Vivado - Writing and running your very first Verilog and VHDL program	10
II	Basics of Verilog (Step by Step)	What is a module? — the basic building block of Verilog -Inputs, outputs, and wires — explained simply with examples -Three easy ways to write Verilog: Gate Level, Dataflow, and Behavioral Modeling -Basic operators: arithmetic (+, -), logical (AND, OR, NOT), relational -always and initial blocks — when and why to use them -Simple design examples: Half Adder, Full Adder, 2-to-1 Multiplexer	10
III	Basics of VHDL (Step by Step)	What is an entity and architecture? (equivalent to module in Verilog) -Common data types: std_logic and std_logic_vector -Concurrent statements — things happening at the same time -Sequential statements — things happening one after another -Using process blocks — the heart of VHDL programming -Using ready-made IEEE libraries (IEEE.std_logic_1164) -Simple examples: 2-to-1 MUX, 4-bit Adder in VHDL	10
IV	Designing Real Circuits in Verilog & VHDL	Combinational circuits (no memory): Encoder, Decoder, MUX, ALU -Sequential circuits (with memory): D Flip-Flop, Registers, Counters -What is a Finite State Machine (FSM)? — Traffic Light Controller as example -Mealy vs Moore FSM — explained with diagrams -How to write a testbench — a program to test your design -Simulate and verify your circuit output using waveforms	10
V	From Code to FPGA Chip & Modern Concepts	What is an FPGA? How is it different from a regular chip? -How Verilog/VHDL code gets converted to actual hardware (Logic Synthesis) -Programming an FPGA board with your design -Introduction to low power design concepts (saving energy) -Quick introduction to SystemVerilog — the modern upgrade of Verilog -Mini Project ideas: 4-bit Calculator, Traffic Light Controller, Digital Clock	10

Reference Book:

1.Digital Logic Design Using Verilog — Vaibbhav Taraate (IIT Bombay).

COURSE OUTCOMES: After completion of this course, student able to

CO1	Explain the concept of HDLs and describe the digital design flow from coding to chip implementation.
CO2	Write Verilog programs using gate level, dataflow, and behavioral modeling styles for basic digital circuits.
CO3	Write VHDL programs using entity-architecture structure, process blocks, and IEEE standard libraries.
CO4	Design and simulate combinational and sequential circuits including FSMs using both Verilog and VHDL.
CO5	Implement synthesized RTL designs on FPGA boards and verify real-time functionality.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	CO Avg
	Foundational Knowledge	*Problem Solving*	*System Design*	*Research & Expt.*	*Modern Tools*	*Societal Impact*	*Ethics & Resp.*	Avg across POs
CO1	3	2	1	1	2	1	1	1.57
CO2	2	3	2	1	3	1	1	1.86
CO3	2	3	3	2	3	1	1	2.14
CO4	2	2	3	3	3	1	1	2.14
CO5	2	3	3	2	3	2	2	2.43
PO Average	2.20	2.60	2.40	1.80	2.80	1.20	1.20	2.03

B.Sc. ELECTRONICS AND COMMUNICATION

L	T	P	C
-	1	2	5

SEMESTER V & VI
CORE PRACTICAL IV
IC'S & COMMUNICATION LAB

(ANY HARDWARE BASED SIMULATION TOOL MAY ALSO BE USED)
(Any 20 Experiments)

COURSE OBJECTIVES

- To understand the characteristics and implementation of different logic families such as TTL, CMOS, IIL, and ECL using basic logic gates.
- To analyze and design linear and non-linear applications of operational amplifiers including amplifiers, adders, subtractors, multipliers, differentiators, and integrators.

- To study the design and performance of active filters, oscillators, waveform generators, and voltage/current converter circuits using Op-Amps.
- To develop practical knowledge in solving analog computation problems and signal generation techniques using operational amplifier circuits.
- To understand the principles of analog and pulse modulation techniques including AM and PAM with modulation and demodulation processes.
- To gain practical experience in timer and waveform generation circuits using 555 IC in astable, monostable, Schmitt trigger, and voltage-controlled oscillator configurations.
- To study digital-to-analog conversion techniques using Binary Weighted Resistor and R-2R Ladder DAC circuits.
- To enhance circuit design, testing, troubleshooting, and analytical skills through practical implementation of analog and digital electronic circuits.

Syllabus

S. No.	Name of the Experiment
1.	NAND Gate Implementation Using TTL
2.	NOT / NAND / NOR Gate Implementation Using IIL / CMOS
3.	OR / NOR Gate Implementation Using ECL
4.	Inverting / Non-Inverting Amplifier using Op-Amp
5.	Inverting / Non-Inverting Adder Using Op-Amp
6.	Subtractor Using Op-Amp
7.	Multiplier / Divider Using Op-Amp
8.	Differentiator / Integrator Using Op-Amp
9.	Low Pass / High Pass Filter Using Op-Amp
10.	Band Pass / Band Reject Filter Using Op-Amp
11.	Voltage to Current Converter (Grounded Load)
12.	Current to Voltage Converter
13.	Solving of Simultaneous Equations Using Op-Amp
14.	Square Wave Generation Using Op-Amp
15.	Triangular Wave Generation Using Op-Amp

16.	Phase Shift Oscillator Using Op-Amp
17.	Amplitude Modulation and Demodulation
18.	Pulse Amplitude Modulation and Demodulation
19.	Astable Multivibrator Using 555 IC
20.	Monostable Multivibrator Using 555 IC
21.	Waveform Generation Using 555 IC
22.	Voltage Controlled Oscillator Using 555 IC
23.	Schmitt Trigger Using 555 IC
24.	Binary Weighted Resistor Type DAC
25.	R-2R Ladder Type DAC

CO No.	**Course Outcome Statement**	**Experiments Covered**	**Bloom's Level**	**K-Level**
CO1	Recall and understand the implementation and characteristics of different logic families such as TTL, CMOS, IIL, and ECL using logic gate circuits.	Exp 1–3	L2 – Understand	K2
CO2	Apply operational amplifier circuits for amplification, addition, subtraction, multiplication, division, differentiation, and integration operations.	Exp 4–8	L3 – Apply	K3
CO3	Analyze the performance of active filters, converters, oscillators, and waveform generation circuits using operational amplifiers.	Exp 9–16	L4 – Analyze	K4
CO4	Demonstrate modulation and demodulation techniques for analog and pulse communication systems.	Exp 17–18	L3 – Apply	K3
CO5	Design and verify timer, multivibrator, Schmitt trigger, and waveform generation circuits using 555 IC.	Exp 19–23	L4 – Analyze	K4
CO6	Implement and evaluate digital-to-analog conversion techniques using Binary Weighted Resistor and R-2R Ladder DAC circuits.	Exp 24–25	L5 – Evaluate	K5

References

1. Linear Integrated Circuits, New Age International Publishers.
2. Op-Amps and Linear Integrated Circuits, Prentice Hall of India.
3. Electronic Devices and Circuit Theory, Pearson Education.
4. Integrated Electronics, McGraw Hill Education.
5. Pulse, Digital and Switching Waveforms, McGraw Hill Education.
6. Electronic Principles, McGraw Hill Education.
7. Digital Principles and Applications, McGraw Hill Education.
8. Design with Operational Amplifiers and Analog Integrated Circuits, McGraw Hill Education.

