MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE

(An Autonomous College)

Affiliated to Periyar University, Salem | Accredited by **NAAC** with 'A' Grade

Recognized by **UGC** under Section 2(f) & 12 (B)

MUTHAYAMMAL
COLLEGE OF ARTS
AND SCIENCE
(Autonomous)
A UNIT OF **VANETRA** GROUP

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DEGREE OF MASTER OF SCIENCE

Learning Outcomes – Based Curriculum Framework
– Choice Based Credit System

Syllabus for M.Sc., Electronics and Communication
(Semester Pattern)

(For Candidates admitted from the academic year
2021 –2022 and onwards)

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

RASIPURAM - 637408

VISION

❖ To redefine the scope of higher education by infusing into each of our pursuits, initiatives that will encourage intellectual, emotional, social and spiritual growth, thereby nurturing a generation of committed, Knowledgeable and socially responsible citizens.

MISSION

❖ To Ensure State of the world learning experience

❖ To espouse value based Education

❖ To empower rural education

❖ To instill the sprite of entrepreneurship and enterprise

❖ To create a resource pool of socially responsible world citizens

QUALITY POLICY

To seek – To strive – To achieve greater heights in Arts & Science, Engineering, Technological and Management Education without compromising on the quality of education.

Vision:

To redefine the scope of higher education by infusing into each of our pursuits, initiatives that will encourage intellectual, emotional, social and spiritual growth, thereby nurturing a generation of committed, Knowledgeable and socially responsible citizens.

Mission:

- ✓ To Ensure State of the world learning experience
- ✓ To espouse value based Education
- ✓ To empower rural education
- ✓ To instill the sprite of entrepreneurship and enterprise
- ✓ To create a resource pool of socially responsible world citizens

PROGRAMME EDUCATIONAL OBJECTIVES (PEO):

PEO1: Post Graduates will be able to promote learning environment to meet the industry Expectation.

PEO2: Post Graduates will be incorporated the critical thinking with good Communication and Leadership skills to become a self-employed

PEO3: Post Graduates will be upholding the human values and environmental sustenance for the betterment of the society

The Graduate Attributes of M.Sc Electronics & Communication are:

GA1. Disciplinary Knowledge:

GA2. Critical Thinking:

GA3. Problem Solving:

GA4. *Research-related skills*

GA5. Collaborative and Multidisciplinary work:

GA6. Communication

GA7. Life-long Learning:

GA8. Ethical Practices and Social Responsibility

PROGRAMME OUTCOMES (POs):

PO1: Post graduates will attain profound proficiency and expertise

PO2: Post graduates will be ensured with corporative self – directed learning

PO3: Post graduates will acquire acumen to handle diverse contexts and function in domains

PO4: Post graduates will exercise intelligence in research Investigations and Introducing innovations.

PO5: Post graduates will learn ethical values and commit to Professional ethics.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1: Apply the fundamental concepts of Electronics and Communication to design a variety of Components and system for applications including system and image processing, Communication, Networking, VLSI, Embedded and Control Systems.

PSO2: Select and apply cutting edge engineering hardware and sof5tware tools to solve complex electronics & Communication engineering problems.

PSO3: Be able to Select, install, calibrate and maintain instruments used for measurement and analysis and interpret the data obtained to arrive at a significant conclusion.

PSO4: Be able to analyze, design and develop signal conditioning circuits for sensors, actuators and select a suitable Embedded System for realizing various control schemes and smart instruments.

PSO5: Be able to design, develop and implement control schemes for various industrial processes and gain hands on experience in configuring Industrial Automation System such as PLC and Lab VIEW.

M.Sc.,-ELECTRONICS & COMMUNICATION Abstract under LOCF-CBCS Pattern with effect from 2021-2022 Onwards

Structure of Credit Distribution as per the TANSCHE / UGC Guidelines

S.No.	Study Components	Sem I No.of Paper	Sem I Credit	Sem II No.of Paper	Sem II Credit	Sem III No.of Paper	Sem III Credit	Sem IV No.of Paper	Sem IV Credit	No.of Paper	Total Credit
1	DISCIPLINE SPECIFIC CORESES(DSC)-THEORY	3	15	2	10	3	15	2	10	10	50
2	DSC-PRACTICAL	2	4	2	4	2	4	1	2	7	14
3	DISCIPLINE SPECIFIC ELECTIVE COURSES(DSE)	1	3	1	3	1	3	1	4	4	13
4	PROJECT WORK							1	5	1	5
5	INTERNSHIP					1	2			1	2
6	GENERIC ELECTIVE COURSES(GEC)-EDC			1	2					1	2
7	HUMAN RIGHTS			1	2					1	2
8	ONLINE - COMPETITIVE EXAMINATION							1	2	1	2
	Cumulative Credits	6	22	7	21	7	24	5	23	25	90

Total No.of Subjects	25
Marks	2400

TOTAL CREDIT	90
Extra Credit	2
Total Credits	92

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE (Autonomous) - RASIPRAM - 637 408
Scheme of Examinations LOCF-CBCS Pattern
(For the Students Admitted from the Academic Year: 2021-2022 Onwards)
Programme: M.Sc. ELECTRONICS & COMMUNICATION

S.No	STUDY COMPONENTS	COURSE CODE	TITLE OF THE COURSE	Hrs / W Lect	Hrs / W Lab	CREDIT POINTS	CIA	ESE	Total
			SEMESTER - I						
1	DSC THEORY - I	21M1PELC01	APPLIED ELECTRONICS	5	-	5	25	75	100
2	DSC THEORY - II	21M1PELC02	IC FABRICATION AND ITS APPLICATION	5	-	5	25	75	100
3	DSC THEORY - III	21M1PELC03	INDUSTRIAL ELECTRONICS	5	-	5	25	75	100
4	DSC PRACTICAL - I	21M1PELP01	PRACTICAL : APPLIED ELECTRONICS AND DIGITAL ELECTRONICS	-	5	2	40	60	100
5	DSC PRACTICAL - II	21M1PELP02	PRACTICAL : INDUSTRIAL ELECTRONICS	-	5	2	40	60	100
6	DSE - I	21M1PELE01	NETWORK AND JAVA PROGRAMMING	5	-	3	25	75	100
			TOTAL	20	10	22	180	420	600
			SEMESTER - II						
1	DSC THEORY - IV	21M2PELC04	ADVANCED MICROPROCESSORS AND INTERFACING	5	-	5	25	75	100
2	DSC THEORY - V	21M2PELC05	ANALOG AND DIGITAL COMMUNICATION SYSTEM	5	-	5	25	75	100
3	DSE - II	21M2PELE02	BIO MEDICAL INSTRUMENTATION	5	-	3	25	75	100
4	HUMAN RIGHTS	21M2PHUR01	HUMAN RIGHTS	2	-	2	100	-	-
5	GEC - EDC - I	21M2PPHED1	ELECTRICAL APPLIANCES	3	-	2	25	75	100
6	DSC PRACTICAL - III	21M2PELP03	PRACTICAL : ADVANCED MICROPROCESSORS AND SIMULATION	-	5	2	40	60	100
7	DSC PRACTICAL - IV	21M2PELP04	PRACTICAL : ANALOG AND DIGITAL COMMUNICATION	-	5	2	40	60	100
			TOTAL	20	10	21	280	420	700
			SEMESTER - III						
1	DSC THEORY - VI	21M3PELC06	VLSI DESIGN AND VHDL PROGRAMMING	5	-	5	25	75	100
2	DSC THEORY - VII	21M3PELC07	EMBEDDED SYSTEMS AND PIC MICROCONTROLLER	5	-	5	25	75	100
3	DSC THEORY - VIII	21M3PELC08	THIN FILM AND NANO TECHNOLOGY	5	-	5	25	75	100
4	DSE - III		ELECTIVE - III	5	-	3	25	75	100
5	DSC PRACTICAL - V	21M3PELP05	PRACTICAL : VHDL PROGRAMMING	-	5	2	40	60	100
6	DSC PRACTICAL - VI	21M3PELP06	PRACTICAL : EMBEDDED SYSTEMS	-	5	2	40	60	100
7	INTERNSHIP	21M3PELIS1	INTERNSHIP	-	-	2	100	-	-
			TOTAL	20	10	24	280	420	700

S.No	STUDY COMPONENTS	COURSE CODE	TITLE OF THE COURSE	Hrs / W		CREDIT POINTS	MAX.MARKS		
				Lect	Lab		CIA	ESE	Total
			SEMESTER - IV						
1	DSC THEORY - IX	21M4PELC09	OPTICAL FIBER COMMUNICATION	5	-	5	25	75	100
2	DSC THEORY - X	21M4PELC10	INDUSTRIAL AUTOMATION AND PLC	5	-	5	25	75	100
3	DSE- IV		ELECTIVE - IV	5	-	4	25	75	100
4	DSC PRACTICAL - VII	21M4PELP07	PRACTICAL :PROGRAMMABLE LOGIC CONTROLLER	-	5	2	40	60	100
5	PROJECT WORK	21M4PELPR1	PROJECT WORK	-	10	5	50	150	200
6	ONLINE - COMPETITIVE	21M4PELOE1	ELECTRONICS AND COMMUNICATION FOR COMPETITIVE EXAMS	-	-	2	100	-	-
			TOTAL	15	15	23	265	435	700
			OVERALL TOTAL	75	45	90	1005	1695	2700
	EXTRA CREDIT COURSE	21M4PELEC1	MOOC COURSES OFFERED IN SWAYAM / NPTEL	-	-	2	-	-	-

HEAD OF THE DEPARTMENT
ELECTRONICS & COMMUNICATION
Muthayammal College of Arts & Science
Rasipuram - 637 408 Namakkal Dt
Tamil Nadu

PG - REGULATIONS

1. Internal Examination Marks - Theory

Components	Marks
CIA I&II	10
Attendance	5
Assignment	5
Seminar	5
Total	25

Attendance Percentage	Marks
96 %to 100%	5
91%to 95%	4
86%to 90%	3
81%to 85%	2
75%to 80%	1
Below 75%	0

2. QuestionPaper PatternforCIAI, II AND ESE (for 75Marks)(3hours)

Section-A(10Marks)   (Objective Type)   10x 1=10Marks

AnswerALLQuestions

ALLquestionscarryEQUALMarks

Section-B (15Marks) (Analytical Type)

Answer any THREE Questions out of FIVEquestions3 x 5=15 Marks

ALLquestionscarryEQUALMarks

SECTION-C (50 Marks)

Answer ALL the Questions5 x 10 = 50 Marks

Eitheror Type.

ALLQuestionsCarryEQUALMarks

                                                Total   75Marks
                                                ----

(Syllabus for CIA-I 2.5 Unit, Syllabus for CIA-II All 5 Unit)

2.a)Components for Practical CIA.

Components	Marks
CIA -I	15
CIA - II	15
Observation Note	5
Attendance	5
Total	40

2.b)Components for Practical ESE.

Components	Marks
CompletionofExperiments	50
Record	5
Viva	5
Total	60

3. Internship/IndustrialTraining,MiniandMajorProjectWork

Internship/ Field Work IndustrialTraining		ProjectWork		
Components	Marks	Components		Marks
CIA*[1] WorkDiary Report Viva-voce Examination	25 50 25	CIA a)AttendanceMarks b)ReviewMarks	20 30	50
Total	100			
		ESE*[1] a)FinalReportMarks	120	
		b)Viva-voceMarks	30	150
			Total	200

*[1]Evaluationof report andconduct of viva- voce will bedonejointlybyInternal andExternalExaminers

4. Componentsfor Human Rights Course(CIA Only)

a) TheCourseHuman Rightsistobetreatedas100%C I A coursewhichisofferedinII Semesterforl year PGstudents.

b) TotalMarks fortheCourse =100

Components	Marks
TwoTests	75
Assignments	25
Total	100

- Incasethecandidatefailstosecure50marks,whichisthepass ingminimum,he/shemayhavetoreappear forthesamein thesubsequent semesters.

5. Guidelines for Competitive Exams- Online Mode - Online Exam 3 hours

Components	Marks
100 Objective Type Questions 100*1=100 Marks	100

Objective type Questions from Question Bank.

- The passing minimum for this paper is 50%
- In case, the candidate fails to secure 50% passing minimum, he / she may have to reappear   for the   same in the subsequent semesters.
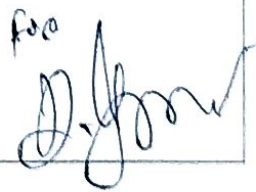
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Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M1PELC01	APPLIED ELECTRONICS	DSC THEORY - I	I	5	5	-	-	5

Objective	To recollect the basics of Analog and Digital Electronics which are learnt early Studies also remember the Digital concepts for design purpose in following course of study.

Unit	Course Content	Knowledge Levels	Sessions
I	**Diodes:** Introduction to Semiconductor – N Type and P Type -PN Junction Diode – ZENER Diode – Tunnel Diode- Photodiodes – LED – Gunn Diode – Step recovery diode – Varactor diode – Laser diode – BARITT Diode and Its Application	K1-K2	12
II	**Rectifiers:** Half Wave Rectifier – Full Wave Rectifier – Bridge rectifier – % of regulation – RMS value – peak value – Average value – application	K2-K4	12
III	**Bipolar Junction Transistors:** Bipolar Junction Transistors Construction and Operation – Transistor Biasing – Configurations and Characteristics-Current Gains-H-Parameters and Analysis of Transistor Amplifier Using H-Parameter-Inter Conversions in Different Configuration-Thermal Instability and Bias Stabilization-Cascaded Transistors.	K3-K4	12
IV	**Amplifiers:** Classification of Amplifiers – Single Stage Amplifiers (CE, CB, & CC) -Class A, Class B, Class C, Push Pull, Complementary Symmetry Push Pull Amplifier – Multistage Amplifier Transformer Coupled Class- A Power Amplifier-Efficiency and Crossover Distortion-Class- B Push Pull Amplifier-Single Tuned and Double Tuned Amplifier-Classification of Feedback Amplifiers- Effect of Negative Feedback-Stability and Response of Feedback Amplifiers	K1-K4	12
V	**Oscillators:** Classification of Oscillators Wien Bridge Oscillator-RC Phase Shift Oscillator-Hartley Oscillator-Voltage Controlled Oscillator- Colpitt's Oscillator-Clapp Oscillators-Crystal Oscillators-Armstrong Oscillator-Tuned Collector Oscillator-Gunn Oscillator-Cross-Coupled Oscillators-Ring Oscillators-Multi-Wave Oscillators	K1-K4	12
Course Outcome	CO1:Identify concepts of semiconductor devices to design and analyze circuits		K1
	CO2:Discuss the various applications of diode		K2
	CO3: Demonstrate special purpose devices.		K3
	CO4: Interpretation of performance characteristics of transistors amplifiers		K4
	CO5: Classify the various types of rectifiers		K4

Learning Resources

Text Books	1. A Textbook of Applied Electronics - R.S Sedha - Revised Edition - 2008. 2. Electronic Devices and Circuits - S. Salivahanan, N. Suresh Kumar- 4th Edition -17 3. Principles of Electronics - By VK Mehta and Rohit Mehta-12th Edition-2020
Reference Books	1. "Electronic devices Application and Integrated Circuits "Umesh Publication" by Athur, Kulshreshtha, Chadha.Kumar 2. Digital Electronics Circuits and System -V.K.Puri -Tata McGraw Hill Publishing Company Limited, New Delhi.
Website Link	https://nptel.ac.in/courses/117103063https://onlinecourses.nptel.ac.in/noc22_ee97/preview

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M1PELC01	APPLIED ELECTRONICS	DSC THEORY - I	I	5	5	-	-	5

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	S	S	S	S	M	M
CO2	S	M	S	S	S	S	M	S	S	M
CO3	M	M	S	S	M	S	M	S	M	M
CO4	L	S	M	L	S	S	M	S	S	M
CO5	S	S	L	S	S	S	S	S	S	M

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment

Designed By	Verified By	Approved By
Mrs. P. VIJAYALAKSHMI	Mr. S.ARULMANI	

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hour	L	T	P	C
21M1PELC02	IC FABRICATION AND ITS APPLICATIONS	DSC THEORY - II	I	5	5	-	-	5
Objective	To design the Integrated circuits based on our applications, to develop the knowledge in the basic Digital filters circuit design and also understand the concepts of Multivibrators and design							

