B.Sc., ELECTRONICS AND COMMUNICATION



Program Code: UEL

2021-2022 onwards



MANNAR THIRUMALAI NAICKER COLLEGE

(AUTONOMOUS) Re-accredited with "A" Grade by NAAC

PASUMALAI, MADURAI – 625 004

Eligibility for Admission

Candidates seeking admission to the B.Sc (E&C) Degree course must have the Higher Secondary Education, (should have studied Physics or Mathematics in HSC) of the Government of Tamil Nadu or any other state or its equivalent qualification.

Subjects of Study

Part I : Tamil / Company Secretarial Practice and Modern Office Management

Part II : English

:

:

:

Part III

- 1. Core Subjects
- 2. Allied Subjects
- 3. Electives

Part IV

- 1. Non Major Electives (II Year)
- 2. Skill Based Subjects
- 3. Environmental Studies Mandatory Subject
- 4. Value Education Mandatory Subject

Part V

Extension Activities

Pattern of the question paper for the Continuous Internal Assessment Note: Duration – 1 hour

(For Part I, Part II & Part III)

The components for continuous internal assessment are:	
Part –A	
Four multiple choice questions (answer all)	4 x01= 04 Marks
Part –B	
Three short answers questions (answer all)	3 x02= 06 Marks
Part –C	
Two questions ('either or 'type)	2 x 05=10 Marks
Part –D	
Two questions out of three	1 x 10 =10 Marks
Total	30 Marks

The scheme of Examination for Part-I, II & III

 The components for continuous internal assessment are:

 (60 Marks of two continuous internal assessments will be converted to 15 marks)

 Two tests and their average
 --15 marks

 Seminar /Group discussion
 --5 marks

 Assignment
 --5 marks

 Total
 25 Marks

Pattern of the question paper for the Summative Examinations: Note: Duration- 3 hours

Part –A		
Ten multiple choice questions	10 x01	= 10 Marks
No Unit shall be omitted: not more than two questions fro	m each uni	t.)
Part –B		
Short answer questions (one question from each unit)	5 x02	= 10 Marks
Part –C		
Five Paragraph questions ('either or 'type)	5 x 05	= 25 Marks
(One question from each Unit)		
Part –D		
Three Essay questions out of five	3 x 10	=30 Marks
(One question from each Unit)		
Total		75 Marks

Part-IV- Skill Based Papers / NME:

The Scheme of Examination for Skill Based Papers: (Except Practical Lab Subjects) Pattern of the questions paper for the continuous Internal Assessment

45 MCQs will be asked for each internal assessment tests (45 x 1=45 Marks) **and converted for 15 marks**

The components for continuous internal assessment are:

Two tests and their average	15 marks
Seminar /Group discussion	5 marks
Assignment	5 marks
Total	25 Marks

Summative Examination Pattern

Pattern of the Question Paper for Skill Based Papers (External)

75 Multiple choice questions will be asked from five units (75 x 1=75 Marks)

(15MCQ's from each unit)

Part-IV- Environmental Studies and Value Education

The Scheme of Examination (Environmental Studies and Value Education)

Two tests and their average	15 marks
Project Report	10 marks*
Total	25 marks

* The students as Individual or Group must visit a local area to document environmental assets – river / forest / grassland / hill / mountain – visit a local polluted site – urban / rural / industrial / agricultural – study of common plants, insects, birds – study of simple ecosystem – pond, river, hill slopes, etc.

Question Paper Pattern

(Internal Assessment)

Pattern of the Question Paper for Environmental Studies & Value Education only) (Internal)

45 MCQs will be asked for each internal assessment tests (45 x 1=45 Marks) **and converted for 15 marks**

	Total	25 Marks
Project		 10 marks
Two tests and their average		 15 marks

Summative Examination Pattern

Pattern of the Question Paper for Environmental Studies & Value Education only) (External)

75 Multiple choice questions will be asked from five units (75 x 1=75 Marks)

(15MCQ's from each unit)

Part V Extension Activities: (Maximum Marks: 100)

- 1. NCC
- 2. NSS
- 3. Physical Education
- 4. YRC
- 5. RRC
- 6. Health & Fitness Club
- 7. Eco Club
- 8. Human Rights Club

Pattern of the Question Paper for (Internal Examination & Summative Examination)

Internal Examinations- - 40 MarksSummative Examinations- - 60 Marks

100

Minimum Marks for a Pass

40% of the aggregate (Internal +Summative Examinations). No separate pass minimum for the Internal Examinations.

27 marks out of 75 is the pass minimum for the Summative Examinations.

Vision

To equip the students to increase their practical skills

Mission

To enhance the students to be technical in par with the industry

The 12 Graduate Attributes*:

- 1. (KB) A knowledge base for engineering: Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.
- 2. (PA) Problem analysis: An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions
- 3. (Inv.) Investigation: An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions.
- 4. (Des.) Design: An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
- 5. (Tools) Use of engineering tools: An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.
- 6. (Team) Individual and teamwork: An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.
- 7. (Comm.) Communication skills: An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.
- 8. (Prof.) Professionalism: An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.
- 9. (Impacts) Impact of engineering on society and the environment: An ability to analyze social and environmental aspects of engineering activities. Such ability includes an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such

interactions; and the concepts of sustainable design and development and environmental stewardship.

- 10. (Ethics) Ethics and equity: An ability to apply professional ethics, accountability, and equity.
- 11. (Econ.) Economics and project management: An ability to appropriately incorporate economics and business practices including project, risk, and change management into the practice of engineering and to understand their limitations.
- 12. (LL) Life-long learning: An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge

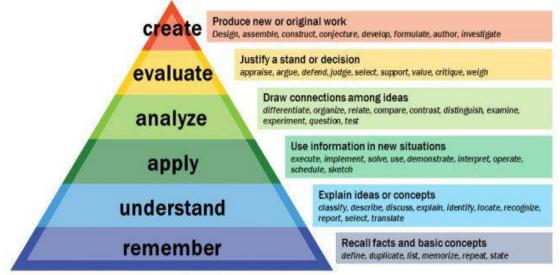
WA	Graduate Attributes	Caption as
WA1	A knowledge base for Electronic Science: Provide graduates with a strong foundation in Electronics domain and to enable them to devise and deliver efficient solutions to challenging problems in Electronics, Communications and allied disciplines.	Knowledge Base
WA2	Problem Analysis: Identify, formulate, r view research literature and analyze complex technical problems reaching substantiated conclusion using principles of Mathematics and Electronic Sciences	Problem Analysis
WA3	Use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions	Investigatio n
WA5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern tools including prediction and modeling to complex technical activities with an understanding of the limitations.	Use of modern tools
WA9	Individual and team work: Function effectively as an individual nd as a member or leader in diverse teams, and in multidisciplinary fields.	Individual and team work
WA12	Life-Long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological changes.	Life-Long learning

PROGE	RAM EDUCATIONAL OBJECTIVES (PEOs)
PEO1:	To prepare Graduates with sound foundation in fundamentals of basic sciences and to assist them exhibit strong, independent learning, analytical & problem solving skills in Electronics and Communication.
PEO2:	To facilitate learning in the core field of Electronics and Communication so as to integrate technological progression and hardware skills to produce high impact, energy efficient and cost effective solutions.
PEO3:	To prepare Graduates to effectively use modern equipments and software tools to solve disciplinary problems that are technically sound, economically feasible and social acceptable
PEO4:	To assist and enable individuals acquire skills to life-long learning in the field of Electronics and Communication and innovations so as to have progressive careers as Application Engineers or Entrepreneurs.
PEO5:	To inculcate professional and ethical attitude, team spirit, leadership qualities and effective communication skills in Graduates and to make them aware of their social responsibilities.
PEO6:	Develop attitude in lifelong learning, applying and adapting new ideas and technologies as their field evolves.

PO NO	PROGRAMME OUTCOMES (POs)	
At the end	l of the programme, the students will be able to	
PO – 1	Demonstrate the knowledge and understanding of Science concepts and its relevant fields.	Disciplinary Knowledge
PO – 2	Identify, formulate, analyse complex problems and reach valid conclusions using the methodologies of Science.	Problem Solving
PO – 3	Employ critical and analytical thinking in understanding the concepts and apply them in various problems appearing in different branches of Science.	Analytical Reasoning & Critical Thinking
PO - 4	Communicate the known concepts effectively within the profession and with any forum	Communication Skills
PO - 5	Function successfully as a member/leader in any team and to apply ethics, accountability and equity in their life.	Team Work and Moral/Ethical Awareness
PO - 6	Use ICT tools in various learning situations, related information sources, suitable software to analyze data and furthermore participating in learning activities throughout life to meet the demands of work place through knowledge /up-skilling / re-skilling	Digital Literacy & Life-long Learning

	PROGRAM SPECIFIC OUTCOME (PSOs)				
	Connect learning from Core and Disciplinary/Interdisciplinary elective courses of				
PSO1:	Electronics and Communication Science to assimilate technological advancements				
	in the field for designing suppresses to arrive at the solution to societal problems.				
	Acquire hardware and software skills pertinent to industry practices in the field of				
PSO2:	Electronics & Communication Science while acquiring soft skills like persistence,				
	proper solutions through projects and industrial interactions.				
	Ability to identify indigenous processes and components for producing high quality,				
PSO3:	compact, energy efficient and eco-friendly solutions at cost effective prices for				
	existing and new applications related to Electronics & Communication industry.				
PSO4:	Focus on acquiring right knowledge of aptitude and attitude so as to be a candidate				
1504.	of best choice for higher education, placements or to become an Energetic and technical Entrepreneur in the society.				
PSO5:	Graduates will be able to apply fundamentals of electronics in various domains of				
1505.	analog and digital systems.				
PSO6:	Use embedded system concepts for developing IoT applications				

Bloom's Taxonomy



Vanderbilt University Center for Teaching

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS), MADURAI

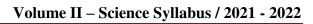
B.Sc ELECTRONICS AND COMMUNICATION. CURRICULUM

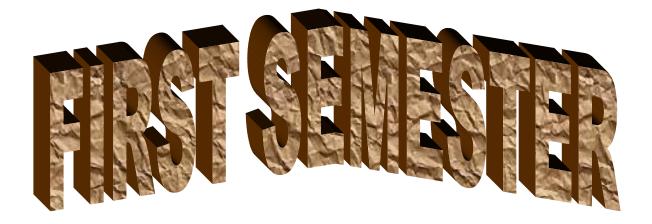
(For the student admitted during the academic year 2021-2022 onwards)

Course	Title of the Course	Hrs	Cre	Max	kimum M	larks
Code			dits	Int	Ext	Total
	FIRST SEMES	TER				
Part – I	Tamil / Alternative Course					
21UTAG11	இக்காலக் கவிதையும் நாடகமும்	6	3	25	75	100
Part – II	English					
21UENG11	Communicative English – I	6	3	25	75	100
Part - III	Core Courses		_			
21UELC11	Semiconductor Devices	5	5	25	75	100
21UELCP1	Electronics-I Lab	4	2	40	60	100
Part III	Allied Course					
21UELA11	Basic Electricity and circuits	5	5	25	75	100
Part IV	Skill Based Course					
21UELS11	Electronic Instrumentation	2	2	25	75	100
Part IV	Mandatory Course					
21UEVG11	Environmental Studies	2	2	25	75	100
	Total	30	22	190	510	700
	SECOND SEME	STER		•		•
Part – I	Tamil / Alternative Course					
21UTAG21	இடைக்கால இலக்கியமும் சிறுகதையும்	6	3	25	75	100
Part – II	English					
21UENG21	Communicative English - II	6	3	25	75	100
Part – III	Core Courses					
21UELC21	Electronic Circuits	5	5	25	75	100
21UELCP2	Electronics-II Lab	4	2	40	60	100
Part III	Allied Course					
21UELA21	Probability and Statistics	5	4	25	75	100
Part IV	Skill Based Course					
21UELS21	Electronic Communication Systems	2	2	25	75	100
Part IV	Mandatory Course					
21UVLG21	Value Education	2	2	25	75	100
	Total	30	21	190	510	700

Course	Tide of the Course	IJma	Creadita	Maximum N		Marks
Code	Title of the Course	Hrs	Credits	Int	Ext	Total
	THIRD SEMES	TER				
Part – I	Tamil / Alternative Course					
21UTAG31	காப்பிய இலக்கியமும்	6	3	25	75	100
	உரைநடையும்					
Part – II	English					
21UENG31	Communicative English – III	6	3	25	75	100
Part - III	Core Courses					
21UELC31	Digital Electronics	5	5	25	75	100
21UELCP3	Digital Electronics Lab	4	2	40	60	100
Part III	Allied Course					
21UCSA31	Programming in C	5	5	25	75	100
Part IV	Skill Based Course					
21UELS31	Computer Oriented Office Automation	2	2	25	75	100
Part IV	Non-Major Elective Course					
21UELN31	Basic Electronics	2	2	25	75	100
	Total	30	22	190	510	700
	FOURTH SEME	STER				
Part – I	Tamil / Alternative Course					
21UTAG41	பண்டைய இலக்கியமும் புதினமும்	6	3	25	75	100
Part – II	English					
21UENG41	Communicative English - IV	6	3	25	75	100
Part - III	Core Courses					
21UELC41	Linear Integrated Circuits	5	5	25	75	100
21UELCP4	Linear Integrated Circuits Lab	4	3	40	60	100
Part III	Allied Course					
21UMCA42	Numerical Aptitude	5	5	25	75	100
Part IV	Skill Based Course					
21UELS41	Fiber Optic Communication Systems	2	2	25	75	100
Part IV	Non-Major Elective Course					
21UELN41	Electronics in Everyday life	2	2	25	75	100
Part V	Extension Activities					
21UEAG40						
-	NSS, NCC, YRC	-	1	40	60	100
21UEAG49						
	Total	30	24	230	570	800

	FIFTH SEMEST	ER					
Part - III	Core Courses						
21UELC51	Microprocessor Interfacing and Its Applications	6	5	25	75	100	
21UELC52	Communication Systems	6	5	25	75	100	
21UELCP5	Microprocessor and Interfacing Lab	3	2	40	60	100	
21UELCP6	Communication Lab.	3	2	40	60	100	
Part III	Core Elective - I						
21UELE51	Microwave and Radar systems						
21UELE52	Internet of Things	5	5	25	75	100	
21UELE53							
Part III	Core Elective - II						
21UELE54	Power Electronics						
21UELE55	PCB design and Fabrication	5	5	25	75	100	
21UELE56	Programmable Logic Controller	5	5	23	15	100	
Part IV	Skill Based Course						
21UELS51	Bio-Medical Instrumentation	2	2	25	75	100	
	Total	30	26	205	495	700	
	SIXTH SEMEST	ER					
Part - III	Core Courses						
21UELC61	8051 Microcontroller and Embedded systems	6	5	25	75	100	
21UELPR1	Project and Viva - Voce	6	4	25	75	100	
21UELCP7	8051 Microcontroller and Embedded Systems Lab	3	2	40	60	100	
21UELCP8	Sensors and Transducer Lab	3	2	40	60	100	
Part III	Core Elective - I						
21UELE61	Satellite Communication						
21UELE62	Digital Signal Processing	5	5	25	75	100	
21UELE63	Robotics						
Part III	Core Elective - II						
21UELE64	VLSI design						
21UELE65	Modern Television Engineering	5 5	5 5	5 5	5 5 25 7	75	100
21UELE66	Sensors and Measurements						
Part IV	Skill Based Course						
21UELS61	Computer Network	2	2	25	75	100	
	Total	30	25	205	495	700	
	Grand Total	180	140	1210	3090	4300	







MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	SEMICONDUCTOR I	DEVI	ICES					
Course Code	21UELC11			L P C				
Category	Core			5 - 5				
Nature of course	EMPLOYABILITY	✓	SKILL ORIENTED	ENTREPRENURSHIP				
Course Objectiv	/es:							
			s, their characteristics and	d applications.				
	d analysis and design of		-					
	transistor working princ	-						
-		-	nd applications of FET, U	JT & Optoelect	ronic I	Jevic	es	
	electronic circuits based of Junction Diada	n the	e semiconducting devices.			15		
	Junction Diode	n in	Insulator - Semiconduc	tor Conductor	Inte			
			e – N Type Semiconduct					
	d Bias - Reverse Bias C	• •	• -	ior - Pormation	OI FIN	June	uon	
	ecial Diodes	Jiiuii				15	5	
	VI Characteristics –	Brea	kdown - Backward Die	ode – Varactor	D: 1			
Lener Diode					1000	e - 1	Sten	
Recovery Diode							-	
•	e - Point Contact Diode		hcottkey Diode - Tunnel				-	
Diode - PIN Die	e - Point Contact Diode ode - PNPN Diode.	- SI					patt	
Diode - PIN Die Unit: III Bip	e - Point Contact Diode ode - PNPN Diode. polar Junction Transist	- Sl	hcottkey Diode - Tunnel	Diode - Gunn I	Diode	– Im	patt	
Diode - PIN DieUnit: IIIBipIntroductionTe	e - Point Contact Diode ode - PNPN Diode. olar Junction Transist o Bipolar Junction Tran	- Sl t or nsiste	hcottkey Diode - Tunnel or – Construction - Trai	Diode - Gunn I	Diode	– Im 15 ration	patt	
Diode - PIN DiaUnit: IIIBipIntroductionToNPN and PNP	e - Point Contact Diode ode - PNPN Diode. olar Junction Transist o Bipolar Junction Tran Transistor - CB, CE &	or cor nsiste	hcottkey Diode - Tunnel	Diode - Gunn I nsistor Biasing bility - Load Lin	Diode - Ope ne - M	– Im 15 ration letho	patt	
Diode - PIN DiaUnit: IIIBipIntroductionToNPN and PNP	e - Point Contact Diode ode - PNPN Diode. Dolar Junction Transist D Bipolar Junction Tran Transistor - CB, CE & Bias - Collector to B	or cor nsiste	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal	Diode - Gunn I nsistor Biasing bility - Load Lin	Diode - Ope ne - M	– Im 15 ration letho	patt	
Diode - PIN DiaUnit: IIIBipIntroductionToNPN and PNPBiasing:FixedThermal runway	e - Point Contact Diode ode - PNPN Diode. Dolar Junction Transist D Bipolar Junction Tran Transistor - CB, CE & Bias - Collector to B	or cor nsiste	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal	Diode - Gunn I nsistor Biasing bility - Load Lin	Diode - Ope ne - M	– Im 15 ration letho	patt	
Diode - PIN DiaUnit: IIIBigIntroductionToNPN andPNPBiasing: $Fixed$ Thermal runwayUnit: IVUnit: IVFEIntroductionto	e - Point Contact Diode ode - PNPN Diode. Dolar Junction Transist D Bipolar Junction Trans Transistor - CB, CE & Bias - Collector to B y-HeatSink. T and UJT FET - Construction at	tor cor nsiste CC (ase] nd C	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal Bias - Voltage Divider	Diode - Gunn I nsistor Biasing bility - Load Lin Bias – Bias C JFET - Drain (Diode - Ope ne - M omper Charac	- Im 15 ration lethousatio 15 tterist	patt n of d of on – tics-	
Diode - PIN DiaUnit: IIIBigIntroductionToNPN and PNP Biasing: FixedThermal runwayUnit: IVFEIntroductiontoComparisonof	e - Point Contact Diode ode - PNPN Diode. olar Junction Transist D Bipolar Junction Tran Transistor - CB, CE & Bias - Collector to B y-HeatSink. T and UJT FET - Construction an JFET &BJT - Introdu	a - Sl cor nsisto CC (ase 1 nd C ction	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal Bias - Voltage Divider Operation of N-Channel n to MOSFET - Enhand	Diode - Gunn I nsistor Biasing bility - Load Lin Bias – Bias C JFET - Drain G cement MOSFE	Diode - Ope ne - M omper Charac T – I	- Im 15 ration lethous isatio 15 eterist Deple	patt n of d of on – tics- tion	
Diode - PIN DiaUnit: IIIBigIntroductionToNPN andPNPBiasing:FixedThermal runwayIntroductionUnit: IVFEIntroductiontoComparisonofMOSFETFE	e - Point Contact Diode ode - PNPN Diode. olar Junction Transisto Dipolar Junction Transisto Transistor - CB, CE & Bias - Collector to B y-HeatSink. T and UJT FET - Construction and JFET &BJT - Introdu T as a Voltage Variabl	a - Sl cor nsisto CC (ase 1 nd C ction	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal Bias - Voltage Divider	Diode - Gunn I nsistor Biasing bility - Load Lin Bias – Bias C JFET - Drain G cement MOSFE	Diode - Ope ne - M omper Charac T – I	- Im 15 ration lethous isatio 15 eterist Deple	patt n of d of m – tics- tion	
Diode - PIN DiaUnit: IIIBigIntroductionToNPN and PNP Biasing: $Fixed$ Thermal runwayIntroductionUnit: IVFEIntroductiontoComparisonofMOSFETFEUJT as a Relaxa	e - Point Contact Diode ode - PNPN Diode. Dolar Junction Transist Dipolar Junction Transistor - CB, CE & Bias - Collector to B y-HeatSink. T and UJT FET - Construction and JFET & BJT - Introdu T as a Voltage Variabl ation Oscillator.	a - Sl cor nsisto CC (ase 1 nd C ction	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal Bias - Voltage Divider Operation of N-Channel n to MOSFET - Enhand	Diode - Gunn I nsistor Biasing bility - Load Lin Bias – Bias C JFET - Drain G cement MOSFE	Diode - Ope ne - M omper Charac T – I	– Im 15 ration letho nsatio 15 eteristic Deple	patt n of d of on – tics- tion cs –	
Diode - PIN DiaUnit: IIIBigIntroductionToNPN and $\mathbb{P}N^{\mathbb{P}}$ Biasing: $\mathbb{F} \times \mathbb{C}$ Thermal runar \mathbb{C} Unit: IVFEIntroductiontoComparisonofMOSFETFEUJT as a $\mathbb{R} \times \mathbb{C}$ Unit: VOp	e - Point Contact Diode ode - PNPN Diode. olar Junction Transist o Bipolar Junction Tran Transistor - CB, CE & Bias - Collector to B y-HeatSink. T and UJT FET - Construction at JFET &BJT - Introdu T as a Voltage Variabl ation Oscillator. toelectronic Devices	a - Sl cor cor cC (ase 1 nd C ction e Re	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal Bias - Voltage Divider Operation of N-Channel n to MOSFET - Enhance esistor(VVR) - Introducti	Diode - Gunn I nsistor Biasing bility - Load Lin Bias – Bias C JFET - Drain C cement MOSFE ion to UJT – Cl	Diode - Ope ne - M omper Charac T – I haract	- Im 15 ration lethoo sation 15 terist Deple eristion 15	patt n of d of m – tics- tion cs –	
Diode - PIN DiaUnit: IIIBigIntroductionToNPN and $\mathbb{P}N$ Biasing: FixedThermal runwayUnit: IVFEIntroductiontoComparisonofMOSFETFEUJT as a RelaxaUnit: VOpPrinciples, Oper	e - Point Contact Diode ode - PNPN Diode. Dolar Junction Transist Dipolar Junction Transist Dipolar Junction Transistor - CB, CE & Bias - Collector to B y-HeatSink. T and UJT FET - Construction and JFET &BJT - Introdu T as a Voltage Variabl ation Oscillator. toelectronic Devices ration And Characteristic	a - Sl cor nsiste CC (ase 1 nd C ction e Re cs of	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal Bias - Voltage Divider Operation of N-Channel n to MOSFET - Enhance esistor(VVR) - Introduction	Diode - Gunn I nsistor Biasing bility - Load Lin Bias – Bias C JFET - Drain C cement MOSFE ion to UJT – Cl : LDR – Photo I	Diode - Ope ne - M omper Charact T – I haracte Diode -	- Im ration lethoonsation 15 teristic Deple eristic 15 - Pho	5 n of d of of n – 5 tics-tion cs – 5 to	
Diode - PIN DiaUnit: IIIBigIntroductionToNPN and $\mathbb{P}N$ Biasing: FixedThermal runkaUnit: IVFEIntroductiontoComparisonofMOSFETFEUJT as a RelaxaUnit: VOpPrinciples, OpenTransistorPho	e - Point Contact Diode ode - PNPN Diode. olar Junction Transist D Bipolar Junction Tran Transistor - CB, CE & Bias - Collector to B y-HeatSink. T and UJT FET - Construction and JFET &BJT - Introdu T as a Voltage Variable ation Oscillator. toelectronic Devices ration And Characteristic oto Voltaic Cell – Solar	a - Sl cor nsiste CC (ase 1 nd C ction e Re cs of	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal Bias - Voltage Divider Operation of N-Channel n to MOSFET - Enhance esistor(VVR) - Introducti	Diode - Gunn I nsistor Biasing bility - Load Lin Bias – Bias C JFET - Drain C cement MOSFE ion to UJT – Cl : LDR – Photo I	Diode - Ope ne - M omper Charact T – I haracte Diode -	- Im ration lethoonsation 15 teristic Deple eristic 15 - Pho	5 n of d of of n – 5 tics-tion cs – 5 to	
Diode - PIN DiaUnit: IIIBigIntroductionToNPN and $\mathbb{P}N$ Biasing: FixedThermal runkaUnit: IVFEIntroductiontoComparisonofMOSFETFEUJT as a RelaxaUnit: VOpPrinciples, OpenTransistorPho	e - Point Contact Diode ode - PNPN Diode. Dolar Junction Transist Dipolar Junction Transist Dipolar Junction Transistor - CB, CE & Bias - Collector to B y-HeatSink. T and UJT FET - Construction and JFET &BJT - Introdu T as a Voltage Variabl ation Oscillator. toelectronic Devices ration And Characteristic	a - Sl cor nsiste CC (ase 1 nd C ction e Re cs of	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal Bias - Voltage Divider Operation of N-Channel n to MOSFET - Enhance esistor(VVR) - Introduction f Optoelectronic Devices – Photo Emissive Sensor	Diode - Gunn I nsistor Biasing bility - Load Lin Bias – Bias C JFET - Drain C cement MOSFE ion to UJT – Cl : LDR – Photo I rs – Photo Multi	Diode - Ope ne - M omper Charact T – I haracte Diode - plier -	Im	n of d of n – tics- tics- to D –	
Diode - PIN DiaUnit: IIIBigIntroductionToNPN and $\mathbb{P}NP$ Biasing: $\mathbb{F}x$ Biasing: $\mathbb{F}x$ Thermal runwayIntroductionUnit: IVFEIntroductiontoComparisonofMOSFET- FEUJT as a RelaxaUnit: VUnit: VOpPrinciples,OperTransistor- PhoIR Emitter- LO	e - Point Contact Diode ode - PNPN Diode. olar Junction Transist o Bipolar Junction Tran Transistor - CB, CE & Bias - Collector to B y-HeatSink. T and UJT FET - Construction an JFET &BJT - Introdu T as a Voltage Variabl ation Oscillator. toelectronic Devices ration And Characteristi oto Voltaic Cell – Solar CD – Optocouplers	a - Sl cor nsiste CC (ase 1 nd C ction e Re cs of	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal Bias - Voltage Divider Operation of N-Channel n to MOSFET - Enhance esistor(VVR) - Introduction f Optoelectronic Devices – Photo Emissive Sensor	Diode - Gunn I nsistor Biasing bility - Load Lin Bias – Bias C JFET - Drain C cement MOSFE ion to UJT – Cl : LDR – Photo I	Diode - Ope ne - M omper Charact T – I haracte Diode - plier -	- Im ration lethoonsation 15 teristic Deple eristic 15 - Pho	in of of of of of of of of of of of of of o	
Diode - PIN DiaUnit: IIIBigIntroductionToNPN andPNPBiasing:FixedThermal runwayIntroductionUnit: IVFEIntroductiontoComparisonofMOSFETFEUJT as a RelaxaUnit: VOpPrinciples, OperTransistorPhoIR EmitterLOBooks for Study	e - Point Contact Diode ode - PNPN Diode. olar Junction Transist o Bipolar Junction Tran Transistor - CB, CE & Bias - Collector to B y-HeatSink. T and UJT FET - Construction at JFET &BJT - Introdu T as a Voltage Variabl ation Oscillator. toelectronic Devices ration And Characteristi oto Voltaic Cell – Solar CD – Optocouplers	a - Sl cor nsisto CC (ase 1 nd C ction e Re cs of Cell	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal Bias - Voltage Divider Operation of N-Channel n to MOSFET - Enhance esistor(VVR) - Introduction f Optoelectronic Devices: – Photo Emissive Sensor	Diode - Gunn I nsistor Biasing bility - Load Lin Bias – Bias C JFET - Drain (cement MOSFE ion to UJT – Cl : LDR – Photo I rs – Photo Multi otal Lecture Ho	Diode - Ope ne - M omper Charactor T - I haractor Diode - plier - Durs	Im International structure in the second str	n of d of m – tics- tion cs – to D – rs	
Diode - PIN DiaUnit: IIIBigIntroductionToNPN and PNP Biasing: FixedThermal runvarUnit: IVFEIntroductiontoComparisonofMOSFETFEUJT as a RelaxaUnit: VOpPrinciples, OperTransistorPhoIR EmitterLOBooks for Stud1.S. Salivahar	e - Point Contact Diode ode - PNPN Diode. olar Junction Transist D Bipolar Junction Tran Transistor - CB, CE & Bias - Collector to B y-HeatSink. T and UJT FET - Construction and JFET &BJT - Introdu T as a Voltage Variable ation Oscillator. toelectronic Devices ration And Characteristic oto Voltaic Cell – Solar CD – Optocouplers ly: nan, N. Suresh Kumar,	A. V	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal Bias - Voltage Divider Operation of N-Channel n to MOSFET - Enhance esistor(VVR) - Introduction f Optoelectronic Devices: – Photo Emissive Sensor Take Vallavaraj, "Electronics	Diode - Gunn I nsistor Biasing bility - Load Lin Bias – Bias C JFET - Drain C cement MOSFE ion to UJT – Cl : LDR – Photo I rs – Photo Multi otal Lecture Ho Devices And C	Diode - Ope ne - M omper Charactor T - I haractor Diode - plier - Durs	Im International structure in the second str	n of d of m – tics- tion cs – to D – rs	
Diode - PIN DiaUnit: IIIBigIntroductionToNPN and PNPBiasing: FixedThermal runwayUnit: IVFEIntroductiontoComparisonofMOSFET - FEUJT as a RelaxaUnit: VOpPrinciples, OperTransistor - PhoIR Emitter - LOBooks for Stude1.S. SalivaharMcGraw Hit	e - Point Contact Diode ode - PNPN Diode. olar Junction Transist o Bipolar Junction Tran Transistor - CB, CE & Bias - Collector to B y-HeatSink. T and UJT FET - Construction at JFET &BJT - Introdu T as a Voltage Variabl ation Oscillator. toelectronic Devices ration And Characteristi oto Voltaic Cell – Solar CD – Optocouplers ly: nan, N. Suresh Kumar, ill Publishing Company	a - Sl asisto CC (ase 1 ase 1 ase 1 ase 1 ase 1 ase 1 ase 1 A. V	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal Bias - Voltage Divider Operation of N-Channel n to MOSFET - Enhance esistor(VVR) - Introduction f Optoelectronic Devices: – Photo Emissive Sensor To Vallavaraj, "Electronics ited, New Delhi, 8th edition	Diode - Gunn I nsistor Biasing bility - Load Lin Bias – Bias C JFET - Drain C cement MOSFE ion to UJT – Cl : LDR – Photo I rs – Photo Multi otal Lecture Ho ion.	Diode - Ope he - Momper Charactor Charactor Diode - plier - Diode - plier - Circui	- Im 15 ration lethoo sation 15 teristic 20 15 - Pho - LEI 75Hn ts", 5	in of d of on – tics- tion cs – to D – rs	
Diode - PIN DiaUnit: IIIBigIntroductionToNPN andPNPBiasing:FixedThermal runwayIntroductionUnit: IVFEIntroductiontoComparisonofMOSFET- FEUJT as a RelaxaUnit: VOpPrinciples, OperTransistor- PhoIR Emitter- LOBooks for Stud1.S. SalivaharMcGraw Hi2.B. L. Thera	e - Point Contact Diode ode - PNPN Diode. polar Junction Transist D Bipolar Junction Transistor - CB, CE & Bias - Collector to B y-HeatSink. T and UJT FET - Construction and JFET &BJT - Introdu T as a Voltage Variable ation Oscillator. toelectronic Devices ration And Characteristic oto Voltaic Cell – Solar CD – Optocouplers ly: nan, N. Suresh Kumar, ill Publishing Company ja, "Basic Electronics –	a - Sl asisto CC (ase 1 ase 1 ase 1 ase 1 ase 1 ase 1 ase 1 A. V	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal Bias - Voltage Divider Operation of N-Channel n to MOSFET - Enhance esistor(VVR) - Introduction f Optoelectronic Devices: – Photo Emissive Sensor Take Vallavaraj, "Electronics	Diode - Gunn I nsistor Biasing bility - Load Lin Bias – Bias C JFET - Drain C cement MOSFE ion to UJT – Cl : LDR – Photo I rs – Photo Multi otal Lecture Ho ion.	Diode - Ope he - Momper Charactor Charactor Diode - plier - Diode - plier - Circui	- Im 15 ration lethoo sation 15 teristic 20 15 - Pho - LEI 75Hn ts", 5	in of of of on – tics- tics- tion cs – to D – rs	
Diode - PIN DiaUnit: IIIBigIntroductionToNPN and PNPBiasing: FixedThermal runwayUnit: IVFEIntroductiontoComparisonofMOSFETFEUJT as a RelaxaUnit: VOpPrinciples, OperTransistorPhoIR EmitterLOPIR EmitterLOP1.S. SalivaharMcGraw Hii2.2.B. L. TheraBooks for Kefe	e - Point Contact Diode ode - PNPN Diode. olar Junction Transist D Bipolar Junction Tran Transistor - CB, CE & Bias - Collector to B y-HeatSink. T and UJT FET - Construction at JFET &BJT - Introdu T as a Voltage Variabl ation Oscillator. toelectronic Devices ration And Characteristic oto Voltaic Cell – Solar CD – Optocouplers ly: nan, N. Suresh Kumar, ill Publishing Company ja, "Basic Electronics – erences:	a - SI siste CC (ase 1 ase 1 nd C ction e Re cs of Cell A. V Limi - Sol	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal Bias - Voltage Divider Operation of N-Channel n to MOSFET - Enhance esistor(VVR) - Introduction f Optoelectronic Devices: – Photo Emissive Sensor Take Vallavaraj, "Electronics ited, New Delhi, 8th edition ited State Devices" , S.Cha	Diode - Gunn I nsistor Biasing bility - Load Lin Bias – Bias C JFET - Drain C cement MOSFE ion to UJT – Cl : LDR – Photo I rs – Photo Multi otal Lecture Ho ion. and&Company I	Diode - Ope ne - M omper Charact T - I haract Diode - plier - Diode - circui Ltd. 20	Im Im Internation Internati	in of d of on – tics- tion cs – to D – rs	
Diode - PIN DiaUnit: IIIBigIntroductionToNPN and PNPBiasing: FixedThermal runvarUnit: IVFEIntroductiontoComparisonofMOSFETFEUJT as a RelaxaUnit: VOpPrinciples, OperTransistorPhoIR EmitterLOPIR EmitterLOPI.S. SalivahaMcGraw Hi2.B. L. TheraBooks for Kefe1.V. K. Mehta	e - Point Contact Diode ode - PNPN Diode. olar Junction Transist D Bipolar Junction Transistor - CB, CE & Bias - Collector to B y-HeatSink. T and UJT FET - Construction and JFET &BJT - Introdu T as a Voltage Variable ation Oscillator. toelectronic Devices ration And Characteristic oto Voltaic Cell – Solar CD – Optocouplers ly: nan, N. Suresh Kumar, ill Publishing Company ja, "Basic Electronics – erences: a, Principles of Electron	A. V Limi	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal Bias - Voltage Divider Operation of N-Channel n to MOSFET - Enhance esistor(VVR) - Introduction f Optoelectronic Devices – Photo Emissive Sensor To Vallavaraj, "Electronics ited, New Delhi, 8th editi id State Devices", S.Chand S.Chand publications, De	Diode - Gunn I nsistor Biasing bility - Load Lin Bias – Bias C JFET - Drain C cement MOSFE ion to UJT – C : LDR – Photo I rs – Photo Multi otal Lecture Ho ion. and&Company I	Diode - Ope ne - M omper Charact T - I haract Diode - plier - Durs Circui Ltd. 20 tion20	- Im 15 ration lethod isation 15 cterist Deple eristic 15 Pho LEI 75Hn ts", 1 00 000.	n of d of n – tics- tion cs – to D – rs	
Diode - PIN DiaUnit: IIIBigIntroductionToNPN and PNPBiasing: FixedThermal runvarUnit: IVFEIntroductiontoComparisonofMOSFETFEUJT as a RelaxaUnit: VOpPrinciples, OperTransistorPhoIR EmitterLOPIR EmitterLOPI.S. SalivahaMcGraw Hi2.B. L. TheraBooks for Kefe1.V. K. Mehta	e - Point Contact Diode ode - PNPN Diode. olar Junction Transist D Bipolar Junction Tran Transistor - CB, CE & Bias - Collector to B y-HeatSink. T and UJT FET - Construction and JFET &BJT - Introdu T as a Voltage Variable ation Oscillator. toelectronic Devices ration And Characteristic oto Voltaic Cell – Solar CD – Optocouplers Hy: nan, N. Suresh Kumar, ill Publishing Company ja, "Basic Electronics – erences: a, Principles of Electron Applied Electronics, S	A. V Limi	hcottkey Diode - Tunnel or – Construction - Tran Configuration - Bias Stal Bias - Voltage Divider Operation of N-Channel n to MOSFET - Enhance esistor(VVR) - Introduction f Optoelectronic Devices: – Photo Emissive Sensor Take Vallavaraj, "Electronics ited, New Delhi, 8th edition ited State Devices" , S.Cha	Diode - Gunn I nsistor Biasing bility - Load Lin Bias – Bias C JFET - Drain C cement MOSFE ion to UJT – C : LDR – Photo I rs – Photo Multi otal Lecture Ho ion. and&Company I	Diode - Ope ne - M omper Charact T - I haract Diode - plier - Durs Circui Ltd. 20 tion20	- Im 15 ration lethod isation 15 cterist Deple eristic 15 Pho LEI 75Hn ts", 1 00 000.	n of d of n – tics- tion cs – to D – rs	