CO-PO Mapping

The mapping correlation values are evaluated based on the degree of alignment:
1: Slight (Low) Mapping | 2: Moderate (Medium) Mapping | 3: Substantial (High) Mapping | "-": No Correlation

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**2**	**1**	-	-	-	-	**2**	**2**	-	**2**
CO2	**3**	**3**	**3**	**2**	**2**	-	-	-	**2**	**2**	-	**2**
CO3	**3**	**3**	**3**	**2**	**2**	-	-	-	**2**	**2**	-	**2**
CO4	**3**	**3**	**3**	**2**	**2**	-	-	-	**2**	**2**	-	**2**
CO5	**3**	**2**	**2**	**2**	-	-	-	-	**2**	**2**	-	**2**

L	T	P	C
2	1	2	4

B.Sc. ELECTRONICS AND COMMUNICATION
SEMESTER V & VI
Group D-ELECTIVE PRACTICAL I
ELECTIVE PRACTICAL 8051 MICROCONTROLLER, ARDUINO & INTERFACING LAB
(ANY EMBEDDED BASED SIMULATION/ WEB-BASED SOFTWARE TOOL MAY ALSO BE USED)
(Any 20 Experiments)(15+5)

COURSE OBJECTIVES

1. To understand the basic architecture and instruction set of microcontrollers.
2. To develop assembly language programming skills for arithmetic, logical, and data manipulation operations.
3. To gain practical knowledge in interfacing input/output devices with microcontroller systems.
4. To study memory organization and peripheral interfacing techniques.
5. To design and implement real-time embedded applications using ADC, DAC,

LCD, RTC, keyboard, LED, and motor interfacing.

Syllabus

S. No.	Name of the Experiment
1.	Addition of Two 8-Bit Numbers & Subtraction of Two 8-Bit Numbers
2.	Multiplication of Two 8-Bit Numbers
3.	Division of Two 8-Bit Numbers
4.	BCD Addition
5.	BCD Subtraction
6.	FILL
7.	BLOCK MOVE
8.	1's & 2's Complement of a 16-Bit Number
9.	Smallest/Largest of N Numbers
10.	Ascending/Descending Order of N Numbers
11.	Sum of N 8-Bit Numbers
12.	ADC Interface
13.	DAC Interface
14.	Interface with Switches & Interface with LEDs
15.	Stepper Motor Interface
16.	Interfacing with Multiple Seven Segment Displays
17.	Hex Keyboard Interface
18.	Traffic Light Control Interface
	ARDUINO UNO BOARDS
19.	LED Control Through Push Buttons
20.	Photo Resistor as Light Intensity Detector
21.	DCMotor Direction Control using L293D

22.	Displaying/Scrolling Text on LCD Display
23.	StepperMotor Speed Control Using ULN2003A
24.	LED Control using Infrared
25.	Switching Control of AC Load using TRIAC

CO No.	**Course Outcome Statement**	**Experiments Covered**	**Bloom's Level**	**K-Level**
CO1	Recall and understand the execution of arithmetic operations such as addition, subtraction, multiplication, division, BCD operations, and complement operations using assembly language programs.	Exp 1–8	L2 – Understand	K2
CO2	Apply programming concepts to perform data transfer, sorting, searching, code conversion, and multi-byte arithmetic operations in microcontroller systems.	Exp 9–14	L3 – Apply	K3
CO3	Analyze the interfacing techniques of ADC, DAC, waveform generation circuits, stepper motors, switches, LEDs, and keyboard interfaces.	Exp 15–20	L4 – Analyze	K4
CO4	Construct and verify interfacing circuits using seven segment displays, LCD modules, and solid-state relay applications in embedded systems.	Exp 21–26	L3 – Apply	K3
CO5	Design and implement real-time embedded applications such as digital clocks and traffic light control systems using microcontroller interfacing techniques.	Exp 27–28	L6 – Create	K6
CO6	Upon successful completion of this course, students will be able to design, program, and interface 8051 and Arduino-based embedded systems with digital I/O, analog sensors, motors, visual displays, and high-power wireless automation systems.	Exp 1–10	L2 – Understand	K2

REFERENCE BOOKS

1. Microprocessor Architecture, Programming and Applications with the 8085 – Penram International Publishing.
2. The 8051 Microcontroller and Embedded Systems – Pearson Education.
3. Advanced Microprocessors and Peripherals – Tata McGraw Hill.

4. Microcontrollers: Theory and Applications – Tata McGraw Hill.
5. Microprocessor and Microcontroller Fundamentals – Pearson Education.

CO-PO Mapping

The matrix below defines the correlation mapping levels between Course Outcomes (COs) and the standard NBA Graduate Attributes / Program Outcomes (POs 1–12).
Mapping Identifiers: 3 = Substantial (High) | 2 = Moderate (Medium) | 1 = Slight (Low) | '-' = No Correlation

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	2	-	-	-	-	-	-	2
CO2	2	2	2	-	3	-	-	-	2	-	-	1
CO3	3	2	3	2	3	-	-	-	2	-	-	2
CO4	2	3	3	2	3	1	1	-	3	-	-	3
Avg.	**2.5**	**2.0**	**2.6**	**2.0**	**2.75**	**1.0**	**1.0**	**-**	**2.3**	**-**	**-**	**2.0**

L	T	P	C
2	1	2	4

B.Sc. ELECTRONICS AND COMMUNICATION
SEMESTER V & VI
Group D-ELECTIVE PRACTICAL I-
16F877 A MICROCONTROLLER, ARDUINO & INTERFACING LAB
ANY EMBEDDED BASED SIMULATION/ WEB-BASED SOFTWARE TOOL MAY ALSO BE USED)
(Any 20 Experiments) (15+5)

COURSE OBJECTIVES

1. To understand the basic architecture and instruction set of microcontrollers.
2. To develop assembly language programming skills for arithmetic, logical, and data manipulation operations.
3. To gain practical knowledge in interfacing input/output devices with microcontroller systems.
4. To study memory organization and peripheral interfacing techniques.
5. To design and implement real-time embedded applications using ADC, DAC, LCD, RTC, keyboard, LED, and motor interfacing.