Unit	Course Content	Knowledge Levels	Sessions
I	**IC Fabrication Process:** Introduction-Classification-IC Chip Size and Circuit Complexity-Fundamentals of Monolithic IC Technology-Basic Planar Processes-Fabrication of a Typical Circuit- Active and Passive Components of IC's - Fabrication of FET - Thin and Thick Film Technology Trends.	K1-K2	12
II	**Operational Amplifier:** Introduction-Basic Information of Operational Amplifiers -the Ideal Operational Amplifiers-DC Characteristics-AC Characteristics-Analysis of Data Sheets of Op- amp - Basic Application of Operational Amplifiers - Differentiator-Integrator – Instrumentation Amplifier-Log and Antilog Amplifiers.	K2-K4	12
III	**Wave Generators:** Comparators – Applications – Zero Crossing Detectors - Schmitt Trigger - Square Wave Generator - Triangular Wave Generators - Sine Wave Generators - Voltage Regulator-Fixed Output and Adjustable Voltage Regulators-Switching Regulators.	K3-K4	12
IV	**Filters:** Active Filters-First Order and Second Order Low Pass Filter-High Pass Filter-Band Pass Filter-Band Rejection Filters- voltage to Frequency and Frequency Converters-Analog to Digital and Digital to Analog Converters	K1-K2	12
V	**IC 555 and PLL:** Introduction to IC 555-IC 555 as a Monostable Multivibrator-Applications-IC555 as Astable Multivibrator-Applications - Phase Locked Loop (PLL)-Operating Principles- Monolithic Phase Locked Loop-IC 555 Applications	K4-K5	12

	CO1: Identify the various IC fabrication methods.	K1
	CO2: Summarize the basic applications of operational amplifier	K2
Course Outcome	**CO3:** Demonstrate the use of analog circuit analysis techniques to analyze the operation and behavior of various analog integrated circuits.	K3
	CO4: Analyze and design AC and DC characteristics.	K4
	CO5: Categorize the building blocks of PLL and its operation	K5

Learning Resources

Text Books	1. Linear Integrated Circuits- 5th Edition - Roy Choudhury - NAI Publishers - 2018 2. Electronic Devices and Circuits - S. Salivahanan, N. Suresh Kumar- 4th Ed -2017
Reference Books	1. Integrated Circuits-K.R.Botkar - 4th Edition-KannaPublishers, New Delhi. 2. Coughlin and Discoll - Operational Amplifiers and Linear Integrated Circuits -3rd Ed- PHI1989
Website Link	1. https://onlinecourses.nptel.ac.in/noc21_mm26/preview 2. https://www.classcentral.com/course/swayam-fundamentals-of-electronic-device-fabrication-14080
L-Lecture, T-Tutorial, C-Credit	

Course Code	Course Title	Course Type	Sem	Hour	L	T	P	C
21M1PELC02	IC FABRICATION AND ITS APPLICATIONS	DSC THEORY - II	I	5	5	-	-	5

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	S	L	S	L	M	L	M	L	M
CO2	S	L	L	S	S	S	S	M	S	S
CO3	S	M	S	S	M	M	S	M	M	S
CO4	L	S	M	L	M	S	S	L	M	M
CO5	M	S	L	M	S	S	S	M	L	S

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment

Designed By	Verified By	Approved By
Mr.S. ARULMANI	Mr.S. ARULMANI	

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M1PELC03	INDUSTRIAL ELECTRONICS	DSC THEORY - III	I	5	5	-	-	5

Objective	To make the students to learn the various Power electronics devices, Power electronic circuits with their commercial and Industrial Applications.

Unit	Course Content	Knowledge Levels	Sessions
I	**Thyristors and Converters:** Thyristors - Construction, Operation Characteristics and Applications of SCR, LASCR, TRAIC, DIAC and UJT - THYRSITOR Rating - Rectifier Circuits using SCR -Two Transistors Model of Thyristors- Thyristors Firing Circuits Principle of Phase Controlled Converter Operation Single Phase Semi converters – Single Phase Converters Single Phase Dual Converters – Single Phase Series Converters. Three Phase Half Wave Converters.	K1-K2	12
II	**AC Voltage Controller:** Principle of ON-OFF Control-Principle of Phase Control-Single Phase Bidirectional Controllers with Resister Loads – Single Phase Controller With Inductor Loads-Three Phase Half Wave Controller – Three Phase Full Wave Controllers-Cyclo-converters.	K2-K4	12
III	**Thyristors Commutation Techniques:** Natural Commutation - Forced Commutation - Self Commutation - Impulse Commutation - Resonant Pulse Commutation - Complimentary Commutation - External Pulse Commutation - Resonant Pulse Commutation - Complimentary Commutation - External Pulse Commutation - Load Side Commutation - Line Side Commutation	K1-K4	13
IV	**DC Choppers and Static Switches:** DC Choppers-Introduction-Principle of Step-Down Operation-Principle of Step up Operation - Switching Mode Regulators - Thyristors Chopper Circuits-Static Switches Mode Regulators-Single Phase AC Switcher-Three Phase AC Switching- Three Phase Reversing Switches -Solid State Relays.	K4-K5	10
V	**DC Drives and AC Drivers:** Basic Characteristic of DC Motor - Operating Modes - Single Phase Half Wave Conversion Driver - Single Phase Semiconductor Drivers - Single Phase Full Converter - Single Phase Dual Converter Drivers, Three Phase Half Wave Converter Drivers. Induction Motor Drivers - Performance Characteristics - Stator Voltage Control - Rotor Voltage Controller - Rotor Voltage Control - Frequency Control - Voltage and Frequency Controller - Current Control - Voltage, Current And Frequency Control - Closed Loop Control of Inductors Motors.	K4-K5	13

	CO1: Recall the construction and working principle of Power semiconductor devices.	K1
	CO2: Explain the concepts of single phase and three phase controllers outputs.	K2
Course Outcome	CO3: Demonstrate the drivers and, phase controllers with V and I controls.	K3
	CO4: Analyze power converter circuits and learn to select suitable power electronic devices by assessing the requirements of application fields.	K4
	CO5: Analyze the thyristors commutation methods and comparisons with its application	K5

Learning Resources

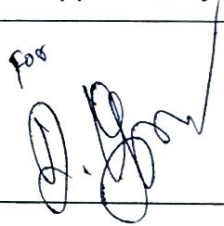| Text Books	1. Power Electronics Devices, Circuits and Applications-4th Edition- Muhammad H. Rashid- Pearson-2017 2. Power Electronics: Devices and Circuits-V. Jagannathan- 2nd Edition
Reference Books	1. Power electronics, 2nd Edition - Singh M D and Khanchandani K B, 2013, Tata Mcgraw hill, Newdelhi. 2. Power Electronics – Dr.P.S. Bimbhra – Khanna Publishers - 1990
Website Link	1. https://nptel.ac.in/courses/108105066 2. https://nptel.ac.in/courses/108101038

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M1PELC03	INDUSTRIAL ELECRONICS	DSC THEORY - III	I	5	5	-	-	5

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	S	L	M	M	S	M	S
CO2	S	M	M	M	S	M	M	S	M	S
CO3	M	S	M	S	M	L	M	M	M	S
CO4	S	S	M	M	L	L	M	S	S	S
CO5	S	S	L	L	M	M	M	S	S	S

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment

Designed By	Verified By	Approved By
DR. M. KUTRALEESWARAN	Mr.S.ARULMANI	

Curriculum Development Cell
MCAS (Autonomous) Rasipuram

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards									
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M1PELP01	PRACTICAL: APPLIED ELECTRONICS AND DIGITAL ELECTRONICS	DSC PRACTICAL - I	I	5	-	1	4	2
Objective	To remember and Practice the various basic Analog and Digital circuits.								

S.No.	List of Experiments / Programmes (Any 10)	Knowledge Levels	Sessions
1	Construction of Dual Power Supply	K4	5
2	Construction of ZENER Regulated Power Supply.	K4	5
3	Characteristics of Transistor under CE Configuration.	K4	5
4	Characteristics of UJT and Construction of UJT Relaxation Oscillator	K4	5
5	Construction of Hartley Oscillator.	K4	5
6	Construction of Phase Shift Oscillator	K5	5
7	Construction of Astable, Monostable and Bistable Multivibrators using transistor.	K5	5
8	Full adder and Full Subtractor	K5	5
9	Study of multiplexer, De multiplexer.	K5	5
10	Encoder and decoder.	K5	5
11	Study of RS and D, JK, master slave and T flip flop.	K4	5
12	Construction of shift registers	K4	5
13	Construction of BCD and UP/Down counter	K4	5
Course Outcome	CO1:Explain the importance of multivibrators		K1
	CO2:Understand the basics of power supply		K2
	CO3:Apply the knowledge of various flip flops(RS,JK,D and T flip flop)		K3
	CO1: Analyze the truth table of various Sequential Logic Circuits.		K4
	CO1: Design and Apply the combinational logics.		K5

Learning Resources	
Text Books	1. Cheery Bargava-Digital Electronics a comprehensive lab manual-BS Publications.
Reference Books	1. S.Munaf,Dr.G.Sekar and A.Shankar-Digital Electronics lab manual 2. George B. Rutkowski, Jerome E. Oleksy-Fundamentale of Digital Electronics-Prentice- hall-1985
Website Link	1. https://da-iitb.vlabs.ac.in/

Course Code	Course Title			Course Type	Sem	Hours	L	T	P	C
21M1PELP01	PRACTICAL:APPLIED ELECTRONICS AND DIGITAL ELECTRONICS			DSC PRACTICAL- I	I	5	-	1	4	2

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	L	L	L	L	M	M	S	S	M
CO2	M	S	M	M	L	L	L	M	S	S
CO3	M	S	M	M	M	S	S	M	S	M
CO4	S	S	M	S	M	L	L	M	S	S
CO5	S	S	M	S	M	S	S	M	S	S

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	Practical in Laboratory
Teaching and Learning Methods	Laboratory Equipment's
Assessment Methods	Observation of Records, Model Practical's

Designed By	Verified By	Approved By
DR. M. KUTRALEESWARAN	Mr.S.ARULMANI	

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M1PELP02	PRACTICAL: INDUSTRIAL ELECTRONICS	DSC PRACTICAL - II	I	5	-	1	4	2

Objective	To remember and practice the various Industrial and Power Electronic Circuits

S.No.	List of Experiments / Programmes (Any 10)	Knowledge Levels	Sessions
1	Firing Characteristics of SCR and TRIAC.	K3	5
2	Half Wave Gate Controlled Rectifier using one SCR.	K4	5
3	Illumination Control using TRIAC.	K4	5
4	Single Phase Half Controlled Full Wave Rectifier Using Two SCR'S.	K4	5
5	Singe phase half-controlled rectifier using two Diodes.	K4	5
6	Switching Regulators.	K4	5
7	Forced Commutation.	K4	5
8	Single Phase Inverter.	K4	5
9	Zero Voltage Switches.	K4	5
10	Speed Control of DC Motor using Thyristors.	K6	5
11	LDR Application in a Light Activated Turn-OFF Circuit.	K6	5

Course Outcome		
	CO1: Identify relevant information to supplement to the Power Electronics	K1
	CO2: Classify various regulators	K2
	CO3: Apply power circuits for real world applications.	K3
	CO4: Demonstrate the operation of controlled rectifiers, and analyze its characteristics and performance parameters of controlled rectifiers	K4
	CO5: Analyze the construction, principle of operation and performance of LED applications.	K5

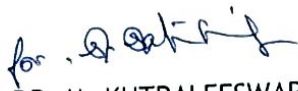| Learning Resources	
Text Books	1. O.P. Arora - Power Electronics Laboratory: Theory, Practice & Organization -Alpha Science International Ltd - ISBN-13-978-1842653012
Reference Books	1. N Mohan and W P Robbins - Power Electronics: Converter, Applications and Design -Wiley publications
Website Link	http://vlabs.iitkgp.ac.in/be/#

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M1PELP02	PRACTICAL: INDUSTRIAL ELECTRONICS	DSC PRACTICAL II	I	5	-	1	4	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	L	L	S	M	M	S	M
CO2	M	S	L	M	M	M	S	M	L	S
CO3	S	M	S	M	M	S	S	M	M	S
CO4	M	M	S	L	M	S	M	S	L	S
CO5	S	S	M	M	M	S	S	M	L	M

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	Practical in Laboratory
Teaching and Learning Methods	Laboratory Equipment's
Assessment Methods	Observation of Records, Model Practical's

Designed By	Verified By	Approved By
for Dr. A. Dalatinji DR. M. KUTRALEESWARAN	for Mr.S.ARULMANI	for
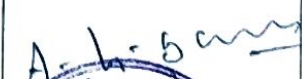
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELC04	ADVANCED MICROPROCESSORS AND INTERFACING	DSC THEORY - IV	II	5	5		-	5

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards

Objective	To make the students to learn the concepts of x86 processors and also to understand the operation of RISC Architecture.

Unit	Course Content	Knowledge Levels	Sessions
I	**8085 Microprocessor:** Introduction To 8085-Bus Structure - Register Set – Pin Details and Functions – Architecture Of 8085- Addressing Mode - Instruction Set –Timing Diagram	K1-K3	12
II	**INTEL 8086 Microprocessor:** Introduction to 8086 microprocessor - internal architecture – execution unit – General purpose registers – instruction pointers – addressing modes – instruction set- constructing the machine codes for 8086 instructions – segment registers – Memory segmentation.	K3-K5	12
III	**8086 Assembly Language Programming:** Simple programs – finding average of two numbers – conditional and unconditional jump instructions – conditional flags – time delay loops – timing diagram – minimum mode - addressing memory and I/O ports – addressing and address decoding – maximum mode.	K4-K5	12
IV	**Advanced Microprocessors:** Salient features of 80386 – Architecture and signal descriptors of 80386- Register organization of 80386- Addressing Modes - Segmentation-paging. Salient features of Pentium – System Architecture – Intel MMX Architecture – Salient features of Pentium 4.	K2-K5	12
V	**RISC Architecture:** History of RISC Processors- RISC and CISC Convergence – Advantages of RISC – Features of RISC – Design issues – Performance issues in RISC Pipeline- RISC Architecture.	K1-K5	12
Course Outcome	**CO1:** Describe the 8085/8086 microprocessor and its operations.		K1
	CO2: Understand and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor.		K2
	CO3: Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor.		K3
	CO4: Illustrate aspects of 8085 and 8086 microprocessor architecture.		K4
	CO5: Evaluate assembly language programs and download the machine code that will provide solutions real-world control problems.		K5

Learning Resources

Text Books	1. Douglas V. Hall, "Microprocessors and Interfacing Programming and Hardware", Second Edition, Tata McGraw-Hill. 2. Bhurchandi K.M, Roy A.K. "Advanced Microprocessors & Peripherals", Third Editio, Tata McGraw-Hill, New Delhi
Reference Books	1. 1. K.R. Venugopal Rajkumar, "Microprocessor X86 Programming", New Delhi, BPB Publications, 2005. 2. M. Rafiquzzaman, "Microprocessors, Theory and Applications", Intel and Motorola (Revised edition), Prentice Hall India.
Website Link	1. https://onlinecourses.nptel.ac.in/noc22_ee09/preview 2. https://onlinecourses.nptel.ac.in/noc20_ee42/preview

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELC04	ADVANCED MICROPROCESSORS AND INTERFACING	DSC THEORY - IV	II	5	5	-	-	5

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	M	M	M	M	L	L
CO2	S	M	L	S	L	S	S	L	L	L
CO3	M	S	M	S	M	S	S	L	S	S
CO4	L	S	M	M	S	S	S	L	S	S
CO5	S	M	M	S	M	S	S	M	S	S

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment

Designed By	Verified By	Approved By
DR. M. MUTRALEESWARAN	Mr.S. ARULMANI	

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards									
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C	
21M2PELC05	ANALOG AND DIGITAL COMMUNICATION SYSTEM	DSC THEORY - V	II	5	5	-	-	5	
Objective	The main objective of this course is to understand and implement the basic Analog and Digital communication techniques/ circuits with the help of theoretical and practical problem solving and also acquire knowledge in Digital Transmission and Television Techniques.								