2. <u>h</u>	ttps://nptel.ac.in/courses/108/108/108108122/ ttps://nptel.ac.in/courses/108/108/108108112/ ttps://nptel.ac.in/courses/115/102/115102103/	
	se Outcomes	K Level
On th	e successful completion of the course, student will be able to:	
CO1	Explain the structure of the basic Semiconductor Devices	Up to K1
CO2	Understand the characteristics, operations and application of Diodes and Special Diodes	Up to K2
CO3	Understand the characteristics and operations of Transistors	Up to K3
CO4	Understand the characteristics and operations of FET and UJT	Up to K4
CO5	Usage and working of Optoelectronic Devices.	Up to K5

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	1	3	2
CO 2	1	1	1	1	2	3
CO 3	2	2	3	2	2	2
CO 4	2	1	1	1	2	3
CO5	1	2	3	2	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	PN Junction DiodeEnergy Band Structure and Conduction in Insulator -Semiconductor, Conductor - Intrinsic and Extrinsic Semiconductor -Doping - P Type - N Type Semiconductor - Formation of PNJunction Diode - Forward Bias - Reverse Bias Condition -Characteristics.	15	Chalk & Talk
II	Special Diodes Zener Diode - VI Characteristics – Breakdown - Backward Diode – Varactor Diode - Step Recovery Diode - Point Contact Diode - Shcottkey Diode - Tunnel Diode - Gunn Diode – Impatt Diode - PIN Diode - PNPN Diode	15	Chalk & Talk
Ш	BJT Introduction To Bipolar Junction Transistor – Construction - Transistor Biasing - Operation of NPN and PNP Transistor - CB, CE &CC Configuration - Bias Stability - Load Line - Method of Biasing: Fixed Bias - Collector to Base Bias - Voltage Divider Bias – Bias Compensation – Thermal runway-HeatSink.	15	Chalk & Talk
IV	FET and UJT Introduction to FET - Construction and Operation of N-Channel JFET - Drain Characteristics- Comparison of JFET &BJT - Introduction to MOSFET - Enhancement MOSFET – Depletion MOSFET - FET as a Voltage Variable Resistor(VVR) - Introduction to UJT – Characteristics – UJT as Relaxation Oscillator.	15	Power point presentation
V	OPTO ELECTRONIC DEVICES Principles, Operation And Characteristics Of Opto Electronic Devices: LDR – Photo Diode - Photo Transistor – Photo Voltaic Cell – Solar Cell – Photo Emissive Sensors – Photo Multiplier – LED – IR Emitter – LCD – Optocouplers.	15	Power point presentation

Course Designed by: 1. Mr. J. Charles Theodore

2. Mr. A. Velmurugan

	Learning Outcome Based Education & Assessment (LOBE)							
	Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
			Sectio	on A	Section Short An	n B	Section C	Section D
Inte rnal	Cos	K Level	No. of. Question S	K – Level	No. of. Question	K – Level	Either or Choice	Open Choice
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	1K3
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3&K3)	1K3
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1K4
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3&K3)	1K4
		No. of Questions to be asked	4		3		4	2
Question Pattern CIA I & II		No. of Questions to be answered	4		3		2	1
	1 & 11	Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	10

	Distribution of Marks with K Level CIA I & CIA II									
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %		
	K1	2	-	-		2	4	20		
	K2	2	6	-	-	8	16	20		
CIA	K3	-	-	20	20	40	80	80		
	K4	-	-	-	-	-	-	-		
•	Marks	4	6	20	20	50	100	100		
	K1	2	-	-		2	4	20		
	K2	2	6	-	-	8	16	20		
CIA	K3	-	-	20	-	20	40	40		
II	K4	-	-	-	20	20	40	40		
	Marks	4	6	20	20	50	100	100		

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Sum	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
			MOQs		Short Ans	swers	Section C	Section D
S.No	Cos	K - Level	No. of	K –	No. of	K –	(Either /	(Open
			Questions	Level	Questions	Level	or Choice)	Choice)
1	CO1	UP TO K2	2	K1&K2	1	K1	2(K1&K1)	1(K2)
2	CO2	K3	2	K1&K2	1	K1	2(K3&K3)	1(K3)
3	CO3	UP TO K4	2	K1&K2	1	K2	2(K2&K2)	1(K4)
4	CO4	UP TO K4	2	K1&K2	1	K2	2(K4&K4)	1(K3)
5	CO5	UP TO K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
No.	of Quest	tions to be	10		5		10	5
	Aske	ed	10		5		10	5
No	.of Quest	ions to be	10		5		5	3
answered			10		5		5	3
Mar	ks for eac	ch question	1		2		5	10
Total N	Marks for	each section	10		10		25	30
	(Figure	s in parenthe	sis denotes, q	uestions sl	hould be ask	ed with	the given K le	evel)

	Distribution of Marks with K Level								
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %		
K1	5	4	10	-	19	15.83	50		
K2	5	6	20	10	41	34.16	50		
K3	-	-	10	30	40	33.33	33		
K4	-	-	10	10	20	16.67	17		
Marks	10	10	50	50	120	100	100		
NB: Hig of K lev	gher level of p els.	erformance o	of the students	s is to be asso	essed by a	attempting	higher level		

Anower		-	ice Questions)
Answer	· All Q	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (Sho	ort Answei	rs)
Answer	· All Q	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eit	her/Or Ty	pe)
Answer	· All Q	uestions	$(5 \times 5 = 25 \text{ marks})$
Q.No	CO	K Level	Questions
16) a	CO1	K1	
16) b	CO1	K1	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K2	
18) b	CO3	K2	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K2	
20) b	CO5	K2	
NB: Hi	gher le	vel of perf	ormance of the students is to be assessed by attempting higher
level of	-	-	
Section	D (Op	en Choice	
Answer	<u>Any</u>	Three ques	tions (3x10=30 marks)
Q.No	CO	K Level	Questions
21	CO1	K2	
22	CO2	K3	
23	CO3	K4	
24	CO4	K3	
27			

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course	e Name	ELECTRONICS – I LAB			
Course	e Code	21UELCP1	L	Р	С
Catego	ory	Core	-	4	2
Nature	of cours	e: EMPLOYABILITY ✓ SKILL ORIENTED ENTREPRENU	JRSH	IIP	
Course	e Objecti	ves:			
2. To n 3. To c 4. To s 5. To k 1. 2. 3. 4. 5. 6.	nake use construct f tudy the o earn the v Verificat Verificat Verificat Verificat Series R	d the fundamental principles of circuit theory and electronic devices. of circuit laws and theorems for measuring the circuit parameters. few applications using semiconductor devices. characteristics of transistor and diodes. vorking of resonance circuits practically. List of Experiments (Any Ten) tion of Ohm's Law and Kirchhoff's Laws. tion of Norton's Theorem tion of Thevenin's Theorem tion of Maximum Power Transfer Theorem tion of Superposition Theorem esonance Circuit Resonance Circuit			
8. 9. 10. 11. 12. 13.	V-I Char V-I Char Transisto V-I Char Characte	racteristics of Junction Diode racteristics of Zener Diode or Characteristics of CE Configuration racteristics of JFET racteristics of UJT eristics of Solar Cell eristics of optocoupler			
Web R	Resources	8:			
		.in/courses/122/106/122106025/			
		.in/courses/122/106/122106026/		ΖΤ-	wal
	e Outcon	ul completion of the course, student will be able to:		K Le	vei
CO1:		he concept of basic circuit and theorems in practical circuits.		K3	
CO2:	Simplif	y the circuits using series and parallel equivalents and using in's and Norton's equivalent circuits practically.		K3	
CO3:		ct resonance circuits.		K4	•
CO4:	Experim Devices	nent the fundamental operations of the main Semiconductor Electronic	;	K3	}
CO5:	Study an	nd analyze the characteristics of transistor practically		K4	ļ

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	1	1	2	1	3	2
CO 2	1	2	2	1	2	1
CO 3	2	1	3	1	1	2
CO 4	2	2	1	1	2	1
CO5	1	2	3	2	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
Ι	Verification of Ohm's Law and Kirchhoff's Laws. Verification of Norton's Theorem Verification of Thevenin's Theorem	9	Practical
II	Verification of Maximum Power Transfer Theorem Verification of Superposition Theorem	9	Practical
ш	Series Resonance Circuit Parallel Resonance Circuit V-I Characteristics of Junction Diode	9	Practical
IV	V-I Characteristics of Zener Diode Transistor Characteristics of CE Configuration V-I Characteristics of JFET V-I Characteristics of UJT	9	Practical
V	Characteristics of Solar Cell Characteristics of optocoupler	9	Practical

Course Designed by: 1. Mr. M. Satheeshkumar

2. Mr. A. Velmurugan



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

	BASIC ELECTRICIT	ΓY A	AND CIRCUITS					
Course Code	21UELA11					L	Р	C
Category	Allied					5	-	5
Nature of course:	EMPLOYABILITY		SKILL ORIENTED	~	ENTREPREN	URSH	IIP	
Course Object	ives:							
1. To become fa	amiliar with fundamental	ls of	resistance and inducta	ince	s			
2. To learn to ty	pes and uses of capacito	rs.						
3. To explain th	he basic concepts and law	s of	DC and AC electrical	net	works and solv	ve ther	n usi	ng
mesh and nodal	-							U
	concepts of Electronic C	'ircu	it network theorems.					
	d the concepts of resonar							
	sistors & Inductors						15	5
Resistors & In	ductors						1	
	stors: Fixed, Variable -	Br	ief mention of their C	Cons	struction and (Charac	teris	tics-
• •	f Resistors - Connecting							
	ctors: Fixed, Variable- S					nd Le	nz's]	Law
	etic Induction-Energy St							
	pacitors				10		15	5
	apacitance-Parallel Plate	Ca	pacitor-Permittivity-D	efin	ition of Dielec	etric C	-	
Dielectric Strer	of the stored in a	Car	pacitor-Types of Capa					
			pacitor-Types of Capa	cito	ors: Air, Paper,	, Mica	, Tef	lon,
Ceramic, Plasti	c and Electrolytic: Cons	struc	tion and Application-	cito	ors: Air, Paper,	, Mica	, Tef	lon,
Ceramic, Plasti and Parallel - Fa	c and Electrolytic: Cons actors Governing the Val	struc lue o	ction and Application- of Capacitors.	cito	ors: Air, Paper,	, Mica	, Tef in Se	flon, eries
Ceramic, Plasti and Parallel - Fa Unit: III Ele	c and Electrolytic: Cons actors Governing the Val actrical Elements and C	struc lue o l ircu	ction and Application- of Capacitors. iits	cito Co	ors: Air, Paper, nnecting Capa	, Mica citors	in Se	flon, eries
Ceramic, Plasti and Parallel - Fa Unit: III Ele Potential Differ	c and Electrolytic: Cons actors Governing the Val ectrical Elements and C rence- Electric Current-E	struc lue o f ircu lecti	ction and Application- of Capacitors. hts romotive Force - Ohms	cito Co s La	ors: Air, Paper, nnecting Capa	, Mica citors sVolta	i, Tef in Se <u>15</u> ge La	flon, eries 5 aw -
Ceramic, Plasti and Parallel - Fa Unit: III Ele Potential Differ Kirchhoff's Cu	c and Electrolytic: Cons actors Governing the Val ectrical Elements and C rence- Electric Current-E rrent Law-Analysis of I	struc lue o l ircu lecti Resi	tion and Application- of Capacitors. hits romotive Force - Ohms stance in Series Circu	cito Co s La uits,	nnecting Capa necting Capa w- Kirchhoff's Parallel Circu	, Mica citors sVolta uits ar	in Se in Se 15 ge La nd Se	flon, eries 5 aw - eries
Ceramic, Plasti and Parallel - Fa Unit: III Ele Potential Differ Kirchhoff's Cu Parallel Circuit	c and Electrolytic: Cons actors Governing the Val ectrical Elements and C ence- Electric Current-E rrent Law-Analysis of I ss-Concept of Voltage S	struc lue o l ircu lecti Resi	tion and Application- of Capacitors. hits romotive Force - Ohms stance in Series Circu	cito Co s La uits,	nnecting Capa necting Capa w- Kirchhoff's Parallel Circu	, Mica citors sVolta uits ar	in Se in Se 15 ge La nd Se	flon, eries 5 aw - eries
Ceramic, Plasti and Parallel - Fa Unit: III Ele Potential Differ Kirchhoff's Cu Parallel Circuit Current Source	c and Electrolytic: Cons actors Governing the Val ectrical Elements and C rence- Electric Current-E rrent Law-Analysis of I ss-Concept of Voltage S in Parallel.	struc lue o l ircu lecti Resi	tion and Application- of Capacitors. hits romotive Force - Ohms stance in Series Circu	cito Co s La uits,	nnecting Capa necting Capa w- Kirchhoff's Parallel Circu	, Mica citors sVolta uits ar	in Se in Se ge La id Se eries	flon, eries 5 aw - eries and
Ceramic, Plasti and Parallel - Fa Unit: III Ele Potential Differ Kirchhoff's Cu Parallel Circuit Current Source Unit: IV Net	c and Electrolytic: Cons actors Governing the Val ectrical Elements and C rence- Electric Current-E rrent Law-Analysis of I as-Concept of Voltage S in Parallel. twork Theorems	struc lue o lircu lecti Resi Sour	tion and Application- of Capacitors. nits romotive Force - Ohms stance in Series Circu rce and Current Source	cito Co s La uits, ce-V	ors: Air, Paper, nnecting Capa w- Kirchhoff's Parallel Circu Voltage Source	, Mica citors sVolta uits ar in Se	in Tef in Se ge Land Se eries	flon, eries 5 aw - eries and 5
Ceramic, Plastiand Parallel - FUnit: IIIElePotential DifferKirchhoff's CuParallel CircuitCurrent SourceUnit: IVNetStar Delta Cont	c and Electrolytic: Cons actors Governing the Val ectrical Elements and C rence- Electric Current-E rrent Law-Analysis of I as-Concept of Voltage S in Parallel. twork Theorems versions (Only Theory)	struc lue o lircu lecti Resi Sour -Su	tion and Application- of Capacitors. nits romotive Force - Ohms stance in Series Circu ce and Current Source perposition Theorem -	cito Co s La uits, xe-V	ors: Air, Paper, nnecting Capa w- Kirchhoff': Parallel Circu Voltage Source hevenin's Theo	, Mica citors sVolta uits ar in So orem-	in Tef in Se ge La nd Se eries 15 Nort	flon, eries 5 aw - eries and 5 on's
Ceramic, $P $ asti and $Paralle - FaranaUnit: IIIElePotential DifferKirchhoff's CurParallel CircuitCurrent SourceUnit: IVNetStar Delta ConvTheorem - Sin$	c and Electrolytic: Cons actors Governing the Val ectrical Elements and C rence- Electric Current-E rrent Law-Analysis of I as-Concept of Voltage S in Parallel. twork Theorems versions (Only Theory) nple Problems - Maxin	struc lue o lircu lecti Resi Sour -Su	tion and Application- of Capacitors. nits romotive Force - Ohms stance in Series Circu ce and Current Source perposition Theorem -	cito Co s La uits, xe-V	ors: Air, Paper, nnecting Capa w- Kirchhoff': Parallel Circu Voltage Source hevenin's Theo	, Mica citors sVolta uits ar in So orem-	in Tef in Se ge La nd Se eries 15 Nort	flon, eries 5 aw - eries and 5 on's
Ceramic, Plasti and Parallel - FaUnit: IIIElePotential Differ Kirchhoff's Cu Parallel Circuit Current SourceUnit: IVNetStar Delta Com Theorem - Sin Theorem (Only)	c and Electrolytic: Cons actors Governing the Val ectrical Elements and C rence- Electric Current-E rrent Law-Analysis of I as-Concept of Voltage S in Parallel. twork Theorems versions (Only Theory) nple Problems - Maxin Theory)	struc lue o lircu lecti Resi Sour -Su	tion and Application- of Capacitors. nits romotive Force - Ohms stance in Series Circu ce and Current Source perposition Theorem -	cito Co s La uits, xe-V	ors: Air, Paper, nnecting Capa w- Kirchhoff': Parallel Circu Voltage Source hevenin's Theo	, Mica citors sVolta uits ar in So orem-	, Tef in Se ge Land Se eries 15 Nort Milln	lon, eries aw - eries and 5 on's nans
Ceramic, Plasti and Parallel - FaUnit: IIIElePotential Differ Kirchhoff's CuParallel Circuit Current SourceUnit: IVNetStar Delta ConvTheorem - Sin Theorem (OnlyUnit: VAC	c and Electrolytic: Cons actors Governing the Val ectrical Elements and C rence- Electric Current-E rrent Law-Analysis of I as-Concept of Voltage S in Parallel. twork Theorems versions (Only Theory) nple Problems - Maxin Theory) C Circuits	struc lue o lircu lecti Resi Sour -Su	tion and Application- of Capacitors. nits romotive Force - Ohms stance in Series Circu rce and Current Source perposition Theorem - Power Transfer Theorem	cito Co s La s La its, ce-V	ors: Air, Paper, nnecting Capa w- Kirchhoff's Parallel Circu oltage Source hevenin's Theo n (Only Theor	, Mica citors sVolta uits ar in Se orem- y) – 1	, Tef in Se ge La d Se eries 15 Nort Milln	Ton, eries aw - eries and 5 on's nans
Ceramic, Plasti and Parallel - FaUnit: IIIElePotential Differ Kirchhoff's CuParallel Circuit Current SourceUnit: IVNetStar Delta Cont Theorem - Sin Theorem (OnlyUnit: VACIntroduction To	c and Electrolytic: Cons actors Governing the Val ectrical Elements and C rence- Electric Current-E rrent Law-Analysis of I as-Concept of Voltage S in Parallel. twork Theorems versions (Only Theory) nple Problems - Maxim Theory) C Circuits O Sinusoidal Wave - RM	struc lue (lircu lecti Resi Sour -Su num	tion and Application- of Capacitors. nits romotive Force - Ohms istance in Series Circu rce and Current Source perposition Theorem - Power Transfer Theorem Value - Average Value	cito Co s La uits, ce-V	ors: Air, Paper, nnecting Capa aw- Kirchhoff's Parallel Circu oltage Source hevenin's Theo n (Only Theor AC Circuits wi	, Mica citors sVolta uits ar in Se orem- ry) – 1 th Res	h, Tef in Se ge La nd Se eries 15 Nort Milln 15 sistan	flon, eries aw - eries and 5 on's nans 5 cce -
Ceramic, Plasti and Parallel - FaUnit: IIIElePotential Differ Kirchhoff's CuParallel Circuit Current SourceUnit: IVNetStar Delta ConvTheorem - Sin Theorem (OnlyUnit: VACIntroduction To Circuits with X	c and Electrolytic: Cons actors Governing the Val ectrical Elements and C rence- Electric Current-E rrent Law-Analysis of I as-Concept of Voltage S in Parallel. twork Theorems versions (Only Theory) nple Problems - Maxin Theory) C Circuits O Sinusoidal Wave - RM XL Alone - Circuits with	struc lue (lircu lecti Resi Sour -Su num	tion and Application- of Capacitors. uits romotive Force - Ohms istance in Series Circu- rce and Current Source perposition Theorem - Power Transfer Theorem Value - Average Value C Alone - Series Read	cito Co s La nits, ce-V	aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's av- Kirchhoff's aw- Kirchhoff'	, Mica citors sVolta uits ar in So orem- y) – 1 th Res tance	, Tef in Se ge La d Se eries 15 Nort Milln 15 sistan - Par	flon, eries 5 aw - eries and 5 on's nans 5 cce - allel
Ceramic, Plasti and Parallel - FaUnit: IIIElePotential Differ Kirchhoff's CuParallel Circuit Current SourceUnit: IVNetStar Delta Conv Theorem (OnlyUnit: VACIntroduction To Circuits with X Reactance and	c and Electrolytic: Cons actors Governing the Val ectrical Elements and C rence- Electric Current-E rrent Law-Analysis of I as-Concept of Voltage S in Parallel. twork Theorems versions (Only Theory) nple Problems - Maxin Theory) C Circuits O Sinusoidal Wave - RM & Alone - Circuits with Resistance - Series Pa	struc lue (lircu lecti Resi Sour -Su num IS V h X	tion and Application- of Capacitors. nits romotive Force - Ohms stance in Series Circu rece and Current Source perposition Theorem - Power Transfer Theorem Value - Average Value C Alone - Series Read el Reactance and Res	cito Co s La nits, ce-V	aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's av- Kirchhoff's aw- Kirchhoff'	, Mica citors sVolta uits ar in So orem- y) – 1 th Res tance	, Tef in Se ge La d Se eries 15 Nort Milln 15 sistan - Par	flon, eries 5 aw - eries and 5 on's nans 5 cce - allel
Ceramic, Plasti and Parallel - FaUnit: IIIElePotential Differ Kirchhoff's CuParallel Circuit Current SourceUnit: IVNetStar Delta Conv Theorem (OnlyUnit: VACIntroduction To Circuits with X Reactance and	c and Electrolytic: Cons actors Governing the Val ectrical Elements and C rence- Electric Current-E rrent Law-Analysis of I as-Concept of Voltage S in Parallel. twork Theorems versions (Only Theory) nple Problems - Maxin Theory) C Circuits O Sinusoidal Wave - RM XL Alone - Circuits with	struc lue (lircu lecti Resi Sour -Su num IS V h X	tion and Application- of Capacitors. nits romotive Force - Ohms stance in Series Circu rece and Current Source perposition Theorem - Power Transfer Theorem Value - Average Value C Alone - Series Read el Reactance and Res	cito Co s La nits, ce-V – T orer	ors: Air, Paper, nnecting Capa aw- Kirchhoff's Parallel Circu oltage Source hevenin's Theo n (Only Theor AC Circuits wi ace And Resist ance – Real H	, Mica citors sVolta uits ar in So orem- y) – 1 th Res tance Power	h, Tef in Se in Se ind Se eries 15 Nort Milln 15 sistan - Par - Se	flon, eries aw - eries and 5 on's nans 5 cce - allel eries
Ceramic, Plasti and Parallel - FaUnit: IIIElePotential Differ Kirchhoff's CuParallel Circuit Current SourceUnit: IVNetStar Delta Conv Theorem - Sin Theorem (OnlyUnit: VACIntroduction To Circuits with X Reactance and	c and Electrolytic: Cons actors Governing the Val ectrical Elements and C rence- Electric Current-E rrent Law-Analysis of I as-Concept of Voltage S in Parallel. twork Theorems versions (Only Theory) nple Problems - Maxin Theory) C Circuits O Sinusoidal Wave - RM & Alone - Circuits with Resistance - Series Pa	struc lue (lircu lecti Resi Sour -Su num IS V h X	tion and Application- of Capacitors. nits romotive Force - Ohms stance in Series Circu rece and Current Source perposition Theorem - Power Transfer Theorem Value - Average Value C Alone - Series Read el Reactance and Res	cito Co s La nits, ce-V – T orer	aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's aw- Kirchhoff's av- Kirchhoff's aw- Kirchhoff'	, Mica citors sVolta uits ar in So orem- y) – 1 th Res tance Power	, Tef in Se ge La d Se eries 15 Nort Milln 15 sistan - Par	flon, eries aw - eries and 5 on's nans 5 cce - allel eries
Ceramic, Plasti and Parallel - FaUnit: IIIElePotential Differ Kirchhoff's CuParallel Circuit Current SourceUnit: IVNetStar Delta Conv Theorem - Sin Theorem (OnlyUnit: VACIntroduction To Circuits with X Reactance and	c and Electrolytic: Cons actors Governing the Val ectrical Elements and C rence- Electric Current-E rrent Law-Analysis of I as-Concept of Voltage S in Parallel. twork Theorems versions (Only Theory) nple Problems - Maxin Theory) C Circuits o Sinusoidal Wave - RM XL Alone – Circuits with Resistance - Series Pa it – Parallel Resonant Circ	struc lue (lircu lecti Resi Sour -Su num IS V h X	tion and Application- of Capacitors. nits romotive Force - Ohms stance in Series Circu rece and Current Source perposition Theorem - Power Transfer Theorem Value - Average Value C Alone - Series Read el Reactance and Res	cito Co s La nits, ce-V – T orer	ors: Air, Paper, nnecting Capa aw- Kirchhoff's Parallel Circu oltage Source hevenin's Theo n (Only Theor AC Circuits wi ace And Resist ance – Real H	, Mica citors sVolta uits ar in So orem- y) – 1 th Res tance Power	h, Tef in Se in Se ind Se eries 15 Nort Milln 15 sistan - Par - Se	flon, eries aw - eries and 5 on's nans 5 cce - allel eries
Ceramic, Plasti and Parallel - FaUnit: IIIElePotential Differ Kirchhoff's CuParallel Circuit Current SourceUnit: IVNetStar Delta Con Theorem - Sin Theorem (OnlyUnit: VACIntroduction To Circuits with X Reactance and Resonant CircuBooks for Student	c and Electrolytic: Cons actors Governing the Val ectrical Elements and C rence- Electric Current-E rrent Law-Analysis of I as-Concept of Voltage S in Parallel. twork Theorems versions (Only Theory) nple Problems - Maxin Theory) C Circuits o Sinusoidal Wave - RM XL Alone – Circuits with Resistance - Series Pa it – Parallel Resonant Circ	struc lue (lircu lecti Resi Sour -Su num IS V h X arall rcuit	tion and Application- of Capacitors. iits romotive Force - Ohms istance in Series Circu- tree and Current Source appropriation Theorem - a Power Transfer Theorem Value - Average Value C Alone - Series Reader el Reactance and Read t - Q Factor.	cito Co s La uits, ce-V - T orer - T ctar sista To	rs: Air, Paper, nnecting Capa w- Kirchhoff': Parallel Circu Voltage Source hevenin's Theo n (Only Theor AC Circuits wi ace And Resist ance – Real H tal Lecture Ho	, Mica citors sVolta uits ar in So orem- y) – 1 th Res tance Power	h, Tef in Se in Se ind Se eries 15 Nort Milln 15 sistan - Par - Se	flon, eries aw - eries and 5 on's nans 5 cce - allel eries
Ceramic, Plasti and Parallel - FaUnit: IIIElePotential Differ Kirchhoff's CuParallel Circuit Current SourceUnit: IVNetStar Delta Conv Theorem (OnlyUnit: VACIntroduction To Circuits with X Reactance and Resonant CircuBooks for Stud1.S.Salivahan	c and Electrolytic: Cons actors Governing the Val etrical Elements and C rence- Electric Current-E rrent Law-Analysis of I as-Concept of Voltage S in Parallel. twork Theorems versions (Only Theory) nple Problems - Maxin Theory) C Circuits o Sinusoidal Wave - RM XL Alone – Circuits with Resistance - Series Pa it – Parallel Resonant Circuits	struc lue c lircu lecti Resi Sour -Su num IS V h X arall rcuit	tion and Application- of Capacitors. nits romotive Force - Ohms astance in Series Circu tree and Current Source perposition Theorem - perposition Theorem - Power Transfer Theorem Value - Average Value C Alone - Series Read el Reactance and Read t - Q Factor.	cito Co s La uits, ce-V — T orer — T orer — T orer — T orer — T orer — T orer — T	rs: Air, Paper, nnecting Capa w- Kirchhoff's Parallel Circu oltage Source hevenin's Theo n (Only Theor AC Circuits wi ace And Resist ance – Real H tal Lecture Ho	, Mica citors sVolta uits ar in Se orem- y) – 1 th Res tance Power burs	h, Tef in Se in Se ge La d Se eries 15 Nort Milln 15 sistan - Par - Se 75 H	flon, eries aw - eries and 5 on's nans 5 ce - allel eries Irs

1. B.L.	1. B.L.Theraja, "Basic Electronics-Solid State Devices", S.Chand Company						
2. Berr	ardGrob"Basic Electronics"-Tata McGraw-Hill Publishing Company Limi	ted, 9thEdition.					
Web R	esources:						
1. <u>ht</u>	1. https://nptel.ac.in/courses/108/104/108104139/						
2. <u>ht</u>	tps://nptel.ac.in/courses/108/101/108101091/						
3. <u>ht</u>	tps://www.youtube.com/playlist?list=PLFF553CED56CDE25D						
4. <u>ht</u>	4. https://www.youtube.com/watch?v=w8Dq8blTmSA						
Course	Course Outcomes K Level						
On the	successful completion of the course, student will be able to:						
CO1:	Highlighting the working of resistors and inductors.	Up to K2					
CO2:	Summarize the working and types of capacitors.	Up to K2					
CO3:	Differentiate and demonstrate the voltage and current sources.	Up to K3					
CO4:	Apply the electronic components in network theorems.	Up to K4					
CO5:	Put into practice and use the electronic components	Up to K5					

CO & PO Mapping:

Books for References:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	1	3	2
CO 2	1	1	1	1	2	3
CO 3	2	2	3	2	2	2
CO 4	2	1	1	1	2	3
CO5	1	2	3	2	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

UNIT	Course Name	Hrs	Pedagogy
I	 Resistors & Inductors Types of Resistors: Fixed, Variable - Brief mention of their Construction and Characteristics- Color Coding of Resistors - Connecting Resistors in Series and Parallel. Types of Inductors: Fixed, Variable- Self and Mutual Inductance-Faraday's Law and Lenz's Law of Electromagnetic Induction-Energy Stored in an Inductor-Inductance in Series and Parallel. 	15	Chalk & Talk
II	Capacitors Principles of Capacitance-Parallel Plate Capacitor-Permittivity-Definition of Dielectric Constant - Dielectric Strength-Energy Stored in a Capacitor- Types of Capacitors: Air, Paper, Mica, Teflon, Ceramic, Plastic and Electrolytic: Construction and Application- Connecting Capacitors in Series and Parallel - Factors Governing the Value of Capacitors.	15	Chalk & Talk
III	Electrical Elements and Circuits Potential Difference- Electric Current-Electromotive Force - Ohms Law- Kirchoff'sVoltage Law - Kirchoff's Current Law-Analysis of Resistance in Series Circuits, Parallel Circuits and Series Parallel Circuits-Concept of Voltage Source and Current Source-Voltage Source in Series and Current Source in Parallel.	15	Chalk & Talk
IV	Star Delta Conversions (Only Theory) -Superposition Theorem – Thevenin's Theorem- Norton's Theorem – Simple Problems - Maximum Power Transfer Theorem (Only Theory) – Millmans Theorem (Only Theory)	15	Power point Presentation
V	AC Circuits Introduction To Sinusoidal Wave - RMS Value - Average Value - AC Circuits with Resistance - Circuits with XL Alone – Circuits with XC Alone - Series Reactance And Resistance - Parallel Reactance and Resistance - Series Parallel Reactance and Resistance – Real Power - Series Resonant Circuit – Parallel Resonant Circuit - Q Factor.	15	Power point Presentation

Course Designed by: 1. Mr. A. Velmurugan

2. Mr. M. SatheeshKumar

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
Inte rnal Cos		K Level	Sectio			Section C Either or Choice	Section Section D Open Choice			
CI	CO1	UP TO K2	2	K1&K2	1	K2	2(K3&K3)	1(K3)		
AI	CO2	UP TO K3	2	K1&K2	2	K2	2(K3&K3)	1(K3)		
CI	CO3	UP TO K4	2	K1&K2	1	K2	2(K3&K3)	1(K3)		
AII	CO4	UP TO K4	2	K1&K2	2	K2	2(K3&K3)	1(K4)		
		No. of Questions to be asked	4		3		4	2		
-	stion tern	No. of Questions to be answered	4		3		2	1		
CIA	I & II	Marks for each question	1		2		5	10		
		Total Marks for each section	4		6		10	10		

		Dist	ribution of]	Marks with	K Level C	CIAI&	CIA II	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	-	-	-	2	4	
	K2	2	6			8	16	20
CIA	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-	-	
-	Marks	4	6	20	20	50	100	100
	K1	2	-	-	-	2	4	20
	K2	2	6		-	8	16	20
CIA	K3	-	-	20	10	30	60	60
II	K4	-	-	-	10	10	20	20
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Sum	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)											
			MO	. /	Short Ans	swers	Section C	Section D				
S.No	Cos	K - Level	No. of	K –	No. of	K –	(Either /	(Open				
							Questions	Level	Questions	Level	or Choice)	Choice)
1	CO1	UP TO K2	2	K1&K2	1	K1	2(K1&K1)	1(K2)				
2	CO2	K3	2	K1&K2	1	K1	2(K2&K2)	1(K3)				
3	CO3	UP TO K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)				
4	CO4	UP TO K4	2	K1&K2	1	K2	2(K4&K4)	1(K3)				
5	CO5	UP TO K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)				
No.	of Quest	tions to be	10		5		10	5				
	Aske	ed	10		5		10	5				
No	.of Quest	ions to be	10		5		5	3				
	answe	ered	10		5		5	3				
Mar	ks for eac	ch question	1		2		5	10				
Total N	Marks for	each section	10		10		25	30				
	(Figure	s in parenthe	sis denotes, q	uestions sl	hould be ask	ed with	the given K le	evel)				