Syllabus

S. No.	Name of the Experiment
1.	Addition of Two 8-Bit Numbers & Subtraction of Two 8-Bit Numbers

2.	Multiplication of Two 8-Bit Numbers
3.	Division of Two 8-Bit Numbers
4.	BCD Addition
5.	BCD Subtraction
6.	FILL
7.	BLOCK MOVE
8.	1's & 2's Complement of a 16-Bit Number
9.	Smallest/Largest of N Numbers
10.	Ascending/Descending Order of N Numbers
11.	Sum of N 8-Bit Numbers
12.	ADC Interface
13.	DAC Interface
14.	Interface with Switches & Interface with LEDs
15.	Stepper Motor Interface
16.	Interfacing with Multiple Seven Segment Displays
17.	Hex Keyboard Interface
18.	Traffic Light Control Interface
	ARDUINO UNO BOARDS
19.	LED Control Through Push Buttons
20.	Photo Resistor as Light Intensity Detector
21.	DCMotor Direction Control using L293D
s22.	Displaying/Scrolling Text on LCD Display
23.	StepperMotor Speed Control Using ULN2003A
24.	LED Control using Infrared
25.	Switching Control of AC Load using TRIAC

CO No.	Course Outcome Statement	Experiments Covered	Bloom's Level	K-Level
CO 1	Recall and understand the execution of arithmetic operations such as addition, subtraction, multiplication, division, BCD operations, and complement operations using assembly language programs.	Exp 1–8	L2 – Understand	K2
CO 2	Apply programming concepts to perform data transfer, sorting, searching, code conversion, and multi-byte arithmetic operations in microcontroller systems.	Exp 9–14	L3 – Apply	K3
CO 3	Analyze the interfacing techniques of ADC, DAC, waveform generation circuits, stepper motors, switches, LEDs, and keyboard interfaces.	Exp 15–20	L4 – Analyze	K4
CO 4	Construct and verify interfacing circuits using seven segment displays, LCD modules, and solid-state relay applications in embedded systems.	Exp 21–26	L3 – Apply	K3
CO 5	Design and implement real-time embedded applications such as digital clocks and traffic light control systems using microcontroller interfacing techniques.	Exp 27–28	L6 – Create	K6
CO 6	Upon successful completion of this course, students will be able to design, program, and interface 8051 and Arduino-based embedded systems with digital I/O, analog sensors, motors, visual displays, and high-power wireless automation systems.	Exp 1–10	L2 – Understand	K2

REFERENCE BOOKS

1. PIC Microcontroller and Embedded Systems – Pearson Education.
2. Design with PIC Microcontrollers – Pearson Education.
3. PIC Microcontrollers: Programming in C – mikroElektronika Publications.
4. The 8051 Microcontroller and Embedded Systems – McGraw Hill Education.
5. Microchip Technology PIC16F877A Datasheet and Technical Reference Manual.
6. Microcontrollers: Theory and Applications – Tata McGraw Hill.

CO-PO Mapping

The matrix below defines the correlation mapping levels between Course Outcomes

(COs) and the standard NBA Graduate Attributes / Program Outcomes (POs 1–12).
Mapping Identifiers: 3 = Substantial (High) | 2 = Moderate (Medium) | 1 = Slight (Low) | '-' = No Correlation

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	2	-	-	-	-	-	-	2
CO2	2	2	2	-	3	-	-	-	2	-	-	1
CO3	3	2	3	2	3	-	-	-	2	-	-	2
CO4	2	3	3	2	3	1	1	-	3	-	-	3
Avg.	**2.5**	**2.0**	**2.6**	**2.0**	**2.75**	**1.0**	**1.0**	**-**	**2.3**	**-**	**-**	**2.0**

B.Sc. ELECTRONICS AND COMMUNICATION

SEMESTER VI

NMSDC-V

L	T	P	C
2	-	-	2

FUNDAMENTALS OF SMARTPHONE AND SERVICING

Candidates who were absent or failed to clear this paper in the regular examinations conducted under the Naan Mudhalvan Programme of the Government of Tamil Nadu shall be eligible to appear for the examination in the subsequent semester.

COURSE OBJECTIVES

- To understand the evolution, features, basic operations, connectivity parameters, and configuration procedures of modern smartphones.
- To understand the architecture and functionality of smartphone hardware components.
- To understand the software environment and operating systems used in smartphones.
- To apply security measures, authentication techniques, and troubleshooting methods for effective smartphone management.
- To analyze smartphone faults and develop practical skills in smartphone servicing and maintenance.

SYLLABUS

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	No. of Hours
I	**Introduction to Smartphone's**	Introduction of Smartphones – Features of Smart phone - History of Smartphones - Basic Smartphone operations – Connectivity and	05 Hrs

		Performance – Setup and Configuration	
II	**Hardware**	CPU, RAM, and Internal memory - Difference between RAM and ROM - Display technologies (LCD, LED, etc.) - Camera and Sensors - Battery - Power management – Audio devices	05 Hrs
III	**Software**	Operating system basics (Android, iOS, etc.) - User interface and navigation- App management and installation- Smartphone Data Management - Data synchronization, backup, Recovery - Security and Privacy	05 Hrs
IV	**Security and Maintenance**	Smartphone security threats and protection- Authentication - Basic troubleshooting techniques (heating, connectivity drops, Lags) - Best practices for Smartphone maintenance – Factory reset procedure	05 Hrs
V	**Servicing and Trouble shooting**	Smartphone repair tools and equipment - Common Smartphone issues - Screen replacement - Battery replacement – Charging port and Power issues – Camera repair – Speaker repair –Water damage recovery - Safety precautions and best practices	05 Hrs
		Total Hours	25 Hrs

References : [Text Book]

[1] R. S. Khandpur, *Mobile Phone Repairing and Maintenance*. New Delhi, India: Tata McGraw-Hill, 2007.