Unit	Course Content	Knowledge Levels	Sessions
I	**Radio Wave Propagation Antennas:** Electronic Radiation - Fundamentals - Effects - Propagation of Waves - Ground Waves - Sky Waves Propagation - Space. Antenna - Basic Consideration - Wire Radiators In Space - Term and Definitions – Effects of Ground on Antennas-Directional High Frequency Consenters-Microwave Antennas-Wide Band Antennas-Folded Dipole-Helical Antenna.	K1-K2	12
II	**Modulation Techniques:** Amplitude Modulation Theory-Frequency Spectrum of the AM Wave-Representation of AM – Power Relations in the AM Wave - Generation of AM - Basic Requirements - Grid Modulated Class C Amplifiers - Modulated Transistor Amplifier - System Summary. Frequency Modulation - Theory of Frequency and Phase Modulation - Noise and Frequency Modulation - Generation of Frequency Modulation.	K1-K3	13
III	**Pulse Modulation Techniques:** Introduction - Pulse Amplitude Modulation (PAM) - Sampling Theorem Quantization & Quantization Error -Pulse Code Modulation (PCM) modulation and detection - Pulse Frequency Modulation (PFM) - Pulse TIME Modulation (PTM) - Pulse Position Modulation (PPM) - Pulse With Modulation (PWM).	K4-K5	12
IV	**Shift keying Techniques:** Companding -modulation and detection of ASK, FSK, BPSK, QPSK and DPSK – comparison of ASK,FSK and PSK.	K1-K5	11
V	**Modern television:** Requirements and Standards - Introduction to Television -Television System and Standards-Black and White Transmission-Scanning-Blanking and Synchronizing Pulse - Black and White Reception - Fundamentals - Common Video and Sound Circuits-Vertical Deflection Circuits-Horizontal Circuits-Color Transmission and Reception.	K1-K5	12

Course Outcome	CO1: Identify basic elements of communication system	K1
	CO3: Explain the importance of synchronization in communication systems	K2
	CO2: Understand and Demonstrate the concepts digital modulations and comparisons.	K3
	CO4: Analyzing of TV circuits and evaluating the signals in various stages	K4
	CO5: Evaluate modulation index, bandwidth and power requirements for various analog modulation schemes including AM,FM and PM	K5

Learning Resources

Text Books	1. Electronic Communications-Dennis Reddy and JohnCoolen-4thEdition-Prentice Hall of India Private Ltd, NewDelhi.ISBN-81-203-0984-7. 2. Electronic Communication System-George Kennedy-3rd Edition- Tat McGraw Hill Publishing Company Ltd, New Delhi.ISBN0-07-034054-4.
Reference Books	1. Electronic Communications - Sanjeev Gupta - Khanna Publications. 2. Principles Of Communication Engineering - Anokh Singh - S.Chand. 3. Electronic Communication Modulation and Transmission - Robert J. Schonbeck - 2nd Edition-PrenticeHallofIndia.ISBN-81-203-1483-2.
Website Link	1. https://nptel.ac.in/courses/117101051 2. https://onlinecourses.nptel.ac.in/noc22_ee115/preview

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELC05	ANALOG AND DIGITAL COMMUNICATION SYSTEM	DSC THEORY - V	II	5	5	-	-	5

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	L	M	M	L	L	L
CO2	L	S	S	M	S	S	M	L	M	S
CO3	S	S	S	S	S	S	L	L	S	M
CO4	S	L	M	L	M	S	M	M	M	M
CO5	S	S	L	S	M	M	L	L	M	M

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment

Designed By	Verified By	Approved By
Mr.I. BALAKRISHNAN	Mr.S. ARULMANI	

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELP03	PRACTICAL: ADVANCED MICROPROCESSOR AND SIMULATION	DSC PRACTICAL-III	II	5	-	1	4	2

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards

Objective	To Enable the stack holders to understand and apply the assembly level programming of 8-Bit and 16-Bit Microprocessors.

S.No.	List of Experiments / Programmes (Any 10)	Knowledge Levels	Sessions
1	8-Bit Addition, Subtraction, Multiplication, and Division and using 8085/8086 µp Kit.	K3	5
2	16-Bit Addition, Subtraction, Multiplication, and Division and using 8085/8086 µp Kit.	K3	5
3	Digital Clock using 8085/8086 µp Kit.	K4	5
4	Stepper Motor Interface using 8085/8086 µp Kit.	K4	5
5	DC Motor Speed Control using 8085 /8085µp Kit.	K4	5
6	Traffic Light Controller Interface using 8085/8086 µp Kit.	K5	5
7	Interfacing ADC 0809 with using 8085/8086 µp Kit.	K4	5
8	DAC Interface with 8085/ 8086 µp Kit and Wave Form Generations using DAC.	K4	5
9	ON and OFF Relay Control using 8085/8086 interrupts.	K4	5
10	Addition of two 16-Bit Numbers and Double Precision Addition using 8085/8086 µp Kit.	K3	5
11	Subtraction of two 16-Bit Numbers and Double Precision Subtraction using 8085/ 8086 µp Kit.	K3	5
12	16-Bit Multiplication and 32-Bit Division using Addition of two 16-bit Numbers and Double Precision Addition using 8085/8086 µp Kit.	K3	5
13	Temperature Measurements Using 8085/ 8086.	K5	5
Course Outcome	CO1: Recall and Understand the 8085/8086 microprocessor and its operations.	K1
	CO2: Primarily via team-based laboratory activities, students will demonstrate the ability to interact effectively on a social and interpersonal level with fellow students, and will demonstrate the ability to divide up and share task responsibilities to complete assignments.	K2
	CO3: Develop testing and experimental procedures on Microprocessor and Microcontroller analyze their operation under different cases.	K3
	CO4: Practice different types of programming keeping in mind technical issues and evaluate possible causes of discrepancy in practical experimental observations in comparison.	K4
	CO5: Design the simple programs of 8086. Learning the procedures of time delay, looping and addressing modes.	K5

Learning Resources

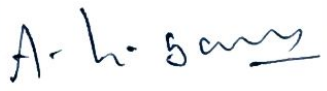|	
Text Books	1. A.K. Mukhopadhyay- Textbook on Microprocessor-based Laboratory Experiments and Projects -I.K International pvt Ltd - ISBN-9789380578040
Reference Books	1. Pablomary,Panda Jeebananda - Microprocessors and Microcontrollers -PHI Learning Pvt. Ltd., 2016
Website Link	1. http://vlabs.iitb.ac.in/vlabs-dev/labs_local/microprocessor/labs/explist.php

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELP03	PRACTICAL: ADVANCED MICROPROCESSORS AND SIMULATION	DSC PRACTICAL-III	II	5	-	1	4	2

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	S	M	S	L	M	L	L	L	M
CO2	M	S	M	S	M	M	S	M	M	M
CO3	L	L	S	S	L	M	S	S	S	S
CO4	M	S	S	S	M	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	Practical in Laboratory
Teaching and Learning Methods	Laboratory Equipment's
Assessment Methods	Observation of Records, Model Practical's

Designed By	Verified By	Approved By
Mr.I. BALAKRISHNAN	Mr.S. ARULMANI	

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELP04	PRACTICAL: ANALOG AND DIGITAL COMMUNICATION	DSC PRACTICAL-IV	II	5	-	1	4	2
Objective	To remember and practice the various electronic communication circuits and equipment's Circuits							

S.No.	List of Experiments / Programmes (Any 10)	Knowledge Levels	Sessions
1	AM Modulation and Demodulation.	K4	5
2	FM Modulation and Demodulation	K4	5
3	Automatic Gain Control.	K4	5
4	Voltage Control Oscillator.	K4	5
5	Pulse Amplitude Modulation.	K4	5
6	Pulse Width Modulation.	K4	5
7	Pulse Position Modulation.	K4	5
8	Study of Pulse Code Modulation.	K3	5
9	Study of PLL Characteristics.	K3	5
10	Digital Phase Detector.	K3	5
11	Installation of CCTV.	K5	5
12	DVR of CCTV.	K5	5
13	Study of Cable TV System.	K2	5

Course Outcome	CO1: Outline of analog and digital modulation techniques.	K1
	CO2: Explain sampling and PCM,	K2
	CO3: Demonstrate various modulations, demodulation circuits.	K3
	CO4: Analyze and compare different analog modulation schemes like AM, FM for their efficiency and bandwidth.	K4
	CO5: Evaluate behavior of a communication receiver system module.	K5

Learning Resources

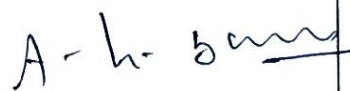| Text Books	1. T L Singal,- Analog and Digital communication -Tata McGraw-Hill Education - ISBN-1259084523, 9781259084522
Reference Books	2. Pablo mary, Panda Jeebananda -Analog & Digital communication: Schaums outline series -McGraw Hill Education-ISBN-10-0070151504
Website Link	3. https://ae-iitr.vlabs.ac.in/List%20of%20experiments.html

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title		Course Type	Sem	Hours	L	T	P	C
21M2PELP04	PRACTICAL: ANALOG AND DIGITAL COMMUNICATION		DSC PRACTICAL IV	II	5	-	1	4	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	S	M	M	L	S	M	L	L	L
CO2	S	S	S	M	L	L	L	L	L	M
CO3	S	S	M	L	L	M	M	L	L	M
CO4	S	S	S	L	M	M	L	L	M	M
CO5	S	S	S	M	S	S	L	L	M	L

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	Practical in Laboratory
Teaching and Learning Methods	Laboratory Equipments
Assessment Methods	Observation of Records, Model Practical's

Designed By	Verified By	Approved By
Mrs. P. VIJAYALAKSHMI	Mr. S. ARULMANI	

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards									
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3PELC06	VLSI DESIGN AND VHDL PROGRAMMING	DSC THEORY - VI	III	5	5	-	-	5
Objective	To analyze logic processes and implement logical operations using Combinational logic circuits, understand concepts of modeling techniques and features of VHDL and also Learn Hardware Description Language (HDL).								

Unit	Course Content	Knowledge Levels	Sessions
I	**MOS Transistor:** Introduction – NMOS Enhancement transistor –PMOS Enhancement transistor – Threshold voltage – Body effect- **CMOS Processing Technology:** Silicon semiconductor technology – Wafer processing-Oxidation – Epitaxy, Deposition, Ion- Implantation and Diffusion – The silicon Gate process –Basic CMOS technology – N-Well CMOS process – P-Well CMOS process -Twin-Tub process - Silicon on Insulator - Technology related CAD issues – DRC – Circuit Extraction	K1	12
II	**Basic concept of VHDL :**Introduction – Basic Terminology – Entity Declaration – Architecture Body – Configuration declaration – Package Declaration – Package Body – Model Analysis – Simulation. **Basic Language Elements:** Identifiers – Data Objects-Data Types – Operators	K4	12
III	**Behavioral Modeling:** Entity Declaration – Architecture Body – Process Statement – Variable assignment Statement-Signal Assignment Statement -Wait Statement-IF Statement - Case Statement – Null Statement – Loop Statement – Exit Statement - Next Statement - Assertion Statement -Report Statement - More on signal assignment Statement - Other sequential Statements - Multiple processes - Postponed Processes	K5	12
IV	**Data Flow Modeling :** Concurrent signal Assignment Statement – Concurrent versus Sequential signal Assignment - Delta Delay Revisited – Multiple Drivers – Conditional Signal Assignment Statement - Selected signal Assignment Statement – The UNAFFECTED Value – Block Statement – Concurrent Assertion Statement – Value of Signal **Packages:** Package Declaration – Package Body	K2	12
V	**Structural Modeling:** Component Declaration – Component Instantiation- Other Examples – Resolving signal values Examples: Basic gates-Half adder – Full adder- Half subtractor- Full subtractor- Multiplexer- Demultiplexer- Encoder - Decoder. **Generics and Configurations:** Generics – Why configurations – Configuration specification – Configuration Declaration – Default Rules – Conversion Functions – Direct Instantiation – Increment Binding.	K5	12

	CO1: Identify and understand the basic theory of MOS Transistors, basic steps of fabrication.	K1-k2	
Course Outcome	CO2: Understand the physical design steps and gain the knowledge on types of VLSI design styles.	K2	60
	CO3: Apply the appropriate layout design rule to create a VLSI layout for a design.	K3	
	CO4: Simplify the physical design steps and VLSI design styles.	K4	
	CO5: Design simple memories using MOS transistors and can understand design of large memories	K5	

Learning Resources

Text Books	1. J.Bhaskar- A VHDL primer- Third Edition - Pearson Education. 2. Gaganpreet Kaur-VHDL Basics to programming- Pearson Education.
Reference Books	1. Douglas A.Pucknell and Kamran Eshraghian- Basic VLSI Design-Third edition- Prentice Hall of India private Ltd, New Delhi. 2. Neil H.E.Weste and Kamran Eshraghian- Principles of CMOS VLSI Design-Second Edition – Pearson Education.
Website Link	https://onlinecourses.nptel.ac.in/noc22_cs109/preview https://onlinecourses.nptel.ac.in/noc22_ee125/preview https://www.coursera.org/learn/fpga-hardware-description-languages

L-Lecture, T-Tutorial, C-Credit

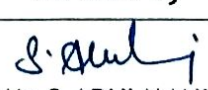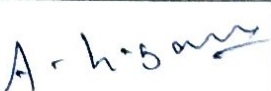| M.Sc-Electronics & Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3PELC06	VLSI DESIGN AND VHDL PROGRAMMING	DSC THEORY - VI	III	5	5	-	-	5

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	S	L	M	S	M	M	M
CO2	M	M	M	M	M	M	S	S	M	S
CO3	S	S	S	S	M	M	M	L	L	M
CO4	S	S	M	L	S	S	M	M	S	S
CO5	S	L	L	S	M	L	S	M	L	M

Level of Correlation between CO and PO: L-LOW , M-MEDIUM, S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment, Internal and Seminars

Designed By	Verified By	Approved By
MR. I. BALAKRISHNAN	Mr.S.ARULMANI	

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3PELC07	EMBEDDED SYSTEMS AND PIC MICROCONTROLLER	DSC THEORY-VII	III	5	5	-	-	5

Objective	To understand the Concept of PIC microcontroller Architecture and its Applications and also develop the programming skills in PIC16F877 microcontroller.