		Dis	stribution of	Marks with	n K Leve	.l	
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	4	10	-	19	15.83	50
K2	5	6	20	10	41	34.16	50
K3	-	-	10	30	40	33.33	33
K4	-	-	10	10	20	16.67	17
Marks	10	10	50	50	120	100	100
NB: Hig of K lev	gher level of p els.	erformance o	of the students	s is to be asso	essed by a	attempting	higher level

· All Q	uestions	
	ucstions	(10x1=10 marks)
CO	K Level	Questions
CO2	K2	
CO3	K1	
CO3	K2	
CO4	K1	
CO4	K2	
CO5	K1	
CO5	K2	
B (Sho	ort Answei	rs)
· All Q	uestions	(5x2=10 marks)
CO	K Level	Questions
CO1	K1	
CO2	K1	
CO3	K2	
CO4	K2	
CO5	K2	
C (Eit	her/Or Ty	pe)
· All Q	uestions	$(5 \times 5 = 25 \text{ marks})$
CO	K Level	Questions
CO1	K1	
CO1	K1	
CO2	K2	
CO2	K2	
CO3	K3	
CO3	K3	
CO4	K4	
CO4	K4	
CO5	K2	
CO5	K2	
gher le	vel of perf	ormance of the students is to be assessed by attempting higher
-	-	
D (Op	en Choice)
· Any T	<u>Three ques</u>	tions (3x10=30 marks)
CO	K Level	Questions
CO1	K2	
CO2	K3	
CO3	K4	
CO4	K3	
CO5	K3	
	CO3 CO4 CO5 CO5 B (Sho All Q CO1 CO1 CO1 CO2 CO3 CO4 CO4 CO5 C (Eit All Q CO CO1 CO1 CO1 CO1 CO1 CO1 CO1 CO1 CO2 CO3 CO3 CO4 CO3 CO4 CO3 CO4 CO4 CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5	CO1 K2 CO2 K1 CO3 K1 CO3 K1 CO3 K2 CO4 K1 CO5 K1 CO5 K1 CO5 K2 B (Short Answer All Questions CO K Level CO1 K1 CO2 K1 CO3 K2 CO4 K2 CO5 K2 B (Short Answer K1 CO2 K1 CO3 K2 CO4 K2 CO5 K2 CO4 K2 CO5 K2 CO4 K2 CO5 K2 CO1 K1 CO2 K2 CO3 K3 CO4 K4 CO5 K2 CO5 K2 CO4 K4 CO5 K2 GO5 K2 GO5 K2

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Co	urse Name	ELECTRONIC INS	TRUMEN	TATION					
	urse Code	21UELS11					L	Р	С
Ca	tegory	Skill					2	-	2
	ure of rse:	EMPLOYABILITY	SKILI	L ORIENTED	~	ENTREPREN	URSH	IIP	
Co	urse Object	ves:							
1. 2. 3. 4. 5. Un DC Tyj Un Wh Ke Un Blo	To impart th To analyze To display t To understa To enable th electronic c it: I Ind Ammeter - pe Ohmmete it: II RL heatstone Bri lvin bridge. it: III Ose ock diagram	he knowledge on electro and measurement the u he concept of CRO and nd the concept of powe he students to acquire the freuits and know the tect licating Instruments DC Voltmeter- AC Vo r – Multimeter -Digita C Measurements dge - Balance Equation cilloscope - CRT - Vertical Deflet Graticules - Oscillosco	nknown R I signal ges er measure he knowled chnique of ltmeter – I al Multime on of Gend ection Syst	, L and C using t nerators for pract ments. dge of digital inst measurements u Multirange Amm ter. eral AC Bridges	tical trum sing neter - N	usage. ents and its app electronic instr &Voltmeter - S Maxwell - Sche orizontal Defle	Series ering ction	ts 06 & Sl 06 - Wi 06 Syste	5 hunt 6 en - 5 em -
- L	issajou's Patt	erns- Digital storage os				1 5, 1			
		asurement of Power blometer method of pow	vor moosu	romont Colorimo	torn	nothed Watt m	tor F	06	
	ter - Phase m		vei measui	tement-Calorine		nethod- w att m		nergy	у
	it: V Sig	nal generation & sign	al analysi	s				06	
	nction Gener alyzer	rator - Pulse Generator	- Wave A	nalyzer - Harmo			-		
D-	- l f C4 d				To	tal Lecture Ho	urs	30 H	lrs
1. 2.	New Delhi. A.K.Sahwn DhanpatRai S.Salivahan	y: (2002), Electronic Inst ey,Electrical and El & Co.(P) Ltd., New De an, N.Sureshkumar, A ll Publishing Company	lectronic lhi. .Vallavara	Measurements j, Electronic De	and	d Instrumenta	tion.	(20	06),
Bo	oks for Refe		Lu, 110 W	Denni.					
1.	Ramachand	ran,Measurements and Electronics and Instru		•		•	l, Ne	w De	elhi,

Web R	lesources:					
http://nptel.ac.in/courses/108105064/ http://nptel.ac.in/courses/108105062/						
Course	Course Outcomes K Level					
On the	successful completion of the course, student will be able to:					
CO1:	Define the working of electronic instruments.	UP TO K2				
CO2:	Summarize the concepts of RLC measurements using bridges	UP TO K3				
CO3:	Gain depth knowledge about the principles of oscilloscope	UP TO K3				
CO4:	Explain the knowledge about the power measurements.	UP TO K4				
CO5:	Put into practice and use the electronic Instruments	UP TO K5				

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	1	1
CO 3	3	3	3	2	2	2
CO 4	2	2	2	3	2	2
CO5	2	2	3	2	3	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

UNIT	Course Name	Hrs	Pedagogy
I	Indicating Instruments DC Ammeter - DC Voltmeter- AC Voltmeter – Multirange Ammeter &Voltmeter - Series & Shunt Type Ohmmeter – Multimeter -Digital Multimeter.	6	Chalk & Talk
п	Bridges Wheatstone Bridge - Balance Equation of General AC Bridges - Maxwell - Schering - Wien - Kelvin bridge.	6	Chalk & Talk
III	Oscilloscope Block diagram - CRT - Vertical Deflection System - Delay line - Horizontal Deflection System - CRT screens &Graticules - Oscilloscope Probes - Measurement of Frequency, Amplitude & Phase - Lissajou's Patterns- Digital storage oscilloscope.	6	Chalk & Talk
IV	Measurement of power Introduction- bolometer method of power measurement-Calorimeter method-Watt meter-Energy meter - Phase meter.	6	Power point Presentation
v	SIGNAL GENERATION & SIGNAL ANALYSIS: Function Generator - Pulse Generator - Wave Analyzer - Harmonic Distortion Analyzer-Spectrum Analyzer	6	Power point Presentation

Course Designed by: 1. Mr. M. Satheeshkumar

2. Mr. M. Velmurugan





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	ELECTRONIC CIRC	CUITS							
Course Code	21UELC21			L	Р	С			
Category	Core			5	-	5			
Nature of course:	EMPLOYABILITY	SKILL ORIENTED	ENTREPREN	URSH	IIP	~			
Course Object	ives:								
2. To acquaint circuits.		wledge on rectifiers and r uction, theory and charact		ronic a	ampli	fier			
4. To understa	nd the working principle	s of feedback amplifier.	···· · · · · ·						
		nd gain the knowledge on	oscillator and multi	vibra					
	ctifiers and Regulators	ing Coloulation of DMG	Volue Average V	<i>L</i> alma	15 Dia				
Factor – Efficie types-Inductor Regulator – Ze	Half wave, Full wave and bridge Rectifiers – Calculation of RMS Value – Average Value – Ripple Factor – Efficiency – Transformer Utility Factor – Peak Inverse Voltage – Clipper and Clamper types-Inductor Filter – Capacitor Filter – LC Filter – Pi Filter - Voltage Doubler – Voltage Regulator – Zener Diode as a Regulator – Transistor Shunt and Series Regulator – Overload Protection – Construction of DC Power Supply.								
	all Signal Amplifiers				15	;			
	<u> </u>	e Transistor Amplifier – H	Frequency Response	e – Ba					
		Coupled Amplifier – Tune							
	wer Amplifiers	1 1	1	1	15	;			
		n of Class A, Class B, Cla	ass C and Class AF	3 Am					
		s A Power Amplifier							
	-	Symmetry Push Pull Amp							
	dback Amplifiers				15	;			
Basic concepts	of feedback – Positive	e Feedback – Negative	Feedback – Effect	s of 1	Nega	tive			
Feedback on G	ain, Bandwidth and Dist	ortion – Noise – Voltage	Series Feedback-	Volta	ge Sł	nunt			
Feedback – Cur	rent Series Feedback – C	Current Shunt Feedback.							
Unit: V Os	cillators And Multivibr	ators			15	í			
	•	tor - Colpitts Oscillator							
e		Crystal and its Eff	•			-			
AstableMultivit	orator – MonostableMult	ivibrator – BistableMultiv							
			Total Lecture Ho	urs	75Hı	ſS			
Books for Stud	Books for Study:								
1. V.K Mehta, Rohit Mehta, Principles of Electronics , S.Chand& Company Ltd, New Delhi, First Edition, 1980.									
2. R.S.Sedha, Applied Electronics, S.Chand& Company Ltd, New Delhi, First Edition, 1990									
Books for References:									
1. S.Salivahan	an, N. Sureskumar and	A. Vallavaraj, Electro	nic Devices and	Circu	its, 🛛	Гata			
McGraw-H	Ill Publishing Company	Ltd, New Delhi, Second E	dition, 2011						
2. B.L.Theraja	, —Basic ElectronicsI, C	Chand Company Ltd, 2000).						
Academic C	ouncil Meeting Held O	n 29.04.2021		Pa	ige 2	0			

Web Resources:

- 1. http://www.ee.iitm.ac.in/~ani/2012/ec5135/lectures.htmlLecture Notes
- 2. https://nptel.ac.in/courses/108/102/108102097/#Introduction to Electronic circuits NPTEL.

3. h	3. https://nptel.ac.in/courses/108/102/108102095/Analog Electronic circuits NPTEL.						
Cour	Course Outcomes						
On th	e successful completion of the course, student will be able to:						
CO1	Understand the concepts of rectifiers and regulators	UP TO K2					
CO ₂ :	Summarize about small signal amplifiers	UP TO K3					
CO3	Analyse the functions of power amplifiers	UP TO K3					
CO4	Distinguish the performance of negative as well as positive feedback circuits	UP TO K4					
CO5	Design oscillators and multivibrators	UP TO K4					

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	1	1
CO 3	3	3	3	2	2	2
CO 4	2	2	2	3	2	2
CO5	2	2	3	1	3	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

UNIT	Course Name	Hrs	Pedagogy
I	Rectifiers and Regulators Half wave, Full wave and bridge Rectifiers – Calculation of RMS Value – Average Value – Ripple Factor – Efficiency – Transformer Utility Factor – Peak Inverse Voltage – Clipper and Clamper types- Inductor Filter – Capacitor Filter – LC Filter – Pi Filter - Voltage Doubler – Voltage Regulator – Zener Diode as a Regulator – Transistor Shunt and Series Regulator – Overload Protection – Construction of DC Power Supply.	15	Chalk & Talk
п	Small Signal Amplifiers Transistor as an Amplifier -Single Stage Transistor Amplifier – Frequency Response – Bandwidth – RC Coupled Amplifier - Transformer Coupled Amplifier – Tuned Amplifier – FET Amplifier.	15	Chalk & Talk
ш	Power Amplifiers Operation and Graphical Representation of Class A, Class B, Class C and Class AB Amplifiers – Maximum Collector Efficiency of Class A Power Amplifier – Class B Push Pull Amplifier – Crossover Distortion – Complementary Symmetry Push Pull Amplifier.	15	Chalk & Talk
IV	Feedback Amplifiers Basic concepts of feedback – Positive Feedback – Negative Feedback – Effects of Negative Feedback on Gain, Bandwidth and Distortion – Noise – Voltage Series Feedback- Voltage Shunt Feedback – Current Series Feedback – Current Shunt Feedback.	15	Power point Presentation
V	Oscillators And Multivibrators Barkhausen Criterion – Hartley Oscillator – Colpitts Oscillator – Phase Shift Oscillator – Wein Bridge Oscillators –Peizo Electric Crystal and its Effects – Crystal Oscillator –AstableMultivibrator – Monostablemultivibrator – BistableMultivibrator – Schmitt Trigger.	15	Power point Presentation

Course Designed by: Mr. J. Charles Theodore Mr. A. Velmurugan

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
Inte rnal	Cos	K Level	Section AMCQsNo. of.K –QuestionsLevel		Section BShort AnswersNo. of.K -QuestionsLevel		Section C Either or Choice	Section Section D Open Choice		
CI	CO1	UP TO K2	2	K1&K2	1	K1	1(K3)	1(K4)		
AI	CO2	UP TO K3	2	K1&K2	2	K2	1(K3)	1(K3)		
CI	CO3	UP TO K4	2	K1&K2	1	K1	1(K3)	1(K3)		
AII	CO4	UP TO K4	2	K1&K2	2	K2	1(K3)	1(K4)		
		No. of Questions to be asked	4		3		2	2		
-	stion tern	No. of Questions to be answered	4		3		2	1		
CIA	I & II	Marks for each question	1		2		5	10		
		Total Marks for each section	4		6		10	10		

Distribution of Marks with K Level CIA I & CIA II									
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %	
	K1	2	2	-	-	4	8	50	
	K2	2	4	-	-	6	12	50	
CIA	K3	-	-	20	10	30	60	50	
I	K4	-	-	-	10	10	20		
-	Marks	4	6	20	20	50	100	100	
	K1	2	2	-	-	4	8	50	
	K2	2	4	-	-	6	12	50	
CIA	K3	-		20	10	30	60	50	
II	K4	-		-	10	10	20		
	Marks	4	6	20	20	50	100	100	

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Sum	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
			MO	. /	Short Ans	swers	Section C	Section D		
S.No	Cos	K - Level	No. of	K –	No. of	K –	(Either /	(Open		
			Questions	Level	Questions	Level	or Choice)	Choice)		
1	CO1	UP TO K2	2	K1&K2	1	K1	2(K1&K1)	1(K2)		
2	CO2	K3	2	K1&K2	1	K1	2(K2&K2)	1(K3)		
3	CO3	UP TO K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)		
4	CO4	UP TO K4	2	K1&K2	1	K2	2(K4&K4)	1(K3)		
5	CO5	UP TO K3	2	K1&K2	1	K2	2(K3&K3)	1(K2)		
No.	of Quest	tions to be	10	5	5		10	5		
	Aske	ed	10		5		10	5		
No	.of Quest	ions to be	10		5		5	3		
answered		10		5		5	3			
Marks for each question			1		2		5	10		
Total Marks for each section			10		10		25	30		
	(Figure	s in parenthe	sis denotes, q	uestions sl	hould be ask	ed with	the given K le	evel)		

	Distribution of Marks with K Level									
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %			
K1	5	4	10	-	219	15.83	50			
K2	5	6	10	20	41	34.16	50			
K3	-	-	20	20	40	33.33	33			
K4	-	-	10	10	20	16.67	17			
Marks	10	10	50	50	120	100	100			
-	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.									

		-	ice Questions)
	-	uestions	(10x1=10 marks)
Q.No	<u>CO</u>	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
		ort Answei	·
	_	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
		her/Or Ty	pe)
	-	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K1	
16) b	CO1	K1	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K4	
18) b	CO3	K4	
19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K2	
20) b	CO5	K2	
	-	-	formance of the students is to be assessed by attempting higher
level of			
	-	en Choice	
		Three ques	
Q.No	<u>CO</u>	K Level	Questions
21	CO1	K2	
22	CO2	K3	
23	CO3	K4	
24	CO4	K3	
25	CO5	K2	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	e Name ELECTRONICS – II LAB									
Course Code	21UELCP2	21UELCP2 L P C								
Category	Core	Core - 4								
Nature of cou	rse: EMPLOYABILITY	SKILL ORIENTED	ENTREPREN	URSI	HIP	~				
Course Obje	ctives:									
 To unders To design To analys To experi To experi 1. Clippe DC Re Dual p IC Reg Rectifi Bridge Voltag CE An Emitte Hartley Colpiti Astabl Monos 	ment the working of multi List of Experiment (Any Ters and Clampers egulated Power Supply using ower supply gulated Power Supply er (Half &Full Wave) er (Ha	iers practically. reuits practically. rs and oscillator practically vibrators using transistor. Fen)	7.							
	otel.ac.in/courses/122/106	(/122106025/								
	otel.ac.in/courses/122/100									
Course Outc	omes				K Le	evel				
On the succes	sful completion of the cou	urse, student will be able to):							
CO1: Cons	struct power supply and re-	ctifier circuits practically.			K	2				
CO2: Cons	struct Amplifier circuits				K	3				
CO3: Cons	CO3:Construct different Oscillator circuitsK3									
CO4: Cons	4: Construct different Multivibrator circuits using TransistorK4									
CO5: Cons	Construct and Analysevarious Electronics Circuits practically. K4									

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	1	1	2	1	3	2
CO 2	1	2	2	1	2	1
CO 3	2	1	3	1	1	2
CO 4	2	2	1	1	2	1
CO5	1	2	3	2	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

Unit	Course Name	Hrs	Pedagogy
I	Clippers and Clampers DC Regulated Power Supply using Zener Diode Dual power supply	9	Practical
п	Rectifier(Half and Full Wave) Bridge Rectifier IC Regulated Power Supply	9	Practical
III	CE Amplifier. Emitter Follower Voltage Doubler	9	Practical
IV	Hartley Oscillator Colpitts Oscillator Wein Bridge Oscillator	9	Practical
v	AstableMultivaibrators MonostableMultivaibrators BistableMultivaibrator Schmitt Trigger	9	Practical

LESSON PLAN

Course Designed by: 1. Mr. M. Satheeshkumar Mr. A. Velmurugan



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	Probability and Statistics								
Course Code	21UMCA21			L	Р	С			
Category	Allied			5	-	4			
Nature of cours	Nature of course:EMPLOYABILITY✓SKILL ORIENTED✓ENTREPRENURSHIP✓								
Course Objecti	ves:								
1	students with the foundations of	1	2	-		in			
	cations in engineering and scien	ce like disease mo	odeling, climate pred	dictior	and				
computer ne		h1							
	ws of probability to concrete pro sures of Central Tendencies :	blems			15				
	rithmetic mean – Partition Valu	ues – Mode – Geor	netric Mean & Har	monic	13				
Mean(problems		1000 - 10000 - 0001		nome					
<u> </u>	sures of Dispersion				15				
	leasures of dispersion(problems	s only)							
	relation and Regression	,			15				
Introduction – C	orrelation – Rank Correlation –	Regression							
	pability				15				
Probability- Intr	oduction -Conditional Probabili	ty – Mathematical	Expectations (Prob	olems	only)				
	cial Distributions				15				
Introduction – E	inomial Distribution – Poisson	Distribution -Norr							
			Total Lecture Ho	urs '	75 Hr	.s			
Books for Stud	y:								
-	and Thangapandi Isaac. A	., "Statistics", N	New Gamma Pub	lishing	g Ho	use,			
Palayamkotai, 2	Init I - Chapter 2: Sect	$ions \cdot 20 24$							
	Init I - Chapter 3: Sect		.11)						
	Init III - Chapter 6: Sect	,	·II <i>)</i>						
	Init IV - Chapter 11: Sect								
	Chapter12 : Section: 12.4	,							
	Init V - Chapter13: Sect	tions: 13.0 – 13.3							
Books for Refe	rence:								
1. Vittal. P.R.,	Mathematical Statistics, Marg	gham Publications	, Chennai, 2013.						
	and Kapoor. V.K., "Fundamen	tals of Mathema	tical Statistics", Ele	eventh	editi	on,			
	d & sons, New Delhi, 2007.								
-	and Kapoor. V.K., "Elements		Statistics", Third E	dition	, Sult	an			
	ns, Educational Publishers, New	w Delhi, 2015.							
Web Resources		1							
	.in/courses/111/105/111105041 sscentral.com/course/swayam		-statistics-5228						
Course Outcon		-provavinty-allu	-51411511C5"5440	1	K Lev	vel			
	il completion of the course, the	students will be al	ole to						
Academic C	ouncil Meeting Held On 29.04	.2021		Pa	ige 28	3			

CO1:	Improve data handling skills and summarize statistical computations.	K3
CO2:	Determine the relationship between quantitative variables and extend regression Analysis.	K3
CO3:	Recall and apply a comprehensive set of Probability ideas.	K1
CO4:	Find, interpret and analyze the measure of central tendencies, Moment Generating function and Characteristic function of random variables.	K3
CO5:	Relate, Analyze and Demonstrate the knowledge of using various distributions for statistical analysis.	K2

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO6
CO 1	3	2	2	3	3	1
CO 2	3	3	3	3	2	1
CO 3	3	3	3	3	2	-
CO 4	3	2	2	3	3	1
CO 5	3	2	3	3	3	1

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
Ι	Introduction –Measures of Central Tendencies(Proofs of the Theorems are not included – Problems only)	15	Chalk & Board
II	Introduction – Measures of Dispersion (Proofs of the Theorems are not included – Problems only)	15	Chalk & Board
III	Introduction – Correlation – Rank Correlation – Regression. Introduction-	15	Chalk & Board
IV	Probability- Conditional Probability – Mathematical Expectations (Proofs of the Theorems are not included – Problems only)	15	Chalk & Board
V	Introduction – Binomial Distribution – Poisson Distribution -Normal Distribution.(Proofs of the Theorems are not included – Problems only)	15	Chalk & Board

Course Designed by: Mrs. H. Sowmiyagowri

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
			Section A		Sectio	n B		Section		
	~		MC	Qs	Short An	iswers	Section C	D		
Internal	Cos	K Level	No. of. Question S	K - Level	No. of. Questio ns	K – Level	Either or Choice	Open Choice		
CI	CO1	Up to K2	2	K1,K2	1	K1	2(K2&K2)	1 K2		
AI	CO2	Up to K3	2	K1,K2	2	K2	2(K3&K3)	1 (K3)		
CI	CO3	Up to K3	2	K1,K2	1	K1	2(K2&K2)	1 (K2)		
AII	CO4	Up to K3	2	K1,K2	2	K2	2(K3&K3)	1 (K3)		
	-	No. of uestions to be asked	4		3		4	2		
Question Pattern	-	No. of uestions to e answered	4		3		2	1		
CIA I & I		rks for each question	1		2		5	10		
		otal Marks for each section	4		6		10	10		

*Note: It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

		Dist	ribution of N	larks with	n K Level	CIA I &	CIA II	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2	-	-	4	8	60
	K2	2	4	10	10	26	52	00
	K3	-	-	10	10	20	40	40
CIA	K4	-	-	-	-	-	-	-
Ι	K5	-	-	-		-	-	-
	Marks	4	6	20	20	50	100	100
	K1	2	2	-	-	4	8	60
	K2	2	4	10	10	26	52	00
CIA	K3	-	-	10	10	20	40	40
II	K4	-	-	-	-	-		-
11	K5	-	-	-		-	-	-
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
S.No	COs	K - Level	MO(No. of Questions		Short An No. of Question	swers K – Level	Section C (Either / or Choice)	Section D (Open Choice)		
1	CO 1	K1	2	K1	1	K1	2 (K3& K3)	1 (K2)		
2	CO 2	K3	2	K1	1	K1	2 (K3 &K3)	1 (K3)		
3	CO 3	K3	2	K1&K2	1	K2	2 (K3 &K4)	1 (K3)		
4	CO 4	K4	2	K1&K2	1	K2	2 (K3 &K4)	1 (K3)		
5	CO 5	K4	2	K1&K2	1	K2	2 (K3 &K4)	1 (K4)		
No.	of Quest. Aske	ions to be ed	10		5		5	5		
No	of Quest. answe	ions to be red	10		5		5	3		
Mar	Marks for each question		1		2		5	10		
Total N	Total Marks for each section		10		10		25	30		
	(Figures	in parenthesi	is denotes, qu	estions s	hould be as	ked with	the given K	level)		

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

	Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5	6	10	-	19	15.83	42				
K2	5	4	10	10	31	25.83					
K3	-	-	20	30	50	41.67	42				
K4	-	-	10	10	20	16.67	16				
Marks	10	10	50	50	120	100	100				
NB: Hig of K lev	gher level of p els.	erformance o	f the students	s is to be asso	essed by a	attempting	higher level				

		-	ice Questions)
Answe	r All Q	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (She	ort Answei	rs)
Answe	r All Q	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eit	her/Or Ty	pe)
Answe	r All Q	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K4	
18) b	CO3	K4	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
			formance of the students is to be assessed by attempting higher
level of			
	-	en Choice	
		Three ques	
Q.No	CO	K Level	Questions
21	CO1	K2	
22	CO2	K3	
23	CO3	K3	
24	CO4	K3	
25	CO5	K4	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name ELECTRONIC COMMUNICATION SYSTEMS			
Course Code 21UELS21	L	Р	С
Category Skill	2	-	2
Nature of course:EMPLOYABILITYSKILL ORIENTEDENTREPRENU	JRSH	IP	
Course Objectives:			
 To define the concept of Analog communication system To understand the concept of digital communication system To acquire knowledge on Amplitude and Frequency modulation. To inculcate the principle of mobile communication& satellite communication To compare and contrast the communication systems by self-study. 			
Unit: I Introduction:		06	
Introduction to communication- Elements of a communication systemneed fo	r mo	dulati	on-
Electromagnetic spectrum and typical applications-some communication systems- cl	assifi	cation	n of
communication systems.			
Unit: IIAnalog Communication:Introduction-Amplitudemodulation-Anglemodulation-Frequencymodulation-Tra	mami	06 ttor	
receiver of AM and FM.	a1151111	llei	anu
Unit: III Digital Communication:		06	
Digital pulse modulation-PCM-Sampling-Quantizing-coding-delta modulation-wirele	SS	00	
communication.			
Unit: IV Mobile Communication:		06	
Introduction: Cell Mobile Telephone system – Group of special mobile (GSM) – M			
techniques (TDMA, FDMA, CDMA) –GPRS- Introduction to Mobile Communication	n Spe		
Unit: VSatellite Communication:Introduction – Active and passive satellite- structure of satellite communication-s	otollit	06	
Application-Attitude and orbit control system-TT&C-communication subsystems.	atenn	e on	ms-
Total Lecture Ho	urs	30H 1	·s
Books for Study:			
 Simon Haykin, Communications Systems, Wiley India, New Delhi, 4th Edition, R K.S.Srinivasan, Principles of Communication System, Anuradha Publications, Ne Edition, Reprint 2007 MonojitMitra, Satellite Communication, Prentice Hall of India, New Delhi, First I 	ew De	lhi, F	First
Books for References:			
1. Simon Haykin, Analog and Digital Communications, Wiley India, New Delh Reprint. 2003	i, 1 st	Edit	ion,
2. B.P.Lathi, Communication Systems, Wiley Eastern University Edition, USA, Reprint 1994.	First	Edi	tion
3. B.P.Lathi, Modern Digital and Analog Communication Systems, Prism Book Newyork, Second Edition, 1993.	s Priv	vate 1	Ltd,

Web R	Web Resources:							
1. <u>htt</u>	ps://swayam.gov.in/nd1_noc20_ee16/preview							
2. <u>htt</u>	ps://swayam.gov.in/nd1_noc19_ee47/preview							
Course	e Outcomes	K Level						
On the	successful completion of the course, student will be able to:							
CO1:	Describe the basic building blocks of communication systems	UP TO K1						
CO2:	Summarize the basic concept of communications.	UP TO K2						
CO3:	Apply themodulation and demodulation concepts in communication	UP TO K3						
005.	systems.							
CO4:	Distinguish the operation of AM and FM modulation	UP TO K4						
CO5:	Compare and contrast the types of communication systems.	UP TO K4						

CO & PO Mapping:

Γ

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	1	1
CO 3	3	3	3	2	2	2
CO 4	2	2	2	3	2	2
CO5	2	2	3	2	3	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

UNIT	Course Name	Hrs	Pedagogy
I	Introduction: Introduction to communication- Elements of a communication systemneed for modulation- Electromagnetic spectrum and typical applications-some communication systems- classification of communication systems.	6	Chalk & Talk
II	Analog communication: Introduction-Amplitude modulation-Angle modulation-Frequency modulation-Transmitter and receiver of AM and FM	6	Chalk & Talk
ш	Digital communication: Digital pulse modulation-PCM-Sampling-Quantizing-coding-delta modulation-wireless communication	6	Chalk & Talk
IV	Mobile Communication: Introduction: Cell Mobile Telephone system – Group of special mobile (GSM) – Multiple access techniques (TDMA, FDMA, CDMA-GPRS- Introduction to Mobile Communication Spectrum.	6	Power point Presentation
V	Satellite communication: Introduction – Active and passive satellite- structure of satellite communication-satellite orbits-Application-Attitude and orbit control system-TT&C-communication subsystems.	6	Power point Presentation

Course Designed by: Mr.M. Satheeshkumar

Mr. A. Velmurugan





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	D	IGITAL ELECTRON	ICS	5				
Course Code	2	1UELC31				L	Р	С
Category	C	core				5	-	5
Nature of cours	e:	EMPLOYABILITY	✓	SKILL ORIENTED	ENTREPREN	EUR	SHIP	,
Course Object	ive	s:						
-		e		systems and arithmetic alysis and design of Boo	1	d logi	с	
circuits		1		, .	C	U		
				binational logic circuits				
				ft registers and Flip-flop	DS			
		cepts of A/D, D/A conv	ersi	ions and their types.				
		er System and Codes					15)
Number Syster							~	
-				mber Systems –Convers	ion from One N	umber	Syst	em
		System – Floating Poi		1		~		
-		•		tion, Multiplication and Di			. The	~~
Code – Gray Cod			l Ar	ithmetic - Binary Coded D	ecimal (BCD) –	Exces	s i nre	e
		an Algebra And Logic	Cat	tos			15	
				olean algebra – De Morg	an's Theorem	Sum		
_	-	d Product of Sum metho				Sum	01	
Logic Gates :	u	a roduce of Sum mean	u	Kurnaugn map.				
0	N	AND NOR – Universal C	lates	s- EX-OR and EX-NOR G	ates - Logic Gate	es usii	ıø	
Discrete Compo					20810 044		-8	
		netic and Combination	onal	Logic Circuits			15	;
				Full Subtractor – Parallel	Binary Adder	– 4 bi	_	
				r – Demultiplexer – Dec				5
		kers – Magnitude Comp					J	
		ntial Logic Circuits					15	, ,
		0	Flip	flop - D Flip flop – J-K	Flip flop –Mast	er Sla		
Flip Flops - T F			г	r r r	r r			
Shift Registers		1						
0			s – 1	Ripple Counters – Syncl	nronous Counter	r – Uj	o Dov	хn
		Aod-5 Counters-Mod-10				-		
Unit: V D/A	ar	nd A/D Converters					15	5
Simultaneous T	'yp	e (Flash type) of ADC-	- Su	ccessive Approximation	n Type of ADC	' - Di	al Sl	ope
Type of ADC	-	Binary weighted Resi	istoı	r type of DAC - R-2	R Ladder Typ	be of	DA	С-
		ing ADC 0809 & DAC						
				То	tal Lecture Ho	urs	75 H	rs
Books for Stud	y:							
1. Salivahanan.	S a	nd Arivazhagan.S, DIG	ITA	AL CIRCUITS AND D	ESIGN, Vikas	Public	catior	1

House Private Ltd, Noida, 3rd edition, 2009. 2. Malvino & Leech, —**DIGITAL PRINCIPLES AND APPLICATIONS**, Tata McGraw Hill

Edition V, 2002

Books for References:

1. M.Morris Mano — Digital Logic and Computer Design PHI 2005

2. M.Morris Mano — Digital Design PHI, Third edition 2005.

3. Thomas L Floyd - Digital Fundamentals 11th edition, Pearson publications

Web Resources:

- 1. https://nptel.ac.in/courses/117/106/117106086/
- 2. https://nptel.ac.in/courses/117/106/117106086/
- 3. https://nptel.ac.in/courses/108/105/108105132/

Course Outcomes K Level On the successful completion of the course, student will be able to: **CO1:** Understand the basics of Number systems and codes Up to K3 **CO2:** Realize the operation of various logic gates and analyzing the outputs Up to K3 CO3: Analyze and design the Arithmetic and combinational logic circuits Up to K4 Up to K4 **CO4:** Analyze and design the Sequential logic circuits Understand the basics of analog-to- digital converter and digital -to -analog **CO5**: Up to K4 converter

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	3	2
CO 2	2	1	2	2	2	3
CO 3	2	2	3	2	2	2
CO 4	2	1	1	1	3	1
CO 5	1	2	3	3	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
Ι	Number System: Decimal, Binary, Octal and Hexa Decimal Number Systems – Conversion from One Number System to Another Number System – Floating Point Representation. Arithmetic Operation: Binary Addition, Subtraction, Multiplication and Division – 1's and 2's Compliments Representation- 2's Compliment Arithmetic - Binary Coded Decimal (BCD) – Excess Three Code – Gray Code – ASCII Codes.	15	Chalk & Talk
Ш	 Boolean Logic Operation – basic laws of Boolean algebra – De Morgan's Theorem – Sum of Product method and Product of Sum method– Karnaugh map. Logic Gates : OR, AND, NOT, NAND, NOR – Universal Gates- EX-OR and EX-NOR Gates - Logic Gates using Discrete Components. 	15	Chalk & Talk
ш	Half Adder – Full Adder – Half Subtractor – Full Subtractor – Parallel Binary Adder – 4 bit Binary Adder / Subtractor – BCD adder – Multiplexer – Demultiplexer – Decoders – Encoders – Parity Generators / Checkers – Magnitude Comparators.	15	Chalk & Talk
IV	Flip Flops: R-S Flip flop - Clocked R-S Flip flop - D Flip flop – J-K Flip flop –Master Slave J-K Flip Flops - T Flip Flops. Shift Registers and Counters: SISO - SIPO – PIPO – PISO - Ring Counters – Ripple Counters – Synchronous Counter – Up Down counter– Mod-3, Mod-5 CountersMod-10 counters.	15	Power point presentation
V	Simultaneous Type (Flash type) of ADC- Successive Approximation Type of ADC - Dual Slope Type of ADC - Binary weighted Resistor type of DAC - R-2R Ladder Type of DAC - Implementation using ADC 0809 & DAC 0800 IC's.	15	Power point presentation

Course Designed by:

1. Mr. Charles Theodore & 2. Mr.A.Velmurugan, Assistant Professor

	Learning Outcome Based Education & Assessment (LOBE)										
	Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
Inte rnal COs			Section A MCQs		Section B Short Answers		Section C	Section D			
	COs	K Level	No. of. Questions	Zs K - Level	No. of. Questions	K - Level	Either or Choice	Open Choice			
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	1K3			
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3&K3)	1K3			
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1K4			
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3&K3)	1K4			
		No. of Questions to be asked	4		3		4	2			
Pat	estion tern	No. of Questions to be answered	4		3		2	1			
CIA I &	1 & 11	Marks for each question	1		2		5	10			
		Total Marks for each section	4		6		10	10			