[2] B. Phillips and C. Stewart, *Android Programming: The Big Nerd Ranch Guide*. Atlanta, GA, USA: Big Nerd Ranch Guides, 2013.

[3] H. L. Davidson, *Troubleshooting and Repairing Smart Phones*. New York, NY, USA: McGraw-Hill, 2012.

[4] N. Elenkov, *Android Security Internals: An In-Depth Guide to Android's Security Architecture*. San Francisco, CA, USA: No Starch Press, 2014.

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Online Resources :

https://www.ifixit.com/Device/Android_Phone
https://developer.android.com/guide
https://www.coursera.org/learn/cyber-security-mobile-security
https://mophoneparts.com/the-internal-components-of-smartphones-in-2024-a-complete-guide/

CO	Course Outcome Statement	Units Covered	Bloom's Level	K-Level

CO	Course Outcome Statement	Units Covered	Bloom's Level	K-Level
CO1	Students will be able to recall and describe the evolution, features, basic operations, connectivity parameters, and configuration procedures of modern smartphones	1	**L1 - Remember**	K1
CO2	Students will be able to explain the architecture and functionality of smartphone hardware components and their interrelationships	2	**L2 – Understand**	K2
CO3	Students will be able to interpret and describe the software environment of smartphones, including operating systems, applications, and firmware	3	**L2 – Understand**	K2
CO4	Students will be able to apply appropriate security measures, authentication techniques, and troubleshooting methods to resolve smartphone operational issues	4	**L3 – Apply**	K3
CO5	Students will be able to diagnose smartphone faults systematically and perform hands-on servicing and repair tasks using appropriate tools and techniques	5	**L4 – Analyze**	K4

CO-PO MAPPING — SMARTPHONE FUNDAMENTALS AND SERVICING													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**Avg (co-wise)**
	Engineering Knowledge	**Problem Analysis**	**Design / Dev**	**Investigation**	**Modern Tools**	**Engineer & Society**	**Environment**	**Ethics**	**Team Work**	**Communication**	**PM & Finance**	**Life-long Learning**	
CO1	3	2	2	2	3	2	1	2	2	2	1	2	**2**
CO2	3	3	2	2	3	2	1	2	2	2	1	2	**2.08**
CO3	3	2	2	2	3	2	1	2	2	2	1	3	**2.08**
CO4	3	3	2	3	3	2	1	2	2	2	1	2	**2.17**
CO5	3	3	3	3	3	2	1	2	2	2	1	3	**2.33**
PO Avg	**3**	**2.6**	**2.2**	**2.4**	**3**	**2**	**1**	**2**	**2**	**2**	**1**	**2.4**	**2.13**

L	T	P	C
3	1	-	4

B.SC. ELECTRONICS AND COMMUNICATION

(For B.Sc CS, BCA, B.Sc IT, &B.Sc PHY)

I/II YEAR-I/III SEMESTER

APPIED ELECTRONICS - I

COURSE OBJECTIVES

- To provide fundamental knowledge of semiconductor materials, PN junction devices, and transistor operation used in electronic circuits.
- To develop an understanding of passive and active electronic components and the application of basic circuit laws in circuit analysis.
- To familiarize students with rectification, filtering, and voltage regulation techniques used in power supply circuits.
- To introduce waveform characteristics, measurement techniques, and the use of electronic test instruments such as Digital Multimeters and CROs.
- To impart knowledge of oscillators, amplifiers, and filters used in electronic communication and signal processing systems.

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	Hours of Instruction	Programme Specific Qualification Attributes (K1, K2, K3, K4)
I	**Semiconductor Theory**	Intrinsic Semiconductor – Extrinsic Semiconductor - Theory of PN Junction Diode - Zener Diode - Avalanche Breakdown - Zener Break Down - Operation of PNP & NPN Transistor - CB, CE, CC Configuration and Characteristics - Transistor as an Amplifier.	10	K2
II	**Resistors, capacitors & inductors**	Resistors, Capacitors & Inductors in Series and Parallel - Factors governing the Resistance of a Resistor, Capacitor & Inductor - Colour Coding of Resistors - Various Other Passive & Active Devices – Ohm's &Kirchhoff Laws - Series Circuits – Parallel Circuits - Series & Parallel Circuits - Open Circuit - Short Circuit	10	K3
III	**Power Supply**	Half Wave Rectifier - Full Wave Rectifier - Bridge Rectifier - Capacitor Filter - Fixed IC Regulated Power Supply using 78XX - Dual IC Regulated Power Supply using 78XX & 79XX	10	K4
IV	**Waveforms**	Sinusoidal Waveform - Non-Sinusoidal Waveform - Peak Value - Peak to Peak Value - Average Value – RMS Value – Period & Frequency Measurement – Use of Digital Multimeter – Use of CRO.	10	K4

V	**Oscillators, Amplifiers & Filters**	Barkhausen Criterion – Sinusoidal Oscillators: Hartley, Phase Shift & Crystal Oscillator. NonSinusoidal Oscillators: Astable, Monostable & UJT as a Sawtooth Oscillator. Amplifiers: RC Coupled & Transformer Coupled Amplifiers. Filters: Low Pass, High Pass, Band Pass & Band Reject Filters.	10	K4

CO	Course Outcome Statement	Bloom's Level	K-Level
CO1	**Explain the concepts of intrinsic and extrinsic semiconductors, PN junction diodes, Zener diodes, and transistor configurations and characteristics.**	L2 – Understand	K2
CO2	**Apply the principles of passive components, Ohm's law, and Kirchhoff's laws to analyze series and parallel electrical circuits.**	L3 – Apply	K3
CO3	**Analyze the operation and performance of rectifiers, filters, and regulated power supply circuits.**	L4 – Analyze	K4
CO4	**Measure and interpret electrical waveforms and circuit parameters using digital multimeters and cathode ray oscilloscopes.**	L4 – Analyze	K4
CO5	**Analyze the working and applications of oscillators, amplifiers, and electronic filters in electronic systems.**	L4 – Analyze	K4

REFERENCES

1. Electronic Devices & Circuits - S. Salivahanan - TMH - II Edition
2. Circuits & Networks - Sudhakar - TMH - 4th Edition.