Unit	Course Content	Knowledge Levels	Sessions
I	**PIC 16F87X Microcontroller:** Device overview - architecture - memory organization - status register - option register - INTCON register - PCON register - I/O ports - data EEPROM - instruction set: Byte oriented operations - Bit oriented operations - Literal and Control operations.	K1-K2	10
II	**Peripheral Features of 16F87X Microcontrollers:** TIMER0 Module - TIMER1 Module - TIMER2 Module - Capture/Compare/PWM Modules - I2 C transmission and reception - USART - ADC Module - Special features of the CPU : oscillator selection - power on reset - power up timer - oscillator start up timer - brown out reset - interrupts - watchdog timer - SLEEP	K1-K3	10
III	**Introduction to Embedded Systems:** Definition and classification - Overview of microprocessor, Microcontroller, and DSP - exemplary high performance processors - CISC and RISC architecture - hardware unit in an embedded System- software embedded into a system - exemplary applications - embedded systems on a chip and in VLSI circuit	K4	13
IV	**Real Time Operating Systems:** Definitions of process, tasks, and threads - Operating system services - goals - structures kernel - process management - memory management - device management - file system organization and implementation - I/O sub systems - interrupt routine handling in RTOS - RTOS task scheduling models - handling of task scheduling - latency - deadlines - round robin scheduling - cyclic scheduling - preemptive - critical session - static real time scheduling - IPC and synchronization - use of semaphore - priority inversion - deadlock - IPC using signals - mutex- flag- message queues - mailboxes - pipes- virtual sockets - remote procedure calls	K3-K4	14
V	**RTOS Programming Tools: Micro C/OS-II and Vx Works:** Study of Micro C/OS-II - Vx Works - other popular RTOS - RTOS system level functions - task service functions - time delay functions - memory allocation related functions - semaphore related functions - mailbox related functions - queue related functions case studies of programming with RTOS - understanding case definition - multiple tasks and their functions - creating a list of tasks- functions and IPCs - exemplary coding steps	K4-K5	13

Course Outcome	CO1:Identify and understands the function of different blocks of PIC microcontroller.	K1-K2	
	CO2:Understand the various instruction set programming techniques of PIC microcontroller.	K2	60
	CO3: Demonstrate the use of interrupts and other programming techniques related to micro-controllers.	K3	
	CO4: Analyze of RTOS based system design.	K4-K5	
	CO5:Develop the programs for data transfer, arithmetic, logical and I/O port operations.	K5-K6	

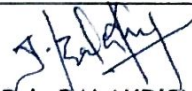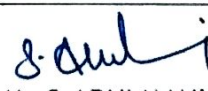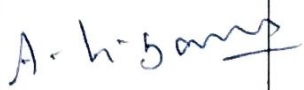|	Learning Resources
Text Books	1. Embedded Systems Architecture, Programming and Design, - Rajkamal, TATA McGraw- Hill, First reprint, 2003. 2. PIC 16F87X data book, Microchip Technology Inc., 2001
Reference Books	1. Programming 8 bit PIC microcontroller in C- Martin P. Bates 2. Embedded Controller Hardware Design - Ken Arnold 3. Designing Embedded Systems with PIC Microcontrollers Principles and applications - Tim Wilmshurst.
Website Link	https://onlinecourses.nptel.ac.in/noc20_ee98/preview https://nptel.ac.in/courses/108107029

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3PELC07	EMBEDDED SYSTEMS AND PIC MICROCONTROLLER	DSC THEORY - VII	III	5	5	-	-	5

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	S	M	M	S	M
CO2	S	M	S	L	M	M	M	S	S	M
CO3	S	M	M	S	M	S	S	S	M	L
CO4	M	M	L	L	L	M	L	L	S	S
CO5	M	L	L	M	L	S	S	M	M	S

Level of Correlation between CO and PO: L-LOW , M-MEDIUM, S-STRONG

Tutorial Schedule	Group discussion,Lab Visit,Problem Solving,Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk,Visualization and Smart Class
Assessment Methods	Unit Test,Assignment,Internal and Seminars

Designed By	Verified By	Approved By
MR.I. BALAKRISHNAN	Mr.S.ARULMANI	
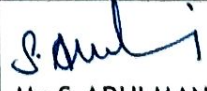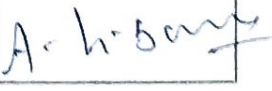
M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards									
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3PELC08	THIN FILM AND NANOTECHNOLOGY	DSC THEORY -VIII	III	5	5	-	-	5
Objective	Acquire the knowledge of thin film preparation by various techniques and also familiar in idea of Nano Electronics and its implications in the Nano systems.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction and preparation of thin film:** Difference between thin and thick film - Appreciation of thin film technology in modern era - Deposition technology: Physical methods - Chemical methods - Other new techniques Vacuum technology: Vacuum pumps - Pressure gauges. Defects in thin film: General concepts - Nature of defect - Microscopic defect - Dislocation- Boundary defects - Defect and energy states - Donor acceptor levels - Trap and Recombination centers – Electrons - Phonons.	K1-K3	13
II	**Thin film analysis:** Structural studies: XRD and electron diffraction - Surface studies: Electron microscopy studies on film (SEM, TEM, and AFM) Film composition: X-ray photoelectron spectroscopy (XPS) - Rutherford Back Scattering spectroscopy (RBS) - Secondary Ion Mass Spectroscopy (SIMS). Properties of thin film: Optical behaviors: Transmission - Reflection - Refractive index- Photoconductivity - Photoluminescence.	K2-K4	13
III	**Electrical and Mechanical Behaviors:** Electrical behaviors: Sheet resistivity - Electron mobility and concentration - Hall effect - Conduction in MIS structure. Mechanical behaviors: Stress – Adhesion – Hardness - Stiffness. Applications of thin films in various fields: Antireflection coating - FET - TFT – Resistor- Thermistor – Capacitor - Solar cell - MEMs fabrication of silicon wafer: Introduction - Preparation of the silicon wafer media - Silicon wafer processing steps.	K3-K4	12
IV	**Background to Nano science:** Definition of Nano - Scientific revolution-Atomic Structure - atomic size - Emergence and challenges of nanoscience and nanotechnology - Carbon age-Newform of carbon (CNT to Graphene) - Influence of nano over micro/macro - Size effects - Crystals - Large surface to volume ration - Surface effects on the properties. Types of nanostructure and properties of nanomaterials: One dimensional - Two dimensional – threedimensional nanostructured materials - Quantum Dots shell structures - Metal oxides- semiconductors - Composites - Mechanical - Physical-Chemical properties.	K4-K5	12

V	**Application of Nanomaterial:** Ferroelectric materials - Coating - Molecular electronics and nanoelectronics - Biological and environmental - Membranebased application - Polymerbased application.	K4	10

	CO1:Identify and understand various deposition techniques	K1-K2	
	CO2: A complete understanding of thin film growth kinetics in physical vapor deposition.	K2	
Course Outcome	CO3: Determine the characterization techniques for nano materials and nano thin films	K3-K4	60
	CO4: Classify different techniques depending on application area.	K4	
	CO5: Evaluate the Nano materials and Nano thin films.	K5	

Learning Resources	
Text Books	1. K. L. Chopra, "Thin Film Phenomena", McGraw Hill, New York, 1969 2. Thin-Film Deposition: Principles and Practice by Donald Smith 3. L. T. Meissel and R. Glang, "Hand book of thin film technology", McGraw Hill, 1978.
Reference Books	1. Goswami, "Thin Film Fundamentals", New Age International, Pvt Ltd, 1996. 2. Chemistry of nanomaterials: Synthesis, properties and applications by CNR Raoet.al. 3. Nanoparticles: From theory to applications - G. Schmidt, Wiley Weinheim 2004.
Website Link	https://onlinecourses.nptel.ac.in/noc22_ch11/preview https://onlinecourses.nptel.ac.in/noc22_mm33/preview

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3PELC08	THIN FILM AND NANO TECHNOLOGY	DSC THEORY - VIII	III	5	5	-	-	5

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	M	S	M	S	M	L	L
CO2	S	S	M	M	M	M	S	M	S	L
CO3	M	M	L	L	S	S	M	S	M	M
CO4	M	M	L	M	M	M	L	S	M	M
CO5	L	L	M	L	L	M	S	L	S	L

Level of Correlation between CO and PO: **L-LOW , M-MEDIUM, S-STRONG**

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment, Internal and Seminars

	Designed By	Verified By	Approved By
	DR.M.KUTRALEESWARAN	Mr.S.ARULMANI	

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards									
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C	
21M3PELP05	PRACTICAL: VHDL PROGRAMMING	DSC PRACTICAL - V	III	5	-	1	4	2	

Objective	To learn and familiarize with the Hardware Description Language (VHDL) and also learn the fundamental principles of VLSI circuit design in Digital and Analog domain.

S.No.	List of Experiments / Programmes (Any 10)	Knowledge Levels	Sessions
1	Universal Building Blocks	K3	5
2	Half adder and Full adder	K3	5
3	Half subtractor and Full subtractor	K4	5
4	Encoder [8:3], and Decoder [3:8]	K4	5
5	Multiplexer [8:1] and Demultiplexer [1:8]	K4	5
6	Combinational circuit implementation for Given Expression	K4	5
7	D and T flip flop	K4	5
8	RS flip flop	K4	5
9	JK flip flop	K4	5
10	4.bit UP/DOWN counter	K5	5
11	4-bit shift register	K5	5
12	Ring counter.	K5	5
13	Time Delay Programming.	K5	5
14	Digital clock.	K5	5

Course Outcome	CO1: Recall the digital circuits using HDL.	K1
	CO2: Understand and apply the HDL system.	K2
	CO3: Demonstrate of combinational circuits, sequential circuits.	K3
	CO4: Analyze the simulation results for all logic circuits.	K4
	CO5: Design and develop the combinational and sequential circuits and all basic gates.	K5

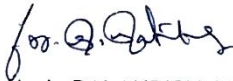| Learning Resources	
Text Books	Digital logic simulation and CPLD programming with VHDL- Steve Waterman
Reference Books	Fundamentals of Digital Logic With VHDL Design- Stephen Brown
Website Link	https://www.youtube.com/watch?v=BxXTy3PXLVs https://www.youtube.com/watch?v=z_OlWv5eN_A https://www.youtube.com/watch?v=775ARR6qz9U

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title		Course Type	Sem	Hours	L	T	P	C
21M3PELP05	PRACTICAL: VHDL PROGRAMMING		DSC PRACTICAL V	III	5		1	4	2

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	L	S	S	M	S	S
CO2	S	S	M	M	M	S	S	L	S	M
CO3	S	S	S	M	M	M	L	M	S	S
CO4	M	S	S	S	M	S	S	M	S	S
CO5	S	S	M	M	S	S	S	M	S	S

Level of Correlation between CO and PO: **L**-LOW , **M**-MEDIUM, **S**-STRONG

Tutorial Schedule	Practical in Laboratory
Teaching and Learning Methods	Laboratory Equipments
Assessment Methods	Observation of Records, Model Practical's

Designed By	Verified By	Approved By
Mr.I. BALAKRISHNAN	Mr.S. ARULMANI	
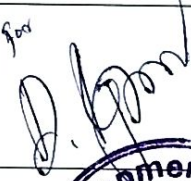
M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards									
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3PELP06	PRACTICAL: EMBEDDED SYSTEMS	DSC PRACTICAL - VI	III	5	-	1	4	2

Objective	To develop the ability to design Microcomputer-based Embedded systems. This class allows students to learn Microcomputer interfacing from both a Hardware and Software perspective.

S.No.	List of Experiments / Programmes (Any 10)	Knowledge Levels	Sessions
1	Arithmetic and logical operation	K3	5
2	Switch and LED interfacing.	K4	5
3	4X4 matrix Keypad interfacing	K4	5
4	7 Segment Display Interface	K4	5
5	Single digit timer using seven segment displays.	K4	5
6	Temperature measurement.	K5	5
7	DAC interface.	K5	5
8	ADC Interface.	K5	5
9	LCD interface.	K5	5
10	Stepper motor control.	K5	5
11	Serial communication using RS232C.	K5	5
12	Serial Communication using I2C Protocol	K5	5
13	DC Motor speed control using PWM	K5	5

Course Outcome	CO1: Identify the functionality of development boards to implement embedded application.	K1
	CO2: Understand basic concepts in the embedded computing systems area	K2
	CO3: Apply knowledge and demonstrate the various addressing modes and data transfer instructions.	K3
	CO4: Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility microcontroller.	K4
	CO5: Evaluate assembly language programs and download the machine code that will provide solutions real-world control problems.	K5

Learning Resources	
Text Books	Custom Pic Microcontroller Lab Manual Paperback – 1 January 2007 by Huang Han-Way
Reference Books	PIC EXPERIMENTS LAB BOOK WITH PIC16F877A AND XC8 by Innocent Okoloko
Website Link	https://www.youtube.com/watch?v=qFKnzxdRy2s https://www.youtube.com/watch?v=Ha5pFv_05Ug https://www.youtube.com/watch?v=rJE1C0MXTSs https://www.youtube.com/watch?v=-pz-iSk3OkM https://www.youtube.com/watch?v=RAFR6HYY26U

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title		Course Type	Sem	Hours	L	T	P	C
21M3PELP06	PRACTICAL: EMBEDDED SYSTEMS		DSC PRACTICAL - VI	III	5	-	1	4	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	M	M	S	L	L	L
CO2	M	M	S	L	S	S	S	M	M	M
CO3	S	M	M	S	M	S	M	L	L	L
CO4	M	L	S	M	L	M	S	M	M	S
CO5	S	S	S	S	L	M	M	M	M	S

Level of Correlation between CO and PO: **L**-LOW , **M**-MEDIUM, **S**-STRONG

Tutorial Schedule	Practical in Laboratory
Teaching and Learning Methods	Laboratory Equipments
Assessment Methods	Observation of Records, Model Practical's

Designed By	Verified By	Approved By
[signature] Mr.I. BALAKRISHNAN	*[signature]* Mr.S. ARULMANI	*[signature and seal]*
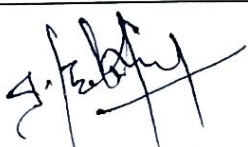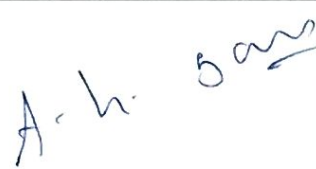
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3PELIS1	INTERNSHIP	INTERNSHIP	III	-	-	-	2	2

Objective	To give some industrial work experiences during the period of study, by which improving the critical thinking and problem solving ability of the students, and also to make them to identify needs of industry in which they have to improve their knowledge and skills.

S.No.	List of Experiments / Programmes (Any 10)	Knowledge Levels	Sessions
1	1. Duration of the internship training is 15 days during the Vacation which falls at the end of the 2nd Semester. 2. The departments concerned will prepare on exhaustive panel of Institutions, Industries and practitioners. 3. The individual student has to identify the institution / industry / practitioners of their choice and inform the same to the HOD / Staff-in-charge. 4. The students hereafter will be called Trainees should maintain a work diary in which the daily work done should be entered and the same should be attested by the Section in-charge. 5. The departments should prepare an outline of the job to be done, Sections in which they have to be attached both in the office as well as in the field. 6. The trainees should strictly adhere to the rules and regulations and office timings of the institutions to which they are attached. 7. The trainees have to obtain a certificate on successful completion of the internship from the Chief Executive of the organization. 8. A Staff member of a Department (Guide) will be monitoring the performance of the Candidate. 9. Report writing manual and format should be prepared by the respective departments and the Report evaluation is done by external Viva-Voce examination will be conducted and the maximum mark is 100 at the end of 3rd Semester. 10. Report should be properly submitted in the beginning of the 3rd Semester.	K4-K5	-

Course Outcome	CO1: Recognize the suitable industry based on the skill set.	K1
	CO2: Understand the work protocols and environmental nature of an industry / Company/institute.	K2
	CO3: Apply their skill sets to the assignment given by the industry / Company/institute.	K3
	CO4: Analyze the problems in the given assignments and trying to resolve it using their skill set.	K4
	CO5: Evaluate the work done and prepare documentations for the work.	K5

Learning Resources

Text Books	1. Aniket Singh -"The Complete Book Of Internships in India: Intern Abroad This Summer"
Reference Books	1. Aniket Singh – " The Complete Book Of International Internships"
Website Link	1. https://internshala.com/

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3PELIS1	INTERNSHIP	INTERNSHIP	II	-	-	-	-	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	S	M	S	S	S
CO2	S	S	M	M	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	15 Days of training in a selected Industry/Company/Institute
Teaching and Learning Methods	Dairy of Work done and documentation
Assessment Methods	Work Dairy : 25% , Evaluation of Report and Viva voce =75%

Designed By	Verified By	Approved By
MR. I. BALAKRISHNAN	Mr. S. ARULMANI	

	M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4PELC09	OPTICAL FIBER COMMUNICATION	DSC THEORY - IX	IV	5	5	-	-	5

Objective	To facilitate the knowledge about optical Fiber Communication, optical sources and Detectors and its Transmission techniques to students.