		Di	stribution of	Marks with	K Level CI	A I & Cl	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	-	-		2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	20	40	80	80
I	K4	-	-	-	-	-	-	-
-	Marks	4	6	20	20	50	100	100
	K1	2	-	-		2	4	
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	-	20	40	40
II	K4	-	-	-	20	20	40	40
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Sum	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes									
			MCQ	(COs) Qs) Short Ans	swers	Section C	Section D		
S.No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open		
			Questions	Level	Questions	Level	Choice)	Choice)		
1	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)		
2	CO2	Up to K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)		
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)		
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	1(K4)		
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)		
No.	of Quest Aske	ions to be ed	10		5		10	5		
No.	of Quest: answer	ions to be red.	10		5		5	3		
Marks for each question.		1		2		5	10			
Total Marks for each section.		10		10		25	30			
	(Figure	s in parenthe	sis denotes, q	uestions s	hould be ask	ked with	the given K le	evel)		

		D	istribution of	Marks with	K Level		
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	-	-	-	5	4.16	17
K2	5	10	-	-	15	12.5	1/
K3	-	-	40	20	60	50	50
K4	-	-	10	30	40	33.3	33
Marks	10	10	50	50	120	100	100
NB: Hig of K lev	gher level of p els.	erformance o	f the students	s is to be asse	essed by a	attempting	higher level

Section	A (Mu	ultiple Cho	ice Questions)
Answe	r All Q	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (She	ort Answei	rs)
Answe	r All Q	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eit	ther/Or Ty	pe)
Answe	r All Q	uestions	$(5 \times 5 = 25 \text{ marks})$
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K3	
20) b	CO5	K3	
			ormance of the students is to be assessed by attempting higher
level of			
		en Choice	
	, i i i i i i i i i i i i i i i i i i i	Chree ques	
Q.No	CO	K Level	Questions
21	CO1	K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
25	CO5	K4	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	Course Name DIGITAL ELECTRONICS LAB								
Course Code	21UELCP3				L	Р	С		
Category	Core				-	4	2		
Nature of cours	Nature of course:EMPLOYABILITYImage: SKILL ORIENTEDENTREPRENEURSHIP								
Course Objectives:									
1. To acquire the basic knowledge of digital logic levels and application of knowledge to									
	tal electronics circuits.								
	tudents to perform the analy								
	l learn and understand basi	s of	digital electronics and	able to design	comb	inatio	onal		
and sequential of			11. 6	1 .					
	tudents to perform the analy								
	ligital –to- analog convertor			nethod.					
	Experiment (Any 12 ex								
	f basic gates using ICs and								
	f Universal gates (NOR and ne Boolean laws and DE Mo								
	der and Full Adder.	Jiga							
	btractor and Full Subtractor	•							
	to Gray Converter and Gray		Sinary Converter						
	flop and Clocked- RS using								
	op and T Flip flop.	5 1 11	and and more guids.						
9. JK flip-									
10. Multiple	1								
11. De- Mu									
	Binary Encoder								
	seven Segment Decoder								
14. Shift Re	egister-SISO								
15. BCD co	ounter								
16. Analog	to Digital converter using I	C08	04						
Web Resource	s:								
	ac.in/vlabs-dev/labs/digital-		ronics/						
	<u>in/courses/108/105/10810513</u>	<u>52/</u>							
Course Outcon			1 4 111 11 4			K Le	vel		
	ful completion of the cours				<u> </u>	T 7 4			
	CO1:To make use of logic circuits using Boolean laws.K4CO2:To construct logic gates using digital IC's and discrete components.K5								
						K5			
	e use of arithmetic and comb			gates.		K5			
	To construct Flip-flop circuits using digital IC's. K5								
CO5: To cons	struct Shift registers and co	unte	rs using digital IC's.			K5)		

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	3	3
CO 2	3	2	2	2	3	3
CO 3	3	3	3	2	3	2
CO 4	2	2	2	3	2	3
CO 5	2	2	3	3	3	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Study of basic gates using ICs and discrete components. Study of Universal gates (NOR and NAND) Study the Boolean laws and DeMorgan's Theorem	9	Practical
II	Half Adder and Full Adder. Half Subtractor and Full Subtractor Binary to Gray Converter and Gray to Binary Converter.	9	Practical
III	RS flip-flop and Clocked- RS using NAND and NOR gates. D-flip-flop, T Flip flop and JK flip-flop	9	Practical
IV	Multiplexer, De- Multiplexer and Octal to Binary Encoder	9	Practical
V	BCD to seven Segment Decoder, Shift Register and BCD counter	9	Practical

Course Designed by: 1. Mr. Charles Theodore

2. Mr.A.Velmurugan



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name P	PROGRAMMING IN C					
Course Code 2	1UITA31			L	Р	С
Category A	Allied			5	-	5
Nature of course:	EMPLOYABILITY	SKILL ORIENTED	ENTREPREN	EUR	SHIP	,
Course Objective	es:					
• To learn th	he fundamentals of C progra	amming concepts.				
1	C programs using arrays a	e				
	p applications in C using fur		ctures.			
-	ent Structures and Unions (-				
_	t/output in file handling in	С.		1	1.7.11	
Unit: I C Prog	17 1	0	15 H			
	ogram – C programming: I					
	Associativity – Expressions			nt sta	iteme	nts
	ng statements – Switch sta	atement – Looping state	ments.			
	s and Strings :				15 He	ours
•	on– Initialization – One Dir					
	Array - Strings: Implement	ing String Variables $-S$	tring operations	: len	gth,	
compare, concaten						
	ions and Pointers :	1 01 1 1 0 1 1 1	D 11 1 0		15 H	ours
	nction prototype, function					
	Recursion Function—Po	inters: Types of Pointers-I	Pointer Expressio	n I	Pointer	S
and Functions.	ures and Unions				15 11	
		tures Calf referential at		ami	15 H	
	d structures - Array of struc luction of Unions - Differen		•	anne	men	lory
	andling	ice between Structure and			15 H	oure
	ening and Closing File - Ir	mut / Output operations	on File - Rand	om		
Files - Command		iput / Output operations	on the - Kand		ALLES	5 10
	Ente / Arguments.	Tota	l Lecture Hour	·s 7	5 Ho	irs
Books for Study:		1000		5 7	. 110	415
		N.C. Tete McCarry II'l	1 Education Du		T ::	4 . 1
-	my, Programming in ANS	SI C, Tata McGraw Hil	I Education Pri	vale	LIMI	tea,
	New Delhi, 2012. , "How to solve it by Comp	uter" Pearson Education	2008			
Books for Refere			, 2008.			
	Koffman E.B, "Problem Sol	lving and Programm des	ion in C" Pear	sonF	ducat	ion
2009.		i ing and i rogrammi dos		SUIL	aavat	,
	netkar, Let Us C, BPB Pub	lications, New Delhi. Te	nth Edition. 201	0.		
	ed, Programming with C, N		,		ted, N	Jew
Delhi, Third E					,	
4. Brain W.Kern	igham & Dennis Ritchie, C	Programming, Prentice	Hall, Second Ed	ditio	1, 198	8.
						_

Web F	Resources:						
1. <u>htt</u>	1. <u>https://www.slideshare.net/AjitNayak20/computer-fundamentals-intro-to-c-programming-</u>						
mo	<u>odule-i</u>						
	ps://www.slideshare.net/avikdhupar/amazing-c						
3. <u>htt</u>	ps://www.guru99.com/c-programming-tutorial.html						
Cours	e Outcomes	K Level					
On the	successful completion of the course, student will be able to:						
CO1:	Demonstrate an understanding of C programming language concepts	K3					
CO2:	Develop and implement applications in C using arrays and strings	K3					
CO3:	Design and develop programs, analyses and interprets the concept of functions and pointers.	К3					
CO4:	Develop applications in C using structures and Unions	K4					
CO5:	Relate the concepts of programming and develop confidence to learn the C language for life time	K4					

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	1	2	2	1	2	3
CO 2	2	2	3	2	3	1
CO 3	3	2	2	3	2	2
CO 4	2	2	3	3	3	2
CO 5	2	3	2	2	3	1

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

UNIT	SUBJECT NAME	Hrs	Mode
I	Structure of C program – C programming: Data Types – Constants– Keywords — Operators: Precedence and Associativity – Expressions – Input/Output statements, Assignment statements — Decision making statements – Switch statement – Looping statements.	15	Chalk & Talk, ICT Kit
II	Arrays– Declaration– Initialization – One Dimensional and Two Dimensional Arrays – Multidimensional Array - Strings: Implementing String Variables – String operations: length, compare, concatenate, copy	15	Chalk & Talk, ICT Kit
III	Introduction - Function prototype, function definition, function call, Built-in functions — Recursion & Non Recursion Function— Pointers: Types of Pointers-Pointer Expression Pointers and Functions	15	Chalk & Talk, ICT Kit
IV	Structure – Nested structures - Array of structures - Self referential structures — Dynamic memory allocation – Introduction of Unions - Difference between Structure and Unions	15	Chalk & Talk, ICT Kit
V	Introduction - Opening and Closing File - Input / Output operations on File - Random Access to Files - Command Line Arguments	15	Chalk & Talk, ICT Kit

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print											
	Articulation Mapping – K Levels with Course Outcomes (COs)											
			Section	n A	Section	n B	Seather C	Castian D				
Internal	Cos	K Level	MCQ)s	Short Ans	swers	Section C Either or	Section D Open				
	Cos	K Level	No. of. Questions	K - Level	No. of. Questions	K – Level	Choice	Choice				
CI	CO1	Up to K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)				
AI	CO2	Up to K3	2	K1,K2	2	K2	2(K3,K3)	1(K3)				
CI	CO3	Up to K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)				
AII	CO4	Up to K4	2	K1,K2	2	K2	2(K4,K4)	1(K4)				
		of Questions be asked	4		3		4	2				
Question Pattern	QuestionNo. of QuestionsPatternto be answered		4		3		2	1				
CIA I & Ma II		rks for each question	1		2		5	10				
		al Marks for the section	4		6		10	10				

***Note:** It is the decision of the course teacher to ask 2 Questions in any unit under section-B (short answer questions)

		Dist	ribution of M	larks with	K Level	CIAI&	CIA II	
	K Section A (Multiple Choice Questions)		Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	20
CIA	K3	-	-	20	20	40	80	80
I	K4	-	-	-	-	-	-	
-	Marks	4	6	20	20	50	100	100
	K1	2	2	-	-	4	8	20
	K2	2	4	-	-	6	12	20
CIA	K3	-	-	10	10	20	40	40
II	K4	-	-	10	10	20	40	40
	Marks	4	6	20	20	50	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
S.No	COs	K - Level	MOQs No. of K – Questions Level		Short AnswersNo. of Questio nsK – Level		Section C (Either / or Choice)	Section D (Open Choice)		
1	CO1	UP TO K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)		
2	CO2	UP TO K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)		
3	CO3	UP TO K3	2	K1,K2	1	K2	2(K3,K3)	1(K3)		
4	CO4	UP TO K4	2	K1,K2	1	K2	2(K4,K4)	1(K4)		
5	CO5	UP TO K4	2	K1,K2	1	K2	2(K4,K4)	1(K4)		
No.	•	stions to be ked	10		5		10	5		
No.	No.of Questions to be answered		10		5		5	3		
Marks for each question		1		2		5	10			
Total Marks for each section		10		10		25	30			
	(Figure	es in parenthes	sis denotes, q	uestions s	hould be a	sked with	the given K	level)		

	Distribution of Marks with K Level									
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %			
K1	5	-	-	-	5	4.17	17			
K2	5	10	-	-	15	12.5	17			
K3	-	-	30	30	60	50	50			
K4	-	-	20	20	40	33.33	33			
Marks	10	10	50	50	120	100	100			
	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.									

	-	iestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
		rt Answers	3)
Answei		iestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
		her/Or Typ	e)
		iestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
		vel of perfo	rmance of the students is to be assessed by attempting higher level
of K lev			
		en Choice)	
		hree questi	
Q.No	CO	K Level	Questions
21	CO1	K3	
22	CO2	K3	
	CO3	K3	
23			
23 24 25	CO3 CO4 CO5	K4 K4	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

	COMPUTER ORIENTED OFFICE AUTOMATIC	JN			
Course Code	21UELS31		L	Р	C
Category	Skill		2	-	2
Nature of cours	e: EMPLOYABILITY SKILL ORIENTED 🗸	ENTREPREN	NEUI	RSHI	P
Course Object	ves:				
1. To learn	about the basis of computer and its application.				
2. To deve	op skills on the Microsoft word.				
	op skills on the Microsoft Excel.				
	op skills on the Microsoft power point.				
5. To deve	op skills on the Microsoft Access.				
	ics Of Computer			06	
	ftware and Hardware Components - Hardware Access				
	vare Applications - Computer Network: LAN - Internet	t - E-Mail – Bro	owsei	rs- E-	
Mail – Clients.					
	Word			06	
	e - Formatting - Border & Shading - Columns - Head		-		otes
	al Page Break - Column Break and Line Break – Creat				
	Arts, Pictures, and Other Files-Anchoring& Wrapping				-
	ts - Index - Page Numbering, Data And Time, Author,	Etc., - Creating	g Mas	ter	
0_{0} 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0					
	•				
	Excel		1	06	
Unit: III MS Creating Works	Excel heet - Entering and Editing Text, Numbers, Formulas -	U U		ction	
Unit: III MS Creating Works Modifying Wor	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De	efining Names -	- Inse	ction rting	
Unit: III MS Creating Works Modifying Wor and Deleting Ro	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De ows of Columns - Moving Around Worksheet Naming	efining Names - Worksheet, Cop	- Inse pying	ction rting	S
Unit: III MS Creating Works Modifying Wor and Deleting Ro Inserting and D	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De bws of Columns - Moving Around Worksheet Naming V eleting Worksheet - Formatting, Gauging, Heading Dis	efining Names - Worksheet, Cop playing Value -	- Inse pying · Cha	ction rting	S
Unit: III MS Creating Works Modifying Wor and Deleting Ro Inserting and D Selecting Fonts	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De ows of Columns - Moving Around Worksheet Naming eleting Worksheet - Formatting, Gauging, Heading Dis - Protesting Data Using Style So Templates - Reprintin	efining Names - Worksheet, Cop playing Value - Ig Worksheet C	- Inse pying · Cha	ction rting	S
Unit: III MS Creating Works Modifying Wor and Deleting Ro Inserting and D Selecting Fonts Charts - Manag	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De was of Columns - Moving Around Worksheet Naming V eleting Worksheet - Formatting, Gauging, Heading Dis - Protesting Data Using Style So Templates - Reprintin ng Date - Tables- Tables Wraps – Macros - Linking V	efining Names - Worksheet, Cop playing Value - Ig Worksheet C	- Inse pying · Cha	ction rting nging ng	s ; of
Unit: IIIMSCreating WorksModifying Worand Deleting RoInserting and DSelecting FontsCharts - ManagUnit: IVMS	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De bws of Columns - Moving Around Worksheet Naming V eleting Worksheet - Formatting, Gauging, Heading Dis - Protesting Data Using Style So Templates - Reprintin ng Date - Tables- Tables Wraps – Macros - Linking V Power Point	efining Names - Worksheet, Cop playing Value - Ig Worksheet C Vorksheets	- Inse pying Cha reati	ction erting nging ng 06	s ; of
Unit: IIIMSCreating WorksModifying Worand Deleting RoInserting and DSelecting FontsCharts - ManagUnit: IVMSCreating a Prese	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De ows of Columns - Moving Around Worksheet Naming V eleting Worksheet - Formatting, Gauging, Heading Disp - Protesting Data Using Style So Templates - Reprintin ng Date - Tables- Tables Wraps – Macros - Linking V Power Point entation: Setting Presentation Style - Adding Text to the	efining Names - Worksheet, Cop playing Value - Ig Worksheet C Vorksheets Presentation -	- Inse pying Cha creating Form	ction erting nging ng 06 nattir	s ; of g a
Unit: IIIMSCreating WorksModifying Worand Deleting RoInserting and DSelecting FontsCharts - ManagUnit: IVMSCreating a PresePresentation: Advisories	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De was of Columns - Moving Around Worksheet Naming V eleting Worksheet - Formatting, Gauging, Heading Disp - Protesting Data Using Style So Templates - Reprintin ng Date - Tables- Tables Wraps – Macros - Linking V Power Point Intation: Setting Presentation Style - Adding Text to the Iding Style - Color, Gradient Fills - Arranging Objects	efining Names - Worksheet, Cop playing Value - g Worksheet C Vorksheets e Presentation - – Adding Head	- Inse pying Cha reating Form	ction rting nging ng 06 nattir Foot	s ; of g a er -
Unit: IIIMSCreating WorksModifying Worand Deleting RoInserting and DSelecting FontsCharts - ManagUnit: IVMSCreating a PresePresentation: ASlide Backgrout	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De bws of Columns - Moving Around Worksheet Naming V eleting Worksheet - Formatting, Gauging, Heading Dis - Protesting Data Using Style So Templates - Reprintin ng Date - Tables- Tables Wraps – Macros - Linking V Power Point entation: Setting Presentation Style - Adding Text to the Iding Style - Color, Gradient Fills - Arranging Objects ad - Slide Layout - Adding Graphics to the Presentation	efining Names - Worksheet, Cop playing Value - g Worksheet C Vorksheets e Presentation - – Adding Head a: Inserting Pict	- Inse pying Cha creating Form ler & ures,	ction rting nging ng 06 nattir Foot	s ; of g a er -
Unit: IIIMSCreating WorksModifying Workand Deleting RoInserting and Deleting RoSelecting FontsCharts - ManageUnit: IVMSCreating a PresePresentation: AcSlide BackgroutTables, Etc. Integer	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De ows of Columns - Moving Around Worksheet Naming V eleting Worksheet - Formatting, Gauging, Heading Dis - Protesting Data Using Style So Templates - Reprintin ng Date - Tables- Tables Wraps – Macros - Linking V Power Point entation: Setting Presentation Style - Adding Text to the Iding Style - Color, Gradient Fills - Arranging Objects and - Slide Layout - Adding Graphics to the Presentation of the Presentation – Drawing Pictures Using Draw - Ad	efining Names - Worksheet, Cop playing Value - g Worksheet C Vorksheets e Presentation - – Adding Head a: Inserting Pict ding Effects to	- Inse pying Cha creating Form ler & ures,	ction rting nging ng 06 nattir Foot	s ; of g a er -
Unit: IIIMSCreating WorksModifying Worand Deleting RoInserting and DSelecting FontsCharts - ManagUnit: IVMSCreating a PresePresentation: ASlide BackgroutTables, Etc. IntoPresentation: Se	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De ows of Columns - Moving Around Worksheet Naming V eleting Worksheet - Formatting, Gauging, Heading Disp - Protesting Data Using Style So Templates - Reprintin ng Date - Tables- Tables Wraps – Macros - Linking V Power Point Intation: Setting Presentation Style - Adding Text to the Iding Style - Color, Gradient Fills - Arranging Objects and - Slide Layout - Adding Graphics to the Presentation of the Presentation – Drawing Pictures Using Draw - Ad tting Animation & Transition Effect - Adding Audio ar	efining Names - Worksheet, Cop playing Value - g Worksheet C Vorksheets e Presentation - – Adding Head a: Inserting Pict ding Effects to	- Inse pying Cha creating Form ler & ures,	ction erting nging ng 06 nattir Foot Mov	g a g a er - ies
Unit: IIIMSCreating WorksModifying Worand Deleting RoInserting and DSelecting FontsCharts - ManagUnit: IVMSCreating a PresePresentation: AcSlide BackgroutTables, Etc. IntoPresentation: SeUnit: VMS	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De bws of Columns - Moving Around Worksheet Naming V eleting Worksheet - Formatting, Gauging, Heading Dis - Protesting Data Using Style So Templates - Reprintin ng Date - Tables- Tables Wraps – Macros - Linking V Power Point Entation: Setting Presentation Style - Adding Text to the Iding Style - Color, Gradient Fills - Arranging Objects and - Slide Layout - Adding Graphics to the Presentation to the Presentation – Drawing Pictures Using Draw - Ad tting Animation & Transition Effect - Adding Audio an Access	efining Names - Worksheet, Cop playing Value - g Worksheet C Vorksheets e Presentation - – Adding Head a: Inserting Pict ding Effects to nd Video.	- Inse pying Cha reating Form ler & ures, the	ction rting nging ng 06 nattir Foot	g a g a er - ies
Unit: IIIMSCreating WorksCreating WorksModifying Worand Deleting RoInserting and Deleting FontsChearts - ManageUnit: IVMSCreating a PresePresentation: Additional setsSlide BackgroutCables, Etc. IntegerPresentation: SetUnit: VMSIntroduction: Deletion:	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De was of Columns - Moving Around Worksheet Naming V eleting Worksheet - Formatting, Gauging, Heading Disp - Protesting Data Using Style So Templates - Reprintin ng Date - Tables- Tables Wraps – Macros - Linking V Power Point Intation: Setting Presentation Style - Adding Text to the Iding Style - Color, Gradient Fills - Arranging Objects and - Slide Layout - Adding Graphics to the Presentation the Presentation – Drawing Pictures Using Draw - Ad tting Animation & Transition Effect - Adding Audio an Access tabase Concepts - Tables - Queries - Forms – Reports.	efining Names - Worksheet, Cop playing Value - g Worksheet C Vorksheets e Presentation - – Adding Head a: Inserting Pict ding Effects to nd Video.	- Inse pying Cha reating Form ler & ures, the ving	ction rting nging 06 nattir Foot Mov	g a ies
Unit: IIIMSCreating WorksCreating WorksModifying Worand Deleting RoInserting and DSelecting FontsCharts - ManagUnit: IVMSCreating a PressPresentation: ASlide BackgroutCables, Etc. IntoPresentation: SeUnit: VMSIntroduction: DDatabase Files:	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De ows of Columns - Moving Around Worksheet Naming V eleting Worksheet - Formatting, Gauging, Heading Disp - Protesting Data Using Style So Templates - Reprintin ng Date - Tables- Tables Wraps – Macros - Linking V Power Point Intation: Setting Presentation Style - Adding Text to the Iding Style - Color, Gradient Fills - Arranging Objects and - Slide Layout - Adding Graphics to the Presentation of the Presentation – Drawing Pictures Using Draw - Ad tting Animation & Transition Effect - Adding Audio an Access Itabase Concepts - Tables - Queries - Forms – Reports. Creating Table Design - Indexing - Entering Data – Im	efining Names - Worksheet, Cop playing Value - g Worksheet C Vorksheets e Presentation - – Adding Head a: Inserting Pict ding Effects to nd Video. Opening & Sav porting Data- C	- Inse pying Cha creating Form ler & ures, the Ving Creating	ction erting nging ng 06 nattir Foot Mov	g a g a er - ies
Unit: IIIMSCreating WorksModifying Worand Deleting RoInserting and DSelecting FontsCharts - ManagUnit: IVMSCreating a PresePresentation: AcSlide BackgroutTables, Etc. IntoPresentation: SeUnit: VMSIntroduction: DDatabase Files:Queries: SQL S	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De ows of Columns - Moving Around Worksheet Naming V eleting Worksheet - Formatting, Gauging, Heading Dis- Protesting Data Using Style So Templates - Reprintin ng Date - Tables- Tables Wraps – Macros - Linking V Power Point entation: Setting Presentation Style - Adding Text to the Iding Style - Color, Gradient Fills - Arranging Objects ad - Slide Layout - Adding Graphics to the Presentation of the Presentation – Drawing Pictures Using Draw - Ad tting Animation & Transition Effect - Adding Audio an Access mabase Concepts - Tables - Queries - Forms – Reports. Creating Table Design - Indexing - Entering Data – Im tatements - Setting Relationship - Using Wizards - Creating tatements - Setting Relationship - Using Wizards - Creating Creating Table Design - Indexing - Entering Data - Im	efining Names - Worksheet, Cop playing Value - g Worksheet C Vorksheets e Presentation - – Adding Head a: Inserting Pict ding Effects to nd Video. Opening & Sav porting Data- C	- Inse pying Cha creating Form ler & ures, the Ving Creating	ction erting nging ng 06 nattir Foot Mov	s of g a er - ies
Unit: IIIMSCreating WorksModifying Worand Deleting RoInserting and Deleting FortsSelecting FontsCharts - ManagUnit: IVMSCreating a PresePresentation: AdSlide BackgroutTables, Etc. IntoPresentation: SeUnit: VMSIntroduction: Database Files:	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De ows of Columns - Moving Around Worksheet Naming V eleting Worksheet - Formatting, Gauging, Heading Disp - Protesting Data Using Style So Templates - Reprintin ng Date - Tables- Tables Wraps – Macros - Linking V Power Point Intation: Setting Presentation Style - Adding Text to the Iding Style - Color, Gradient Fills - Arranging Objects nd - Slide Layout - Adding Graphics to the Presentation of the Presentation – Drawing Pictures Using Draw - Ad tting Animation & Transition Effect - Adding Audio an Access intabase Concepts - Tables - Queries - Forms – Reports. Creating Table Design - Indexing - Entering Data – Im tatements - Setting Relationship - Using Wizards - Crea- ting Report.	efining Names - Worksheet, Cop playing Value - g Worksheet C Vorksheets e Presentation - – Adding Head a: Inserting Pict ding Effects to nd Video. Opening & Sav porting Data- C ating Forms: G	- Inse pying Cha reating Forr ler & ures, the ving Creating UI - 1	ction rting nging ng 06 nattir Foot Mov	s g a er - ies
Unit: IIIMSCreating WorksModifying Worand Deleting RoInserting and DSelecting FontsCharts - ManagUnit: IVMSCreating a PresePresentation: AdSlide BackgroutTables, Etc. IntoPresentation: SeUnit: VMSIntroduction: DDatabase Files:Queries: SQL SCreating & Print	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De ows of Columns - Moving Around Worksheet Naming V eleting Worksheet - Formatting, Gauging, Heading Disp - Protesting Data Using Style So Templates - Reprintin ng Date - Tables- Tables Wraps – Macros - Linking V Power Point entation: Setting Presentation Style - Adding Text to the Iding Style - Color, Gradient Fills - Arranging Objects and - Slide Layout - Adding Graphics to the Presentation the Presentation – Drawing Pictures Using Draw - Ad tting Animation & Transition Effect - Adding Audio an Access mabase Concepts - Tables - Queries - Forms – Reports. Creating Table Design - Indexing - Entering Data – Im tatements - Setting Relationship - Using Wizards - Crea- ting Report. Tota	efining Names - Worksheet, Cop playing Value - g Worksheet C Vorksheets e Presentation - – Adding Head a: Inserting Pict ding Effects to nd Video. Opening & Sav porting Data- C	- Inse pying Cha reating Forr ler & ures, the ving Creating UI - 1	ction erting nging ng 06 nattir Foot Mov	s g a er - ies
Unit: IIIMSCreating WorksModifying Worand Deleting RoInserting and DSelecting FontsCharts - ManagUnit: IVMSCreating a PresePresentation: AcSlide BackgroutTables, Etc. IntoPresentation: SeUnit: VMSIntroduction: DDatabase Files:Queries: SQL SCreating & PrinBooks for Stud	Excel heet - Entering and Editing Text, Numbers, Formulas - ksheet Range Selection Copying and Moving Data - De ows of Columns - Moving Around Worksheet Naming V eleting Worksheet - Formatting, Gauging, Heading Disp - Protesting Data Using Style So Templates - Reprintin ng Date - Tables- Tables Wraps – Macros - Linking V Power Point entation: Setting Presentation Style - Adding Text to the Iding Style - Color, Gradient Fills - Arranging Objects and - Slide Layout - Adding Graphics to the Presentation the Presentation – Drawing Pictures Using Draw - Ad tting Animation & Transition Effect - Adding Audio an Access mabase Concepts - Tables - Queries - Forms – Reports. Creating Table Design - Indexing - Entering Data – Im tatements - Setting Relationship - Using Wizards - Crea- ting Report. Tota	efining Names - Worksheet, Cop playing Value - g Worksheet C Vorksheets e Presentation - – Adding Head a: Inserting Pict ding Effects to nd Video. Opening & Sav porting Data- C ating Forms: Gl al Lecture Hou	- Inse pying Cha creatin Forr ler & ures, the Ving Creati UI - I	ction rting nging ng 06 nattir Foot Mov	s g a er - ies

Lam	bert					
2. Mici	2. Microsoft Office Word 2007 Plain & Simple by Jerry Joyce & Marianne Moon					
Books	for References:					
1.The	Unofficial Guide to Microsoft Office Excel 2007 Julia Kelly & Curt Simmons					
2. Mici	rosoft Office Power point 2007 Plain & Simple Nancy Muir					
Web R	Resources:					
https:/	/www.msuniv.ac.in/images/e-					
conten	t/6.Computer%20%20Fundamentals%20and%20Office%20Automation.pd	lf				
Course	e Outcomes	K Level				
On the	e successful completion of the course, student will be able to:					
CO1:	Recognize and understand Basics of Computer	Up to K2				
CO2:	Use and Practice of Word Processing	Up to K2				
CO3:	Use and Practice of MS Excel	Up to K2				
CO4:	Knowledge to Make Small Presentation	Up to K2				
	Use and Practice of MS Access	Up to K2				

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	2	1
CO 3	3	3	2	3	2	2
CO 4	2	2	3	2	3	2
CO 5	2	2	3	3	2	2

*3 – Advanced Application; 2 – Intermediate Developme2nt; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Basics Of Computer: Introduction- Software and Hardware Components – Hardware Accessories - Operating System Software - Software Applications - Computer Network: LAN - Internet - E- Mail – Browsers- E-Mail – Clients.	6	Chalk & Talk
п	MS Word : Setting Page Style - Formatting - Border & Shading – Columns - Header & Foot- Setting Footnotes - Inserting Manual Page Break - Column Break and Line Break – Creating Sections and Frames Inserting. Clip Arts, Pictures, and Other Files-Anchoring& Wrapping Setting Document Styles - Table of Contents - Index - Page Numbering, Data And Time, Author, Etc., - Creating Master Documents -Web Page.	6	Power point presentation
III	MS Excel : Creating Worksheet - Entering and Editing Text, Numbers, Formulas - Saving – Excel Functions Modifying Worksheet Range Selection Copying and Moving Data - Defining Names - Inserting and Deleting Rows of Columns - Moving Around Worksheet Naming Worksheet, Copying Inserting and Deleting Worksheet - Formatting, Gauging, Heading Displaying Value - Changing of Selecting Fonts - Protesting Data Using Style So Templates - Reprinting Worksheet Creating Charts - Managing Date - Tables- Tables Wraps – Macros - Linking Worksheets	6	Power point presentation
IV	MS Power Point: Creating a Presentation: Setting Presentation Style - Adding Text to the Presentation - Formatting a Presentation: Adding Style - Color, Gradient Fills - Arranging Objects – Adding Header & Footer - Slide Background - Slide Layout - Adding Graphics to the Presentation: Inserting Pictures, Movies, Tables, Etc. Into the Presentation – Drawing Pictures Using Draw - Adding Effects to the Presentation: Setting Animation & Transition Effect - Adding Audio and Video.	6	Power point presentation
v	MS Access: Introduction: Database Concepts - Tables - Queries - Forms – Reports. Opening & Saving Database Files: Creating Table Design - Indexing - Entering Data – Importing Data- Creating Queries: SQL Statements - Setting Relationship - Using Wizards - Creating Forms: GUI - Form Creating & Printing Report.	6	Power point presentation

Course Designed by: 1. Mr. M. Satheesh Kumar 2. Mr.M. Velmurugan



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	BASIC ELECTRONICS							
Course Code	21UELN31			L	Р	С		
Category	Non-Major Elective			2	-	2		
Nature of cours	e: EMPLOYABILITY SKILL ORIENTED	✓	ENTREPR	ENE	URSH	HIP		
Course Objecti	ves:							
2. To under 3. To under 4. To learn 5. To acquir Unit: I ELF Simple Theory Seven Segment Unit: II SEM Conductor- Ser Ser	re the basic knowledge of electronic component stand the function and uses of semiconductor. rstand the working function of the power supplet the uses of Electronic instruments and optical of re the basic knowledge of digital electronics. CTRONIC COMPONENTS & Use of : Resistors, Capacitors, Inductors, Die Display, Transformers, Switches, Microphone, IICONDUCTOR THEORY : niconductor- Intrinsic Semiconductor- Extrinsic	y odes, Zen Loudspea	ker, Buzzers ductor- P typ	, Fuse	e. 06	<u> </u>		
Semiconductor a diode	and N type Semiconductor- PN junction diode -	V-I chara	acteristics of	PN jı	unctio	on		
Unit: III POV	VER SUPPLY				06)		
Bridge Rectifie	- Capacitor Filter - Fixed IC Regulated Power	Supply -	SMPS – UP	S-Inv	erter	_		
Constant Voltag								
	CTRONIC INSTRUMENTS AND OPTICA				06	5		
	lication of multimeter- Merits and Demerits of		ers					
	& Use of: LED, Laser, Solar Cell, LDR, LCD	lisplay						
	ITAL ELECTRONICS				06)		
conversion -Sin	n: Decimal, Binary– Decimal to Binary Converged binary numbers. asic Operation of OR, AND, NOT, NOR, NAN		-					
		Total	Lecture Ho	urs	30 H	rs		
Books for Stud	y:							
 R.S.Sedha, A Books for Refe S. Salivahan McGraw Hii B. L. Theraj Web Resources 	an, N. Suresh Kumar, A. Vallavaraj, "Electron l Publishing Company Limited, New Delhi, 8th a, "Basic Electronics – Solid State Devices" , 5 :	New Dell ics Devic edition.	hi, first Editi	on, 19 uits",	990 Tata			
 https://nptel.ac.in/courses/108/108/108108122/ https://nptel.ac.in/courses/108/108/108108112/ 								
	ptel.ac.in/courses/103/103/103/103103112/ ptel.ac.in/courses/115/102/115102103/							
Course Outcon				1	K Le	vel		
	ul completion of the course, student will be abl	e to:						

CO1:	Understand the theory basics of electronic components.	Up to K2
CO2:	Understand the simple theory and use of semiconductor.	Up to K2
CO3:	Utilization of electronic components in power supply circuits.	Up to K2
CO4:	Utilization of Electronic instruments and optical devices.	Up to K2
CO5:	Gain the knowledge about digital electronics	Up to K2

CO & PO Mapping:

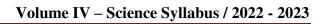
COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	2	2	2	2	2
CO 2	2	3	1	2	2	3
CO 3	1	2	2	1	1	2
CO 4	3	2	2	2	1	2
CO 5	2	1	2	3	2	1

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Simple Theory & Use of : Resistors, Capacitors, Inductors, Diodes, Zener diodes, Transistors, Seven Segment Display, Transformers, Switches, Microphone, Loudspeaker, Buzzers, Fuse.	6	Chalk & Talk
п	Conductor- Semiconductor- Intrinsic Semiconductor- Extrinsic semiconductor- P type Semiconductor and N type Semiconductor- PN junction diode - V-I characteristics of PN junction diode	6	Chalk & Talk
III	Bridge Rectifier - Capacitor Filter - Fixed IC Regulated Power Supply - SMPS – UPS-Inverter –Constant Voltage Transformer	6	Chalk & Talk
IV	Multimeter-Application of multimeter- Merits and Demerits of multimeters Simple Theory & Use of: LED, Laser, Solar Cell, LDR, LCD display	6	Power point presentation
V	 Number System: Decimal, Binary– Decimal to Binary Conversion – Binary to Decimal conversion -Singed binary numbers. Logic Gates: Basic Operation of OR, AND, NOT, NOR, NAND, Ex-OR and Ex-NOR. 	6	Power point presentation

Course Designed by: 1. Mr. M. Satheesh Kumar & Mr. A.Velmurugan







MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	L	INEAR INTEGRATED	CIR	CUITS					
Course Code	2	IUELC41				L	Р	С	
Category	C	ore				5	-	5	
Nature of cours	e:	EMPLOYABILITY	✓	SKILL ORIENTED	ENTREPR	ENEU	JRSI	HIP	
Course Objecti	ve	s:							
1. To impart the knowledge on Op-amp Characteristics.									
 To Gain the knowledge about the linear applications of an Op-amp To understand the knowledge about the nonlinear applications of an Op-amp 									
		udents to acquire the know							
		udents to acquire the know				5 and	1 566) in	
various circuits.	SL	udents to acquire the know	ieug	e of special functions of	108 (555,50		1 300) 111	
	ro	tional Amplifier					15		
		of Op-amp - Functional B	lock	diagram Characterist	ics of an ide	al On			
		t Schematic of Op Amp 74				ai Op	crain	Лаг	
±		fier Characteristics: Open		n gain _ CMRR _ Input	bias and of	fset c	urren	te _	
		offset voltages – Offse							
		ability – Limitation – Freq				, ne y	respe	, c	
		r Application of Operation					15	;	
		n-inverting amplifiers – V			g amplifier	- Di			
		mentation amplifier – In							
_		to voltage converter- High	-			-			
– Narrow band		•	1	1 1					
Unit: III Non	L	inear Application of Oper	ratio	onal Amplifier			15	;	
		generative comparator – Ze			ole and Hold	circu	it –		
Precision diode	_]	Half wave precision rectifie	ers –	Active peak detector -C	Clipper and C	Clamp	er –		
		ponential amplifier							
		form Generators and IC					15		
_		ator: Square wave generate				-			
		ator: Block diagram of 72.							
	t li	miting schemes. Output cu	rren	t boosting – Fixed and a	adjustable the	ree te	rmina	al	
regulator.									
		I Functions ICs	• .•				15		
		n block diagram and descr	-		-	on - I	W M	-	
566 Voltage Co	ntr	olled Oscillator –. Monolit	nic i				75 H	100	
				Total	Lecture Ho	urs	/э п	15	
Books for Stud	•								
1. Roy Cho 199 2.	ouc	lhury and Shail, Linear In	tegr	rated Circuits, Wiley L	td, New Del.	lhi, II	I Edi	tion	
2. Salivaha Edition,		n.S & Kanchana Bhaska 08	ıran.	V.S, "Linear Integra	ated Circui	i ts ", ′	ТМН	, II	
Books for Refe									
		*							

1.	Gayakwad A.R., OP – Amps and Linear Integrated Circuits,	Prentice Hall of India,
	New Delhi, Third Edition, 1993.	

- 2. ConghlinF.R and Driscoll F.F, **Operational Amplifier and Linear Integrated Circuits**, PHI New Jersey, III Edition. 1997.
- 3. Millman and Halkias, **Integrated Electronics: Analog and Digital Circuits and Systems**, McGraw Hill, Reprint, 1995, New Delhi.