CO-PO MAPPING — Applied Electronics - I

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO
	Engineering Knowledge	Problem Analysis	Design / Dev	Investigation	Modern Tools	Engineer & Society	Environment	Ethics	Team Work	Commu
CO1	3	2	2	2	2	2	1	1	1	
CO2	3	3	2	2	2	2	2	1	1	
CO3	3	3	3	3	2	2	2	1	1	
CO4	3	3	2	3	3	2	1	1	1	
CO5	3	3	3	3	2	2	1	1	2	
PO Avg	3	2.8	2.4	2.6	2.2	2	1.4	1	1.2	

L	T	P	C
3	1	-	4

B.SC. ELECTRONICS AND COMMUNICATION

(For B.Sc CS, BCA, B.Sc IT, &B.Sc PHY

I/II YEAR-II/IV SEMESTER

APPIED ELECTRONICS - II

COURSE OBJECTIVES

- To introduce the principles and applications of various transducers and instrumentation amplifiers used in measurement systems.
- To develop an understanding of operational amplifier characteristics, configurations, and signal-processing applications.
- To familiarize students with integrated circuit fabrication techniques and semiconductor device manufacturing processes.
- To impart knowledge of printed circuit board (PCB) design principles and fabrication processes used in electronic product development.
- To provide an understanding of analog and digital communication systems, modulation techniques, transmitters, and receivers.

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	Hours of Instruction	Programme Specific Qualification Attributes (K1, K2, K3, K4)
I	**Transducers**	Resistive Transducers – Inductive Transducers - Capacitive Transducers - Piezo Electric Transducer – Thermo-Electric Transducers –Temperature Transducers– Instrumentation Amplifier – Microphones & Loud Speakers.	10	K1, K2
II	**Op – Amp's**	Introduction - The ideal OP-AMP - OP-Amp stages - OP-Amp parameters - Inverting & Non-Inverting Amplifier - Adder - Subtractor - Multiplier - Divider - Integrator - Differentiator - V to I Converter - I to V Converter.	10	K1, K2, K3
III	**IC Fabrication Process**	Basic Planar Process - Fabrication of a Typical Circuit - Active and Passive Components - Fabrication of FET, MOSFET & CMOS - Thin & Thick Film Technology.	10	K2, K3
IV	**PCB Fabrication Process**	PCB Types – Layout & General Rules – Design Rules for Digital Circuit PCB's – Artwork – Properties & Types of Copper Clad Laminates – Photo Printing – Screen Printing – Types of Etchants	10	K2, K3, K4
V	**Communication Systems**	Need For Modulation – Amplitude Modulation & Detection - Frequency Modulation & Detection – AM Transmitter - AM Receiver – FM Transmitter - FM Receiver – Modulation & Demodulation of PAM, PPM, PWM, PCM.	10	K2, K3, K4

CO	Course Outcome Statement	Bloom's Level	K-Level
CO1	Explain the operating principles and applications of various transducers, instrumentation amplifiers, microphones, and loudspeakers.	L2 – Understand	K2
CO2	Apply the characteristics and configurations of operational amplifiers to analyze and design basic analog signal-processing circuits.	L3 – Apply	K3
CO3	Apply operational amplifier concepts to analyze and design basic analog	L2 – Understand	K2

CO	Course Outcome Statement	Bloom's Level	K-Level
	circuits such as amplifiers, adders, subtractors, integrators, and differentiators.		
CO4	Describe IC fabrication processes and the fabrication of semiconductor devices such as FETs, MOSFETs, and CMOS circuits.	L2 – Understand	K2
CO5	Explain PCB fabrication techniques, layout rules, design considerations, and manufacturing processes for electronic circuits.	L4 – Analyze	K4

REFERENCES

1. Electronic Devices & Circuits - S. Salivahanan - TMH - II Edition.
2. PCB Design – Walter.C. Bosshart – TMH
3. Electronic Communication Systems - Kennedy - TMH – IV Edition.

CO-PO Mapping

CO-PO MAPPING — Applied Electronics - II

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO
	Engineering Knowledge	Problem Analysis	Design / Dev	Investigation	Modern Tools	Engineer & Society	Environment	Ethics	Team Work	Commu
CO1	3	2	2	2	2	2	1	1	1	
CO2	3	3	2	2	2	2	2	1	1	
CO3	3	3	3	3	2	2	2	2	1	
CO4	3	3	2	3	3	2	1	2	1	
CO5	3	3	3	3	2	2	1	1	2	
PO Avg	3	2.8	2.4	2.6	2.2	2	1.4	1.4	1.2	

L	T	P	C
-	-	2	2

B.SC. ELECTRONICS AND COMMUNICATION

APPLIED ELECTRONICS LAB (ALLIED)

(For B.Sc CS, BCA, B.Sc IT, & B.Sc PHY)

I/II YEAR-II/IV SEMESTER

(Any 20 Experiments)

COURSE OBJECTIVES

- To familiarize students with basic electronic components, circuit elements, and laboratory instruments used in electrical and electronic measurements.
- To provide practical understanding of fundamental electrical laws and network theorems through experimental verification.
- To study the characteristics and applications of semiconductor devices such as PN junction diodes and bipolar junction transistors.
- To develop skills in designing, constructing, and analysing digital logic circuits using logic gates and combinational logic ICs.
- To enable students to build and test analog electronic circuits, including rectifiers, voltage regulators, and operational amplifier-based circuits.
- To enhance experimental, analytical, troubleshooting, and technical reporting skills required for electronics and electrical engineering applications.

S. No.	Name of the Experiment
1.	Colour Coding of Resistors
2.	Ohm's Law
3.	Kirchhoff's Current Law
4.	Kirchhoff's Voltage Law
5.	Resistors in Series & Parallel
6.	Capacitors in Series & Parallel
7.	PN Junction Diode Characteristics
8.	CE Input Characteristics
9.	CE Output Characteristics
10.	Measurement of Amplitude & Frequency Using CRO
11.	Truth Table Verification of BASIC Gates (Any one gate)
12.	Verification of De Morgan's Theorem
13.	NAND as a UNIVERSAL GATE (AND / OR)
14.	NOR as a UNIVERSAL GATE (AND /OR)

S. No.	Name of the Experiment
15.	Half Adder / Full Adder
16.	Half Subtractor / Full Subtractor
17.	Encoder Using 74147 IC
18.	Decoder Using 7442 IC
19.	Multiplexer Using 74153 IC
20.	Demultiplexer Using 74155 IC
21.	Full Wave Rectifier With Capacitor Filter
22.	Fixed IC Regulated Power Supply (78XX)
23.	Dual IC Regulated Power Supply (78XX & 79XX)
24.	Inverting Adder /Non-Inverting Adder Using Op-Amp IC 741
25.	Subtractor Using Op-Amp IC 741