Unit	Course Content	Knowledge Levels	Sessions
I	**Overview Of Optical Fiber Communication:** Introduction- General System- Advantage of Optical Fiber Communication - Optical Fiber Waveguides- Ray Theory - Electromagnetic mode theory for optical propagation - Cylindrical fibers.	**K1-K3**	12
II	**Transmission Characteristics Of Optical Fibers:** Introduction -Attenuation-Absorption -Scattering losses- Linear scattering losses-Non linear scattering losses- Fiber bend loss-Mid-infrared and far-infrared transmission.	**K2-K4**	12
III	**Fiber Couplers And Connectors:** Introduction - Fiber alignment and joint loss- Fiber splices- Fiber connectors - Expanded beam connectors - Fiber couplers.	**K1-K4**	12
IV	**Optical Sources And Detectors: Optical sources:** LASER: Basic concepts of laser - Optical emission from semiconductors - Semiconductor injection laser -Injection laser characteristics (ILD) - LED: Power and Efficiency - LED Structures - LED Characteristics. **Optical detectors:** P-N photodiodes- P-I-N Photodiodes - Avalanche photodiodes - Quantum efficiency- Speed of response - Phototransistor.	**K1-K5**	12
V	**Optical Fiber Links And Receiver: Digital links:** Introduction - point- to - point links - power penalties - Error control. **Analog links:** Introduction - Overview of analog links - carrier to noise ratio -multichannel Transmission techniques. **Receiver:** Introduction - Optical receiver operation - Receiver sensitivity -Eye diagram -Burst mode receiver - Analog receiver.	**K3-K5**	12

Course Outcome	CO1: Recognize and classify the structures of Optical fiber and types.	K1
	CO2: Explain and use different kind of losses, distortion in optical wave guides.	K2
	CO3: Calculate various key parameters of optical fiber systems.	K3
	CO4: Demonstrate an understanding of optical fiber communication link, structure, propagation and transmission properties of an optical fiber.	K4
	CO5: Analyze the performance of various optical fiber systems and various coupling losses.	K5

Learning Resources

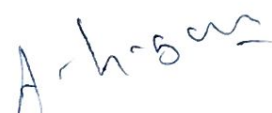|	
Text Books	1. Optical Fiber Communication - Gerd Keiser, 4th Ed., MGH, 2010. 2. Optical Fiber Communications- - John M. Senior, Pearson Education. 3rd Impression, 2007.
Reference Books	1. Fiber optic communication - Joseph C Palais: 4th Edition, Pearson Education.
Website Link	1. https://onlinecourses.nptel.ac.in/noc20_ph07/preview 2. https://onlinecourses.nptel.ac.in/noc22_ee88/preview

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4PELC09	OPTICAL FIBER COMMUNICATION	DSC THEORY - IX	IV	5	5	-	-	5

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	L	M	L	M	L	L	M	M	M
CO2	M	M	L	M	M	M	L	S	L	M
CO3	M	S	S	S	L	L	M	M	S	M
CO4	M	S	L	S	L	M	M	S	M	S
CO5	M	M	M	M	S	M	M	M	S	S

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment, Internal, Seminars

Designed By	Verified By	Approved By
Mr.S. ARULMANI	Mr.S. ARULMANI	

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4PELC10	INDUSTRIAL AUTOMATION AND PLC	DSC THEORY - X	IV	5	5	-	-	5

Objective	To make the students understand the fundamentals of Automation and various Automation systems used in Industry and understand the working of these systems and should be able to determine Hardware and Software's requirements of PLC, DCS and SCADA.

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction to PLC:** Automation - Types of Automation - Advantages of Automation - PLC Introduction - Definition - Block diagram of PLC - Principle of Operation -Modes of Operating System - PLC Scan - Hardwire Control System compared with PLC System - Advantages and Disadvantages of PLCs - Criteria for selection of suitable PLC -Memory Organization - Input Types - Discrete input - Analog input and outputs - Elements of Power Supply Unit - PLC Types - List of various PLCs available -Applications of PLC.	K1-K2	12
II	**Input / Output Modules:** The I/O Section - Discrete I/O Modules and types - Analog I/O Modules - Special I/O Modules- I/O Module Specification - Typical Discrete and Analog I/O field Devices -Sensors - Limit Switch- Reed Switch - Proximity Sensor and types - Types of Photo Electric Sensor - Sinking and Sourcing I/O Modules- TTL Output Module - Relay Output Module -Isolated Output Module -Input /Output Addressing Scheme in important commercial PLCs.	K3-K4	12
III	**PLC Programming:** Types of Programming Methods - Types of Programming Devices - Logic Functions - AND Logic - OR Logic - NOT Logic - Relay Type instructions -Timer Instructions - ON Delay and OFF Delay Timer - (PLC Programming)Retentive Timer Instruction - Cascading Timers - Counter Instruction - UP Counter - DOWN Counter - UP/DOWN Counter - Cascading Counters - Program Control Instructions -Data Manipulation Instruction - Data Compare Instructions - Math Instructions - Sequencer Instructions - PID Instruction - PWM Function - Simple programs using above instructions - Develop ladder logic for: Bottle Filling System - Automatic Car Parking System - EB To Generator Changeover System - Batch Process - Elevator System -DOL Starter- Automatic Star-Delta Starter - Traffic Light Control.	K2	12
IV	**Networking:** Levels of Industrial Network - Network Topology - Network Protocol - OSI Reference Model - Networking with TCP / IP Protocol - I/O Bus networks - Block diagram of I/O Bus networks - Types of I/O Bus networks. Protocol standards - Advantages of I/O Bus networks - Gateway - Token passing - Data Highway - Serial Communication - Device Net - Control Net - Ethernet - Modbus -Fieldbus - Profibus- Sub Netting - Subnet mask - File transfer protocol.	K3-K5	12
V	**Data Acquisition Systems:** Computers in Process Control - Types of Processes - Structure of Control system - ON/OFF Control - Closed loop Control - PID Control - Motion Control - Block diagram of Direct Digital Control. Supervisory Control and Data Acquisition (SCADA)-Block diagram of SCADA - Features of SCADA - Functions of SCADA - SCADA software - Data Loggers - Tags - Alarms - landlines for SCADA - use of modems in SCADA.	K3	12

	CO1:	Identify and understand the basics of PLC programming.	K1
Course Outcome	CO2:	Discuss the different parameters of PLC.	K2
	CO2:	Demonstrate and apply the concept of electrical ladder logic programming.	K3
	CO4:	Analyze and explain the different functions of PLC.	K4
	CO5:	Design and program basic PLC circuits for entry-level PLC applications.	K5

Learning Resources

Text Books	1. Programmable logic controllers (3 Edition) Frank Petruzella Tata McGraw Hill 2. Samuel M. Herb, ―Understanding Distributed Processor Systems for Controll, International Society of Automation Publication, 1st Edition, 1999. 3. PLCs & SCADA: theory and practice Prof. Rajesh Mehra and Er. Vikrant Vij
Reference Books	1. Gary Dunning, ―Introduction to Programmable Logic controllerll, Thomas Learning, Pck edition, 2001. 2. Programmable logic controllers and industrial automation: an introduction Madhuchhanda Mitra and Samarjit Sen Gupta Penram international publishing (India) Pvt. Ltd. Mumbai.
Website Link	https://nptel.ac.in/courses/108105062 https://nptel.ac.in/courses/108105088

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4PELC10	INDUSTRIAL AUTOMATION AND PLC	DSC THEORY - X	IV	5	5	-	-	5

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	L	M	S	M	M	L	S
CO2	M	L	M	M	S	S	S	M	S	S
CO3	S	S	M	S	M	M	S	S	S	S
CO4	L	M	S	M	S	M	S	L	M	S
CO5	S	M	L	S	L	M	S	L	M	S

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment, Internal, Seminars.

Designed By	Verified By	Approved By
DR. M. KUTRALEESWARAN	Mr.S. ARULMANI	

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4PELP07	PRACTICAL: PROGRAMMABLE LOGIC CONTROLLER	DSC PRACTICAL - VII	IV	5	-	1	4	2
Objective	To provide systematic training on electric motor controls that would develop technical skills in the students to design, construct and test various motor control circuits using relay logics as well as Programmable Logic Controllers.							

S.No.	List of Experiments / Programmes (Any 10)	Knowledge Levels	Sessions
1	Logic Gates Implementation.	K3	5
2	Timer Programming (ON Delay and OFF Delay).	K3	5
3	Counter Programming (UP Counter and Down Counter).	K4	5
4	Design a Switch and Relay Interface using Ladder logic.	K4	5
5	Design of Star to Delta starter.	K4	5
6	Develop and test the control circuit for dynamic braking of DC motor using ladder logic.	K5	5
7	Develop and test the control circuit for Conveyor using ladder programming.	K5	5
8	Study of Lift controller.	K5	5
9	Study of AC motor control.	K5	5
10	Study of Thermocouple interface.	K5	5
11	Study of traffic light controller.	K5	5
12	Develop the Ladder diagram for the Arithmetic and Logic unit.	K5	5
Course Outcome	CO1: Identify the basic components of ladder logics.	K1	
	CO2: Explain the basic concepts of programmable logic controller.	K2	
	CO3: Explain and use the concept of electrical ladder logic	K3	
	CO4: Analyze and evaluate use timer, counter and other intermediate programming functions.	K4	
	CO5: Design and program basic PLC circuits for entry level plc applications.	K5	

Learning Resources

Text Books	1. Programmable Logic Controllers - W.Bolton Fouth Edition
Reference Books	1. Automating Manufacturing Systems with PLCs- Hugh Jack
Website Link	1. https://plc-coep.vlabs.ac.in/exp/hardware-software-plc/ 2. https://plc-coep.vlabs.ac.in/exp/implementation-logic-gates/ 3. https://plc-coep.vlabs.ac.in/exp/on-delay-timer/ 4. https://plc-coep.vlabs.ac.in/exp/off-delay-timer/ 5. https://plc-coep.vlabs.ac.in/exp/up-down-counter/ 6. https://plc-coep.vlabs.ac.in/exp/plc-arithmatic-instructions/

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title		Course Type	Sem	Hours	L	T	P	C
21M4PELP07	PRACTICAL: PROGRAMMABLE LOGIC CONTROLLER		DSC PRACTICAL - VII	IV	5	-	1	4	2
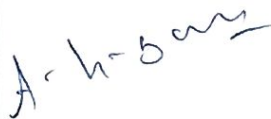
CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	S	L	S	M	L	M	S
CO2	M	M	S	S	M	M	S	M	M	M
CO3	S	L	M	M	L	S	S	M	S	M
CO4	M	S	S	S	S	S	M	L	S	S
CO5	S	M	L	L	M	S	M	M	M	S

Level of Correlation between CO and PO: **L**-LOW , **M**-MEDIUM, **S**-STRONG

Tutorial Schedule	Practical in Laboratory
Teaching and Learning Methods	Laboratory Equipments
Assessment Methods	Observation of Records, Model Practical's

Designed By	Verified By	Approved By
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M.Sc - Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4PECPR1	PROJECT WORK	PROJECT WORK	IV	12	12	-	10	5

Objective	To apply the knowledge of analog and digital electronic systems in the design to solve some real time problems of industrial and social needs. And to impart the experience to the students in the industrial Field work.		
Details	**Course Content**	**Knowledge Levels**	**Sessions**
Format for the preparation of Project Report:	The final stage of work consists of the 1. Title Page 2. Bonafide Certificate 3. Acknowledgement/Preface 4. Table of contents 5. List of table and charts 6. Abbreviation	K4	-
Text of the Project	The following structure of project work should be followed to maintain the uniformity in preparation and presentation. **Chapter 1 - Introduction:** In this chapter Selection and relevance problem, historical background of the problem, definitions of related aspects, characteristics, different concepts pertaining to the problem etc can be covered by the candidate. **Chapter 2 - Research Methodology:** This chapter will include Objectives, Hypothesis, Scope of the study, Selection of the problem, Sample size, Data collection, Tabulation of data, Techniques and tools to be used, limitations of the study, significance of the study etc. **Chapter 3 - Literature Review:** This chapter will provide information about studies done on the respective issue. This would assist students to undertake further study on the same issue. **Chapter 4 - Data Presentation and Data Analysis:** This chapter is the core part of the study. The analysis pertaining to collect data will be done by the students. The application of selected tools or techniques will be used to arrive at findings. In this table of information, presentation of graph etc. should be provided by the students. **Chapter 5- Conclusion:** In this unit, findings of work will be covered by the candidate and suggestion will be mentioned by the candidate to validate the objectives and hypotheses. **If required, more chapters of data analysis could be added.** **6. Bibliography** **7. Appendix**	K3- K6	-

Typing Instruction	**Paper:** 8 ½ * 11 inches in size (A4). Only one side of the sheet should be typed. **Margin:** The left side margin should not be less than 1.5 inches (or 40 mm) the right, top and Bottom Margin one inch (or 25 mm). **Font:** Times New Roman, subject matter -12 font size in running format, Heading and Section headings should be capitalized - 14 font size.	K3	-
Headings and Titles	1. Heading and Section headings should be capitalized and centered- 14 font sizes with Bold. 2. Subdivision headings should be typed from the left hand margin sentence case -12 font sizes with Bold. 3. Paragraphs should be indented seven space for pica type and nine for elite type.	K3	-
Tables, Graphs and Diagrams	1. The table number (Example: TABLE 1.5) typed in capitals, should be separated from the text by two or three spaces. 2. If an explanatory note to a time is necessary, an asterisk should be used. 3. The note should be placed immediately below the table.	K3	-
Numbering and Spacing	**Line Spacing:** The text of the thesis should be 1.5 lines spacing **Pagination:** Pages of the text are numbered continuously in Arabic numerals.	K3	-
Bibliography	The format for bibliographical listing for books, reports, articles are the same for footnote also. Books and articles can be arranged either chronological order or year wise. **For citing Books:** Mann, R.S Social Change and Social Research, New Delhi: Concept Publishing Company, 2018, p.27 **Publication of Government and Public Organization:** Government of India, India 2016: A Reference Annual, New Delhi: Publication Division, 201, p.127 **For Citing Journal:** GoelRanjan, "Achievement through Human Engineering", Indian Management, 28, No.8, July, 2016, pp.14-16. **For Citing Thesis or Dissertation:** Ganapathy , A study of organizational and Individual Characteristics in R & D Organizations, unpublished Ph.D Thesis, Bangalore: Indian Institute of Science, 2016. **For Citing Seminar Paper:** Krishnaswami O.R., "Towards Excellence in Cooperative Management" (Paper Presented at a Seminar on "Excellence in Management", Cooperative Training College, Bangalore, July 2019).	K3 - K4	-
Schedule	**IV Semester:** 1. December: Identification of problem & Selection of topic. 2. January: Review of Literature & Finalization of Questionnaire. 3. February : Data collection& Analysis and preparation of Project report. 4. March: First, Second draft and Final draft Correction. 5. April: Review Presentation & Submission of Project.	-	-

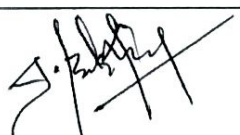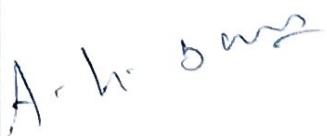| Course Outcome		
	CO1: Understand the Selection of the problem.	K2
	CO2: Interpret Hypothesis and Objectives.	K3
Course Outcome	CO3: Analyze the literature review based on the research problem.	K4
	CO4: Evaluate the data collection.	K5
	CO5: Create and conclude the Project report.	K6

L-Lecture , T-Tutorial, P-Practical

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4PECPR1	PROJECT WORK	PROJECT WORK	IV	12	12	-	10	5

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	S	M	S	S	S
CO2	S	S	M	M	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG	
Tutorial Schedule	Data collection and training under a recognized organization
Teaching and Learning Methods	Work dairy and Documentation, Design and Preparation
Assessment Methods	Report = 40%, Demonstration and Viva Voce = 60%

Designed By	Verified By	Approved By
MR. I. BALAKRISHNAN	for Mr.S. ARULMANI	

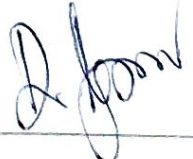| M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards									
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C	
21M4PELOE1	Electronics and Communication for Competitive Examinations	Online Competitive Exam	4	-	-	4	-	2	

Objective	To evaluate the knowledge of the students over Electronics and Communication and to prepare them to take part in the competitive examinations by Creating awareness on competitive examination among students.