Web Resources:

- 1. https://www.digimat.in/nptel/courses/video/108108111/L01.html
- 2. https://www.youtube.com/watch?v=clTA0pONnMs
- 3. https://www.digimat.in/nptel/courses/video/108102112/L01.html

Course	e Outcomes	K Level				
On the	On the successful completion of the course, student will be able to:					
CO1:	CO1: Understand the characteristics of Op-Amp					
CO2:	Gain the knowledge about the linear applications of an Op-amp	Up to K3				
CO3:	Gain the knowledge about the nonlinear applications of an Op-amp	Up to K4				
CO4:	Understand the working of regulators and generators.	Up to K4				
CO5:	Apply the concepts of special functions of ICs (555,565 and 566) in various circuits.	Up to K4				

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	3	2	2	3
CO 2	2	2	2	3	2	3
CO 3	2	3	1	2	3	2
CO 4	3	2	2	2	2	2
CO 5	2	2	2	1	2	3

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Basic information of Op-amp - Functional Block diagram – Characteristics of an ideal Operational Amplifier – Circuit Schematic of Op Amp 741. Operational Amplifier Characteristics: Open loop gain – CMRR – Input bias and offset currents – Input and output offset voltages – Offset compensation techniques – Frequency response characteristics – Stability – Limitation – Frequency compensation – Slew rate	15	Chalk & Talk
Ш	Inverting and Non-inverting amplifiers – Voltage follower – Summing amplifier - Differential amplifier – Instrumentation amplifier – Integrator and Differentiator – Voltage to Current converter-Current to voltage converter- High pass-Low pass- Band Stop Filter- Butter worth filters – Narrow band pass Filter.	15	Chalk & Talk
ш	Comparators – Regenerative comparator – Zero crossing detector – Sample and Hold circuit – Precision diode – Half wave precision rectifiers – Active peak detector -Clipper and Clamper – Logarithm and Exponential amplifier	15	Chalk & Talk
IV	 Waveform generator: Square wave generator-Triangular wave generator- Sine wave generator IC Voltage Regulator: Block diagram of 723 general Purpose of voltage regulator – Dual power supply – Current limiting schemes. Output current boosting – Fixed and adjustable three terminal regulator. 	15	Power Point Presentation
V	555 Timer function block diagram and description – Monostable and Astable operation – PWM -566 Voltage Controlled Oscillator –. Monolithic PLL IC 565analog multiplexer using op-amp.	15	Power Point Presentation

Course Designed by: 1. Mr. J. Charles Theodore & Mr. M. Satheesh Kumar

		Articulation	Mapping – K	Levels wit	h Course O	outcomes	(COs)	
			Section A MCQs		Section B Short Answers		-	Section D
Inte							Section C	
rnal	COs	K Level	No. of. Questions	K - Level	No. of. K - Questions Level	Either or Choice	Open Choice	
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3&K3)	1(K3)
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3&K3)	1(K4)
		No. of Questions to be asked	4		3		4	2
-	estion	No. of Questions to be answered	4		3		2	1
Pattern CIA I & II	Marks for each question	1		2		5	10	
		Total Marks for each section	4		6		10	10

Learning Outcome Based Education & Assessment (LOBE)Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)

		Distr	ribution of Ma	arks with K I	Level CIA I	& CIA II		
	K(Multiple Choice(Short AnswerSection C (Either / Or Choice)Section D (Open Choice)Total Marks(Mar wither		% of (Marks without choice)	t %				
	K1	2	-	-		2	4	20
	K2	2	6	-	-	8	16	20
	K3	-	-	20	20	40	80	80
CIAI	K4	-	-	-	-	-	-	-
	Marks	K Level(Multiple Choice Questions)(Short Answer Questions)Sect (Eith Choice Questions)K12-K226K3K4Marks46K12-K4K3K4K4K4K4K3K4	20	20	50	100	100	
	K1	2	-	-		2	4	
	K2	2	6	-	-	8	16	20
CIAII	K3	_	_	20	-	20	40	40
	K4	-	-	-	20	20	40	40
	Marks	4	6	20	20	50	% of (Marks without choice) Consistent Consistent 4 4 16 - 80 - 100 4 16 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 40 -	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component

Sum	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes									
	(COs)									
		К-	MCQs		Short Answers		Section C	Section D		
S.No	COs	Level	No. of	K –	No. of	K –	(Either / or	(Open		
		Level	Questions	Level	Questions	Level	el Choice) 2(K3&K3) 2(K3&K3) 2(K3&K3) 2(K4&K4)	Choice)		
1	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)		
2	CO2	Up to K3	2	K1&K2	1	K2	2(K3&K3)	1(K3)		
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)		
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	1(K4)		
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	1(K4)		
No. of Questions to be				10	5		10	5		
	Aske	d	10		5		10	5		
No.of Questions to be		10		5		5	3			
	answer		10					5		
Mark	s for each	n question.	1		2		5	10		
Tot	al Marks	for each	10		10		25	30		
	sectio	n.	10		10		23	50		
	(Figure	s in parenth	esis denotes,	questions s	should be ask	ked with	the given K le	evel)		

	Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5	-	-	-	5	4.16	17				
K2	5	10	-	-	15	12.5	1/				
K3	-	-	40	20	60	50	50				
K4	-	-	10	30	40	33.3	33				
Marks	10	10	50	50	120	100	100				
C	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.										

		-	ce Questions)
	_	uestions	(10x1=10 marks)
Q.No	<u>CO</u>	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	<u>CO4</u>	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
		ort Answer	
	-	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
		her/Or Typ	
Answer	: All Qı	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K3	
20) b	CO5	K3	
	0	vel of perfo	ormance of the students is to be assessed by attempting higher level of
K levels			
	· .	en Choice)	
		<u>Three quest</u>	
Q.No	CO	K Level	Questions
21	CO1	K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
25	CO5	K4	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	LINEAR INTEGRATED) CI	RCUITS LAB				
Course Code	21UELCP4				L	Р	С
Category	Core				-	4	3
Nature of cours	se: EMPLOYABILITY	✓	SKILL ORIENTED	ENTREPRE	NEUI	RSHI	Р
Course Object	ives:	•					
1. To acquire t	he basic knowledge of op-an	np c	haracteristics in practic	ally.			
2. To prepare st	tudents to perform the analys	sis a	nd design of op-amp IC	741 based circ	uits.		
	l learn and construct the op-a	-					
4. To prepare st	tudents to design IC 555 time	er ba	ased circuits.				
5. To design mi	ini project based above pract	ical	circuit.				
List of	Experiment (Any 12 experi	imer	nts)				
	g Amplifier						
	ower Supply.						
	nverting Amplifier.						
4. Summir	ng Amplifier.						
	ntial Amplifier						
6. Differer	ntiator and Integrator.						
	p – Phase Shift Oscillator.						
	p – Wien's Bridge Oscillator						
	- Astable Multivibrator.						
	– Monostable Multivibrator.						
	and Negative Clipper.						
	and Negative Clamper.						
13. Compar							
	wave generator.						
	network experiment						
16. Sequend	ce Timer						
Web Resource	s:						
https://vlab.an	nrita.edu/?sub=3&brch=22	5					
	gur.ac.in/linear-integrated-		uit-lab				
Course Outcon						K Le	vel
	ful completion of the course	, stu	dent will be able to:				
	act the circuits using IC741					K4	ļ
	ct the Amplifier circuits using	op-a	mp.			K4	
	use of oscillator circuits IC 74	-				K4	
	ict rectifier and clipper& cla		<u> </u>	IC741		K4	
	ict the multivibrators using I					K4	
							-

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	3	3
CO 2	3	2	2	2	3	3
CO 3	3	3	3	2	3	2
CO 4	2	2	2	3	2	3
CO 5	2	2	3	3	3	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
Ι	Inverting Amplifier ,Dual Power Supply. Non- Inverting Amplifier	9	Practical
II	Summing amplifier,Difference Amplifier, Differentiator and Integrator. Op-Amp – Phase Shift Oscillator.	9	Practical
III	Op-Amp – Wien's Bridge Oscillator, IC 555– Astable Multivibrator. IC 555 – Monostable Multivibrator.	9	Practical
IV	Positive and Negative Clipper, Positive and Negative Clamper. Comparator	9	Practical
V	Square wave generator, LORA network experiment, Sequence Timer.	9	Practical

Course Designed by: 1. Mr. M. Satheesh Kumar

2. Mr.A.Velmurugan



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	FIBER OPTIC COMMUNICATION SYSTEMS			
Course Code	21UELS41	L	Р	С
Category	Skill	2	-	2
Nature of cours	e: EMPLOYABILITY SKILL ORIENTED 🖌 ENTREPREN	NEU	RSH	IP
Course Objecti	ves:			
	nber the theory of fiber optic communication.			
	be the different characteristics of optical fiber.			
1	tion of different types of optical sources			
	y the different types of optical detector.			
	tance of an optical fiber system.			-
	damentals of optical fiber:		06	
	Multimode Step index fiber – Multimode Graded index fiber – Single r			
	of general communication system-comparison with other communication	on sy	stem	-
	ptical fiber Communication		-	
	ory of transmission and Fiber losses:		06)
	eflection-Acceptance angle – Numerical aperture - Skew rays – Attenua	ation	l —	
	ion loss – Scattering loss – Fiber bend loss			
	cal source:		06	
	emission of radiation-population inversion-optical feedback and laser			
	tion Spontaneous emission - Carrier recombination - Stimulated	emis	sion	and
Lasing-LASER				
Unit: IV Opt			06	
• -	ptical detection principles- PN photo diode - P-I-N photo diode- Avala	inche	e Pho	to
diode – Photo T				
	cal Fiber System:		06)
-	sion circuit - optical receiver circuit - Analog and Digital system - Diff	feren	ıt	
multiplexing tec	1			
	Total Lecture Hou	rs	30 H	rs
Books for Stud				
	Senior," Optic fibre communication." Pearson Education, New Del	lhi,In	idia,I	First
Edition,2				
	a,Tata Mc Graw Hill "Fiber Optic in telecommunication."TataMcGr	raw l	Hill,	
	hi,First Edition,2003			
Books for Refe				
	Optical Fiber communication, TMH .Ltd, New Delhi, First Edition,2			
	ta, Optical fiber communication and its Application , PHI Learning l	Pvt.	Ltd,	
New Delhi, First				
	umugam, Optical communication , Anuradha Publication.			
	mar Sarkar Optical fibers and Fibre Optic Communication System	S.C	hand	,
New Delhi.				
Web Resources				
https://nptel.ac	.in/courses/108/106/108106167/			

	https://nptel.ac.in/courses/117/101/117101054/					
https:/	https://nptel.ac.in/courses/108/104/108104113/					
Course	e Outcomes	K Level				
CO1:	Understand the fundamentals of optical fiber	Up to K2				
CO2:	Gain the knowledge about the Theory of transmission of optical signal	Up to K2				
CO3:	Use and working of optical sources	Up to K2				
CO4:	Understand the working of optical detectors	Up to K2				
CO5:	Understanding the concept of optical fiber communication system	Up to K2				

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	2	2	2	2	2
CO 2	2	3	1	2	2	3
CO 3	1	2	2	1	1	2
CO 4	3	2	2	2	1	2
CO 5	2	1	2	3	2	1

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Fundamentals of optical fiber : Optical Fiber – Multimode Step index fiber – Multimode Graded index fiber – Single mode fiber - Block diagram of general communication system-comparison with other communication system-Advantages of optical fiber Communication	06	Chalk & Talk
П	Theory of transmission and Fiber losses : Total internal reflection-Acceptance angle – Numerical aperture - Skew rays – Attenuation – Material absorption loss – Scattering loss – Fiber bend loss	06	Chalk & Talk
III	Optical source: Absorption and emission of radiation-population inversion-optical feedback and laser oscillation - Threshold condition. Optical emission from semiconductors: P N Junction – Spontaneous emission – Carrier recombination – Stimulated emission and Lasing LASER-types of laser.	06	Chalk & Talk
IV	Optical detection: Device types- Optical detection principles- PN photo diode - P-I-N photo diode- Avalanche Photo diode – Photo Transistor.	06	Power Point Presentation
V	Optical Fiber System: Optical transmission circuit - optical receiver circuit - Analog and Digital system - Different multiplexing techniques	06	Power Point Presentation

elmurugan vir. A. v esigned by: **1.**

2. Mr. M. Velmurugan



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	ELECTRONICS IN EV	ERYDAY LIFE				
Course Code	21UELN41			L	Р	С
Category	Non-Major Elective			2	-	2
Nature of cours	e: EMPLOYABILITY	SKILL ORIENTED	✓ ENTREPR	ENEU	JRSH	HP
Course Objecti	ves:					
	t the microwave oven and					
	t the washing machines and	01	1			
	t the Air conditioners and i					
-	tills on using Digital device ills on using digital access					
	CROWAVE OVENS AND				06	
	roperties and generation - N		ram -LCD time	r with		
	ring and Safety instruction			i vvitil	ululi	.11
	SHING MACHINES AN				06	
	oller for washing machines		are and softwar	e - Ty		
	es -Features of washing ma				r	
	CONDITIONERS and R				06	j
AIR CONDIT	IONERS				•	
Air Conditionin	g-Components of Air Cond	litioning System-Water Air	Conditioning S	ysten	n- Air	r
	stem-Remote Control butto	ons.				
REFRIGERAT						
_	efrigeration System-Dome					
	ME / OFFICE DIGITAL				06	
	pier - Calculators - Structur			a cal	culat	ors
	ronic calculators - Digital		a digital clock			
	ITAL ACCESS DEVICE				06	,
	servation -Barcode Scanne					
Automated Tell	er Machines (ATMs) - Set-	1 0			20 11	
		10	tal Lecture Ho	urs	<u>30 H</u>	rs.
Books for Stud						
· · · · ·	sumer Electronics, Pearson					
	h,Everyday Electronics an	d you, kindle edition,2020	•			
Books for Refe						
	, Making Everyday electron					
	Beier, Everything electronic	cs,Mc Graw Hill,second Ec	lition,2015			
Web Resources						
	<u>www.youtube.com/watch?</u> ptel.ac.in/courses/108/108					
	ww.classcentral.com/cou		onic-circuits 1	2052		
Course Outcon		1505wayam-uigitai-titti	unt-en cunts-1.		Lev	el
	ful completion of the course	student will be able to				
on the successi	a completion of the course					

CO1:	Recognize and understand the use of Microwave oven	Up to K2
CO2:	Use and Practice of Washing machine	Up to K2
CO3:	Use and Practice of fridge and Air conditioners	Up to K2
CO4:	Use and Practice of home and office digital device	Up to K2
CO5:	Use and Practice of digital access devices	Up to K2

CO & PO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	3	2	2	2
CO 2	1	1	3	2	2	2
CO 3	2	2	2	1	3	3
CO 4	2	3	2	2	2	1
CO 5	3	2	3	2	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Microwaves - Properties and generation - Microwave oven block diagram -LCD timer with alarm - Controllers - Wiring and Safety instructions – Care and Cleaning-Induction stove	6	Chalk & Talk
п	Electronic controller for washing machines - Washing machine hardware and software - Types of washing machines -Features of washing machines- TV transmitter and receiver basics.	6	Chalk & Talk
ш	AIR CONDITIONERS Air Conditioning-Components of Air Conditioning System-Water Air Conditioning System- Air Conditioning System-Remote Control buttons. REFRIGERATORS Refrigeration- Refrigeration System- Domestic Refrigerators	6	Chalk & Talk
IV	Xerographic copier - Calculators - Structure of a calculator - Internal Organization of a calculators - Servicing electronic calculators - Digital clocks - Block diagram of a digital clock	6	Power point presentation
V	Online ticket reservation -Barcode Scanner and decoder – Electronic Fund Transfer. Automated Teller Machines (ATMs) - Set-Top boxes - Digital cable TV	6	Power point presentation

Course Designed by: 1. Mr. M. Velmurugan & Mr. M. Satheesh Kumar







MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	MICROPROCESS		115 APPLICATI	ONS		
Course Code	21UELC51			L	Р	С
Category	Core			6	-	5
Nature of cours	se: EMPLOYABILI'	TY ✓ SKILL ORIENTED	ENTREPRENE	EURSI	HIP	
Course Object						
		ut the 8085 Microprocessor A				
		5 and to develop the program	0			
		nory and I/O Interfacing con		1	.1	
		out the 8086 Microprocessor	Architecture and to	learn	the	
instruction set o		C N C:				
	various applications o	· · · · · · · · · · · · · · · · · · ·			10	
	hitecture of 8085 Mi		T'' 10	4 1	18	
	0 0	rs – ALU – Addressing mod	es - I iming and Co	ontrol	signa	-1S
Machine cycles					10	
	gramming in 8085:	No. 1 for A constitution for a		4 - 6 4	18	
		- Need for Assembly langu	age – Developmen	It of F	Assen	101
Language Progi	ram					
					10	
Unit: III Mer	nory and I/O Interfa	<u> </u>		T 4	18	
Unit: III Mer Peripherals I/O	nory and I/O Interfa	Selection and Data Transfer			erfaci	ng
Unit: III Mer Peripherals I/O Memory- Bus C	nory and I/O Interfa Instruction – Device Contention - Memory	Selection and Data Transfer Time and Wait States. The 8	255A Programmabl	le Peri	erfaci iphera	ng al
Unit: III Mer Peripherals I/O Memory- Bus C Interface: Block	nory and I/O Interfa Instruction – Device Contention - Memory Diagram of 8255A,	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF	255A Programmabl R Mode, Programm	le Peri ing the	erfaci iphera e 825	ng al
Unit: III Mer Peripherals I/O Memory- Bus C Interface: Block in Mode1, Mod	nory and I/O Interfa Instruction – Device Contention - Memory Diagram of 8255A, e 2 – Bidirectional Da	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program	255A Programmabl R Mode, Programm	le Peri ing the	erfaci iphera e 825	ng al 5A
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Mode1, ModUnit: IVArc	nory and I/O Interfa Instruction – Device Contention - Memory Contention of 8255A, e 2 – Bidirectional Da hitecture of 8086 and	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Programs Instruction set:	255A Programmable Mode, Programme nable Interval Cont	le Peri ing the troller	erfaci iphera e 825 18	ng al 5A
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Model, ModUnit: IVArcFunctional block	nory and I/O Interfa Instruction – Device Contention - Memory C Diagram of 8255A, e 2 – Bidirectional Da hitecture of 8086 and ck diagram – Register	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program	255A Programmable Mode, Programme nable Interval Cont	le Peri ing the troller	erfaci iphera e 825 18	ng al 5A
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Mode1, ModUnit: IVFunctional blockMemory segme	nory and I/O Interfa Instruction – Device Contention - Memory & Diagram of 8255A, e 2 – Bidirectional Da hitecture of 8086 and ck diagram – Register ntation.	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program Instruction set: s – Addressing modes – Instr	255A Programmable Mode, Programme nable Interval Cont	le Peri ing the troller	erfaci iphera e 825 18 sters	ng al 5A -
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Mode1, ModUnit: IVArcFunctional blockMemory segmeUnit: VApp	nory and I/O Interfa Instruction – Device Contention - Memory & Diagram of 8255A, T e 2 – Bidirectional Da hitecture of 8086 and ck diagram – Register ntation.	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program Instruction set: rs – Addressing modes – Instr rocessors:	255A Programmable Mode, Programma nable Interval Cont ruction set- Segmen	le Peri ing the troller nt regis	erfaci iphera e 825 18 sters 18	ng al 5A -
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Model, ModUnit: IVArcFunctional blockMemory segmeUnit: VAppDelay subrouting	nory and I/O Interfa Instruction – Device Contention - Memory Contention - Memory Contention - Memory Contention - Memory Contention - Display - Device Nation - Register Nation - The Segment LED of Content Contention - The Segment LED of Content Contention - The Segment LED of Content Content - The Segment LED of Content - The Segment - The S	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program Instruction set: rs – Addressing modes – Instr rocessors: display – Measurement of fre	255A Programmable Mode, Programma nable Interval Cont ruction set- Segmen quency, voltage and	le Peri ing the troller nt regis	erfaci iphera e 825 18 sters 18	ng al 5A -
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Model, ModUnit: IVArcFunctional blockMemory segmeUnit: VAppDelay subrouting	nory and I/O Interfa Instruction – Device Contention - Memory Contention - Memory Contention - Memory Contention - Memory Contention - Display - Device Nation - Register Nation - The Segment LED of Content Contention - The Segment LED of Content Contention - The Segment LED of Content Content - The Segment LED of Content - The Segment - The S	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program Instruction set: rs – Addressing modes – Instr rocessors:	255A Programmable Mode, Programma nable Interval Cont ruction set- Segmen quency, voltage and Control.	le Peri ing the croller at regis	erfaci iphera e 825 18 sters 18 ent –	ng al 5A
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Mode1, ModUnit: IVArcFunctional blockMemory segmeUnit: VAppDelay subroutingWater Level Co	nory and I/O Interfa Instruction – Device Contention - Memory & Diagram of 8255A, 1 e 2 – Bidirectional Da hitecture of 8086 and ek diagram – Register ntation. Dications of Microp ne – 7 segment LED o ontroller – Stepper mo	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program Instruction set: rs – Addressing modes – Instr rocessors: display – Measurement of fre	255A Programmable Mode, Programma nable Interval Cont ruction set- Segmen quency, voltage and	le Peri ing the croller at regis	erfaci iphera e 825 18 sters	ng al 5A 6
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Model, ModUnit: IVArcFunctional blockMemory segmeUnit: VAppDelay subroutinWater Level CoBooks for Stud	nory and I/O Interfa Instruction – Device Contention - Memory & Diagram of 8255A, T e 2 – Bidirectional Da hitecture of 8086 and ck diagram – Register ntation. Dications of Microp ne – 7 segment LED controller – Stepper mo	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program Instruction set: rs – Addressing modes – Instr rocessors: display – Measurement of fre tor Controller – Traffic light	255A Programmable Mode, Programma nable Interval Cont ruction set- Segmen quency, voltage and Control. Total Lecture Ho	le Peri ing the croller at regis d curr ours	erfaci iphera e 825 18 sters 18 ent – 90 H	ng al 5A 6
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Mode1, ModUnit: IVArcFunctional blockMemory segmeUnit: VAppDelay subroutingWater Level CoBooks for Stud1. Ramesh S G	nory and I/O Interfa Instruction – Device Contention - Memory & Diagram of 8255A, 1 e 2 – Bidirectional Da hitecture of 8086 and ek diagram – Register ntation. Dications of Microp ne – 7 segment LED o ontroller – Stepper mo	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program Instruction set: rs – Addressing modes – Instr rocessors: display – Measurement of fre otor Controller – Traffic light	255A Programmable Mode, Programma nable Interval Cont ruction set- Segmen quency, voltage and Control. Total Lecture Ho	le Peri ing the croller at regis d curr ours	erfaci iphera e 825 18 sters 18 ent – 90 H	ng al 5A
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Mode1, ModUnit: IVArcFunctional blockMemory segmeUnit: VAppDelay subroutinWater Level CoBooks for Stud1. Ramesh S G8085/8080A", I	nory and I/O Interfa Instruction – Device Contention - Memory & Contention - Memory & Contention - Memory & Contention of 8255A, & e 2 – Bidirectional Da hitecture of 8086 and ck diagram – Register ntation. Dications of Micropione ne – 7 segment LED controller – Stepper mo	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program Instruction set: s – Addressing modes – Instr rocessors: display – Measurement of fre otor Controller – Traffic light sor Architecture Program e International (P) Ltd	255A Programmable Mode, Programmable mable Interval Cont ruction set- Segmen quency, voltage and Control. Total Lecture Ho ning and Applicat	le Peri ing the croller at regis d curr ours	erfaci iphera e 825 18 sters 18 ent – 90 H	ng al 5A
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Mode1, ModUnit: IVArcFunctional blockMemory segmeUnit: VAppDelay subroutinWater Level CoBooks for Stud1. Ramesh S G8085/8080A", I2. Aditya. P. M	nory and I/O Interfa Instruction – Device Contention - Memory Contention - Memory Contention - Memory Contention of 8255A, T e 2 – Bidirectional Da hitecture of 8086 and ck diagram – Register ntation. Dications of Micropione ne – 7 segment LED controller – Stepper mo	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program Instruction set: rs – Addressing modes – Instr rocessors: display – Measurement of fre otor Controller – Traffic light sor Architecture Program e International (P) Ltd n to Microprocessors", IIIro	255A Programmable Mode, Programmable Mode, Programma nable Interval Control ruction set- Segmen quency, voltage and Control. Total Lecture Ho ning and Applicat d Edition	le Peri ing the croller at regis d curr ours	erfaci iphera e 825 18 sters 18 ent – 90 H	ng al 5A
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Mode1, ModUnit: IVArcFunctional blockMemory segmeUnit: VAppDelay subroutingWater Level CoBooks for Stud1. Ramesh S G8085/8080A", I2. Aditya. P. M3. S.Malarvizhi	nory and I/O Interfa Instruction – Device Contention - Memory & Contention - Memory & Contention - Memory & Contention - Memory & e 2 – Bidirectional Da hitecture of 8086 and ek diagram – Register ntation. Dications of Microp ne – 7 segment LED of ontroller – Stepper mo	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program Instruction set: s – Addressing modes – Instr rocessors: display – Measurement of fre otor Controller – Traffic light sor Architecture Program e International (P) Ltd	255A Programmable Mode, Programmable Mode, Programma nable Interval Control ruction set- Segmen quency, voltage and Control. Total Lecture Ho ning and Applicat d Edition	le Peri ing the croller at regis d curr ours	erfaci iphera e 825 18 sters 18 ent – 90 H	ng al 5A
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Mode1, ModUnit: IVArcFunctional blocMemory segmeUnit: VAppDelay subroutinWater Level CoBooks for Stud1. Ramesh S G8085/8080A", I2. Aditya. P. M3. S.MalarvizhiPublications, M	nory and I/O Interfa Instruction – Device Contention - Memory & Diagram of 8255A, 1 e 2 – Bidirectional Da hitecture of 8086 and ck diagram – Register ntation. Dications of Micropy ne – 7 segment LED of ontroller – Stepper mo	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program Instruction set: rs – Addressing modes – Instr rocessors: display – Measurement of fre otor Controller – Traffic light sor Architecture Program e International (P) Ltd n to Microprocessors", IIIro	255A Programmable Mode, Programmable Mode, Programma nable Interval Control ruction set- Segmen quency, voltage and Control. Total Lecture Ho ning and Applicat d Edition	le Peri ing the croller at regis d curr ours	erfaci iphera e 825 18 sters 18 ent – 90 H	ng al 5A
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Model, ModUnit: IVArcFunctional blocMemory segmeUnit: VAppDelay subroutinWater Level CoBooks for Stud1. Ramesh S G8085/8080A", I2. Aditya. P. M3. S.MalarvizhiPublications, MBooks for Refe	nory and I/O Interfa Instruction – Device Contention - Memory & Diagram of 8255A, 1 e 2 – Bidirectional Da hitecture of 8086 and ck diagram – Register ntation. Dications of Microp ne – 7 segment LED of ontroller – Stepper mo	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program Instruction set: rs – Addressing modes – Instr rocessors: display – Measurement of fre tor Controller – Traffic light sor Architecture Program e International (P) Ltd n to Microprocessors", IIIro d Its Application", IInd Edit	255A Programmable Mode, Programmable Mode, Programma nable Interval Contr ruction set- Segmen quency, voltage and Control. Total Lecture Ho ning and Applicat d Edition tion, Anuradha Age	le Peri ing the croller at regis d curr ours ion wi	erfaci iphera e 825 18 sters 18 ent – 90 H ith	ng al 5A
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Mode1, ModUnit: IVArcFunctional blockMemory segmeUnit: VAppDelay subroutinWater Level CoBooks for Stud1. Ramesh S G8085/8080A", I2. Aditya. P. M3. S.MalarvizhiPublications, MBooks for Refe1. DoughlasV.H	nory and I/O Interfa Instruction – Device Contention - Memory & Diagram of 8255A, 1 e 2 – Bidirectional Da hitecture of 8086 and ck diagram – Register ntation. Dications of Microp ne – 7 segment LED of ontroller – Stepper mo	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program Instruction set: rs – Addressing modes – Instr rocessors: display – Measurement of fre otor Controller – Traffic light sor Architecture Program e International (P) Ltd n to Microprocessors", IIIro	255A Programmable Mode, Programmable Mode, Programma nable Interval Contr ruction set- Segmen quency, voltage and Control. Total Lecture Ho ning and Applicat d Edition tion, Anuradha Age	le Peri ing the croller at regis d curr ours ion wi	erfaci iphera e 825 18 sters 18 ent – 90 H ith	ng al 5A
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Mode1, ModUnit: IVArcFunctional blockMemory segmeUnit: VAppDelay subroutinWater Level CoBooks for Stud1. Ramesh S G8085/8080A", I2. Aditya. P. M3. S.MalarvizhiPublications, MBooks for Refe1. DoughlasV.HTMH,2012	nory and I/O Interfa Instruction – Device Contention - Memory & Diagram of 8255A, 1 e 2 – Bidirectional Da hitecture of 8086 and ck diagram – Register ntation. Dications of Micropy ne – 7 segment LED of ontroller – Stepper mo	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program Instruction set: rs – Addressing modes – Instr rocessors: display – Measurement of fre otor Controller – Traffic light sor Architecture Program e International (P) Ltd n to Microprocessors", IIIra d Its Application", Ilnd Edit	255A Programmable Mode, Programmable Mode, Programma nable Interval Contr ruction set- Segmen quency, voltage and Control. Total Lecture Ho ning and Applicat d Edition tion, Anuradha Age	le Peri ing the croller at regis d curr ours ion wi encies ware	erfaci iphera e 825 18 sters 18 ent – 90 H ith	ng al 5 <i>A</i>
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Model, ModUnit: IVArcFunctional blockMemory segmeUnit: VAppDelay subroutinWater Level CoBooks for Stud1. Ramesh S G8085/8080A", I2. Aditya. P. M3. S.MalarvizhiPublications, MBooks for Refe1. DoughlasV.HTMH,20122. M. RafiQuaz	nory and I/O Interfa Instruction – Device Contention - Memory Contention - Memory Contention - Memory Contentional Date Controller – Stepper model of the second date of the second date of the second date	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program Instruction set: rs – Addressing modes – Instr rocessors: display – Measurement of fre tor Controller – Traffic light sor Architecture Program e International (P) Ltd n to Microprocessors", IIIro d Its Application", Ilnd Edit ors and Interfacing, Progra	255A Programmable Mode, Programmable Mode, Programma nable Interval Contr ruction set- Segmen quency, voltage and Control. Total Lecture Ho ning and Applicat d Edition tion, Anuradha Age	le Peri ing the croller at regis d curr ours ion wi encies ware	erfaci iphera e 825 18 sters 18 ent – 90 H ith	ng al 5A
Unit: IIIMerPeripherals I/OMemory- Bus CInterface: Blockin Model, ModUnit: IVArcFunctional blockMemory segmeUnit: VAppDelay subroutinWater Level CoBooks for Stud1. Ramesh S G8085/8080A", I2. Aditya. P. M3. S.MalarvizhiPublications, MBooks for Refe1. DoughlasV.HTMH,20122. M. RafiQuaz	nory and I/O Interfa Instruction – Device Contention - Memory ' C Diagram of 8255A, ' e 2 – Bidirectional Da hitecture of 8086 and ck diagram – Register ntation. Dications of Micropy ne – 7 segment LED controller – Stepper mo ly: oankar, "Microprocess Ind Edition, New Age (athur, —Introductio arch 2006 prences: Hall, —Microprocess Zaman, "Microprocess India, Pvt. Ltd., New	Selection and Data Transfer Time and Wait States. The 8 Mode 0, Simple I/O and BSF ata Transfer – 8253 Program Instruction set: rs – Addressing modes – Instr rocessors: display – Measurement of fre tor Controller – Traffic light sor Architecture Program e International (P) Ltd n to Microprocessors", IIIro d Its Application", Ilnd Edit ors and Interfacing, Progra	255A Programmable Mode, Programmable Mode, Programma nable Interval Contr ruction set- Segmen quency, voltage and Control. Total Lecture Ho ning and Applicat d Edition tion, Anuradha Age	le Peri ing the croller at regis d curr ours ion wi encies ware	erfaci iphera e 825 18 sters 18 ent – 90 H ith	ng al 5 <i>A</i>