CO	Course Outcome Statement	Experiments Covered	Bloom's Level	K-Level
CO1	Identify electronic components and verify the fundamental laws of electrical circuits, including Ohm's Law, Kirchhoff's Current Law, and Kirchhoff's Voltage Law	Exp 1–4	**L1 – Understand**	**K2**
CO2	Analyse the behaviour and characteristics of passive and active electronic devices such as resistors, capacitors, diodes, and transistors through experimental measurements	Exp 5-9	**L5 – Analyze**	**K4**
CO3	Operate Cathode Ray Oscilloscope (CRO) to measure electrical parameters, including amplitude and frequency	Exp 10	**L4 – Apply**	**K3**
CO4	Design and verify logic gates, combinational digital circuits, adders & subtractors, using logic gates	Exp 11-16	**L5 – Design**	**K6**
CO5	Understand the functioning of encoders, decoders, multiplexers, and demultiplexers using ICs	Exp 17-20	**L1 – Understand**	**K2**
CO6	Construct and evaluate rectifier circuits, regulated power supplies, and operational amplifier-based circuits for analog signal processing applications	Exp 21-25	**L5 – Construct**	**K6**

REFERENCES

1. Practical Physics and Electronics - C.C Ouseph.. and U.J Rao. - S Viswanathan Printers & Publishers Pvt Ltd - 2019th edition

CO-PO MAPPING — ALLIED ELECTRONICS – I													
CO	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO 8	PO 9	PO10	PO1 1	PO1 2	Avg (co-wise)
	Engineering Knowledge	Problem Analysis	Design / Dev	Investigation	Modern Tools	Engineer & Society	Environment	Ethics	Team Work	Communication	PM & Finance	Life-long Learning	
CO1	3	2	3	3	2	3	1	1	2	2	1	2	2.08
CO2	3	3	3	3	2	3	1	1	2	2	1	2	2.17
CO3	3	2	2	2	3	2	1	1	2	2	1	2	1.92
CO4	3	3	3	3	2	3	1	2	2	2	2	2	2.33
CO5	3	3	2	2	2	2	1	1	2	2	1	2	1.92
CO6	3	3	3	3	2	2	2	2	2	2	2	2	2.33
PO Avg	3	2.67	2.67	2.67	2.17	2.5	1.17	1.33	2	2	1.33	2	2.13

L	T	P	C
3	1	-	4

B.SC. ELECTRONICS AND COMMUNICATION
For B.Sc [MATHS,STATISTICS,MATHS (CA) , BIO CHEMISTRY, MICROBIOLOGY, BIO-TECH]

I/II YEAR-I/III SEMESTER
ALLIED ELECTRONICS I

COURSE OBJECTIVES

- **To provide fundamental knowledge of semiconductor materials and electronic devices** such as PN junction diodes, Zener diodes, and transistors used in basic electronic circuits.
- **To develop an understanding of passive and active electronic components**, their characteristics, and their behavior in series and parallel circuit configurations.
- **To familiarize students with basic electrical and electronic circuit laws** including Ohm's Law, Kirchhoff's Current Law (KCL), and Kirchhoff's Voltage Law (KVL) for circuit analysis.

- **To introduce waveform concepts and measurement techniques**, enabling students to interpret and analyze various electrical signal parameters.
- **To impart knowledge of rectification, filtering, and voltage regulation techniques** used in electronic power supply circuits.

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	Hours of Instruction	Programme Specific Qualification Attributes (K1, K2, K3, K4)
I	**Semiconductor theory**	Intrinsic Semiconductor – Extrinsic Semiconductor - Theory of PN Junction Diode - Zener Diode - Avalanche Breakdown - Zener Break Down - Operation of PNP & NPN Transistor - CB, CE, CC Configuration and Characteristics - Transistor as an Amplifier.	10	K1, K2
II	**Resistors, capacitors & inductors**	Resistors, Capacitors & Inductors in Series and Parallel - Factors Governing Resistance, Capacitance &Inductance - Colour Coding of Resistors - Energy Stored in a Capacitor - Energy Stored in an Inductor - Various Other Passive & Active Devices.	10	K1, K2, K3
III	**Circuit laws**	Ohm's Law - Kirchhoff's Current Law - Kirchhoff's Voltage Law - Voltage Division - Current Division - Series Circuits - Parallel Circuits - Series & Parallel Circuits - Open Circuit - Short Circuit.	10	K2, K3
IV	**Waveforms**	Sinusoidal Waveform - Non-Sinusoidal Waveforms - Peak Value - Peak to Peak Value - Average Value - RMS Value – Period & Frequency Measurement	10	K2, K3, K4
V	**Power supply**	Half Wave Rectifier - Full Wave Rectifier - Bridge Rectifier - Capacitor Filter - Fixed IC Regulated Power Supply using 78XX - Dual IC Regulated Power Supply using 78XX & 79XX.	10	K2, K3, K4

CO	Course Outcome Statement	Bloom's Level	K-Level
CO1	**Explain the concepts of intrinsic and extrinsic semiconductors, PN junction diodes, Zener diodes, and transistor configurations and characteristics.**	L2 – Understand	K2
CO2	**Apply the principles of resistors, capacitors, inductors, and other electronic components in electrical and electronic circuits.**	L3 – Apply	K3
CO3	**Analyze electrical circuits using Ohm's law, Kirchhoff's laws, voltage division, and current division techniques.**	L4 – Analyze	K4
CO4	**Analyze and interpret sinusoidal and non-sinusoidal waveforms by determining their electrical parameters.**	L4 – Analyze	K4
CO5	**Explain the operation and performance of rectifiers, filters, and regulated power supply circuits.**	L3 – Apply	K3

REFERENCES

1. Digital Circuits and Design –S. Salivahanan- Vikas Publications, III Edition.
2. Digital Principles and Applications – Albert Paul Malvino and Donald P. Leach- McGraw Hill Education-8th edition
3. Modern Digital Electronics –R.P.Jain- Tata McGraw Hill-4th edition
4. Op-Amps and Linear Integrated Circuits -Ramakant A. Gayakwad – Pearson Education-4th edition
5. Principles of Electronics-V.K. Mehta -11th edition-S Chand publication
6. Basic Electronics- B.L. Theraja & A.K. Theraja-S Chand publication-5th edition