Unit	Course Content	Knowledge Levels	Sessions
-	Arrangement of different topics related to Semiconductor physics, Circuit Analysis and theorems, Electronic device, ICs and Instrumentation. Digital Principles, Communication Systems, Microcontroller like Advanced concepts etc., Major emphasis has been put forth to include recent developments in the subjects. This course aims to give a holistic view of all the topics which comprised of some factual text points, multiple choice questions (MCQ), it is extremely suitable for students pursuing their higher degree in University/institute for their entrance exams, students preparing for various national and state level competitive entrance exams such as UGC-JRF/SRF/NET, ISRO, DRDO, BSNL, SAIL, BHEL, SBI, IBPS, etc. to get admission in Ph.D. in Electronics. In addition, it is also useful for UPSC and states PSC. **Rules for creating MCQ pattern:** 1. Objective type online examination will be conducted at the end of 4th semester. 2. Questions must be taken from all previous question papers of UGC-NET, SET, DRDO, BSNL JTO, UPSC, IBPS and Common Entrance Test for Ph.D of various Universities. 3. Test critical thinking. ✓ Multiple choice questions to test the superficial knowledge. ✓ Learners to interpret facts, evaluate situations, explain cause and effect, make inferences, and predict results. 4. Emphasize Higher-Level Thinking ✓ Use memory-plus application oriented questions. These questions require students to recall principles, rules or facts in a real life context. Example 1: Ability to analyze statements and justify it : 1. Which of the following statement not suitable for semiconductors? a) Semiconductors are having 4 valance electrons b) At 0°C it behaves like an insulator. c) The energy gap is large. d) Si and Ge are the commonly used Semiconductors	K1-K6	-

		Eg.2
		Ability to incorporate the facts with real time problems
		  2. Which kind of power supplies are suitable for computer systems design.
		    a) Regulated power supply
		    b) Uninterrupted power supply
		    c) Variable regulated power supply
		    d) Switch mode Power supply
		
		5. Mix up the order of the correct answers:
		  ✓ Keep correct answers in random positions and don't let them fall into a pattern that can be detected
		6. Use a Question Format:
		  ✓ Multiple-choice items to be prepared as questions (rather than incomplete statements)
		Incomplete Statement Format:
		The Astable multivibrator is also known as_____
		    :This in Direct Question Format and it will be Less effective.
		Select another name of an Astable multivibrator.
		    a) One shot Multivibrator
		    b) Two shot Multiibrator
		    c) Free running Multivibrator
		    d) No shot Multivibrator
		    : This is Best format.
		7. Keep Option Lengths Similar
		  ✓ Avoid making your correct answer the long or short answer
		8. Avoid the "All the Above" and "None of the Above" Options
		  ✓ Students merely need to recognize two correct options to get the answer correct
		9. HOD's instruct to the faculty to prepare minimum 500 questions booklet (cumulatively for each Programme) with solutions and circulate among the students.
		10. Each Department to prepare the Questions (MCQ pattern with four answers) and submit to ICT.		

Course Outcome	CO1: Recall and understand the various fundamentals of Electronics and communication.	K1
	CO2: Describe the various concepts and Methodologies of Analog and Digital electronic system design principles	K2
	CO3: Demonstrate the various applications and advantages of discrete components and ICs in the circuit design process.	K3
	CO4: Analyze and optimize the complex circuits using various theorems and principles.	K4
	CO5: Design and evaluate the different analog and digital circuits for controlling and communication process.	K5

Learning Resources

Text Books	1. Objective Electronics with solutions for IMD,DRDO,ISRO etc. by Rakesh Patel and Priyanka Kumari - July 2022 2. Trueman's UGC-NET Electronic Sciences - Danika Publication -Jan 23 3. GATE 2023 : Electronics & Communication Engineering - 36 Years' Topic-wise Previous Solved Papers by G.K. Publications (P) Ltd.-March 2022
Reference Books	1. Handbook Series of Electronics & Communication Engineering by Experts Compilation Jan 2013 2. Objective Electronics & Telecommunication Engineering by M.P.Sinha , Neetu Singh- Jan 2012
Website Link	3. http://www.sanfoundry.com 4. https://www.geeksforgeeks.org 5. https://www.indiabix.com/electronics/questions-and-answers/

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4PELOE1	Electronics and Communication for Competitive Examinations	Online Competitive Exam	4	-	-	4	-	2

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	S	S	M	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	M	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	NET/SET/GATE/CET/TRB Old question papers -solutions - online mock test
Teaching and Learning Methods	Self study , Group discussion ,Chalk and Talk, Audio-Video Learning, learning through mock test
Assessment Methods	100 multiple choice questions through computer based online examinations passing minimum is 50%

Designed By	Verified By	Approved By
Mr. I. BALAKRISHNAN	Mr.S. ARULMANI	

MCAS
Curriculum Development Cell
Autonomous
Rasipuram

List of Elective Course (DSE) Details for M.Sc.,Electronics & Communiaction
SYLLABUS - LOCF-CBCS Pattern
EFFECTIVE FROM THE ACADEMIC YEAR 2021-2022 Onwards

S.No.	COURSE_CODE	TITLE OF THE COURSE
1	21M1PELE01	NETWORK AND JAVA PROGRAMMING
2	21M2PELE02	BIO MEDICAL INSTRUMENTATION
3	21M3PELE03	ADVANCED COMMUNICATION SYSTEMS
4	21M3PELE04	SIGNALS AND SYSTEMS
5	21M4PELE05	CONTROL SYSTEMS
6	21M4PELE06	MICROWAVE ENGINEERING

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards									
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C	
21M1PELE01	NETWORK AND JAVA PROGRAMMING	DSE I	I	5	3	2	-	3	
Objective	To enable the students to understand and gain the knowledge on Data communication networks and network security and also enable the students to gain knowledge on various Network topologies and principles of JAVA.								

Unit	Course Content	Knowledge Levels	Sessions
I	**Network and Types:** IT Trends in computer communications and networks- Messages, characters, bit streams, symbols and waveforms-Digital/analog, serial/parallel, simples/half duplex/full duplex - Synchronous/asynchronous-MODEM: Modulation and keying alternatives-Multiplexing alternatives.	K1-K2	12
II	**Layer and their Functions:** OSI Model - Physical Layer - Data Layer -Network Layer - Transport, Session and Application Layer. MODEM: Modulation Techniques-Multilevel Transmission -Advance in Modem. SWITCHING: Circuit Switching -Message Switching -Compressing.	K3-K4	12
III	**Network Hardware LAN:** LAN Definition -Major Components of LAN -Protocols -IEEE Standards -CSMA/ CD -Token Ring -Token Bus -FDDI -Logical Link Control.	K3-K5	12
IV	**Introduction to JAVA:** JAVA Evolution: History - Features - How Java differs from C and C++ - Java and Internet-Simple Java program- Constants- variables - Data types - Operators and Expressions .Decision Making and Branching: If, If. Else, else. If ladder, Switch, operator Decision Making and Looping: While, do, for-jump sin loops-labeled loops. Classes, Objects and Methods.	K5	12
V	**Files and Applets:** Arrays, Strings-Interfaces: Multiple Inheritances-Packages: Putting classes together -Multi Threaded Programming-Applet programming Files: Introduction-concept of streams-Stream classes-Using streams-I/O Classes-File class-I/O Exceptions - creation of files-Reading/Writing characters/Bytes.	K3-K5	12
Course Outcome	**CO1:** Identify and Understanding the various networks and its applications.	K1	
	CO2: Discuss the key technological components of the Network.	K2	
	CO3: Illustrate and Design the C languages and JAVA languages.	K3	
	CO4: Classify and to understand classes and objects.	K4	
	CO5: Analyze and evaluate various related technical, administrative and social aspects of specific computer network protocols from standards documents and other primary materials found through research.	K5	

	Learning Resources
Text Books	1. Data communication and networking- 2nd Edition -Behrouza Forouzan. 2. Programming with JAVA-2nd Edition.-E.Balagurusamy.
Reference Books	1. Computer Networks-Andrews.Tanenbaum. 2. High speed networking and internets-William Stallings. 3. Java how to program (5th edn) H.M.Deitel,P.J.Deitel.
Website Link	https://onlinecourses.nptel.ac.in/noc19_cs84/preview https://archive.nptel.ac.in/courses/106/105/106105191/
L-Lecture, T-Tutorial, C-Credit	

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M1PELE01	NETWORK AND JAVA PROGRAMMING	DSE I	I	5	3	2	-	3

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	L	L	M	M	L	L	L
CO2	M	S	L	S	M	S	S	S	S	M
CO3	L	M	M	L	S	S	S	S	S	M
CO4	S	L	M	M	S	S	S	S	S	M
CO5	M	M	L	M	M	L	M	M	S	M

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG	
Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment, Internal & Semester Examinations

Designed By	Verified By	Approved By
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Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELE02	BIO MEDICAL INSTRUMENTATION	DSE II	II	5	3	2	-	3
Objective	To Enable the students to understand the various kind of Instruments used in Medical field and how they works with their various parameters.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Bio-Electric Signals and Electrodes:** Elementary ideas of cell structure, Bio – potential and their generation – resting and action potential – propagation of action potential. Electrodes – Micro – Skin surface – needle electrodes. Measurement of Blood pressure (direct, indirect) – blood flow meter -Electromagnetic & ultrasonic blood flow meter – blood pH measurement - Measurement of Respiration rate – measurement of lung volume – heart rate measurement – Measurement of body and skin temperature - Chromatography, Photometry, Flurometry.	K1	12
II	**Bio - Medical Recorders:** Electro cardiograph (ECG) – Lead system – ECG electrodes – ECG amplifiers – ECG recording units – analysis of ECG curves. Nervous system - EEG recorder – 10-20 lead system – recording techniques – EEG wave types – Clinical use of EEG – brain tumor Electro – myograph (EMG) – EMG waves – measurement of conduction velocity - EMG recording techniques – Electro – radiograph (ERG) Audiometer – principle – types - Basics audiometer working.	K3-K4	12
III	**Therapeutic Instrument:** Cardiac pacemaker – classification – External pace makers – implantable pacemaker – pacing techniques – programmable pacemaker – Cardiac defibrillators – types – AC and DC defibrillators - Heart lung machine with Block diagram. Dialysis – Hemo dialysis – peritoneal dialysis. Endoscopes Endoscopic laser coagulator and applications – physiotherapy equipment - short wave diathermy – micro wave diathermy – ultrasonic therapy unit (block / circuit) – Ventilators - types – modern ventilator block diagram.	K4-K5	12
IV	**Biotelemetry And Patient Safety:** Introduction to biotelemetry - physiological - adaptable to biotelemetry - components of a biotelemetry system - application of telemetry - elements of biotelemetry; AM, FM transmitter and receiver - requirements for biotelemetry system - radio telemetry with sub carrier - single channel and multi channel telemetry - Telemedicine; introduction, working, applications. **Patient safety:** Physiological effects of electric current - Micro and macro shock - leakage current - shock hazards from electrical equipment. Methods of Accident Prevention - Grounding - Double Insulation - Protection by low voltage - Ground fault circuit interrupter - Isolation of patient connected parts - Isolated power distribution system. Safety aspects in electro surgical units - burns, high frequency current hazards, Explosion hazards.	K3-K6	12

V	Modern Imaging Techniques: LASER beam properties - block diagram - operation of CO2 and NDYag LASER - applications of LASER in medicine. X ray apparatus - block diagram - operation - special techniques in X-ray imaging - Tomogram - computerized Axial tomography - Ultrasonic imaging techniques - Echo cardiography - Angiography - CT scanner - Magnetic resonance imaging techniques	K4-K6	12

	CO1: Identify the various biomedical electrodes. Understand the ECG, EEG and EMG.	K1
	CO2: Understand the principles of endoscopy, pacemaker and defibrillator.	K2
Course Outcome	CO3:Apply the concepts of electronic circuits to biomedical applications	K3
	CO4:Classify various bio medical recorders	K4
	CO5: Design practical circuits for acquisition and analysis of biomedical signals.	K5

Learning Resources

Text Books	1. Biomedical Instrumentation – By- Dr.M. Arumugam – Anuradha publications, 2. Hand book of Bio -Medical Instrumentation – By -R.S .Khandpur 3. Medical Electronics – By- Kumara doss
Reference Books	1. Bio medical Instrumentation and measurements – By-Leslie Cromwell -Fred j. Wibell, Erich A.P Feither – II Edition. 2. Medicine and clinical Engineering -By - Jacobson and Webstar
Website Link	1. https://onlinecourses.nptel.ac.in/noc21_md04/preview 2. https://onlinecourses.nptel.ac.in/noc22_md01/preview

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELE02	BIO MEDICAL INSTRUMENTATION	DSE II	II	5	3	2	-	3

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	L	L	L	L	S	L
CO2	M	M	S	M	L	M	M	M	S	L
CO3	M	S	S	M	M	M	S	S	S	M
CO4	L	S	S	S	S	M	S	S	M	S
CO5	S	M	S	L	S	M	S	S	S	S

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment

Designed By	Verified By	Approved By
Mr. S. SATHISHKUMAR	Mr.S. ARULMANI	

Curriculum Development Cell
MCAS Autonomous Rasipuram

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3PELE03	ADVANCED COMMUNICATION SYSTEMS	DSE III	III	5	3	2	-	3
Objective	To understand the principles of Radar, Navigation aids. Study basic Digital communication system and Digital codes and to learn Error detection and correction codes.							

Unit	Course Content	Knowledge Levels	Sessions
I	**RADAR and Navigational Aids:** Basic Radar System- Applications - Radar Range Equation - Factors Influencing Maximum Range - Basic Pulsed Radar System - Block Diagram - Display Methods- A - Scope, PPI Display - Instrument Landing System - Ground Controlled Approach System.	K1-K3	12
II	**Basics of Digital Communication and Codes:** Basic Elements Of Digital Communication System - Block Diagram-Characteristics of Data Transmission Circuits - Bandwidth Requirement - Speed - Baud Rate - Noise - Crosstalk - Distortion. **Digital Codes:** ASCII Code - EBCDIC Code - Error Detection Codes - Parity Check Codes - Redundant Codes - Error Correction Codes - Retransmission- Forward Error Correcting Code - Hamming Code.	K2-K3	12
III	**Digital Modulation Techniques:** Sampling- Sampling Theorem-Quantization-Quantization Error- Companding - PCM Generation and Detection-Delta Modulation - Adaptive Delta Modulation - DPCM - ASK, FSK, PSK, QPSK Modulation/Demodulation.	K3	12
IV	**Satellite Communication:** Satellite system: Kepler's laws - orbits - launching orbits - types - Geostationary synchronous satellites - Advantages - Apogee - Perigee - Active and passive satellite - Earth eclipse of satellite - Parabolic reflector antenna - cassegrain antenna. **Space segment:** Power supply- Attitude control- station keeping - Transponders - TT and C subsystem - Antenna subsystem. **Earth segment:** Block diagram of Transmit receive earth station - Satellite mobile services - Basics of GPS	K3	12
V	**Mobile Communication and Multiple Access Techniques:** **Mobile Communication:** Cellular telephone- fundamental concepts - Simplified Cellular telephone system - frequency reuse - Interference - Co-channel Interference - Adjacent Channel Interference - Improving coverage and capacity in cellular systems - cell splitting - sectoring - Roaming and Hand off - Basics of blue tooth technology. **Multiple Access Techniques:** TDMA, FDMA, CDMA. Digital cellular system - Global system for mobile communications (GSM) -GSM services - GSM System Architecture - Basics of GPRS.	K3-K4	12

	CO1: Recall the communication systems.	K1	
Course Outcome	CO2: Discuss the modulation techniques.	K2	
	CO3:Calculate the various frequency range and analyze the Performance of communication systems.	K3-K4	60
	CO4:Analyze the design parameters of a single and multi-Carrier communication system.	K4	
	CO5:Evaluate the performance of communication systems and modulation techniques.	K5	

Learning Resources

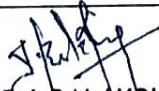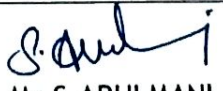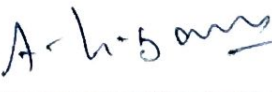|	
Text Books	1. Radar and Navigation Aids ", Scholnik, Tata McGraw Hill.1st Edition. 2. Electronic communication systems, Kennedy - Davis -Fourth Edition - Tata McGraw Hill 3. Microwave and Radar Engineering", N. Kulkarni umesh publication, 2nd edition.
Reference Books	1. Electronic Communications systems - Fundamentals through Advanced - Wayne Tomasi – Fifth Edition - Pearson Education – 2005 2. Satellite communication, Dr. D.C. Agarwal - Third Edition - Khanna publishers
Website Link	https://onlinecourses.nptel.ac.in/noc22_ee114/preview

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3PELE03	ADVANCED COMMUNICATION SYSTEMS	DSE III	III	5	3	2	-	3

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	M	M	L	M	S	M	M
CO2	M	S	M	M	M	L	M	L	M	M
CO3	S	M	L	L	S	M	S	M	L	L
CO4	M	L	M	L	L	L	M	S	M	L
CO5	S	S	M	M	S	M	S	M	M	M