2. <u>https</u> 3. <u>http</u>	1. <u>https://nptel.ac.in/courses/108/103/108103157/</u> 2. <u>https://www.youtube.com/watch?v=t0Z8P_hpbFk&vl=en</u> 3. <u>https://www.youtube.com/watch?v=fS7FFOaC_iQ</u> EXPECTED COURSE OUTCOME				
Course	Course Outcomes K Level				
On the	e successful completion of the course, student will be able to:				
CO1:	Explain the 8085 microprocessor architecture.	K3			
CO2:	Write programs in 8085 using instruction set.	K3			
CO3:	Interface the 8085 microprocessor with various peripheral devices	K4			
CO4:	Understand the concepts of 8086 architecture and instruction set.	K4			
CO5:	Write programs for their project development	K4			

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	2	3
CO 2	3	2	3	2	2	3
CO 3	3	3	3	2	2	1
CO 4	2	2	2	3	3	1
CO5	2	2	3	3	3	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
Ι	Architecture of 8085 Microprocessor: Functional block diagram – Registers – ALU – Addressing modes - Timing and control signals – Machine cycles.	18	Chalk & Talk
п	Programming in 8085: Instruction format – instruction set – need for Assembly language – Development of Assembly Language Program.	18	Chalk & Talk
ш	Memory and I/O Interfacing Concepts Peripherals I/O Instruction – Device Selection and Data Transfer – Input Interfacing – Interfacing Memory Bus Contention - Memory Time and Wait States. The 8255A Programmable Peripherals Interface: Block Diagram of 8255A, Mode 0 Simple I/P O/P BSR Mode, Programming the 8255A in Mode1, Mode 2 – Bidirectional Data Transfer –8253 Programmable Interval Controller	18	Chalk & Talk
IV	Architecture of 8086 and Instruction set: Functional block diagram – Registers – Addressing modes – Instruction set- Segment registers – Memory segmentation	18	Power point presentation
V	Applications of Microprocessors: Delay subroutine – 7 segment LED display – Measurement of frequency, Voltage and Current –Water Level Controller – Stepper motor Controller – Traffic light Control.	18	Power point presentation

Course Designed by: Dr.G.Pandeeswari

Mr.A.Velmurugan

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
			Sectio	on A	Sectio	n B		
Inte	Inte		MC	Qs	Short Ar	swers	Section C	Section D Open Choice 1(K3) 1(K3) 1(K4)
rnal	Cos	K Level	No. of. Questions	K - Level	No. of. Question s	K - Level	Either or Choice	
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3, K3)	1(K3)
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3, K3)	1(K3)
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3, K3)	1(K4)
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3, K3)	1(K3)
	I	No. of Questions to be asked	4		3		4	2
-	estion tern	No. of Questions to be answered	4		3		2	1
CIA	I & II	Marks for each question	1	2			5	10
		Total Marks for each section	4		6		10	10

	Distribution of Marks with K Level CIA I & CIA II								
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %	
	K1	2	-	-	-	2	4	20	
	K2	2	6	-	-	8	16	20	
CIA	K3	-	-	20	20	40	80	80	
I	K4	-	-	-	-	-	-	-	
•	Marks	4	6	20	20	50	100	100	
	K1	2	-	-	-	2	4	20	
	K2	2	6	-	-	8	16	20	
CIA	K3	-	-	20	10	30	60	60	
II	K4	-	-	-	10	10	20	20	
	Marks	4	6	20	20	500	100	100	

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summa	ative Exa	mination – E	Blue Print A	rticulation (COs)		K Leve	l with Course	Outcomes
S.No	COs	K - Level	MC No. of Question	Qs K –	Short An No. of	K –	Section C (Either /	Section D (Open
1	CO1	Up to K3	s 2	Level K1&K2	Question	Level K2	or Choice) 2(K3&K3)	Choice) (K3)
2	CO2	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	(K4)
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)
No.	of Quest Aske	ions to be d	10		5	5	10	5
No.of Questions to be answered		10		5		5	3	
Marks for each question		1		2		5	10	
Total N	Aarks for	each section	10		10		25	30
((Figures	in parenthesi	s denotes, q	uestions s	hould be ask	ked with	the given K l	evel)

	Distribution of Marks with K Level								
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %		
K1	5	-	-	-	5	4.16	17		
K2	5	10	-	-	15	12.5	1/		
K3	-	-	40	20	60	50	50		
K4	-	-	10	30	40	33.3	33		
Marks	10	10	50	50	120	100	100		
	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								

Section	A (Mu	ltiple Cho	vice Questions)
Answe	r All Q	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (Sho	ort Answei	rs)
Answe	~	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
		her/Or Ty	
	-	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4 CO5	K4 K3	
20) a 20) b	CO5	K3	
/			commance of the students is to be assessed by attempting higher
level of			formance of the students is to be assessed by attempting higher
		en Choice	
	-	Three ques	
Q.No	CO	K Level	Questions
21	C01	K2	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
25	CO5	K4	
			1

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	COMMUNICATION	SYS	STEMS				
Course Code	21UELC52				L	Р	C
Category	Core				6	-	5
Nature of cour	se: EMPLOYABILITY	(✓	SKILL ORIENTED	ENTREPRENI	EURS	HIP	
Course Object							
	nderstand the concepts o						
	erstand the Analog Com						
	erstand the Amplitude m			on			
-	ire knowledge on Pulse						
	lcate the principle of win	reless	communication			40	
	ve Propagation	~				18	
	Free Space Propagation						
	ropagation – Troposphe	eric S	Scatter Propagation –	Virtual Height –	MUF	– LU	J F –
Skip Distance.							
	alog Communication					18	
	n of AM - Frequency sp						
comparison of	f levels – modulated	l tra	nsistor amplifier –	single side band	Tecl	nniqu	le –
Representation	of FM - Generation of	FM	- FM methods - Dir	rect methods - Ind	irect r	netho	ods -
Demodulation	techniques of AM and F	M.					
Unit: III Pul	se Communication					18	3
Introduction to	Pulse Modulation – Typ	bes - I	Pulse Amplitude Mod	ulation (PAM) - P	ulse F	reque	ency
Modulation (PI	FM)– Pulse Time Modul	ation	(PTM) – Pulse Widtl	n Modulation (PWI	M) – P	ulse	•
Position Modul	lation (PPM)- Pulse code	e Moo	dulation (PCM) - Blo	ck diagram of PCM	I trans	miss	ion
and reception				-			
Unit: IV Dig	ital Communication					18	3
Generation and	Detection of ASK circu	it – C	Generation and Detect	ion of FSK circuit	– Gen	eratio	on
and Detection of	of PSK circuit – Quadrat	ure A	Amplitude Modulation	. M-Ary ASK – M	-Ary I	-SK	_
M-Ary PSK.			I	2	5		
	reless Communication					18	3
	pt – The advanced Mobi	le Ph	one System – AMPS	control System – (ellula		-
	cification and operations						
1 1	- Digital cellular system		ciocit diagram com		Cond	141	
		•		Total Lecture Ho	ours	90 H	rs
Books for Stud	dv:				, and		
	y Davis, Electronic (lomn	nunication Systems	Tata McGraw I	Hill P	ublic	hing
	ny ltd,Fourth Edition,199		v	,	1		
1	Haykin, An Introductio	,		Communications	John	wilev	vand
	sia) Pvt.Ltd,1989,Singap			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	5 0111		,
	Shanmugam, Digital an			on System John	Wiley	&	Sone
	Pvt.Ltd, 1979,Singapore.		-	on bystem, joilli	wine y		50115
Books for Ref		(Unit	, . ,				
	S.Roden, Analog and	Dig	vital Communicatio	n Systems Prent	ica H	all]	First
						an.	
	Council Meeting Held (ii Systems, Trent		an, 1	

Edition, 1985, New Delhi.

- 2. Lathi.B.P, Modern Digital and Analog Communication Systems, Oxford University Press, USA, First Edition, 1998.power
- 3. Srinivasan K.S. Analog and Digital CommunicationAnuradha Publications, 2nd Edition, 2011.
- 4. Electronics Communication by Dennis Roddy, John Collen.

Web Resources: https://swayam.gov.in/nd1 noc20 ee16/preview https://swayam.gov.in/nd1_noc19_ee47/preview EXPECTED COURSE OUTCOME K Level **Course Outcomes** On the successful completion of the course, student will be able to: Understand the basic of EM waves and wave propagation **K3** CO1: **CO2:** Analyze the performance of Analog Communication techniques **K3 CO3:** Demonstrate the stages Pulse communication techniques K4 Understand the concepts of Digital communication K4 **CO4:** CO5: Understand the wireless communication concepts **K4**

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	2	3
CO 3	3	3	3	2	2	1
CO 4	2	2	2	3	3	1
CO5	2	2	3	3	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Wave Propagation EM Waves – Free Space Propagation – Surface Wave Propagation – Sky Wave Propagation – Space Wave Propagation – Tropospheric Scatter Propagation – Virtual Height – MUF – LUF – Skip Distance.	18	Chalk & Talk
п	Analog Communication Representation of AM - Frequency spectrum of AM- Generation of AM- Basic requirements – comparison of levels – modulated transistor amplifier – single side band Technique – Representation of FM – Generation of FM – FM methods – Direct methods – Indirect methods -Demodulation techniques of AM and FM.	18	Chalk & Talk
ш	Pulse Communication Introduction to Pulse Modulation – Types - Pulse Amplitude Modulation (PAM) – Pulse Frequency Modulation (PFM)– Pulse Time Modulation (PTM) – Pulse Width Modulation (PWM) – Pulse Position Modulation (PPM)- Pulse code Modulation (PCM) – Block diagram of PCM transmission and reception	18	Chalk & Talk
IV	Digital Communication Generation and Detection of ASK circuit – Generation and Detection of FSK circuit – Generation and Detection of PSK circuit – Quadrature Amplitude Modulation. M-Ary ASK – M-Ary FSK – M- Ary PSK.	18	Power point presentation
V	Wireless Communication Cellular concept – The advanced Mobile Phone System – AMPS control System – Cellular Telephone specification and operations with block diagram – Cellular Base Station – Cellular Radio System – Digital cellular system.	18	Power point presentation

Course Designed by: Dr.G.Pandeeswari

Mr.A.Velmurugan

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
			Sectio		Section		Section C	Section D		
Inte rnal	Cos	K Level	MC No. of. Questions	Qs K - Level	Short An No. of. Question S	K - Level	Either or Choice	Open Choice		
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3, K3)	1(K3)		
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3, K3)	1(K3)		
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3, K3)	1(K4)		
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3, K3)	1(K3)		
		No. of Questions to be asked	4		3		4	2		
Pat	stion tern I & II	No. of Questions to be answered	4		3		2	1		
UIA	1 & 11	Marks for each question	1	2			5	10		
		Total Marks for each section	4		6		10	10		

		D	istribution of	f Marks with	K Level CI	A I & Cl	IA II		
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %	
	K1	2	-	-	-	2	3.3	17	
	K2	2	6	-	-	8	13.3	1/	
CIA	K3	-	-	20	30	50	83.3	83	
I	K4	-	-	-	-	-	-	-	
•	Marks	4	6	20	40	60	100	100	
	K1	2	-	-	-	2	3.3	17	
	K2	2	6	-	-	8	13.3	17	
CIA II	K3	-	-	20	-	20	33.3	33	
	K4	-	-	-	30	30	50	50	
	Marks	4	6	20	30	60	100	100	

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
		es K - Level	MC		Short An	swers	Section C	Section D		
S.No	COs		No. of	K –	No. of	K –	(Either /	(Open		
			Questions	Level	Question	Level	or Choice)	Choice)		
1	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)		
2	CO2	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)		
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)		
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	(K4)		
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)		
No. c	of Quest Aske	ions to be ed	10		5	5	10	5		
No.o	f Quest answe	ions to be red	10		5		5	3		
Marks	Marks for each question		1		2		5	10		
Tota	l Marks sectio	s for each	10		10		25	30		
	(Figure	es in parent	hesis denotes,	questions s	hould be as	ked with	the given K l	evel)		

		Dis	tribution of	Marks with	n K Leve	l					
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5	-	-	-	5	4.16	17				
K2	5	10	-	-	15	12.5	17				
K3	-	-	40	20	60	50	50				
K4	_	_	10	30	40	33.3	33				
Marks	10	10	50	50	120	100	100				
C		Marks 10 50 120 100 100 NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels. 60 100 100 100									

	-	iltiple Cho uestions	ice Questions) (10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	2 and a constant
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (Sho	ort Answei	rs)
		uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K2	~
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eit	her/Or Ty	pe)
		uestions	$(5 \times 5 = 25 \text{ marks})$
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K3	
20) b	CO5	K3	
			ormance of the students is to be assessed by attempting higher
level of			
		en Choice	
		Chree ques	
Q.No	CO	K Level	Questions
21	CO1	K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
25	CO5	K4	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	Microprocessor and I	Microprocessor and Interfacing Lab							
Course Code	21UELCP5	UELCP5 L P C							
Category	Core					-	3	2	
Nature of course: EMPLOYABILITY 🗸 SKILL ORIENTED ENTREPRENEURSH					HIP				
Course Object	ives:				•				

- 1. To develop the assembly language programming of Microprocessor and to interface it with various peripheral devices
- 2. To develop the assembly language program using data transfer instruction.
- 3. To develop the assembly language program using arithmetic instruction
- 4. To develop the assembly language program using branch instruction
- 5. To develop the assembly language program using interfacing instruction.

List of Experiment

- 1. Addition / Subtraction/ Multiplication / Division of 8 bit data
- 2. Block Data Transfer and Sum of N 8 bit Numbers
- 3. To Arrange in Ascending / Descending order
- 4. UP/DOWN Counter using 7 segment displays
- 5. Traffic Light Control Interface
- 6. LED Interface
- 7. Stepper Motor Interface
- 8. Solid State Relay Interface
- 9. Data Transfer using 8255 (PPI)
- 10.Square Wave Generator using 8255
- 11. Interfacing ADC and DAC with 8085.

Web Resources:

http://vlabs.iitb.ac.in/vlabs-dev/labs_local/microprocessor/labs/explist.php

EXPECTED COURSE OUTCOME

K Level

On the successful completion of the course, student will be able to:

CO1:	Gain knowledge of data transfer Programming of 8085	K4
CO2:	Gain knowledge of arithmetic Programming of 8085	K4
CO3 :	Knowledge about branch instruction based Programming of 8085	K4
CO4 :	Knowledge about logic Programming of 8085	K4
CO5:	Understand the wave form generation and interfacing Programming of 8085	K4

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	1	2	1	3	1
CO 2	2	2	2	2	3	3
CO 3	2	3	3	3	1	3
CO 4	3	2	1	2	2	2
CO5	2	2	3	2	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
Ι	Addition / Subtraction/ Multiplication / Division of 8 bit data Block Data Transfer and Sum of N 8 bit Numbers	9	Practical
II	To Arrange in Ascending / Descending order UP/DOWN Counter using 7 segment displays	9	Practical
III	Traffic Light Control Interface LED Interface	9	Practical
IV	Stepper Motor Interface Solid State Relay Interface	9	Practical
V	Data Transfer using 8255 (PPI) 10.Square Wave Generator using 8255. Interfacing ADC / DAC with8085	9	Practical

Course Designed by: Dr.G.Pandeeswari Mr.A.Velmurugan



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	COMMUNICATION	COMMUNICATION LAB							
Course Code	21UELCP6	1UELCP6 L P C							
Category	Core	Core - 3 2							
Nature of cours	e: EMPLOYABILITY	√	SKILL ORIENTED	ENTREPRENI	EURS	HIP			
Course Objecti 1. To understand	ves: d the concept of working	g of	Different types of Filt	er experiments.					

- 2. To experiment the Analog modulation and detection techniques
- 3. To experiment the Digital modulation and detection techniques
- 4. To experiment the voltage to frequency converter.
- 5. To experiment the sample & hold circuits, cross over network and PLL circuit.

List of Experiment

- 1. Low pass active filters.
- 2. High pass active filters.
- 3. Band pass active filters
- 4. Band rejection active filters.
- 5. Sampling and reconstruction of signals.
- 6. Amplitude Modulation and Demodulation.
- 7. Suppressed Carrier amplitude Modulation.
- 8. Frequency Modulation and Demodulation.
- 9. Pulse Amplitude Modulation and Demodulation.
- 10. Pulse Width Modulation and Demodulation.
- 11. Pulse Position Modulation and Demodulation.
- 12.Phase lock loop

Relate	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc.)					
https://www.vlab.co.in/ba-nptel-labs-electronics-and-communications						
EXPE	EXPECTED COURSE OUTCOME K Lev					
On the	e successful completion of the course, student will be able to:					
CO1:	Design the Filters circuits (Low pass, High pass, Band pass and Band reject)	K4				
CO2:	Design the working principles of modulation and demodulation techniques	K4				
CO3:	Knowledge about branch instruction based Programming of 8085	K4				
CO4:	Construct analog and digital demodulation circuits	K4				
CO5:	Construct ADC and DAC using IC0804 and R-2R ladder circuit.	K4				

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	1	2	1	3	1
CO 2	2	2	2	2	3	3
CO 3	2	3	3	3	1	3
CO 4	3	2	1	2	2	2
CO5	2	2	3	2	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON	PLAN

Unit	Course Name	Hrs	Pedagogy
I	Low pass active filters. High pass active filters. Band pass active filters Band rejection active filters.	9	Practical
II	Sampling and reconstruction of signals. Amplitude Modulation and Demodulation. Suppressed Carrier amplitude Modulation.	9	Practical
ш	Frequency Modulation and Demodulation. Pulse Amplitude Modulation and Demodulation. Pulse Width Modulation and Demodulation.	9	Practical
IV	Pulse Position Modulation and Demodulation. Phase lock loop	9	Practical

Course Designed by: Mr.J.Charles theodore

Mr.A.Velmurugan



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	MICROWAVE AND	RADAR SYSTEMS								
Course Code	21UELE51			L	Р	С				
Category	Core Elective			5	-	5				
Nature of cours	ture of course: EMPLOYABILITY SKILL ORIENTED ✓ ENTREPRENE									
$\begin{array}{c c} de \lor ice a \\ 2. & To gain \\ de \lor ices. \\ 3. & To unde \\ 4. & To unde \\ 5. & To gain \\ \hline Unit: I & Intree \\ Introduction - N \\ of TM Wates in \\ \hline Unit: II & Mice \\ \hline High Frequency \\ \end{array}$	rt knowledge on the wor nd communication system knowledge on the operat rstand the concepts of M rstand the concepts of M knowledge on Radar Con oduction to Microwave Maxwell's Equations – T n Rectangular Wave Guid rowave Tubes	ion of Microwave tubes a icrowave Communication icrowave Communication mmunication systems.	and Microwave solid n Devices. n Systems. TE and TM Modes ngular Wave Guide.	d state – Pro	ppaga 15 15 tron	5 tion				
	CROWAVE SOLID ST	ATE DEVICES			15	;				
Tunnel diodes -	Theory of negative resis	e transistors – Varactor d stance amplifiers – Gunn FT diodes – Lasers and N	effect – Gunn diode			s —				
	CROWAVE COMMUN				15	;				
Frequency and scommunicationUnit: VRALRadar range eqFrequency mod	space diversity – Protecti - system gain. DAR SYSTEMS: uations – Mono static ulated CW radar – MT	em block diagram – Repe on switching arrangemen and bio static radars – I and pulse Doppler rad	nts – Microwave rad	io vave)	15 Rada	ar –				
antennas – Case	study in Automated traf	fic systems.			86 11	r				
Books for Stud	v:		Total Lecture Ho	urs	75 H	rs				
	•	NCIPLES", Van nostrand	Reinhold co., 1 st ec	lition.	198	7.				
2.George Ke		nd S R M Prasanna, Elect								
		TRONIC COMMUNICA	ATION SYSTEMS"	', Prer	ntice]	Hall				

- Liao Y.S., "MICROWAVE DEVICE AND CIRCUITS", Prentice Hall of India, 3rd Edition, 5th reprint 1992.
- 3. Solink M.I., "INTRODUCTION TO RADAR SYSTEMS", McGraw Hill, 2nd Edition, 1992.

Web Resources

- 1. <u>https://onlinecourses.nptel.ac.in/noc19_ee58/preview</u>
- 2. <u>https://nptel.ac.in/courses/108/105/108105154/</u>
- 3. <u>https://www.classcentral.com/course/swayam-microwave-engineering-14199</u>

EXPE	EXPECTED COURSE OUTCOME						
Course	Course Outcomes						
On the	e successful completion of the course, student will be able to:						
CO1:	Understand the theory of microwave and Radar systems	K3					
CO2:	Discuss the working of microwave amplifiers, oscillators and devices.	K3					
CO3:	Design and analyze the microwave amplifiers, oscillator and devices.	K4					
CO4:	Illustrate the different types of radar systems	K4					
CO5:	Evaluate the concepts of Radar transmitter and receiver.	K4					

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	2	3
CO 3	3	3	3	2	2	1
CO 4	2	2	2	3	3	1
CO5	2	2	3	3	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Introduction to Microwaves: Introduction – Maxwell's Equations – Types of Wave Guides – TE and TM Modes – Propagation of TM Waves in Rectangular Wave Guide – TM Modes in Rectangular Wave Guide.	15	Chalk & Talk
II	Microwave Tubes: High Frequency limitation of conventional tubes – Principle of velocity modulation – Klystron amplifiers – Reflex Klystrons – Magnetron oscillators – Travelling wave tubes – Backward oscillators	15	Chalk & Talk
ш	MICROWAVE SOLID STATE DEVICESL: High Frequency limitations – Microwave transistors – Varactor diode – Parametric amplifier – Tunnel diodes – Theory of negative resistance amplifiers – Gunn effect – Gunn diode oscillators – Avalanche effect IMPATT and TRAPATT diodes – Lasers and Masers.	15	Chalk & Talk
IV	MICROWAVECOMMUNICATION SYSTEMS: Micro wave Antennas - Microwave system block diagram – Repeaters – Need for diversity – Frequency and space diversity – Protection switching arrangements – Microwave radio communication- system gain.	15	Power point presentation
V	RADAR SYSTEMS: Radar range equations – Mono static and bio static radars – CW (Continuous wave) Radar – Frequency modulated CW radar – MTI and pulse Doppler radar – Duplexers – displays- radar antennas – Case study in Automated traffic systems.	15	Power point presentation

Course Designed by: Dr. D. Sivaranjani Mr. J. Charles Theodore

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)											
Inte rnal		K Level	Sectio		Section B Short Answers		Section C	Section D				
	Cos		No. of. Questions	K - Level	No. of. Questions	K - Leve l	Either or Choice	Open Choice				
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3, K3)	1(K3)				
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3, K3)	1(K3)				
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3, K3)	1(K4)				
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3, K3)	1(K3)				
		No. of Questions to be asked	4		3		4	2				
Pat	stion tern I & II	No. of Questions to be answered	4		3		2	1				
	1 & 11	Marks for each question	1		2		5	10				
		Total Marks for each section	4		6		10	10				

		D	istribution of	f Marks with	K Level CI	A I & Cl	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-	-	-
-	Marks	4	6	20	20	50	100	100
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	10	30	60	60
II	K4	-	-	-	10	10	20	20
	Marks	4	6	20	30	60	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summativ	ve Examinatio		rint Articul Dutcomes (ping – K	Level with C	Course
			MC		Short Ar	nswers	Section C	Section D
S.No	COs	K - Level	No. of	К –	No. of	K –	(Either /	(Open
5.110	000		Question s	Level	Questio n	Level	or Choice)	Choice)
1	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)
2	CO2	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	(K4)
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)
No.	of Quest Aske	ions to be ed	10		5	5	10	5
No	No.of Questions to be answered		10		5		5	3
Mar	Marks for each question		1		2		5	10
Total N	Total Marks for each section		10		10		25	30
	(Figures	in parenthesi	is denotes, q	uestions sh	nould be as	ked with	the given K l	evel)

	Distribution of Marks with K Level											
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %					
K1	5	-	-	-	5	4.16	17					
K2	5	10	-	-	15	12.5	17					
K3	-	-	40	20	60	50	50					
K4	-	-	10	30	40	33.3	33					
Marks	10	10	50	50	120	100	100					
NB: Hig of K lev	gher level of p els.	erformance o	f the students	s is to be asse	essed by a	attempting	higher level					

Section	A (Mu	iltiple Cho	ice Questions)
Answe	r All Q	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (Sho	ort Answei	rs)
Answe	r All Q	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eit	her/Or Ty	pe)
Answe	r All Q	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K3	
20) b	CO5	K3	
			ormance of the students is to be assessed by attempting higher
level of			
	_	en Choice	
		Three ques	
Q.No	CO	K Level	Questions
21	CO1	K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
25	CO5	K4	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	Internet of Things								
Course Code	21UELE52			L	Р	C			
Category	Core			5	-	5			
Nature of course: EMPLOYABILITY SKILL ORIENTED ENTREPRENEU									
Course Object1.To enab2.To unde3.To enabArduinoArduino4.To unde5.To gainUnit: IIOTIntroduction toTechnologies for Security in IoT.Unit: IIDesignUnit: IIDesignIntroduction-Io' consolidation anUnit: IIIProgramArduino IDE –Conditional St other invoking IUnit: IVSenatAnalog and Dig	ives: le the students to learn at erstand the concept of dat ole the students to learn a rstand the interfacing cor knowledge about the app Fundamentals IoT: Evolution of IoT – Tor IoT – Developing Io ign Principles For Conr I/M2m systems - Cond Device management - gramming Fundamenta Basic Syntax – Data Typ atements and Loops – U Functions – Strings and M sors and Actuators gital Sensors – Interfacing	ta and device managemen bout the Programming Funcepts. Dications in IoT. Definition & Characterist T Applications – Applic	ndamentals With C ics of IoT - Archite ations of IoT – In ies - Data mana ffordability o IDE Operators – ⁷ Functions for Ser tions.	ecture dustri igeme	15 of Ic al Ic 215 ent, 15 elay 15	oT – oT – 5 data 5 and			
	ding Sensor Data over I				15	5			
		ESP 32 - WiFi Module –	Programming NOI)EM(-				
Arduino IDE -		d NODEMCU to transmi	t data from tempera	ature	senso	or to			
			Total Lecture Ho	urs	75 H	lrs			
Books for Stud	ly:								
Blackswan Pvt. 2. Boris Adryan Artech Houser I	Ltd., First edition, 2015.	" <i>Internet of Things:</i> A H ul Fremantle, — The Tec				,			

1. Jeeva Jose "Internet of Things" Khanna Book Publishing Co Pvt Ltd. NewDelhi

2.David Etter, IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT **Web Resources:**

1. https://nptel.ac.in/courses/106/105/106105166/Introduction to IoT Part I – Lecture 1

2. <u>https://ocw.cs.pub.ro/courses/iot/courses/02Electronics for Internet of Things – Lecture II</u> 3. <u>https://nptel.ac.in/courses/106105166/Introduction to Arduino – I – Lecture 22</u>						
	EXPECTED COURSE OUTCOME Course Outcomes K Level					
On the	On the successful completion of the course, student will be able to:					
CO1:	Study the concept of basic IoT	K3				
CO2:	: Familiarize the principle of connected devices K3					
CO3:	O3: Gain knowledge about embedded devices K4					
CO4:	CO4: Analyze different sensor Interface technology K4					
CO5:	Analyze the IoT applications	K4				

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	2	3
CO 3	3	3	3	2	2	1
CO 4	2	2	2	3	3	1
CO5	2	2	3	3	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	IOT Fundamentals Introduction to IoT: Evolution of IoT – Definition & Characteristics of IoT - Architecture of IoT – Technologies for IoT – Developing IoT Applications – Applications of IoT – Industrial IoT – Security in IoT.	15	Chalk & Talk
II	Design Principles For Connected Devices: Introduction-IoT/M2m systems - Communication Technologies - Data management, data consolidation and Device management - Ease of Designing and Affordability	15	Chalk & Talk
Ш	Programming Fundamentals With C Using Arduino IDE Arduino IDE – Basic Syntax – Data Types/ Variables/ Constant – Operators –Conditional Statements and Loops – Using Arduino C Library Functions for Serial, delay and other invoking Functions – Strings and Mathematics Library Functions	15	Chalk & Talk
IV	Sensors and Actuators Analog and Digital Sensors – Interfacing temperature sensor, ultrasound sensor and infrared (IR) sensor with Arduino – Interfacing LED and Buzzer with Arduino.	15	Power point presentation
V	RADAR SYSTEMS: Introduction to ESP8266 NODEMCU, ESP 32 - WiFi Module – Programming NODEMCU using Arduino IDE - MQTT – Using WiFi and NODEMCU to transmit data from temperature sensor to Open Source IoT cloud platform .	15	Power point presentation

Course Designed by: Dr.G.Pandeeswari

Mr.A.Velmurugan

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
Inte	Cos	K Level	Section A MCQs		Section B Short Answers		Section C Either or	Section D	
rnal	COS		No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Open Choice	
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3, K3)	1(K3)	
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3, K3)	1(K3)	
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3, K3)	1(K4)	
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3, K3)	1(K3)	
		No. of Questions to be asked	4		3		4	2	
Question Pattern CIA I & II		No. of Questions to be answered	4		3		2	1	
	1 & 11	Marks for each question	1		2		5	10	
		Total Marks for each section	4		6		10	10	

	Distribution of Marks with K Level CIA I & CIA II								
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %	
	K1	2	-	-	-	2	4	20	
	K2	2	6	_	-	8	16	20	
CIA	K3	-	-	20	20	40	80	80	
	K4	-	-	-	-	-	-	-	
	Marks	4	6	20	20	50	100	100	
	K1	2	-	-	-	2	4	20	
CIA II	K2	2	6	_	-	8	16	20	
	K3	-	-	20	10	30	60	60	
	K4	-	-	-	10	10	20	20	
	Marks	4	6	20	30	60	100	100	

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
			MCQs		Short A	nswers		Section D
S.No	COs	K - Level	No. of Questions	K – Level	No. of Questio n	K – Level	Section C (Either / or Choice)	Section D (Open Choice)
1	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)
2	CO2	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	(K4)
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)
No.	No. of Questions to be Asked		10		5	5	10	5
No.of Questions to be answered		10		5		5	3	
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
	(Figures in parenthesis denotes, questions should be asked with the given K level)							

	Distribution of Marks with K Level							
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %	
K1	5	-	-	-	5	4.16	17	
K2	5	10	-	-	15	12.5	17	
K3	_	_	40	20	60	50	50	
K4	-	-	10	30	40	33.3	33	
Marks	10	10	50	50	120	100	100	
ND. II!	ND. Higher lovel of nonformance of the students is to be accounted by attempting higher lovel							

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Section	A (Mu	Itiple Cho	ice Questions)
Answe	r All Q	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (Sho	ort Answei	rs)
Answe	r All Q	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eit	her/Or Ty	pe)
Answe	r All Q	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K3	
20) b	CO5	K3	
			ormance of the students is to be assessed by attempting higher
level of			
	-	en Choice	
	1	Three ques	
Q.No	CO	K Level	Questions
21	CO1	K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
25	CO5	K4	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	MOBILE TECHNOL	OGY							
Course Code	21UELE53			L	Р	С			
Category	Core Elective				5 -				
Nature of cours	e: EMPLOYABILITY	SKILL ORIENTED	✓ ENTREPRENE	RENEURSHIP					
Course Objecti			· · · ·						
	d the concept of mobile C								
	ut the mobile communica								
3. To understand	d about multiple access to	echniques							
	concepts of mobile service	cing.							
5. To gain know	ledge on service tools.								
	BILE DATA COMMU				15				
	Antennas for mobile c								
Network – Cel	lular Telephony – Radio	Propagation – Speech	Coding – Error C	oding	g and	Error			
Correction.									
	BILE COMMUNICAT				15				
• •	ement - Hand Off Mana	•				•			
	MTSO Interconnections-	Circuit Switched and Pacl	ket Switched Data Se	rvices	on C	ellular			
Networks.									
	LTIPLE ACCESS TEC			. J. T	15				
Introduction - F	requency division multip	le access - 11me division	i multiple access - C	ode L	J1V1S10	on			
Multiple Access	s – Spread Spectrum Tecl	nniques							
	BILE SERVICING				15				
	vare Repairing - Various		UFS Driver, UFS S	Suite	& Fla	ashing			
Files - IMEI Nu	mber Detection – Mobile	e Utility Codes.							
	HER MOBILE SERVIC				15				
Ultrasonic Clear	ner - Computer Connecto	ors - SIM Card Reader - I	Memory Card Reade	er - M	lobile	Virus			
- Virus Preventi	on - Removing Virus - H	ealth Hazards with Mob	iles - SAR.						
			Total Lecture Ho	urs	75 H	rs			
Books for Stud	y:								
1. Wireless Com Units : I , II & II	munications and Network I)	ing – Made Simple – Sati	sh Jain – BPB Public	ations	5.	(
(Units IV & V)	le Phone Repair using Con	-				,			
3. Modern Mobi Unit IV)	le Phone Unlocking & Uti	lity Codes For GSM & C	DMA Phones – Mana	ahar L	.otia -	(

Books for References:

1. Mobile Cellular Telecommunication – II Edition - William CY Lee – TMH

2. Mobile Communications – Schiller – Pearson – II Edition.

3. Wireless Communications – Stalling – Pearson II Edition.

4. Mobile & Personal Communication Systems & Services - Raj Pandya - PHI - Rs.250/-.

Web Resources:

- 1. <u>https://swayam.gov.in/nd1_noc20_ee16/preview</u>
- 2. https://swayam.gov.in/nd1_noc19_ee47/preview

EXPECTED COURSE OUTCOME

Course	e Outcomes	K Level			
On the successful completion of the course, student will be able to:					
CO1:	CO1: Remember the modulation techniques and elements of communication system.				
CO2:	CO2: Summarize different technique in mobile communication.				
CO3:	Identify the concepts of GSM and multiple access techniques.	K4			
CO4:					
CO5:	Importance of mobile service tools.	K4			

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	2	3
CO 3	3	3	3	2	2	1
CO 4	2	2	2	3	3	1
CO5	2	2	3	3	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
Ι	MOBILE DATA COMMUNICATION Introduction – Antennas for mobile communication – Cellular Radio – Elements of a Cellular Network – Cellular Telephony – Radio Propagation – Speech Coding – Error Coding and Error Correction.	15	Chalk & Talk
п	MOBILE COMMUNICATION TECHNIQUES Mobility Management - Hand Off Management – Hard Hand Off – Soft Hand Off – Switching and Authentication – MTSO Interconnections- Circuit Switched and Packet Switched Data Services on Cellular Networks.	15	Chalk & Talk
III	MULTIPLE ACCESS TECHNOLOGIES Introduction - Frequency division multiple access - Time division multiple access - Code Division Multiple Access – Spread Spectrum Techniques.	15	Chalk & Talk
IV	MOBILE SERVICING Hardware/Software Repairing - Various Locks - Installation of: UFS Driver, UFS Suite & Flashing Files - IMEI Number Detection – Mobile Utility Codes.	15	Power point presentation
V	OTHER MOBILE SERVICE TOOLS : Ultrasonic Cleaner - Computer Connectors - SIM Card Reader - Memory Card Reader - Mobile Virus - Virus Prevention - Removing Virus - Health Hazards with Mobiles - SAR.	15	Power point presentation

Course Designed by: Dr.D.Sivaranjani Dr.G.Pandeeswari.