CO-PO MAPPING — Allied Electronics - I

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO
	Engineering Knowledge	**Problem Analysis**	**Design / Dev**	**Investigation**	**Modern Tools**	**Engineer & Society**	**Environment**	**Ethics**	**Team Work**	**Commu**

CO1	3	2	2	2	2	2	1	1	1	
CO2	3	3	2	2	2	2	2	1	1	
CO3	3	3	3	3	2	2	2	1	1	
CO4	3	3	2	3	3	2	1	2	1	
CO5	3	3	3	3	2	2	1	1	1	
PO Avg	**3**	**2.8**	**2.4**	**2.6**	**2.2**	**2**	**1.4**	**1.2**	**1**	

B.SC. ELECTRONICS AND COMMUNICATION

L	T	P	C
3	1	-	4

For B.Sc [MATHS,STATISTICS,MATHS (CA) , BIO CHEMISTRY, MICROBIOLOGY, BIO-TECH]

I/II YEAR-II/IV SEMESTER

ALLIED ELECTRONICS II

COURSE OBJECTIVES

- **To introduce the fundamentals of number systems and their conversions used in digital electronics.**
- **To develop the ability to perform binary arithmetic operations and complement methods for digital computations.**
- **To provide knowledge of logic gates, Boolean algebra, and logic simplification techniques for digital circuit design.**
- **To familiarize students with combinational logic circuits such as adders, subtractors, encoders, decoders, multiplexers, and demultiplexers.**
- **To impart understanding of oscillators, modulation techniques, amplifiers, filters, and operational amplifier applications in electronic circuits.**

Unit	Unit Title	Intended learning Chapters (Programme specific qualification attributes K1, K2, K3, K4)	Hours of Instruction	Programme Specific Qualification Attributes (K1, K2, K3, K4)
I	Number Systems	Introduction – Binary Number System – Octal Number System – Decimal Number System – Hexadecimal Number System – Conversion from	10	K1, K2

		One System to Another		
II	Binary Rules	Binary Addition – Binary Subtraction – Binary Multiplication – Binary Division – 1's & 2's Complement Subtraction – 9's & 10's Complement Subtraction	10	K1, K2, K3
III	Boolean Algebra	Logic Gates – NAND as a Universal Gate – NOR as a Universal Gate – Basic Laws of Boolean Algebra – Principle of Duality – De Morgan's Theorem	10	K2, K3
IV	Combinational Elements	Half Adder – Full Adder – Half Subtractor – Full Subtractor – Encoder – Decoder – Multiplexer – Demultiplexer	10	K2, K3, K4
V	Electronic Circuits	Barkhausen Criterion – Sinusoidal Oscillators (Hartley, Phase Shift & Crystal Oscillator) – Amplitude & Frequency Modulation and Detection – Amplifiers: RC Coupled & Transformer Coupled – Filters: Low Pass, High Pass, Band Pass & Band Reject Filters – Op-Amps and Their Applications (Addition, Subtraction, Multiplication, Division, Differentiation & Integration)	10	K2, K3, K4

CO	Course Outcome Statement	Bloom's Level	K-Level
CO1	**Explain various number systems and perform conversions between binary, octal, decimal, and hexadecimal number systems.**	L2 – Understand	K1,K2
CO2	**Apply binary arithmetic operations and complement methods to solve digital computation problems**	L3 – Apply	K1,K2,K3
CO3	**Apply Boolean algebra laws, De Morgan's theorem, and logic gate concepts to simplify and analyze digital circuits.**	L3 – Apply	K2,K3
CO4	**Analyze the operation and applications of combinational logic circuits**	L4 – Analyze	K2,K3,K4

CO	Course Outcome Statement	Bloom's Level	K-Level
	including adders, subtractors, encoders, decoders, multiplexers, and demultiplexers.		
CO5	**Analyze the working principles and applications of oscillators, modulation systems, amplifiers, filters, and operational amplifier circuits.**	L4 – Analyze	K2,K3,K4

REFERENCES

1. Digital fundamentals – V Vijayendran – S Viswanathan printers & Publishers, 2004 Edition.
2. Electronic Devices and Circuits – S Salivahanan– Tata McGraw Hill-II Edition.
3. Digital Principles and Applications - Donald P. Leach, Albert Paul Malvino– McGraw Hill Education-8th edition
4. Modern Digital Electronics –R.P. Jain- Tata McGraw Hill – 4th edition
5. Op-Amps and Linear Integrated Circuits – Ramakant A. Gayakwad-Pearson Education-4th edition.

CO-PO MAPPING — Alllied Electronics - II

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO
	Engineering Knowledge	**Problem Analysis**	**Design / Dev**	**Investigation**	**Modern Tools**	**Engineer & Society**	**Environment**	**Ethics**	**Team Work**	**Commu**
CO1	3	2	2	2	2	2	1	1	1	
CO2	3	3	3	2	2	2	2	1	1	
CO3	3	3	3	3	2	2	2	1	1	
CO4	3	3	2	3	3	2	1	2	1	
CO5	3	3	3	3	2	2	1	1	1	

PO Avg	**3**	**2.8**	**2.6**	**2.6**	**2.2**	**2**	**1.4**	**1.2**	**1**	

CO-PO Mapping

L	T	P	C
-	-	3	2

B.SC. ELECTRONICS AND COMMUNICATION
For B.Sc [MATHS,STATISTICS,MATHS (CA) , BIO CHEMISTRY, MICROBIOLOGY, BIO-TECH]
I/II YEAR-II/IV SEMESTER
Allied Electronics Lab

(Any 20 Experiments)

COURSE OBJECTIVES

- To familiarize students with basic electronic components, circuit elements, and laboratory instruments used in electrical and electronic measurements.
- To provide practical understanding of fundamental electrical laws and network theorems through experimental verification.
- To study the characteristics and applications of semiconductor devices such as PN junction diodes and bipolar junction transistors.
- To develop skills in designing, constructing, and analysing digital logic circuits using logic gates and combinational logic ICs.
- To enable students to build and test analog electronic circuits, including rectifiers, voltage regulators, and operational amplifier-based circuits.
- To enhance experimental, analytical, troubleshooting, and technical reporting skills required for electronics and electrical engineering applications.