Level of Correlation between CO and PO: L-LOW , M-MEDIUM, S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment, Internal, Seminars

Designed By	Verified By	Approved By
MR.I.BALAKRISHNAN	Mr.S.ARULMANI	
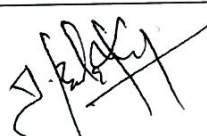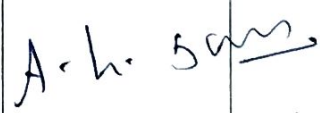
M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards									
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C	
21M3PELE04	SIGNALS AND SYSTEMS	DSE IV	III	5	3	2		3	
Objective	To enable the students to understand and gain the knowledge on Signals and their representations, Systems used for representation and manipulation of the Signals.								
Unit	Course Content				Knowledge Levels		Sessions		
I	**Signals:** Signals- Types-Step-Unit Step-Ramp-Unit Ramp-Pulse-Impulse and unit Impulse-Sinusoidal and non sinusoidal-Continuous Time (CT) and Discrete Time (DT) signals – classification of CT and DT signals- Basic CT and DT signals – Signal Operations – Representation of signals by impulses.				K1-K3		12		
II	**Continues Time and Discrete Time Systems:** Properties – Linear Time Invariant (LTI) system – Linear Shift Invariant (LSI) systems - Properties – Continuous and discrete convolution – CT systems representation by differential equations – DT systems representation by differential equations.				K3		12		
III	**Fourier series representation of Periodic Signals:** Fourier series analysis of periodic signals – properties of Continuous Time Fourier series (CTFS)– Convergence of CTFS - Representation of periodic signals by Continuous time Fourier transform (CTFT) – properties of CTFT- Convergence of CTFT - Frequency response of systems characterized by differential equations				K3,K4		12		
IV	**Fourier analysis of DT Signals and Systems:** Fourier series representation of DT periodic signals (DTFS) – Properties of DTFS - representation of aperiodic signals by DTFT – properties of the DTFT – Frequency response of systems characterized by differential equations				K3-K4		12		
V	**Sampling, Laplace Transform & Z Transforms:** Sampling: Introduction – sampling theorem – reconstruction of a signal from its samples using interpolation – Aliasing – DT processing of a CT signal – sampling of DT signals Laplace Transform: Introduction – Laplace transform – region of convergence for LT – Inverse Laplace Transform – properties of Laplace transform -Z Transform: Introduction – Z transform – region of convergence for Z transform – Inverse Z Transform – properties of Z Transform.				K4-K5		12		
Course Outcome	CO1: Recall the various kinds of signals and their mathematical representations.						K1		
	CO2: Understand and Apply the methods of Laplace and Z transforms in signals transformations						K2		
	CO3: Apply the Fourier analysis of discrete time signals.						K3		
	CO4: Analyze the discrete time signals.						K4		
	CO5: Evaluate the various signals.						K5		

Learning Resources

Text Books	1. "Signals and Systems", Alen V Oppenheim Alen S. Wilsky and Hamid Nawab S second Edition, PHI, New Delhi, 1997 2. Signals and Systems Analysis using transform methods and MATLAB, Michael J Roberts, Tata McGraw- Hill, 2003
Reference Books	1. Signals and Systems, Haykin.S and Barry Van Veen, John willy and Sons Inc., 2002 2. Continuous and discrete signals and systems, Samir S Soliman and Srinath MD, Second Edition, PHI, 2003. 3. Linear Systems and Signals, Lathi B.P., Oxford University Press Inc., 2003
Website Link	https://onlinecourses.nptel.ac.in/noc21_ee28/preview https://nptel.ac.in/courses/117104074

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3PELE04	SIGNALS AND SYSTEMS	DSE III	III	5	3	2	-	3

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	M	L	M	M	S	S
CO2	L	M	S	L	S	M	M	S	S	M
CO3	M	L	M	M	L	M	L	M	M	M
CO4	L	M	L	M	M	L	S	M	L	M
CO5	M	M	S	L	M	S	M	L	M	M

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment, Internal, Seminars

Designed By	Verified By	Approved By
Mr.I.BALAKRISHNAN	Mr.S. ARULMANI	

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4PELE05	CONTROL SYSTEMS	DSE V	IV	5	4	1		4

Objective	To enable the students to understand and gain the knowledge on various control systems in Industries.

Unit	Course Content	Knowledge Levels	Sessions
I	**Mathematical Models of Control System:** Introduction to Control system - Examples of control system - Block diagram reduction techniques - Signal flow graph using Mason's gain formula – Mathematical models : Mechanical system - Electrical system - Electrical analogous of mechanical translational systems- Electrical analogous of mechanical rotational systems.	K1-K2	12
II	**Time Response Analysis:** Time response - Test signals - Transfer function of a system - Laplace transform review Response of first order system for unit step input - Second order system response: Under damped - over damped - critically damped. Time domain specifications: Rise time - Time constant - Settling time.	K3	12
III	**Controllers and Errors:** Response of 2nd order systems with P, PI & PID controllers - Comparison of the responses - Steady state error constants - Steady state error - unit step - unit ramp - unit parabolic signal - Generalized error coefficients - Correlation between static and dynamic error coefficients.	K3	12
IV	**Frequency Response Analysis:** Review of Fourier transform - Frequency domain specifications - Estimation of frequency domain specifications for II order system - Correlation between time and frequency response - Frequency response plots: Bode plot - Nichols plot - M &N circles Nichols chart	K3	12
V	**Concepts Of Stability And Root Locus:** Definitions of stability - Location of roots on the S-plane for stability - Routh Hurwitz criterion - Mathematical preliminaries for Nyquist stability criterion - Relative stability - Estimation range 37 of system gain - Root locus construction - Root locus for systems with dead time - transportation lag - Steps for designing a lead and lag compensator.	K3- K4	12
Course Outcome	CO1: Identify the various control system components and their representations.	K1
	CO2: Understand and analyze the various Time response systems.	K2
	CO3: Apply the concepts of various system stability criterions.	K3
	CO4: Analysis the various frequency response plots and its system.	K4
	CO5: Evaluate the various transfer functions of control systems	K5

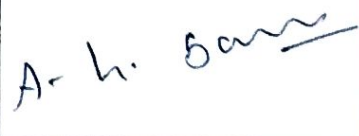|	Learning Resources	
Text Books	1. Nagoor Gani, "Control system", 2nd Edition, RBA publications,	
Reference Books	1. R. Anandanatarajan & P. Ramesh Babu, "Control Systems Engineering", 2nd Edition, Scitech Publications, 2010 2. M. Gopal, "Control system principles and design", TMH, 1998. 3. B. C. Kuo, "Automatic Control Systems", 7th Edition, PHI, 1995.	
Website Link	1. https://onlinecourses.nptel.ac.in/noc20_ee90/preview 2. https://onlinecourses.nptel.ac.in/noc22_ee31/preview	

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4PELE05	CONTROL SYSTEMS	DSE V	IV	5	4	1		4

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	L	M	S	S	L	M	M
CO2	M	S	M	M	L	M	S	S	M	S
CO3	M	M	S	S	S	L	S	S	S	S
CO4	L	M	S	M	L	S	S	S	S	S
CO5	M	L	L	M	M	M	M	S	S	S

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG	
Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment, Internal, Seminars

Designed By	Verified By	Approved By
DR.M.KUTRALEESWARAN	Mr.S ARULMANI	

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards										
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4PELE06	MICROWAVE ENGINEERING	DSE VI	IV	5	4	1	-	4

Objective	Understand Basics of Microwave and its properties, Micro wave Semiconductor devices, and also Real time applications of Microwave signals.

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction to Microwave:** Introduction – Maxwell's equation – ampere's law – faraday's law – gauss law – wave equation – TE, TM wave equation – wave guides – rectangular wave guides – propagation of waves in rectangular wave guides – TM and tm modes – propagation of TM waves in rectangular wave guides – TM modes in rectangular wave guides.	K1-K3	12
II	**Microwave Amplifiers and Oscillators:** Klystrons – two cavity klystrons – multi cavity klystrons – reflex klystrons – power output and frequency characteristics – efficiency of reflex klystron – traveling wave tube (TWT) – applications of TWT – backward wave oscillator – magnetron – cavity magnetron – sustained oscillation in magnetron – characteristics and applications of magnetron.	K3	12
III	**Microwave Antennas:** Quantitative theory of short dipole antenna – characteristics of grounded quarter wave and ungrounded half wave antenna – radiation resistance and radiation pattern – folded dipole and its application – broad side and fire array – loop antenna – direction finding by Adcock and beeline tossi system – helical – rhombic – YAGI antenna – horn antenna and parabolic reflectors.	K2-K3	12
IV	**Semiconductor Microwave Devices:** Crystal diode - Schottkey diode - detector and mixers, PIN diode switch, Gunn diode oscillator, IMPATT diode oscillator and amplifier, Varactor diode, Introduction to MIC.	K3	12
V	**Microwave Systems:** System Aspects of Antennas - Fields and Power Radiation - Antenna Pattern Characteristics - Antenna Gain and Efficiency - Aperture Efficiency and Effective Area - Background and Brightness Temperature - Antenna Noise Temperature and G/T - Wireless Communications -Radar Systems - The Radar Range Equation - Pulse Radar - Doppler Radar - Radiometer Systems - Theory and Applications of Radiometry - Microwave Heating.	K3	12

Course Outcome	CO1:Define microwave frequencies and the waveguides that are used in communication	K1
	CO2: Understand about the various methods of microwave Oscillators and Amplifier apply the concept of microwave propagations and its mathematical analysis	K2
	CO3: Demonstrate various microwave bench setup for measuring various parameters.	K3
	CO4: Analyze typical microwave networks and wave propagation in TE, TM or TEM modes.	K4
	CO5: Evaluate various microwave components such as power dividers, hybrid junctions, microwave solid state devices, ferrite devices and microwave amplifier.	K5

Learning Resources

Text Books	1. Microwave Engineering - 4th Edition - David M. Pozar 2. Antenna And Propagation, K. D. Prasad Sathya Pradhasan 3. Microwave and Radar Engineering", N. Kulkarni umesh publication, 2nd edition.
Reference Books	1. Microwave Engineering: A Practical Guide to Theory, Measurements and Circuits", Cambridge University Press, 2004. 2. "Microwave Engineering" Annapurna Das and Sisir K Das, , Tata McGraw Hill Publishing
Website Link	1. https://onlinecourses.nptel.ac.in/noc22_ee103/preview

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4PELE06	MICROWAVE ENGINEERING	DSE IV	IV	5	4	1	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	M	S	M	M	M	S	S
CO2	M	M	L	M	M	M	L	L	S	S
CO3	L	S	M	S	L	L	S	M	M	L
CO4	M	M	M	M	L	L	M	M	S	L
CO5	L	L	M	M	M	L	M	M	L	L

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment, Internal, Seminars

Designed By	Verified By	Approved By
Mr.I. BALAKRISHNAN	Mr.S. ARULMANI	

List of Extra Disciplinary Course(GEC) Details offered by the
M.Sc.,Electronics & Communication
SYLLABUS - LOCF-CBCS Pattern
EFFECTIVE FROM THE ACADEMIC YEAR 2021-2022 Onwards

S.No.	SEM	COURSE_CODE	TITLE OF THE COURSE
1	II	21M2PELED1	BASIC ELECTRONICS
2	II	21M2PELED2	BIO MEDICAL INSTRUMENTATION
3	II	21M2PELED3	CELLULAR PHONE SERVICING
4	II	21M2PELED4	INTERNET OF THINGS
5	II	21M2PELED5	ARTIFICIAL INTELLIGENCE
6	II	21M2PELED6	ROBOTICS

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELED1	BASIC ELECTRONICS	GEC-EDC	II	4	2	2	-	2

Objective	To understand the basic concepts of semiconductor, Linear ICs, Oscillators and also Rectifiers.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Semiconductors:** Semiconductors and its types - P Type Semiconductor - N type Semiconductor- PN Junction diode VI Characteristics - Zener Diode VI Characteristics - Gunn Diode VI Characteristics -Introduction of Transistor & its Types - Common Base Configuration of NPN Transistor.	K1-K3	9
II	**Digital Principles:** Number System - Decimal to Others Conversion - Others to Decimal Conversion -Boolean Algebra - Basic Laws of Boolean algebra - Basic Gates - Universal Gate - Half and Full Adder - Encoder - RS Flip Flop - JK Flip flop	K3-K4	9
III	**Op-Amp and Its Applications:** Introduction - Block & Pin diagram of Operational Amplifier - Op-Amp Parameters - Ideal Op-Amp - Non-inverting Amplifier - Inverting amplifier - Adder - Subtractor - Integrator – Differentiator - V to I Converter - I to V Converter.	K3-K4	9
IV	**Oscillators:** Introduction to Oscillator - Types of Oscillator - Hartley Oscillator - Colpitt Oscillator - Clapp Oscillator - Phase Shift Oscillator - Multivibrator-Monostable-Astable-Bistable- Schmitt Trigger	K3-K4	9
V	**Rectifiers:** Introduction - Half Wave Rectifier - Full Wave Rectifier - Bridge Rectifier - Series Voltage Regulators - Shunt Voltage Regulators - IC Voltage Regulators (78XX & 79XX).	K4	9

Course Outcome	CO1: Recite and understand about semiconductor diodes and its applications.	K1
	CO2: Calculate the various parameters of a signal using different kinds of instruments	K2
	CO3: Illustrate the operations of various electronic circuits and their applications.	K3
	CO4: Analyze the problems on circuits and troubleshoot	K4
	CO5: Design power supply, amplifier and oscillator circuits	K5

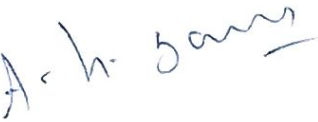|	Learning Resources
Text Books	1. Electronic Devices and Circuits - S. Salivahanan, N. SureshKumar- 4th Ed -2017 2. A Textbook of Applied Electronics - R.S Sedha – Revised Edition - 2008. 3. Circuits and Networks: Analysis and Synthesis - 5th Edition by A. Udhakar, Shyammohan S. Palli - 2017
Reference Books	1. Fundamentals of Digital Circuits. Anand Kumar. 2008.PHI. 2. Linear Integrated Circuits- 5th Edition - Roy Choudhury - NAI Piblishers – 2018
Website Link	https://onlinecourses.nptel.ac.in/noc21_ee55/preview

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELED1	BASIC ELECTRONICS	GEC-EDC	II	4	2	2	-	2

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	S	S	M	M	S
CO2	M	S	M	S	M	M	S	M	S	M
CO3	M	M	S	M	L	M	M	S	M	L
CO4	M	M	S	L	M	M	M	S	L	M
CO5	S	L	M	M	S	S	L	M	M	S

Level of Correlation between CO and PO: L-LOW, M-MEDIUM, S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment, Internal, Seminars

Designed By	Verified By	Approved By
Mr. S. SATHISHKUMAR	Mr.S. ARULMANI	
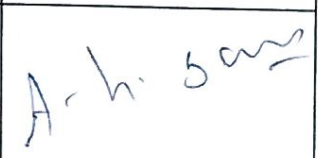
M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards ||||||||||

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELED2	BIO MEDICAL INSTRUMENTATION	GEC-EDC	II	4	2	2	-	2

Objective	To understand the fundamental principles for Measurement techniques, Imaging methods, treatment, and analysis of the most common types of Electrical medical equipment used today, and to understand the context in which these are used. An essential part of the course is to describe the Medical and physiological need for the equipment, and how these interact.