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
Inte rnal Cos		K Level	Section A MCQs		Section B Short Answers		Section C Either or	Section D		
		K Leve	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Open Choice		
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3, K3)	1(K3)		
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3, K3)	1(K3)		
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3, K3)	1(K4)		
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3, K3)	1(K3)		
		No. of Questions to be asked	4		3		4	2		
-	stion tern	No. of Questions to be answered	4		3		2	1		
CIA	I & II	Marks for each question	1		2		5	10		
		Total Marks for each section	4		6		10	10		

		D	Distribution of	f Marks with	K Level CI	AI&C	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-	-	-
	Marks	4	6	20	20	50	100	100
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	10	30	60	60
II	K4	-	-	-	10	10	20	20
	Marks	4	6	20	30	60	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summ	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
			MCQs		Short An	iswers	Section C	Section D	
S.No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open	
			Questions	Level	Question	Level	Choice)	Choice)	
1	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)	
2	CO2	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)	
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)	
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	(K4)	
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)	
No. of	Question	s to be Asked	10		5	5	10	5	
No	o.of Questi answe		10		5		5	3	
Ma	rks for eac	h question	1		2		5	10	
Total	Marks for	each section	10		10		25	30	
	(Figu	res in parenthe	esis denotes, q	uestions sh	ould be ask	ed with th	ie given K leve	l)	

		Dis	tribution of	Marks with	ı K Leve	l			
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %		
K1	5	-	-	-	5	4.16	17		
K2	5	10	-	-	15	12.5	17		
K3	-	-	40	20	60	50	50		
K4	-	-	10	30	40	33.3	33		
Marks	10	10	50	50	120	100	100		
C	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								

Section	A (Mu	iltiple Cho	ice Questions)
Answe	r All Q	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (Sho	ort Answei	rs)
Answe	r All Q	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eit	her/Or Ty	
	-	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K3	
20) b	CO5	K3	
			ormance of the students is to be assessed by attempting higher
level of			<u>\</u>
	_	en Choice	
	CO	Three ques K Level	
Q.No 21	C01	K Level K3	Questions
21	CO1 CO2	K3 K3	
22	CO2 CO3	K3 K4	
23	CO3	K4 K4	
24	CO4	K4 K4	
23	005	174	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	POWER ELECTRON	VICS				
Course Code	21UELE54			L	Р	С
Category	Core Elective			5	-	5
Nature of cours	e: EMPLOYABILITY	SKILL ORIENTED	✓ ENTREPRENE	URS	HIP	
Course Objecti						
	the concepts of Thyristo		r			
		ncepts of Turn On –Off M	lechanism			
	d the concepts of Inverter	•				
	d the concept of chopper		ouito			
	ristor Devices	y the power electronic cir	cuits.		15	
		electronics – Introduction	on to thuristor	Inara	-	
		sistors – TRIAC – DIAC -				anu
	n ON/OFF Mechanisms		-010-303-305	0 - 10	15	
		ods: AC Gate Triggerin	g. Forward Voltag	e Tri		
		ng– DC Gate Triggering:				
		Forced Commutation: C				
	ss F Commutation			00 0	Ciust	
	erters and Cyclo Conve	rter			15	;
		hase bridge inverter - Thr	ee phase bridge inv	erter -		
		Modulation-Multiple Pu				
		ase Cyclo Converters-Thr				
	ppers and Regulator				15	;
Introduction – I	Principle of Chopper Op	eration-types of chopper	- Step up chopper	s - St	ep de	own
Choppers - Swit	ching Regulator-Buck R	egulator-Boost regulator				
Unit: V Thy	ristors Applications				15	;
Automatic Wat	er level indicator using	SCR-Automatic battery	charger using SC	R –A	utom	natic
Street light usin	g SCR – Battery Charger	r –Emergency Light using	g SCR-Burglar alarr	n usir	ig SC	R.
			Total Lecture Ho	urs	75 H	rs
Books for Stud	y:					
1. MD. Singh, -	– PowerElectronics, 2 nd	¹ Edition, Tata-McGrawH	ill, 2007.			
		neirApplications ,2 nd Edi		Ltd,1	999	
Books for Refe	rences:					
1. Harish C Rai,	"Industrial and Power	• Electronics" 10 th edition	n, Umesh publicatio	ns 20	02	
		State Electronic Devices				86
Web Resource						
1. <u>https://v</u>	www.youtube.com/watc	<u>h?v=1Auay7ja2oY</u>				
2. <u>https://v</u>	www.youtube.com/watc	<u>h?v=oqnLQVFaqYI</u>				
3. <u>https://v</u>	<u>vww.youtube.com/watc</u>	<u>h?v=naxnRkOfh2Q</u>				
EXPECTED C	OURSE OUTCOME					
Course Outcon	nes]	K Le	vel
						_
Academic C	ouncil Meeting Held O	n 20.04.2023		Pag	ge 10.	3

On the	e successful completion of the course, student will be able to:	
CO1:	Understand the Concepts of the thyristor device working	K3
CO2:	Understand the concept of Turn on off mechanism of Thyristor.	K3
CO3:	Acquire knowledge about basic concepts of inverters and Cyclo converters	K4
CO4:	Ability to analyze various types of Choppers.	K4
CO5:	Apply the Thyristor devices in industrial needs.	K4

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	2	3
CO 3	3	3	3	2	2	1
CO 4	2	2	2	3	3	1
CO5	2	2	3	3	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Thyristor Devices Power electronics – types of power electronics – Introduction to thyristor - Operation and Characteristics of thyristor – Power transistors –TRIAC – DIAC – GTO – SUS - SBS – IGBT	15	Chalk & Talk
П	Turn ON/OFF Mechanisms Introduction– Types of Turn on Methods: AC Gate Triggering: Forward Voltage Triggering– Thermal Triggering– Radiation Triggering– DC Gate Triggering: Pulse Triggering – Types of Turn Off Methods: Natural Commutation – Forced Commutation: Class A-Class B-Class C-Class D-Class E and Class F Commutation	15	Chalk & Talk
III	Inverters and Cyclo Converter Inverters: operating Principle - Single phase bridge inverter - Three phase bridge inverter - Pulse width modulated inverters - Single Pulse Modulation-Multiple Pulse modulation –sinusoidal pulse modulation Cyclo converters; Single phase Cyclo Converters-Three phase Cyclo converters	15	Chalk & Talk
IV	Choppers and Regulator Introduction – Principle of Chopper Operation-types of chopper - Step up choppers – Step down Choppers - Switching Regulator-Buck Regulator-Boost regulator.	15	Power point presentation
V	Thyristors Applications Automatic Water level indicator using SCR–Automatic battery charger using SCR –Automatic Street light using SCR – Battery Charger –Emergency Light using SCR-Burglar alarm using SCR.	15	Power point presentation
Co	urse Designed by: Mr.A.Velmurugan Dr.G.Pandeeswari.		

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
Inte	Cos	K Level	Section A MCQs		Section B Short Answers		Section C Either or	Section D			
rnal	005		No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Open Choice			
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3, K3)	1(K3)			
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3, K3)	1(K3)			
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3, K3)	1(K4)			
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3, K3)	1(K3)			
		No. of Questions to be asked	4		3		4	2			
~	stion tern	No. of Questions to be answered	4		3		2	1 10			
CIA	I & II	Marks for each question	1		2		5				
		Total Marks for each section	4		6		10	10			

		D	istribution of	f Marks with	K Level CI	A I & CI	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	20	40	80	80
	K4	-	-	-	-	-	-	-
	Marks	4	6	20	20	50	100	100
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	10	30	60	60
II	K4	-	-	-	10	10	20	20
	Marks	4	6	20	30	60	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summ	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
			MC	Qs	Short A	nswers	Section C	Section D			
S.No	COs	K - Level	No. of Questions	K – Level	No. of Questio n	K – Level	(Either / or Choice)	(Open Choice)			
1	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)			
2	CO2	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)			
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)			
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	(K4)			
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)			
No. of	Questions	s to be Asked	10		5	5	10	5			
No	No.of Questions to be answered		10		5		5	3			
Ma	Marks for each question		1		2		5	10			
Total	Total Marks for each section		10		10		25	30			
	(Figu	res in parenthe	esis denotes, q	uestions sho	ould be ask	ed with th	e given K leve	l)			

		Dis	tribution of	Marks with	n K Leve	1	
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	-	-	-	5	4.16	17
K2	5	10	-	-	15	12.5	17
K3	-	-	40	20	60	50	50
K4	-	-	10	30	40	33.3	33
Marks	10	10	50	50	120	100	100
NR · Hic	ther level of n	orformance	f the students	s is to be asse	esed by a	ottemnting	higher level

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Section	A (Mu	ltiple Cho	vice Questions)
Answe	r All Q	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (Sho	ort Answei	rs)
Answe		uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
		her/Or Ty	
	-	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4 CO5	K4 K3	
20) a 20) b	CO5	K3	
/			commance of the students is to be assessed by attempting higher
level of			formance of the students is to be assessed by attempting higher
		en Choice	
	-	Three ques	
Q.No	CO	K Level	Questions
21	C01	K Level K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
25	CO5	K4	
			1

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Code 21UELE55 L P C Category Core Elective 5 5 5 5 Nature of course: EMPLOYABILITY ✓ SKILL ORIENTED ✓ ENTREPRENEURSHIP Course Objectives: 1. to inculcate the knowledge of PCB design ✓ ENTREPRENEURSHIP 2. to impart knowledge on various methods of laying out a PCB 3. To learn how to etch and solder 4. To understand layout and artwork. 5. To understand layout and artwork. 5 5 15 Single sided layer – double sided layer – Multilayer – Types of PCB board - Plated through holes technology – Benefits of Surface Mount Technology (SMT) – Limitation of SMT – Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's. 15 Unit: II Layout And Artwork 15 Planning – General Rules of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check Basic Artwork Approachs – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection. 15 Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process for Wet Film Resists – Exposure and Further Process for Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film Resists – Dry Film Resists 15 Unit:	Course Name	PCB DESIGN AND FA	ABRICATION				
Nature of course: EMPLOYABILITY SKILL ORIENTED ENTREPRENEURSHIP Course Objectives: 1. To inculcate the knowledge of PCB design 2. To impart knowledge on various methods of laying out a PCB 3. To learn how to etch and solder 4. To understand layout and artwork. 5. 5. To understand layout and artwork. 5. 15 Single sided layer – double sided layer – Multilayer – Types of PCB board - Plated through holes technology – Benefits of Surface Mount Technology (SMT) – Limitation of SMT – Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's. 15 Planning – General Rules of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection. 15 Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process for Wet Film Resists – Costing Process for Wet Film Resists – Costing Process for Wet Film Resists – Dry Film Resists 15 Unit: IV Etching and Soldering 15 Numiter V Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Process for Solder ing Joints – Soldering – CAD Unit: IV Etching and Soldering – Solder Mask – Safety, Health and Medica	Course Code	21UELE55			L	Р	С
Course Objectives: 1. To inculcate the knowledge of PCB design 2. To impart knowledge on various methods of laying out a PCB 3. To learn how to etch and solder 4. To understand layout and artwork. 5. To understand the concepts of transmission line, crosstalk and thermal issues. Unit: I Types Of PCB 15 Single sided layer – double sided layer – Multilayer – Types of PCB board - Plated through holes technology – Benefits of Surface Mount Technology (SMT) – Limitation of SMT – Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's. Unit: II Layout And Artwork 15 Planning – General Rules of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection. 15 Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process and Photo Printing 15 Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Net Film Resists – Dry Film Resists 15 Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Solder Connection – Solder Joints – Soldering Throcess for Wet Film Resists – Dry Film Resists 15 Manufacture of Copper Clad Laminates – Properties of Laminates – Soldering Process for Wet Film Resists – Unit IV Etching an	Category	Core Elective			5	-	5
 To inculeate the knowledge of PCB design To impart knowledge on various methods of laying out a PCB To impart knowledge on various methods of laying out a PCB To learn how to etch and solder To understand layout and attwork. To understand the concepts of transmission line, crosstalk and thermal issues. Unit: I Types Of PCB Tspes Of PCB Tspes of PCB on the choice of SMT acce Mount Technology (SMT) – Limitation of SMT – Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's. Unit: II Layout And Artwork Is Planning – General Rules of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection. Unit: III Laminates and Photo Printing Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process for Wet Film Resists – Droy Film Resists – Mater Jing and Soldering Its Etching and Soldering Its etching and Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice Unit: V Design Rules And Automation Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD Total Lecture Hours 75 Hrs Books for Study: N. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 RS Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New 	Nature of cours	e: EMPLOYABILITY	✓ SKILL ORIENTED	✓ ENTREPRENE	URS	HIP	
 To impart knowledge on various methods of laying out a PCB To learn how to etch and solder To understand layout and artwork. To understand the concepts of transmission line, crosstalk and thermal issues. Unit: I Types Of PCB Types of PCB Single sided layer – double sided layer – Multilayer – Types of PCB board - Plated through holes technology – Benefits of Surface Mount Technology (SMT) – Limitation of SMT – Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's. Unit: II Layout And Artwork I5 Planning – General Rules of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection. Unit: III Laminates and Photo Printing 15 Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process for Wet Film Resists – Exposure and Further Process for Wet Film Resists – Dry Film Resists Unit: IV Etching and Soldering 15 Etching and Soldering 15 Etching and Soldering 15 Reflection – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD Total Lecture Hours 75 Hrs Books for Study: 1. Nualter C. Bosshart, —PCB Design and Technolog	•						
 To learn how to etch and solder To understand layout and artwork. To understand the concepts of transmission line, crosstalk and thermal issues. Unit: I Types Of PCB 15 Single sided layer – double sided layer – Multilayer – Types of PCB board - Plated through holes technology – Benefits of Surface Mount Technology (SMT) – Limitation of SMT – Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's. Unit: II Layout And Artwork 15 Planning – General Rules of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection. Unit: III Laminates and Photo Printing 15 Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process – Basic Printing Process for Double Sided PCB's – Photo Resists – Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film Resists – Droy Film Resists – Unit: IV Etching and Soldering Its Etching and Soldering Its Etching and Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD Total Lecture Hours 75 Hrs Books for Study: 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 Rs Khandpur, —Printed Circuit Board by Tata McGraw Hill Education Pvt Ltd., New 		-	-				
 4. To understand layout and artwork. 5. To understand the concepts of transmission line, crosstalk and thermal issues. Unit: I Types Of PCB [15] Single sided layer – double sided layer – Types of PCB board - Plated through holes technology – Benefits of Surface Mount Technology (SMT) – Limitation of SMT – Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's. Unit: II Layout And Artwork [15] Planning – General Rules of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection. Unit: III Laminates and Photo Printing [15] Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process for Wet Film Resists – Coating Process for Wet Film Resists – Coating Process for Wet Film Resists – Coating Process for Wet Film Resists – Dry Film Resists Unit: IV Etching and Soldering [15] Etching and Soldering – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice – Unit: V Design Rules And Automation [15] Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD [15] Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications. Delhi 1983 2. RS Khandpur, —Printed Circuit Board by Tata McGraw Hill Education Pvt Ltd., New 			ods of laying out a PCB				
 5. To understand the concepts of transmission line, crossstalk and thermal issues. Unit: I Types Of PCB Single sided layer – double sided layer – Multilayer – Types of PCB board - Plated through holes technology – Benefits of Surface Mount Technology (SMT) – Limitation of SMT – Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's. Unit: II Layout And Artwork IS Planning – General Rules of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection. Unit: II Laminates and Photo Printing Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process – Basic Printing Process for Double Sided PCB's – Photo Resists – Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film resists – Dry Film Resists Unit: IV Etching and Soldering I15 Etching and Soldering I15 Etching and Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice Unit: V Design Rules And Automation I15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD Total Lecture Hours I 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 R Khandpur, —Printed Circuit Board by Tata McGraw Hill Education Pvt Ltd., New 							
Unit: I Types Of PCB 15 Single sided layer – double sided layer – Multilayer – Types of PCB board - Plated through holes technology – Benefits of Surface Mount Technology (SMT) – Limitation of SMT – Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's. 15 Unit: II Layout And Artwork 15 Planning – General Rules of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection. 15 Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process For Double Sided PCB's – Photo Resists – Manual Cleaning Process for Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film resists – Dry Film Resists 15 Etching and Soldering 15 Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice 15 Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD 75 Hrs Books for Study: 1 1. Nalter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications. Delhi 1983							
Single sided layer – double sided layer – Multilayer – Types of PCB board - Plated through holes technology – Benefits of Surface Mount Technology (SMT) – Limitation of SMT – Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's. Unit: II Layout And Artwork Planning – General Rules of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection. Unit: III Laminates and Photo Printing Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process for Wet Film Resists – Exposure and Further Process for Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film resists – Dry Film Resists Unit: IV Etching and Soldering Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice I5 Unit: V Design Rules And Automation 15		<u>+</u>	ssion line, crosstalk and t	hermal issues.			
technology – Benefits of Surface Mount Technology (SMT) – Limitation of SMT – Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's. Unit: II Layout And Artwork 15 Planning – General Rules of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection. Unit: III Laminates and Photo Printing 15 Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process – Basic Printing Process for Double Sided PCB's – Photo Resists – Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film resists – Dry Film Resists Unit: IV Etching and Soldering 15 Etching and Soldering Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD Total Lecture Hours 75 Hrs Books for Study: 1. 1. Walter C. Bosshart, –PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, –Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New							
components: Resistors, Capacitor, Inductor, Diode and IC's. Init: II Layout And Artwork Planning – General Rules of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection. Unit: III Laminates and Photo Printing 15 Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process – Basic Printing Process for Double Sided PCB's – Photo Resists – Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film 15 Resists – Dry Film Resists 15 Unit: IV Etching and Soldering 15 Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Solder ing De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice 15 Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD 75 Hrs							
Unit: II Layout And Artwork 15 Planning – General Rules of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection. Unit: III Laminates and Photo Printing 15 Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process – Basic Printing Process for Double Sided PCB's – Photo Resists – Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film 15 Etching and Soldering 15 Unit: IV Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD 75 Hrs Books for Study: 1. 1. 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circui				mitation of $SMT - S$	urfac	e mo	unt
Planning – General Rules of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection. Unit: III Laminates and Photo Printing Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process – Basic Printing Process for Double Sided PCB's – Photo Resists – Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film resists – Dry Film Resists Unit: IV Etching and Soldering Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice Unit: V Design Rules And Automation Type EM Fields and Automation – Automated Artwork Drafting – CAD Type EM Fields and Automation – Automated Artwork Drafting – CAD Total Lecture Hours 75 Hrs Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, D	-		tor, Diode and IC's.			1	-
Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection. Unit: III Laminates and Photo Printing Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process – Basic Printing Process for Double Sided PCB's – Photo Resists – Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film resists – Dry Film Resists Unit: IV Etching and Soldering Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD 75 Hrs Books for Study: 1 1. 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New					1 /		•
Requirement and Package Density – Layout Check Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection. 15 Unit: III Laminates and Photo Printing 15 Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process – Basic Printing Process for Double Sided PCB's – Photo Resists – Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film resists – Dry Film Resists 15 Unit: IV Etching and Soldering 15 Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice 15 Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD 75 Hrs Books for Study: 1. 1. Nalter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. 2. RS Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New 14.	U	•	· 1			r	
Guidelines – General Artwork Rules – Artwork Check and inspection. 15 Unit: III Laminates and Photo Printing 15 Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process – Basic Printing Process for Double Sided PCB's – Photo Resists – Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film resists – Dry Film Resists 15 Unit: IV Etching and Soldering 15 Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD 75 Hrs Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New						т:	
Unit: III Laminates and Photo Printing 15 Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process – Basic Printing Process for Double Sided PCB's – Photo Resists – Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film Resists – Dry Film Resists Unit: IV Etching and Soldering 15 Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD 75 Hrs Books for Study: 1. 1. Natter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. 2. RS Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New 1.	-				vork	Tapir	ng
Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process – Basic Printing Process for Double Sided PCB's – Photo Resists – Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film resists – Dry Film Resists Unit: IV Etching and Soldering Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice Unit: V Design Rules And Automation Type EM Fields and Automation – Automated Artwork Drafting – CAD Total Lecture Hours Type EM Fields and Automation – Automated Artwork Drafting – CAD Total Lecture Hours 75 Hrs Books for Study: 1. 1. Nalter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New				tion.		1	-
Cleaning Process – Basic Printing Process for Double Sided PCB's – Photo Resists – Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film resists – Dry Film Resists Unit: IV Etching and Soldering Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD 75 Hrs Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New			0	T CI '			
Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film Introstation Init: IV Etching and Soldering 15 Etching and Soldering Is Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice Is Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD Total Lecture Hours 75 Hrs Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New							ual
resists – Dry Film Resists Unit: IV Etching and Soldering 15 Etching and Soldering Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice 15 Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD 75 Hrs Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. 2. RS Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New	-	-					
Unit: IV Etching and Soldering 15 Etching and Soldering Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD 15 Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New		-	Kesists – Exposure and F	urther Process for w	et F1	IIII	
Etching and Soldering Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD 75 Hrs Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. R Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New						14	-
Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD Total Lecture Hours 75 Hrs Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New						13)
Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice Unit: V Design Rules And Automation Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD Total Lecture Hours 75 Hrs Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New	0	0					
and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD Total Lecture Hours 75 Hrs Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technology , Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circuit Board by Tata McGraw Hill Education Pvt Ltd., New		•	•	-			
Practice Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD 75 Hrs Total Lecture Hours 75 Hrs Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technology , Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circuit Board by Tata McGraw Hill Education Pvt Ltd., New				-		-	
Unit: V Design Rules And Automation 15 Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD Total Lecture Hours 75 Hrs Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New	and Techniques	- Man Soldering - Solde	er Mask – Safety, Health	and Medical Aspect	ts in S	Solde	ring
Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD Total Lecture Hours 75 Hrs Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New	Practice						
Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD Total Lecture Hours 75 Hrs Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New	Unit: V Desi	ign Rules And Automat	ion			15	5
Type EM Fields and Automation – Automated Artwork Drafting – CAD Total Lecture Hours 75 Hrs Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technologyll, Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circuit Boardll by Tata McGraw Hill Education Pvt Ltd., New				magnetic Interferen	ce fro	m Pu	ılse
Total Lecture Hours 75 Hrs Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technology , Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circuit Board by Tata McGraw Hill Education Pvt Ltd., New							
 Books for Study: 1. 1. Walter C. Bosshart, —PCB Design and Technologyl, Tata McGraw Hill Publications, Delhi 1983 2. RS Khandpur, —Printed Circuit Boardl by Tata McGraw Hill Education Pvt Ltd., New 					urs	75 H	[rs
Delhi 1983 2. RS Khandpur, —Printed Circuit Board by Tata McGraw Hill Education Pvt Ltd., New	Books for Stud	y:			uis	10 11	
2. RS Khandpur, —Printed Circuit Board by Tata McGraw Hill Education Pvt Ltd., New	1. 1. Walte	er C. Bosshart, —PCB I	Design and Technology ^{II} ,	Tata McGraw Hill	l Pub	licati	ons,
	Delhi 19	983					
			Board by Tata McGraw	Hill Education Pvt I	Ltd. N	New	
	Delhi	1			, 1		

Books for References:

1. S D Mehta, -Electronic Product Design Volume-I S Chand Publications

Web Resources

- 1. https://www.wikihow.com/Create-Printed-Circuit-Boards
- 2. http://www.siongboon.com/projects/2005-09-07_home_pcb_fabrication/
- 3. https://reprap.org/wiki/MakePCBInstructions#Making_PCBs_yourself
- 4. <u>https://www.youtube.com/watch?v=mv7Y0A9YeUc</u>
- 5. <u>https://www.youtube.com/watch?v=imQTCW1yWkg</u>

EXPECTED COURSE OUTCOME

Cours	e Outcomes	K Level				
On the	e successful completion of the course, student will be able to:					
CO1:	O1: Classify the boards and layers					
CO2:	Design layout and make use of the photo printing and etching techniques	K3				
CO3:	Understand basic concepts of transmission line, crosstalk and thermal issues	K4				
CO4:	Understand the design rules and automation techniques	K4				
CO5:	Design (schematic and layout) PCB for analog circuits, digital circuits and mixed circuits	K4				

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	2	3
CO 3	3	3	3	2	2	1
CO 4	2	2	2	3	3	1
CO5	2	2	3	3	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Types Of PCB Single sided layer – double sided layer – Multilayer – Types of PCB board - Plated through holes technology – Benefits of Surface Mount Technology (SMT) – Limitation of SMT – Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's.	15	Chalk & Talk
п	Layout And Artwork Planning – General Rules Layout of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling Requirement and Package Density – Layout Check Basic Artwork Approaches – Artwork Taping Guidelines – General Artwork Rules – Artwork Check and inspection	15	Chalk & Talk
ш	Laminates and Photo Printing Manufacture of Copper Clad Laminates – Properties of Laminates – Types of Laminates – Manual Cleaning Process – Basic Printing Process for Double Sided PCB's – Photo Resists – Wet Film Resists – Coating Process for Wet Film Resists – Exposure and Further Process for Wet Film resists – Dry Film Resists	15	Chalk & Talk
IV	Etching and Soldering Introduction – Etching Machine – Etchant System - Soldering: Principles of Solder Connection – Solder Joints – Solder Alloys – Soldering Fluxes - Soldering Tools: Soldering – De-soldering Tools and Techniques – Man Soldering – Solder Mask – Safety, Health and Medical Aspects in Soldering Practice	15	Power point presentation
v	Design Rules And Automation Reflection – Crosstalk – Ground and Supply Line Noise – Electromagnetic Interference from Pulse Type EM Fields and Automation – Automated Artwork Drafting – CAD	15	Power point presentation

Course Designed by: Mr.A.Velmurugan

Dr.G.Pandeeswari.

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)											
Inte	Cos	K Level	Section A MCQs		Section B Short Answers		Section C Either or	Section D				
rnal			No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Open Choice				
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3, K3)	1(K3)				
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3, K3)	1(K3)				
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3, K3)	1(K4)				
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3, K3)	1(K3)				
		No. of Questions to be asked	4		3		4	2				
-	estion tern	No. of Questions to be answered	4		3		2	1				
CIA	I & II	Marks for each question	1		2		5	10				
		Total Marks for each section	4		6		10	10				

		D	istribution of	f Marks with	K Level CI	A I & CI	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	20	40	80	80
I	K4	-	-	-	-	-	-	-
-	Marks	4	6	20	20	50	100	100
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	10	30	60	60
II	K4	-	-	-	10	10	20	20
	Marks	4	6	20	30	60	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	ummativ	ve Examinatio		int Articula utcomes (C	-	ping – K	Level with C	Course
S.No COs		K - Level	MC No. of	Qs K –	Short A No. of Questio	K –	Section C (Either /	Section D (Open
1	CO1	Up to K3	Questions 2	Level K1&K2	n 1	Level K2	or Choice) 2(K3&K3)	Choice) (K3)
2	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	(K4)
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)
No.	of Quest Aske	ions to be ed	10		5	5	10	5
No.of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
	(Figures	in parenthesi	is denotes, qu	estions sh	ould be as	ked with	the given K l	evel)

	Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5	-	-	-	5	4.16	17				
K2	5	10	-	-	15	12.5	17				
K3	-	-	40	20	60	50	50				
K4	-	-	10	30	40	33.3	33				
Marks	10	10	50	50	120	100	100				
NB: Hig of K lev	gher level of p els.	erformance o	f the students	s is to be asso	essed by a	attempting	higher level				