S. No.	Name of the Experiment
1.	Ohm's Law
2.	Kirchhoff's Current Law
3.	Kirchhoff's Voltage Law
4.	Resistors in Series & Parallel
5.	Capacitors in Series & Parallel
6.	PN Junction Diode Characteristics
7.	CE Input Characteristics
8.	CE Output Characteristics
9.	Measurement of Amplitude & Frequency Using CRO

S. No.	Name of the Experiment
10.	Truth Table Verification of BASIC Gates
11.	Verification of De Morgan's Theorem
12.	NAND as a UNIVERSAL GATE (AND / OR)
13.	NOR as a UNIVERSAL GATE (AND /OR)
14.	Clock Generation Using NAND/NOR Gate
15.	Half Adder / Full Adder using logic gates
16.	Half Subtractor / Full Subtractor using logic gates
17.	Encoder Using 74147 IC
18.	Decoder Using 7442 IC
19.	Multiplexer Using 74153 IC
20.	Demultiplexer Using 74155 IC
21.	Full Wave Rectifier With Capacitor Filter
22.	Dual IC Regulated Power Supply (78XX & 79XX)
23.	Inverting Adder / Non-Inverting Adder Using Op-Amp IC 741
24.	Subtractor Using Op-Amp IC 741
25.	Low Pass Filter / High Pass Filter

CO	Course Outcome Statement	Experiments Covered	Bloom's Level	K-Level
CO1	Identify electronic components and verify the fundamental laws of electrical circuits, including Ohm's Law, Kirchhoff's Current Law, and Kirchhoff's Voltage Law	Exp 1–3	**L1 – Understand**	**K2**
CO2	Analyse the behaviour and characteristics of passive and active electronic devices such as resistors, capacitors, diodes, and transistors through experimental measurements	Exp 4-8	**L5 – Analyze**	**K4**
CO3	Operate Cathode Ray Oscilloscope (CRO) to measure electrical parameters, including amplitude and	Exp 9	**L4 – Apply**	**K3**

CO	Course Outcome Statement	Experiments Covered	Bloom's Level	K-Level
	frequency			
CO4	Design and verify logic gates and construct combinational digital circuits, adders & subtractors, using logic gates	Exp 10-16	**L5 – Design**	**K6**
CO5	Understand the functioning of encoders, decoders, multiplexers, and demultiplexers using ICs	Exp 17-20	**L1 – Understand**	**K2**
CO6	Construct and evaluate rectifier circuits, regulated power supplies, filters and operational amplifier-based circuits for analog signal processing applications	Exp 21-25	**L5 – Construct**	**K6**

REFERENCES

1. Practical Physics and Electronics - C.C Ouseph. and U.J Rao. - S Viswanathan Printers & Publishers Pvt Ltd - 2019th edition

CO-PO Mapping

CO-PO MAPPING — APPLIED ELECTRONICS – I

CO	PO1 Engineering Knowledge	PO2 Problem Analysis	PO3 Design / Dev	PO4 Investigation	PO5 Modern Tools	PO6 Engineer & Society	PO7 Environment	PO8 Ethics	PO9 Team Work	PO10 Communication
CO1	3	2	3	3	2	3	1	1	2	2
CO2	3	3	3	3	2	3	1	1	2	2
CO3	3	2	2	2	3	2	1	1	2	2
CO4	3	3	3	3	2	3	1	2	2	2
CO5	3	3	2	2	2	2	1	1	2	2
CO6	3	3	3	3	2	2	2	2	2	2
PO Avg	3	2.67	2.67	2.67	2.17	2.5	1.17	1.33	2	2

பெரியார் பல்கலைக்கழகம்
PERIYAR UNIVERSITY
State University-NAAC A++ Grade-NIRF 94,
State Public University Rank 40-SDG Institutions Rank Band-11-50
Salem- 636011, Tamil Nadu

Dr.K.JAYARAMAN
DEAN

PU/AD-1/BOS MEETING/006458/2026, Date:21.05.2026
BOARD OF STUDIES - MEETING NOTICE

I am, by direction, to state that the 2nd meeting of the Board of Studies in **Electronics and Communication** - **UG (Affiliated College)** is scheduled to be held on 26.05.2026 at 10.30 a.m. at Kalaingar Research Centre, Periyar University, Salem-11.

AGENDA

1. To Frame the syllabus for **B.Sc. Electronics and Communication** under Choice Based Credit System (CBCS) and Outcome Based Education (OBE) from the academic year 2026-2027 and thereafter.
2. To Prepare the Scheme of Examination, Question Paper Pattern, Model Question Paper, List of Examiners, Question Paper Setters, etc.
3. Any other item.

Members of the Board:

Sl.No.	Name & Address	Designation of the Board
1.	Mrs. S. Vennila Assistant Professor Department of Electronics & Communication Government Arts College Dharmapuri – 636 705. Ph.No: 9952626888	Chairman
2.	Dr. K. M. Prabusankarlal Assistant Professor, Dept. of of Electronics & Communication, K.S.Rangasamy College of Arts & Science (Autonomous), Thokkavadi (Post) Tiruchengode - 637 215, Namakkal Dt. Ph.No: 9842410124	Member
3.	Mrs. C. Leelavathi Assistant Professor Dept. of of Electronics & Communication Government Arts & Science College for Women Barugur, Kirshnagiri Dt – 635 104. Ph.No: 8220081313,9444378470	Member
4.	Mr.A.Mani Kandan Assistant Professor Dept.of.Electronics & Communication Sri Ganesh College of Arts & Science Ammapet, Salem-636014 Ph.No:9003640740	Member

PTO

5.	Dr. J. Kalyanasundar Assistant Professor, Department of Physics Periyar University, Salem-636 011 Ph.No:99654 32165	University Nominee
6.	Mr. R. Thiruvengadam Assistant Professor Department of Electronics A.M Jain College Meenambakkam, Chennai-600 061 Ph.No:9842175785	External Member
7.	Dr. V. Jagadeesan Assistant Professor, Department of Electronics P.S.G College of Arts and Science, Coimbatore-641 014. Ph.No:99949 58334	External Member
8.	Mr. K. N. Sreekumar Project lead, NYTT Analytics Private Limited Sulur-641 402, Coimbatore Ph.No:98425 84477	Industrial Expert
9.	Miss J.Mohana Bai PMO Lead CapGemini Technologies India PVT Ltd 6B,RMZ Eco Space, Outer Ring Road Varthur Hobli, Bellandur, Bangalore-560037 Ph:686565689	Alumni

I request you to make it convenient to attend the above meeting on 26.05.2026. TA/DA and Honorarium will be paid as per Periyar University Rules through ECS only.

DEAN (FAC)