Unit	Course Content	Knowledge Levels	Sessions
I	**Bio-electric potentials, Electrodes and Clinical measurements:** Fundamental idea of cell structure-Bio-electric potentials and their origin -Resting and action potentials-Propagation of action potentials-Electrodes Clinical measurements: Measurement of blood pressure-Sphygmomanometer-Blood flow meter-Heart rate monitor.	K1-K3	9
II	**Diagnostic Instruments:** ECG-ECG recorder –Analysis of abnormal ECG waves - EEG – EEG recorder-EEG wave types-Clinical uses of EEG- EMG – ERG – Audio meter	K3-K4	9
III	**Imaging Techniques:** Recent trends Medical imaging-X rays – LASER applications-Ultra sound scanner -Echo cardiography-CT scan-MRI scan-Endoscopy-Sample and hold circuit	K3	9
IV	**Image modalities and Analysis:** Radiographic and fluoroscopic techniques -Computer tomography-Ultra sonography-Endoscopy-Thermography-Different types of Bio telemetry systems-Retinal imaging-Imaging application in Bio metric systems	K3-K4	9
V	**Bio medical Imaging systems and operation theatre Equipments:** Bio medical Imaging systems: X-Ray machine-MRI Scan-CT scan-Ultra sound scanner-Angiography- LASER in medical applications Operation Theater Equipment: Surgical Diathermy-Short wave Diathermy-Micro wave Diathermy - Ultrasonic Diathermy- Therapeutic effect of heart-Ventilators-Spiro meter-Increment Binding	K4	9
Course Outcome	CO1: Remember the human physiological systems and bio potentials	K1
	CO2: Understanding on clinical applications of medical instrumentation systems.	K2
	CO3: Calculate the temperature, pH level, blood cell counts, BP,Herat rate using instruments.	K3
	CO4: Categorize and understand and explain medical imaging, X-rays, Ultra sound scanner, CT scan, MRI scan	K4
	CO5: Analyze the medical reports using the Knowledge gained.	K5

Learning Resources

Text Books	1. R.S.Khandpur – Handbook of Biomedical Instrumentation – TATA McGraw -Hill publishing company Limited 2. M.Arumugam –Bio Medical Instrumentation – Anuradha agencies -2003
Reference Books	1. Bhuvaneshwar--Bio Medical Instrumentation- Anuradha publications 2. Leslie Cromwell, FRED J.WEIBELL and ERICH A.PFEIFFER- Bio medical Instrumentation and Measurements-Second Edition – Prentice-Hall of India
Website Link	1. https://onlinecourses.nptel.ac.in/noc22_bt56/preview 2. https://nptel.ac.in/courses/102101068

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELED2	BIO MEDICAL INSTRUMENTATION	GEC-EDC	II	4	2	2	-	2

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	M	L	M	S	M	M	L
CO2	M	M	M	L	S	M	M	M	L	S
CO3	L	M	L	M	M	L	M	L	M	M
CO4	L	L	M	M	M	L	L	M	M	M
CO5	M	M	S	S	M	M	M	S	S	M

Level of Correlation between CO and PO: **L-LOW , M-MEDIUM, S-STRONG**

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment, Internal, Seminars

Designed By	Verified By	Approved By
Mrs. P. VIJAYALAKSHMI	Mr.S. ARULMANI	

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards									
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELED3	CELLULAR PHONE SERVICING	GEC-EDC	II	4	2	2	-	2

Objective	To impart knowledge in Wireless Communication and to provide basic conceptual skills in Mobile Phone servicing, skills to enable the aspiring students to exploit mobile phone servicing and also understand the different kinds of Accessing Technology.

Unit	Course Content	Knowledge Levels	Sessions
I	**Basics of Wireless Communication:** Introduction – History of Wireless Communication – Frequency for Radio Transmission – Signals – Modulation – Wave propagation – Antennas.	K1-K2	9
II	**Multiple Access Technologies:** GSM - CDMA - GPRS - EDGE - WCDMA - UMTS - HSDPA - Satellite Phones - GPS - Mobile Browsers - WAP.	K3	9
III	**Usage of Tools:** Using Multimeter - Soldering & De soldering Normal Resistor- Speaker Testing Method- External Speaker- Buzzer Testing Method-Testing the Mic- Vibrator Motor Testing- Battery Connectors Testing.	K4	9
IV	**Problems:** LED Problems-Display Problems-Ringer Problems-Incoming Voice Not hearing problems-Outgoing Voice not send -Auto shut off Problems-Camera Not Working Problems.	K4	9
V	**Trouble Shooting:** Mobile Troubleshooting List: Ripped Keypads - Water Damages - Power Problems - Network Problems -Insert SIM Problems - Locking Problems - Charging Problems.	K4	9

Course Outcome	CO1: Outline of the Wireless communication systems.	K1
	CO2: Understand the different types of Access technology.	K2
	CO3: Use appropriate tools, spares and software updates, conduct test for repairs.	K3
	CO4: Analyze the Repair and Diagnose the Problem of all kinds of faults in Mobile Phones.	K4
	CO5: Justify the mobile cell phone faults and solve them.	K5

Learning Resources	
Text Books	1. Modern Mobile Phone Repair: Using Computer Software and Service Devices- M. Lotia, Pradeep Nair- BPB Publications.
Reference Books	1. Learn Cell Phone Repair: A Do-It-Yourself Guide To Troubleshooting and Repairing Cell phones - Mohammed Asif Azeemi 2. Mobile Phones and Tablets Repairs: A Complete Guide for Beginners and Professionals - Chukky oparandu
Website Link	1. https://onlinecourses.swayam2.ac.in/nou22_ge57/preview 2. https://www.coursera.org/learn/mobile-architecture

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title		Course Type	Sem	Hours	L	T	P	C
21M2PELED3	CELLULAR PHONE SERVICING		GEC-EDC	II	4	2	2	-	2

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	S	M	M	M	M	S	M
CO2	M	L	S	M	L	M	L	S	M	L
CO3	M	M	L	M	M	M	M	L	M	M
CO4	S	M	S	M	S	S	M	S	M	S
CO5	M	S	L	M	M	M	S	L	M	M

Level of Correlation between CO and PO: L-LOW , M-MEDIUM, S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment, Internal, Seminars

Designed By	Verified By	Approved By
Mr. S. SATHISHKUMAR	Mr.S. ARULMANI	

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards									
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELED4	INTERNET OF THINGS	GEC-EDC	II	4	4	2	-	4

Objective	To learn the basic principles of various smart sensors and apply it in IoT applications and also Train the students to build IoT systems using sensors, single board computers and open source IoT platforms.

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction to IoT:** Introduction – Design principles of IoT – IoT Architecture and protocols – IoT levels – IoT Vs M2M – Challenges in IoT design – IoT System management – Physical design – Logical design	K1-K2	9
II	**IoT Architecture:** M2M high level ETSI Architecture – IETF Architecture for IoT – OGC Architecture – IoT reference model – Domain model – Functional model – Communication model – IoT Reference architecture	K3	9
III	**The Cloud:** Cloud-to -Device connectivity – Messaging and the IoT- Device Ingress/Egress- Data normalization and protocol translation- Data consistency – Infrastructure – APIs - The topology of the cloud	K3	9
IV	**Sensors and Devices for AALL:** Devices for AAL: Introduction to AAL – Fall detection-Activity classification – Location tracking -Telemonitoring of vital-parameters- Wireless sensor networks – Behavior determination – Wearable sensors for AAL – AAL Architecture – Applications of AAL. **Sensors:** Sensors classification – Working principles of sensors – Criteria to Choose a Sensor - Generation of Sensors	K3	9
V	**Applications of IoT in Real world:** Agriculture and pest control - Environment – Smart home applications – Health care -Smart cities – Safe driving – Waste management	K4	9
Course Outcome	**CO1:** Recognize the factors that contributed to the emergence of IoT	K1
	CO2: Understand building blocks of Internet of Things and characteristics	K2
	CO3: Use real IoT protocols for communication	K3
	CO4: Illustrate the applications of IoT in real time scenario	K4
	CO5: Design and program IoT devices	K5

Learning Resources

Text Books	1. 1. Internet of Things (IoT) Technologies, Applications, Challenges and Applications - B.K.Tripathy and J.Anuradha- CRC Press Taylor and Francis group. 2. Foundational elements of an IoT solution - Joe Biron and Jonathan Follett - O'Relly media 3. The internet of things Enabling Technologies, platforms and use cases - Pethuru Raj,Anupama and C.Raman - CRC Press Taylor and Francics group.
Reference Books	1. Internet of Things - A hands -on approach- . Arshdeep Bahga, Vijay Madisetti- University press, 2015 2. Internet of Things in the cloud a middleware perspective - Pethuru Raj, Anupama C. Raman - CRC press, 2012
Website Link	1. https://www.arduino.cc/en/IoT/HomePage 2. https://swayam.gov.in/nd2_arp19_ap52/preview 3. https://opensource.com/article/17/12/how-build-custom-iot-hardware-arduino

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELED4	INTERNET OF THINGS	GEC-EDC	II	4	2	2	-	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	L	M	S	S	M	L	M	S
CO2	M	S	L	M	M	M	S	L	M	M
CO3	M	L	L	M	M	M	L	L	M	M
CO4	L	M	L	M	M	L	M	L	M	M
CO5	M	M	L	M	M	M	M	L	M	M

Level of Correlation between CO and PO: L-LOW , M-MEDIUM, S-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment, Internal, Seminars

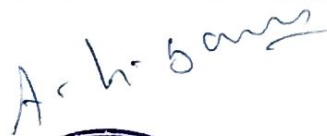| Designed By	Verified By	Approved By
Mr. S. SANTHOSH	Mr.S. ARULMANI	

M.Sc-Electronics and Communication Syllabus LOCF-CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELED5	ARTIFICIAL INTELLIGENCE	GEC-EDC	II	4	2	2	-	2

Objective	This course provides an introduction to the fundamentals of artificial intelligence. It contains a theory component about the concepts and principles that underlie modern AI algorithms, and a practice component to relate theoretical principles with practical implementation.

Unit	Course Content	Knowledge Levels	Sessions
I	**Basics of Artificial Intelligence:** Introduction to AI – The History of AI-The foundation of AI- Risk and Benefits of AI - Agents and Environments - Concept of rationality - Nature of Environments - Structure of Agents.	K1-K2	9
II	**Problem Solving:** Problem Solving Agents –Search Algorithms –Uninformed Search Strategies – Informed (Heuristic) Search Strategies –Heuristic Functions - Local Search and Optimization Problems - Local Search in Continuous Space - Search With Non-Deterministic Actions –Search in Partially Observable Environments – Online Search Agents and Unknown Environments.	K2-K4	9
III	**Adversarial search and Games:** Game theory –Optimal Decisions in Games –Alpha-Beta Search – Monte-Carlo Tree Search –Stochastic Games –Partially Observable Games - Limitation of Game Search Algorithms	K3	9
IV	**Logical Agents:** Knowledge-based Agents - Propositional Logic - Propositional Theorem Proving -Effective Propositional Model Checking – Agents Based on Propositional Logic.	K5	9
V	**Knowledge Representation & Automated Planning:** Ontological engineering –Categories and Objects –Events – Mental Objects and Modal Logic –Reasoning Systems for Categories –Reasoning with Default Information Classical Planning –Algorithms for Classical Planning – Heuristics for Planning –Hierarchical Planning –Non-Deterministic Domains –Time, Schedule, and Resources – Analysis Of Planning Approaches.	K3-K4	9

Course Outcome	CO1: Define the concept of Artificial Intelligence.	K1
	CO2: Understand and solving the problems	K2
	CO3: Apply AI techniques to real-world problems to develop intelligent systems.	K3
	CO4: Illustrate the AI techniques	K4
	CO5: Evaluate Using Predicate Logic.	K5

Learning Resources

Text Books	1. Stuart Russel and Peter Norvig, "Artificial Intelligence: A Modern Approach", Fourth Edition, Pearson Education, 2021.
Reference Books	1. 1. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007 2. 2Kevin Night, Elaine Rich, and Nair B., "Artificial Intelligence", McGraw Hill, 2008 3. Patrick H. Winston, "Artificial Intelligence", Third edition, Pearson Edition, 2006
Website Link	1. https://onlinecourses.nptel.ac.in/noc21_cs42/preview 2. https://onlinecourses.nptel.ac.in/noc21_cs79/preview

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELED5	ARTIFICIAL INTELLIGENCE	GEC-EDC	II	4	2	2	-	2

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	M	M	M	L	M	M	M
CO2	M	M	L	S	M	M	M	L	S	M
CO3	L	M	L	M	M	L	M	L	M	M
CO4	S	L	L	S	L	S	L	L	S	L
CO5	M	M	L	L	M	M	M	L	L	M

Level of Correlation between CO and PO: **L**-LOW , **M**-MEDIUM, **S**-STRONG

Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment, Internal, Seminars

Designed By	Verified By	Approved By
DR.M.KUTRALEESWARAN	Mr.S. ARULMANI	

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2PELED6	ROBOTICS	GEC-EDC	II	4	2	2	-	2
Objective	To study the fundamentals of Robotic system, Robot transformation, drivers and Robot cell design and applications							

Unit	Course Content	Knowledge Levels	Sessions
I	**Fundamentals of Robotic System:** Introduction – Definition – History - Law of robotics, Terminology of Robotics – Robot Anatomy – Robot joints and links – Types of joints - Joint Configuration of robots/Coordinate systems – Joint notation scheme – Wrist Configuration - Pitch, Yaw, Roll – End Effector - Types of robots – Specifications of Robot – Robot Classifications – Architecture of robotic systems.	K1-K3	9
II	**Robot Transformation and Sensors:** Robot kinematics-Types- 2D - 3D Transformation-Scaling – Rotation – Translation – Homogeneous coordinates – multiple transformation - Sensors in robot – Position sensor (Piezo electric sensor) - Touch sensors (Binary sensor) -Tactile sensor – Proximity and Range sensors – Robotic vision sensor-Wrist force sensor-Light sensors - Pressure sensors.	K3	9
III	**Drives and Control system for Robotics:** Objectives - open loop control - closed loop control with velocity and position feedback - robot path control – point to point – continuous path control – sensor based path control - Types of drive system - Functions of Drive system - Hydraulic drives - Pneumatic drives - Electrical drives - Servo drive.	K3	9
IV	**Robot cell design and Applications:** Robot work cell design and control-Sequence control - Operator interface - Safety monitoring devices in Robot-Mobile robot working principle - actuation using MATLAB - NXT Software Introductions-Robot applications-Material handling - Machine loading and unloading – assembly – Inspection – Welding - Spray painting and undersea robot.	K3	9
V	**Micro/ Nano Robotics System:** Micro/Nanorobotics system overview-Scaling effect-Top down and bottom up approach- Actuators of Micro/Nano robotics system-Nanorobot communication techniques-Fabrication of micro/nano grippers-Wall climbing micro robot working principles-Biomimetic robot-Swarm robot- Nanorobot in targeted drug delivery system.	K2-K3	9

	Course Content	Knowledge Levels
Course Outcome	CO1: Outline the fundamentals of robotics and its components.	K1
	CO2: Describe working principle of various sensors and program different operations.	K2
	CO3: Demonstrate knowledge of industrial robots, characteristics, end effectors and actuators.	K3
	CO4: Demonstrate and Illustrate about functionalities of Robots and Robotics.	K4
	CO5: Develop some familiarity with current research problems and research methods in AI.	K5

Learning Resources

Text Books	1. Deb .S.R, "Robotics Technology and flexible automation", Tata McGraw-Hill Education, 2009. 2. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, "Technology Programming and Applications", McGraw Hill, 2012.
Reference Books	1. 1. Janaki Raman .P.A, "Robotics and Image Processing an Introduction", Tata McGraw Hill Publishing company Ltd., 1995. 2. Carl D. Crane and Joseph Duffy, "Kinematic Analysis of Robot manipulators", Cambridge University Press, 2008.
Website Link	https://onlinecourses.nptel.ac.in/noc19_me74/preview https://onlinecourses.nptel.ac.in/noc22_de11/preview

L-Lecture, T-Tutorial, C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21MIPELED6	ROBOTICS	GEC-EDC	I	4	2	2	-	2

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	L	M	M	M	M	L
CO2	L	M	S	L	M	L	M	S	L	M
CO3	M	M	M	M	M	M	M	M	M	M
CO4	M	L	M	M	M	M	L	M	M	M
CO5	L	M	M	M	M	L	M	M	M	M

Level of Correlation between CO and PO: **L-LOW, M-MEDIUM, S-STRONG**	
Tutorial Schedule	Group discussion, Lab Visit, Problem Solving, Brain Storming & Quiz
Teaching and Learning Methods	Chalk and Talk, Visualization and Smart Class
Assessment Methods	Unit Test, Assignment, Internal, Seminars

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DR.M. KUTRALEESWARAN	Mr.S. ARULMANI	