		-	ice Questions)
Answei	r All Q	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (Sho	ort Answei	rs)
Answer	r All Q	uestions	(5x2=10 marks)
Q.No	СО	K Level	Questions
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eit	her/Or Ty	pe)
Answer	r All Q	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Hi	gher le	vel of perf	formance of the students is to be assessed by attempting higher
level of			
	•	en Choice	
		Three ques	
Q.No	CO	K Level	Questions
21	CO1	K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
	CO5	K4	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	PROGRAMMABLI							
Course Code	21UELE56			L	Р	C		
Category	Core Elective	Core Elective5-						
Nature of cours	of course: EMPLOYABILITY ✓ SKILL ORIENTED ENTREPRENEURSHIP							
Course Object								
	d the programmable lo	e						
	d the operation of PLC							
		er diagrams from process c	control description a	and ur	iderst	tanc		
various types of	-			. .	•			
11.		ers for the control of indust	rial processes, PLC	Tunci	lions	and		
Data Handling								
	nd the application of P	LCS.			15			
	grammable Logic		Laturas Dragnomm	ahla I	-	,		
		- Programmable Logic Stru						
		Logic (Pals), Programmable Sequential Network Desig						
-			n with Programmat	JIE LO	gic			
DEVICES (I LDS)) Decign of Sequentin	Notworks Using POMs on	d Flach Traffic Lie	tht Co	ntrol	lar		
) -Design of Sequentia	l Networks Using ROMs an	d Flash -Traffic Lig	ght Co	ntrol	ler		
Using PAL			d Flash -Traffic Lig	ght Co				
Using PAL Unit: II Pro Programmable PLC Sizes - PL	grammable Logic Co Logic Controllers (PL C Hardware Compone	ntrollers CS) - Introduction Parts Of I nts - I/O Section - Analog I	PLC - Principles of /O Section - Analog	Opera g I/O N	15 ation- Aodu	5 les		
Using PAL Unit: II Pro Programmable PLC Sizes - PL Digital I/O Moo PLCS with Con	grammable Logic Co Logic Controllers (PL C Hardware Compone dules CPU - Processor nputers	ntrollers CS) - Introduction Parts Of nts - I/O Section - Analog I Memory Module - Program	PLC - Principles of /O Section - Analog	Opera g I/O N	15 ation- Aodu cs of	5 les,		
Using PAL Unit: II Pro Programmable PLC Sizes - PL Digital I/O Mod PLCS with Con Unit: III Bas	grammable Logic Co Logic Controllers (PL C Hardware Compone dules CPU - Processor nputers ics of PLC Programm	ntrollers CS) - Introduction Parts Of nts - I/O Section - Analog L Memory Module - Program	PLC - Principles of /O Section - Analog ming Devices -Diag	Opera g I/O N gnosti	15 ation- Aodu cs of 15	5 les		
Using PAL Unit: II Pro Programmable PLC Sizes - PL Digital I/O Mod PLCS with Con Unit: III Bas PLC Programm	grammable Logic Co Logic Controllers (PL C Hardware Compone dules CPU - Processor nputers ics of PLC Programme ing-Simple Instruction	ntrollers CS) - Introduction Parts Of I nts - I/O Section - Analog I Memory Module - Program ning is - Programming EXAMIN	PLC - Principles of O Section - Analog ming Devices -Diag E ON And EXAMI	Opera gl/O M gnosti	15 ation- Aodu cs of 15 FF	5 les		
Using PAL Unit: II Pro Programmable PLC Sizes - PL Digital I/O Mod PLCS with Con Unit: III Bas PLC Programm Instructions -El	grammable Logic Co Logic Controllers (PL C Hardware Compone dules CPU - Processor nputers ics of PLC Programm ing-Simple Instruction ectromagnetic Control	ntrollers CS) - Introduction Parts Of 1 nts - I/O Section - Analog I Memory Module - Program ning is - Programming EXAMIN Relays-Motor Starters -Ma	PLC - Principles of O Section - Analog ming Devices -Diag E ON And EXAMI nually Operated Sw	Opera g I/O M gnosti NE O ritches	15 Ation- Aodu cs of 15 FF	5 les		
Using PAL Unit: II Pro Programmable PLC Sizes - PL Digital I/O Mod PLCS with Con Unit: III Bas PLC Programm Instructions -El Mechanically C	grammable Logic Co Logic Controllers (PL) C Hardware Compone dules CPU - Processor nputers ics of PLC Programm ing-Simple Instruction ectromagnetic Control Operated and Proximity	ntrollers CS) - Introduction Parts Of I nts - I/O Section - Analog I Memory Module - Program ning s - Programming EXAMIN Relays-Motor Starters -Ma Switches - Output Control	PLC - Principles of /O Section - Analog ming Devices -Diag E ON And EXAMI nually Operated Sw Devices - Latching	Opera gl/O M gnosti NE O itches Relay	15 ation- Modu cs of 15 FF 5- Vs - P	5 les		
Using PAL Unit: II Pro Programmable PLC Sizes - PL Digital I/O Mod PLCS with Con Unit: III Bas PLC Programm Instructions -El Mechanically C Ladder Diagram	grammable Logic Co Logic Controllers (PL C Hardware Compone dules CPU - Processor nputers ics of PLC Programme ing-Simple Instruction ectromagnetic Control Operated and Proximity n - Converting Simple	ntrollers CS) - Introduction Parts Of 1 nts - I/O Section - Analog I Memory Module - Program ning is - Programming EXAMIN Relays-Motor Starters -Ma	PLC - Principles of /O Section - Analog ming Devices -Diag E ON And EXAMI nually Operated Sw Devices - Latching	Opera gl/O M gnosti NE O itches Relay	15 ation- Aodu cs of 15 FF FF - /s - P: cam	5 less 5		
Using PAL Unit: II Pro Programmable PLC Sizes - PL Digital I/O Mod PLCS with Con Unit: III Bas PLC Programm Instructions -El Mechanically C Ladder Diagram	grammable Logic Co Logic Controllers (PL) C Hardware Compone dules CPU - Processor nputers ics of PLC Programm ing-Simple Instruction ectromagnetic Control Operated and Proximity	ntrollers CS) - Introduction Parts Of I nts - I/O Section - Analog I Memory Module - Program ning s - Programming EXAMIN Relays-Motor Starters -Ma Switches - Output Control	PLC - Principles of /O Section - Analog ming Devices -Diag E ON And EXAMI nually Operated Sw Devices - Latching	Opera gl/O M gnosti NE O itches Relay	15 ation- Modu cs of 15 FF 5- Vs - P	5 less 5		
Using PAL Unit: II Programmable Programmable PLC Sizes - PL Digital I/O Moo PLCS with Con Unit: III Bas PLC Programm Instructions -El Mechanically C Ladder Diagram Unit: IV PLC Timer Instruction	grammable Logic Co Logic Controllers (PL) C Hardware Compone dules CPU - Processor nputers ics of PLC Programm ing-Simple Instruction ectromagnetic Control Operated and Proximity n - Converting Simple C Instructions	ntrollers CS) - Introduction Parts Of 1 nts - I/O Section - Analog L Memory Module - Program ning is - Programming EXAMIN Relays-Motor Starters -Ma Switches - Output Control Relay Ladder Diagram into r and OFF DELAY Timer -	PLC - Principles of /O Section - Analog ming Devices -Diag E ON And EXAMI nually Operated Sw Devices - Latching PLC Relay Ladder Counter Instruction	Opera g I/O M gnosti NE O itches Relay Diagr	15 ation- Aodu cs of FF ys - P ys - P ys - P ys - 15 am 15 o/Dov	5 lles, 5 LC		
Using PAL Unit: II Pro Programmable PLC Sizes - PL Digital I/O Mod PLCS with Con Unit: III Bas PLC Programm Instructions -El Mechanically C Ladder Diagram Unit: IV PLC Timer Instructio Counters -Time	grammable Logic Co Logic Controllers (PL C Hardware Compone dules CPU - Processor nputers ics of PLC Programm ing-Simple Instruction ectromagnetic Control Operated and Proximity n - Converting Simple C Instructions ons ON DELAY Time er and Counter Applica	ntrollers CS) - Introduction Parts Of I nts - I/O Section - Analog I Memory Module - Program ning is - Programming EXAMIN Relays-Motor Starters -Ma Switches - Output Control Relay Ladder Diagram into	PLC - Principles of /O Section - Analog ming Devices -Diag E ON And EXAMI nually Operated Sw Devices - Latching PLC Relay Ladder Counter Instruction	Opera g I/O M gnosti NE O itches Relay Diagr	15 ation- Aodu cs of FF ys - P ys - P ys - P ys - 15 am 15 o/Dov	5 lles 5 LC		
Using PAL Unit: II Pro Programmable PLC Sizes - PL Digital I/O Mod PLCS with Con Unit: III Bas PLC Programm Instructions -El Mechanically C Ladder Diagram Unit: IV PLC Timer Instruction Counters -Time Instructions - M	grammable Logic Co Logic Controllers (PL C Hardware Compone dules CPU - Processor nputers ics of PLC Programme ing-Simple Instruction ectromagnetic Control Operated and Proximity n - Converting Simple C Instructions ons ON DELAY Time er and Counter Applica fath Instructions	ntrollers CS) - Introduction Parts Of I nts - I/O Section - Analog I Memory Module - Program ning is - Programming EXAMIN Relays-Motor Starters -Ma Switches - Output Control Relay Ladder Diagram into r and OFF DELAY Timer - tions - Program Control Ins	PLC - Principles of /O Section - Analog ming Devices -Diag E ON And EXAMI nually Operated Sw Devices - Latching PLC Relay Ladder Counter Instruction	Opera g I/O M gnosti NE O itches Relay Diagr	15 Ation- Aodu cs of 15 FF ys - P ys - P ys - P -	5 lless 5 LC 5 wn		
Using PAL Unit: II Pro Programmable PLC Sizes - PL Digital I/O Mod PLCS with Con Unit: III Bas PLC Programm Instructions -El Mechanically C Ladder Diagran Unit: IV PLC Timer Instructio Counters - Time Instructions - M Unit: V App	grammable Logic Co Logic Controllers (PL) C Hardware Compone dules CPU - Processor nputers ics of PLC Programm ing-Simple Instruction ectromagnetic Control Operated and Proximity n - Converting Simple C Instructions ons ON DELAY Time er and Counter Applica Inth Instructions	ntrollers CS) - Introduction Parts Of I nts - I/O Section - Analog I Memory Module - Program ning s - Programming EXAMIN Relays-Motor Starters -Ma Switches - Output Control Relay Ladder Diagram into r and OFF DELAY Timer - tions - Program Control Ins CADA	PLC - Principles of /O Section - Analog ming Devices -Diag E ON And EXAMI nually Operated Sw Devices - Latching PLC Relay Ladder Counter Instruction tructions - Data Ma	Opera gl/O M gnosti NE O vitches Relay Diagn nis - Up nipula	15 ation- /Iodu cs of 15 FF /s - P am 15 o/Dov ating 15	5 lless 5 LC 5 wn		
Using PAL Unit: II Programmable Programmable PLC Sizes - PL Digital I/O Mod PLCS with Con Unit: III Bas PLC Programm Instructions - El Mechanically C Ladder Diagram Unit: IV PLC Timer Instructio Counters - Time Instructions - M Unit: V App Simple Materia	grammable Logic Co Logic Controllers (PL C Hardware Compone dules CPU - Processor nputers ics of PLC Programme ing-Simple Instruction ectromagnetic Control Operated and Proximity n - Converting Simple C Instructions ons ON DELAY Time er and Counter Applicat fath Instructions Dications of PLC & S als Handling Applicati	ntrollers CS) - Introduction Parts Of 1 nts - I/O Section - Analog L Memory Module - Program ning is - Programming EXAMIN Relays-Motor Starters -Ma 'Switches - Output Control Relay Ladder Diagram into r and OFF DELAY Timer - tions - Program Control Ins CADA ons - Automatic Control of	PLC - Principles of /O Section - Analog ming Devices -Diag E ON And EXAMI nually Operated Sw Devices - Latching PLC Relay Ladder Counter Instruction tructions - Data Ma Warehouse Door - A	Opera gli /O N gnosti NE O ritches Relay Diagr nipula	$ \begin{array}{c} 15\\ \text{ation-}\\ \text{Aodu}\\ \text{cs of}\\ 15\\ \text{FF}\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\$	5 lles 5 LC 5 wn		
Using PAL Unit: II Pro Programmable PLC Sizes - PL Digital I/O Mod PLCS with Con Unit: III Bas PLC Programm Instructions -El Mechanically C Ladder Diagram Unit: IV PLC Timer Instructio Counters -Time Instructions - M Unit: V App Simple Materia Lubricating Oil	grammable Logic Co Logic Controllers (PL C Hardware Compone dules CPU - Processor nputers ics of PLC Programme ing-Simple Instruction ectromagnetic Control Operated and Proximity n - Converting Simple C Instructions ons ON DELAY Time er and Counter Applicat fath Instructions Dications of PLC & S als Handling Applicati	ntrollers CS) - Introduction Parts Of I nts - I/O Section - Analog I Memory Module - Program ning s - Programming EXAMIN Relays-Motor Starters -Ma Switches - Output Control Relay Ladder Diagram into r and OFF DELAY Timer - tions - Program Control Ins CADA	PLC - Principles of /O Section - Analog ming Devices -Diag E ON And EXAMI nually Operated Sw Devices - Latching PLC Relay Ladder Counter Instruction tructions - Data Ma Warehouse Door - A	Opera gli /O N gnosti NE O ritches Relay Diagr nipula	$ \begin{array}{c} 15\\ \text{ation-}\\ \text{Aodu}\\ \text{cs of}\\ 15\\ \text{FF}\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\$	5 lles 5 LC 5 wn		
Using PAL Unit: II Programmable Programmable PLC Sizes - PL Digital I/O Mod PLCS with Con Unit: III Bas PLC Programm Instructions - El Mechanically C Ladder Diagram Unit: IV PLC Timer Instructio Counters - Time Instructions - M Unit: V App Simple Materia	grammable Logic Co Logic Controllers (PL C Hardware Compone dules CPU - Processor nputers ics of PLC Programme ing-Simple Instruction ectromagnetic Control Operated and Proximity n - Converting Simple C Instructions ons ON DELAY Time er and Counter Applicat fath Instructions Dications of PLC & S als Handling Applicati	ntrollers CS) - Introduction Parts Of 1 nts - I/O Section - Analog L Memory Module - Program ning is - Programming EXAMIN Relays-Motor Starters -Ma 'Switches - Output Control Relay Ladder Diagram into r and OFF DELAY Timer - tions - Program Control Ins CADA ons - Automatic Control of	PLC - Principles of /O Section - Analog ming Devices -Diag E ON And EXAMI nually Operated Sw Devices - Latching PLC Relay Ladder Counter Instruction tructions - Data Ma Warehouse Door - A tic Car Washing Ma	Opera JI/O N gnosti NE O vitchess Relay Diagr nipula Autom ichine	15 Alodu Alodu cs of 15 FF - vs - P ram 15 o/Down tring 15 natic -	5 les 5 LC 5 wn		
Using PALUnit: IIProgrammableProgrammableProgrammablePLC Sizes - PLDigital I/O ModeDigital I/O ModePLCS with ControlUnit: IIIBasePLC ProgrammaInstructions - ElMechanically CLadder DiagramaUnit: IVPLCTimer Instructions - TimeInstructions - MageInstructions - MageSimple MateriaLubricating OilContents - Mage	grammable Logic Co Logic Controllers (PL C Hardware Compone dules CPU - Processor nputers ics of PLC Programme ing-Simple Instruction ectromagnetic Control Operated and Proximity n - Converting Simple C Instructions ons ON DELAY Time er and Counter Applicat fath Instructions Dications of PLC & S als Handling Applicati	ntrollers CS) - Introduction Parts Of 1 nts - I/O Section - Analog L Memory Module - Program ning is - Programming EXAMIN Relays-Motor Starters -Ma 'Switches - Output Control Relay Ladder Diagram into r and OFF DELAY Timer - tions - Program Control Ins CADA ons - Automatic Control of	PLC - Principles of /O Section - Analog ming Devices -Diag E ON And EXAMI nually Operated Sw Devices - Latching PLC Relay Ladder Counter Instruction tructions - Data Ma Warehouse Door - A	Opera JI/O N gnosti NE O vitchess Relay Diagr nipula Autom ichine	$ \begin{array}{c} 15\\ \text{ation-}\\ \text{Aodu}\\ \text{cs of}\\ 15\\ \text{FF}\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\ -\\$	5 les 5 LC 5 wn 5		
Using PAL Unit: II Pro Programmable PLC Sizes - PL Digital I/O Mod PLCS with Con Unit: III Bas PLC Programm Instructions - El Mechanically C Ladder Diagram Unit: IV PLC Timer Instructio Counters - Time Instructions - M Unit: V App Simple Materia Lubricating Oil	grammable Logic Co Logic Controllers (PL C Hardware Compone dules CPU - Processor nputers ics of PLC Programme ing-Simple Instruction ectromagnetic Control Operated and Proximity n - Converting Simple C Instructions ons ON DELAY Time er and Counter Applicat fath Instructions Dications of PLC & S als Handling Applicati Supplier Conveyor Bo	ntrollers CS) - Introduction Parts Of 1 nts - I/O Section - Analog L Memory Module - Program ning is - Programming EXAMIN Relays-Motor Starters -Ma 'Switches - Output Control Relay Ladder Diagram into r and OFF DELAY Timer - tions - Program Control Ins CADA ons - Automatic Control of	PLC - Principles of /O Section - Analog ming Devices -Diag E ON And EXAMI nually Operated Sw Devices - Latching PLC Relay Ladder Counter Instruction tructions - Data Ma Warehouse Door - A tic Car Washing Ma	Opera JI/O N gnosti NE O vitchess Relay Diagr nipula Autom ichine	15 Alodu Alodu cs of 15 FF - vs - P ram 15 o/Down tring 15 natic -	5 les 5 LC 5 wn		
Using PAL Unit: II Pro Programmable PLC Sizes - PL Digital I/O Mod PLCS with Con Unit: III Bas PLC Programm Instructions - El Mechanically C Ladder Diagram Unit: IV PLC Timer Instructio Counters - Time Instructions - M Unit: V App Simple Materia Lubricating Oil SCADA. Books for Stud	grammable Logic Con Logic Controllers (PL) C Hardware Compone dules CPU - Processor inputers ics of PLC Programme ing-Simple Instruction ectromagnetic Control Operated and Proximity in - Converting Simple C Instructions ons ON DELAY Time er and Counter Applicat Instructions Dications of PLC & S als Handling Applicati Supplier Conveyor Bo	ntrollers CS) - Introduction Parts Of 1 nts - I/O Section - Analog L Memory Module - Program ning is - Programming EXAMIN Relays-Motor Starters -Ma 'Switches - Output Control Relay Ladder Diagram into r and OFF DELAY Timer - tions - Program Control Ins CADA ons - Automatic Control of	PLC - Principles of /O Section - Analog ming Devices -Diag E ON And EXAMI nually Operated Sw Devices - Latching PLC Relay Ladder Counter Instruction tructions - Data Ma Warehouse Door - A tic Car Washing Ma	Opera glosti NE O vitches Relay Diagn nipula Autom chine	15 Alodu Alodu cs of 15 FF - vs - P ram 15 o/Down tring 15 natic -	5 les 5 LC 5 wn		
Using PAL Unit: II Pro Programmable PLC Sizes - PL Digital I/O Mod PLCS with Con Unit: III Bas PLC Programm Instructions -El Mechanically C Ladder Diagram Unit: IV PLC Timer Instructio Counters -Time Instructions - M Unit: V App Simple Materia Lubricating Oil SCADA. Books for Stud 1.Charles H. Re	grammable Logic Co Logic Controllers (PL C Hardware Compone dules CPU - Processor nputers ics of PLC Programme ing-Simple Instruction ectromagnetic Control Operated and Proximity n - Converting Simple C Instructions ons ON DELAY Time for and Counter Applicat lath Instructions Dications of PLC & S als Handling Applicati Supplier Conveyor Bo ly:	ntrollers CS) - Introduction Parts Of 1 nts - I/O Section - Analog L Memory Module - Program ning is - Programming EXAMIN Relays-Motor Starters -Ma 'Switches - Output Control Relay Ladder Diagram into r and OFF DELAY Timer - tions - Program Control Ins CADA ons - Automatic Control of 1 elt - Motor Control Automat	PLC - Principles of /O Section - Analog uming Devices -Diag E ON And EXAMI nually Operated Sw Devices - Latching PLC Relay Ladder Counter Instruction tructions - Data Ma Warehouse Door - A tic Car Washing Ma Total Lecture Ho Edition, Jaico Publi	Opera gl/O M gnosti NE O itches Relay Diagr nipula as - Up nipula Autom chine	15 Alodu Alodu cs of 15 FF - 25 0/Down 15 75 H	5 les 5 LC 5 wn		

Books for References:

1. William I. Fletcher **"An Engineering Approach to Digital Design "**, Prentice, Hall of India Ltd., New Delhi, 1999.

Web Resources

web I	Xesources						
1. <u>https://unitronicsplc.com/what-is-plc-programmable-logic-controller/</u>							
EXPE	EXPECTED COURSE OUTCOME						
Course	e Outcomes	K Level					
On the	e successful completion of the course, student will be able to:						
CO1:	Gain knowledge on Programmable Logic Controllers	K3					
CO2:	Devices to which PLC input and output modules	K3					
CO3:	Gain knowledge about various types of PLC registers, ladder diagrams from process control descriptions	K4					
CO4:	Develop a coil and contact control system and analog PLC operations	K4					
CO5:	Apply time delay on PLC operations	K4					

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	2	2	3
CO 2	3	2	3	2	2	3
CO 3	3	3	3	2	2	1
CO 4	2	2	2	3	3	1
CO5	2	2	3	3	3	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Programmable Logic Programmable Logic – Introduction - Programmable Logic Structures - Programmable Logic Arrays (PLAS), Programmable Array Logic (Pals), Programmable Gate Arrays (PGAS), Field Programmable Gate Arrays(FPGAS) - Sequential Network Design With Programmable Logic Devices (PLDs) -Design of Sequential Networks Using ROMs and Flash - Traffic Light Controller Using PAL	15	Chalk & Talk
П	PLC Instructions Timer Instructions ON DELAY Timer and OFF DELAY Timer - Counter Instructions - Up/Down Counters -Timer and Counter Applications - Program Control Instructions - Data Manipulating Instructions - Math Instructions	15	Chalk & Talk
ш	Basics of PLC Programming PLC Programming-Simple Instructions - Programming EXAMINE ON And EXAMINE OFF Instructions -Electromagnetic Control Relays-Motor Starters - Manually Operated Switches -Mechanically Operated and Proximity Switches - Output Control Devices - Latching Relays - PLC Ladder Diagram - Converting Simple Relay Ladder Diagram into PLC Relay Ladder Diagram	15	Chalk & Talk
IV	Timer Instructions ON DELAY Timer and OFF DELAY Timer - Counter Instructions - Up/Down Counters -Timer and Counter Applications - Program Control Instructions - Data Manipulating Instructions - Math Instructions	15	Power point presentation
V	Applications of PLC & SCADA: Simple Materials Handling Applications - Automatic Control of Warehouse Door - Automatic Lubricating Oil Supplier Conveyor Belt - Motor Control Automatic Car Washing Machine – SCADA.	15	Power point presentation

Course Designed by: Mr.A.Velmurugan

Dr.G.Pandeeswari.

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
Inte	Cos	K Level	Section A MCQs		Section B Short Answers		Section C Either or	Section D			
rnal Cos		K Levei	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Open Choice			
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3, K3)	1(K3)			
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3, K3)	1(K3)			
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3, K3)	1(K4)			
AII	CO4	Up to K4	2	K1&K2	2 K2		2(K3, K3)	1(K3)			
		No. of Questions to be asked	4		3		4	2			
-	estion tern	No. of Questions to be answered	4		3		2	1			
CIA	I & II	Marks for each question	1		2		5	10			
		Total Marks for each section	4		6		10	10			

		D	istribution of	f Marks with	K Level CI	A I & CI	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	20	40	80	80
I	K4	-	-	-	-	-	-	-
-	Marks	4	6	20	20	50	100	100
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	10	30	60	60
II	K4	-	-	-	10	10	20	20
	Marks	4	6	20	30	60	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summ	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
			MC	Qs	Short A	nswers	Section C	Section D			
S.No	COs	K - Level	No. of Questions	K – Level	No. of Questio n	K – Level	(Either / or Choice)	(Open Choice)			
1	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)			
2	CO2	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)			
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)			
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	(K4)			
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)			
No. of	Questions	s to be Asked	10		5	5	10	5			
No	No.of Questions to be answered		10		5		5	3			
Marks for each question		1		2		5	10				
Total Marks for each section		10		10		25	30				
	(Figu	res in parenthe	esis denotes, q	uestions sho	ould be ask	ed with th	e given K leve	I)			

	Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5	-	-	-	5	4.16	17				
K2	5	10	-	-	15	12.5	17				
K3	-	-	40	20	60	50	50				
K4	-	-	10	30	40	33.3	33				
Marks	10	10	50	50	120	100	100				
NR · Hic	ther level of n	orformance	f the students	s is to be asse	esed by a	ottemnting	higher level				

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

		-	ice Questions)
Answei	r All Q	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (Sho	ort Answei	rs)
Answer	r All Q	uestions	(5x2=10 marks)
Q.No	СО	K Level	Questions
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eit	her/Or Ty	pe)
Answer	r All Q	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Hi	gher le	vel of perf	formance of the students is to be assessed by attempting higher
level of			
	•	en Choice	
		Three ques	
Q.No	CO	K Level	Questions
21	CO1	K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
	CO5	K4	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	BIO-MEDICAL INSTRUMENTATION				
Course Code	21UELS51		L	Р	С
Category	Skill		2	-	2
Nature of cours	EMPLOYABILITY SKILL ORIENTED	URSI	HIP		
2. To gain know 3. To understand 4. To gain know 5. To understand Unit: I BIO Introduction - Taction potentials sensors. Unit: II BIO Origin of bioele ECG – EMG an Unit: III BIO SYS Block diagram Electromyograp blood flow and of Unit: IV THE Cardiac pacem Microwave diat Unit: V MO Computer X ray	 the basic physiology. ledge about different electrodes and bioelectric signed the concepts of Biomedical recorders. ledge for medical instruments, signal conditioners. ledge for medical Assisting devices. POTENTIALS: Tissues, Muscles and Nervous System-Cellular for a Generation & Characteristics - Physiological ELECTRIC SIGNALS AND ELECTRODES: ctrical signals – Recording electrodes – Skin contrading the Electrical conductivity of electrodes- jellice MEDICAL RECORDERS AND PATIES and signal analysis of phonocardiography by – Measurement of heart rate – Measurement of temperature – Measurement of temperature – Measurement of temperature – Measurement of the cardiac defibrillators – Surgical diath thermy- ultrasonic therapy unit – Pain relief therapy DERN IMAGING SYSTEMS: machine - X ray computer tomography – Basic Nay - Thermography equipment. 	and diagnostic equ luids, Transmembr - transducers, Bios act – Impedance – H es creams microele NTS MONITO / - Electroencep blood pressure –M easurement of respi ermy – software / electrical stimulat	ane particular and pa	06 poten rs, S1 06 odes es. 06 graph marte 06 herm 06	tial- mart for for . – nt of - y –
Books for Stud	y:	Total Lecture Ho		30 H	15
Measure Books for Refe 1. R.Kha	well.F., J,.Weibell and E.A.Pfeiffer." Bio-Medical ments". PHI, 1991. rences: ndpur. "Hand book of Bio-Medical Instrumenta mugam. "Bio-Medical Instrumentation." Anura	tion". TMH.II Edit	tion.,	2003	
Web Resources 1. <u>https://v</u> 2. <u>https://v</u> 3. <u>https://v</u>			-		

EXPE	EXPECTED COURSE OUTCOME						
Course	Course Outcomes						
On the	On the successful completion of the course, student will be able to:						
CO1:	Understand the Concept of bio-potential	K3					
CO2:	Understand the concept of biomedical signals and electrodes.	K3					
CO3:	Analyze the types of biomedical recorders.	K4					
CO4:	Understand the concepts of diagnostic equipment	K3					
CO5:	Analyze the modern imaging systems.	K4					

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	2	3
CO 3	3	3	3	2	2	1
CO 4	2	2	2	3	3	1
CO5	2	2	3	3	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	BIOPOTENTIALS Introduction - Tissues, Muscles and Nervous System-Cellular fluids, Transmembrane potential- action potentials - Generation & Characteristics - Physiological - transducers, Biosensors, Smart sensors.	06	Chalk & Talk
П	BIOELECTRIC SIGNALS AND ELECTRODES: Origin of bioelectrical signals – Recording electrodes – Skin contact – Impedance – Electrodes for ECG – EMG and EEG – Electrical conductivity of electrodes- jellies creams microelectrodes.	06	Chalk & Talk
ш	BIOMEDICAL RECORDERS AND PATIENTS MONITORING SYSTEMS: Block diagram and signal analysis of phonocardiography - Electroencephalograph. – Electromyography – Measurement of heart rate – Measurement of blood pressure –Measurement of blood flow and cardiac output – Measurement of temperature – Measurement of respiration rate.	06	Chalk & Talk
IV	THERAPEUTIC EQUIPMENTS: Cardiac pacemaker - Cardiac defibrillators – Surgical diathermy – software diathermy – Microwave diathermy- ultrasonic therapy unit – Pain relief therapy electrical stimulation.	06	Power point presentation
V	MODERN IMAGING SYSTEMS Computer X ray machine - X ray computer tomography – Basic NMR components – Echocardiography - Thermography equipment.	06	Power point presentation

Course Designed by: Dr.G.Pandeeswari

Mr.A.Velmurugan





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	8051 MICROCONTROLLER AND EMBEDD						
Course Code	21UELC61		L	Р	С		
Category	Core		6	-	5		
Nature of course: EMPLOYABILITY ✓ SKILL ORIENTED ENTREPRENEUR							
Course Object							
-	architecture and addressing modes of 8051						
-	owledge about assembly language programs of 805						
-	erstand the importance of different peripheral devic	es &t heir interfaci	ingto8	3051.			
4. To impart kr	owledge of Interfacing with microcontroller 8051.						
5. To understar	d the real time application of 8051.						
Unit: I Mie	rocontroller Overview and Instruction set			18	3		
Microcontrolle	rs and Embedded Processors - Microcontrollers for	Embedded System	ns – C	Overv	iew		
of 8051 Family	- 8051 Instruction Set and Registers.						
Unit: II AS	SEMBLY PROGRAMMING & ADDRESSING	MODES		18	5		
Introductionto	8051AssemblyProgramming–The Program Counter	and ROM-Data 7	Гуреs	and			
D'and Ele							
Directives-Flag	BitsandPSWRegister-RegisterBankandStack-Loo	pandJumpInstruction	ons –	I/O P	ort		
	BitsandPSWRegister–RegisterBankandStack–Loo Addressing Modes.	pandJumpInstructio	ons –	I/O F	ort		
Programming -			ons –	I/O F			
Programming - Unit: III AR	Addressing Modes.	ALP & C		18	8		
Programming - Unit: III AR Arithmetic Ins	Addressing Modes. ITHMETIC AND LOGICAL OPERATIONS IN	ALP & C and Subtraction	and J	18 Unsig	nec		
Programming – Unit: III AR Arithmetic Ins Multiplication	Addressing Modes. ITHMETIC AND LOGICAL OPERATIONS IN tructions and Programs – Unsigned Addition	ALP & C and Subtraction a s – Single Bit In	and U	18 Unsig	ned and		
Programming – Unit: III AR Arithmetic Ins Multiplication Programming.	Addressing Modes. ITHMETIC AND LOGICAL OPERATIONS IN tructions and Programs – Unsigned Addition and Division – Logic Instructions and Program	ALP & C and Subtraction a s – Single Bit In	and U	18 Unsig	ned and		
Programming – Unit: III AR Arithmetic Ins Multiplication Programming. Logic Operatio	Addressing Modes. ITHMETIC AND LOGICAL OPERATIONS IN tructions and Programs – Unsigned Addition and Division – Logic Instructions and Program Programming with C: Data Types – Time Delay Pro-	ALP & C and Subtraction a s – Single Bit In	and U	18 Unsig	ned and ng –		
Programming – Unit: III AR Arithmetic Ins Multiplication Programming. Logic Operatio Unit: IV 805	Addressing Modes. ITHMETIC AND LOGICAL OPERATIONS IN tructions and Programs – Unsigned Addition and Division – Logic Instructions and Program Programming with C: Data Types – Time Delay Pro- ns Arithmetic Operations	ALP & C and Subtraction a s – Single Bit In ogramming – I/O P	and U struct Progra	18 Unsig ions mmin	ned and 1g –		
Programming – Unit: III AR Arithmetic Ins Multiplication Programming. Logic Operatio Unit: IV 805 Basic Registers	Addressing Modes. ITHMETIC AND LOGICAL OPERATIONS IN tructions and Programs – Unsigned Addition and Division – Logic Instructions and Program Programming with C: Data Types – Time Delay Pro- ns Arithmetic Operations 1 INTERRUPTS & PERIPHERALS	ALP & C and Subtraction a s – Single Bit In ogramming – I/O P Programming – B	and U struct Progra asics	18 Unsig ions mmin 18 of Se	and and ng –		
Programming – Unit: III AR Arithmetic Ins Multiplication Programming. Logic Operatio Unit: IV 805 Basic Registers Communicatio	Addressing Modes. ITHMETIC AND LOGICAL OPERATIONS IN tructions and Programs – Unsigned Addition and Division – Logic Instructions and Program Programming with C: Data Types – Time Delay Pro- ns Arithmetic Operations I INTERRUPTS & PERIPHERALS s of Timer – Programming 8051 Timer – Counter	ALP & C and Subtraction a s – Single Bit In ogramming – I/O P Programming – B - 8051 Serial C	and U struct Progra asics	18 Unsig ions mmin 18 of Se	ned and ng –		
Programming – Unit: III AR Arithmetic Ins Multiplication Programming. Logic Operatio Unit: IV 805 Basic Registers Communicatio Programming –	Addressing Modes. ITHMETIC AND LOGICAL OPERATIONS IN tructions and Programs – Unsigned Addition and Division – Logic Instructions and Program Programming with C: Data Types – Time Delay Pro- ns Arithmetic Operations I INTERRUPTS & PERIPHERALS s of Timer – Programming 8051 Timer – Counter n – 8051 Connection to RS 232 and RS 485	ALP & C and Subtraction a s – Single Bit In ogramming – I/O P Programming – B - 8051 Serial C	and U struct Progra asics	18 Unsig ions mmin 18 of Se	ined and and s erial tior		
ProgrammingUnit: IIIARArithmeticInsMultiplicationProgramming.Logic OperatioUnit: IV805Basic RegistersCommunicatioProgrammingProgramming-Unit: VRE	Addressing Modes. ITHMETIC AND LOGICAL OPERATIONS IN tructions and Programs – Unsigned Addition and Division – Logic Instructions and Program Programming with C: Data Types – Time Delay Pro- ns Arithmetic Operations I INTERRUPTS & PERIPHERALS s of Timer – Programming 8051 Timer – Counter n – 8051 Connection to RS 232 and RS 485 -8051 Interrupts – Programming External Hardwar	ALP & C and Subtraction a s – Single Bit In ogramming – I/O P Programming – B - 8051 Serial C e Interrupts	and U struct Progra asics	18 Unsig ions mmin 18 of Se unica	ined and and s erial tior		
ProgrammingUnit: IIIARArithmeticInsMultiplicationProgramming.Logic OperatioUnit: IV805Basic RegistersCommunicatioProgramming -Unit: VREInterfacing LC	 Addressing Modes. ITHMETIC AND LOGICAL OPERATIONS IN tructions and Programs – Unsigned Addition and Division – Logic Instructions and Program Programming with C: Data Types – Time Delay Pro- ns Arithmetic Operations 1 INTERRUPTS & PERIPHERALS s of Timer – Programming 8051 Timer – Counter n – 8051 Connection to RS 232 and RS 485 - 8051 Interrupts – Programming External Hardware AL WORLD APPLICATIONS 	ALP & C and Subtraction a s – Single Bit In ogramming – I/O P Programming – B - 8051 Serial C e Interrupts	and U struct Progra asics	18 Unsig ions mmin 18 of Se unica	ined and and s erial tior		
Programming – Unit: III AR Arithmetic Ins Multiplication Programming. Logic Operatio Unit: IV 805 Basic Registers Communicatio Programming – Unit: V RE Interfacing LC	 Addressing Modes. ITHMETIC AND LOGICAL OPERATIONS IN tructions and Programs – Unsigned Addition and Division – Logic Instructions and Program Programming with C: Data Types – Time Delay Pro- ns Arithmetic Operations I INTERRUPTS & PERIPHERALS G of Timer – Programming 8051 Timer – Counter n – 8051 Connection to RS 232 and RS 485 8051 Interrupts – Programming External Hardwar AL WORLD APPLICATIONS D to the 8051 – Interfacing ADC – Interfacing Sen 	ALP & C and Subtraction a s – Single Bit In ogramming – I/O P Programming – B - 8051 Serial C e Interrupts	and U struct Progra asics commu- rfacin	18 Unsig ions mmin 18 of Se unica	ned and ng –		
Programming – Unit: III AR Arithmetic Ins Multiplication Programming. Logic Operatio Unit: IV 805 Basic Registers Communication Programming – Unit: V RE Interfacing LC Stepper Motor	Addressing Modes. ITHMETIC AND LOGICAL OPERATIONS IN tructions and Programs – Unsigned Addition and Division – Logic Instructions and Program Programming with C: Data Types – Time Delay Pro- ns Arithmetic Operations I INTERRUPTS & PERIPHERALS s of Timer – Programming 8051 Timer – Counter n – 8051 Connection to RS 232 and RS 485 8051 Interrupts – Programming External Hardward AL WORLD APPLICATIONS D to the 8051 – Interfacing ADC – Interfacing Sen – 8051 Interfacing to the Keyboard – Interfacing D.	ALP & C and Subtraction a s – Single Bit In ogramming – I/O P Programming – B - 8051 Serial C e Interrupts sors to 8051 – Inter AC to the 8051	and U struct Progra asics commu- rfacin	18 Unsig ions mmin 18 of Se unica g	ned and ng – erial tior		
Programming Unit: III AR Arithmetic Ins Multiplication Programming. Logic Operation Unit: IV 805 Basic Registers Communication Programming. Interfacing Communication Unit: V RE Interfacing LC Stepper Motor Interfacing Interfacing Books for Study Study Study	Addressing Modes. ITHMETIC AND LOGICAL OPERATIONS IN tructions and Programs – Unsigned Addition and Division – Logic Instructions and Program Programming with C: Data Types – Time Delay Pro- ns Arithmetic Operations I INTERRUPTS & PERIPHERALS s of Timer – Programming 8051 Timer – Counter n – 8051 Connection to RS 232 and RS 485 8051 Interrupts – Programming External Hardward AL WORLD APPLICATIONS D to the 8051 – Interfacing ADC – Interfacing Sen – 8051 Interfacing to the Keyboard – Interfacing D.	ALP & C and Subtraction a s – Single Bit In ogramming – I/O P Programming – B - 8051 Serial C e Interrupts sors to 8051 – Inter AC to the 8051 Total Lecture Ho	and U struct Progra asics communication rfacin	18 Unsig ions mmin 18 of Se unica g	ned and ng –		
ProgrammingUnit: IIIARArithmeticInsMultiplicationProgramming.Logic OperationUnit: IVBasic Registers805Basic RegistersCommunicationProgramming-Unit: VREInterfacing LCStepper MotorStepper Motor-Books for Stude1. Muhamma	 Addressing Modes. ITHMETIC AND LOGICAL OPERATIONS IN tructions and Programs – Unsigned Addition and Division – Logic Instructions and Program Programming with C: Data Types – Time Delay Pro- ns Arithmetic Operations INTERRUPTS & PERIPHERALS G of Timer – Programming 8051 Timer – Counter n – 8051 Connection to RS 232 and RS 485 8051 Interrupts – Programming External Hardwar AL WORLD APPLICATIONS D to the 8051 – Interfacing ADC – Interfacing Sen – 8051 Interraction to the Keyboard – Interfacing D. 	ALP & C and Subtraction a s – Single Bit In- ogramming – I/O P Programming – B - 8051 Serial C e Interrupts sors to 8051 – Inter AC to the 8051 Total Lecture Ho	and U struct Progra asics communication rfacin urs	18 Unsig ions mmin 18 of Se unica g 90 H	nec anc ng – eria tior		
Programming - Unit: III AR Arithmetic Ins Multiplication Programming. Logic Operatio Unit: IV 805 Basic Registers Communication Programming - Interfacing LC Unit: V RE Interfacing LC Stepper Motor Books for Stud 1. Muhamm Microcontr Interfacing LC	Addressing Modes. ITHMETIC AND LOGICAL OPERATIONS IN tructions and Programs – Unsigned Addition and Division – Logic Instructions and Program Programming with C: Data Types – Time Delay Pro- ns Arithmetic Operations I INTERRUPTS & PERIPHERALS s of Timer – Programming 8051 Timer – Counter n – 8051 Connection to RS 232 and RS 485 8051 Interrupts – Programming External Hardward AL WORLD APPLICATIONS D to the 8051 – Interfacing ADC – Interfacing Sen – 8051 Interfacing to the Keyboard – Interfacing D. Iy: had Ali Mazidi, Janice GillispieMazidi and Rolin D	ALP & C and Subtraction a s – Single Bit In ogramming – I/O P Programming – B - 8051 Serial C e Interrupts sors to 8051 – Inter AC to the 8051 Total Lecture Ho . McKinlay, "The 8 C", PHI, 2nd editio	and U struct Progra asics communication rfacin urs 3051 on 200	18 Unsig ions mmin 18 of Se unica 18 g 90 H 6	nec anc ng – Pria tior		

Books for References:

- 1. Mykepredko, "Programming and Customizing the 8051 Microcontroller", Tata McGraw Hill, 1st Edition
- Ayala J.K., —The 8051 Microcontroller: Architecture, programming and applications", Penram International (2005) 3rd edition.

Web Resources:

https://www.youtube.com/watch?v=84YUQu8tE4w

- https://www.youtube.com/watch?v=GPz_mR7Flas
- https://www.youtube.com/watch?v=uFhDGagZzjs

EXPE	EXPECTED COURSE OUTCOME						
Course	Course Outcomes						
On the	e successful completion of the course, student will be able to:						
CO1:	Describe architecture and operation of Microcontroller 8051						
CO2:	Foster ability to understand the design concept of interfacing Microcontroller						
CO2:	with various Peripherals						
CO3:	Apply the concepts of interfacing techniques						
CO4:	Foster ability to understand the role of PIC Microcontroller in industry						

CO5:	Importance of	of the features and functional description of ARM mi	crocontroller.	

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	1	2	1	3	1
CO 2	2	2	2	2	3	3
CO 3	2	3	3	3	1	3
CO 4	3	2	1	2	2	2
CO5	2	2	3	2	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

K Level

K3

K3

K4 K4

K4

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
Ι	MICROCONTROLLER OVERVIEW Microcontrollers and Embedded Processors – Microcontrollers for Embedded Systems – Overview of 8051 Family – 8051 Instruction Set and Registers.	18	Chalk & Talk
П	ASSEMBLY PROGRAMMING & ADDRESSING MODES Introductionto8051AssemblyProgramming–The Program Counter and ROM– Data Types and Directives–FlagBitsandPSWRegister– RegisterBankandStack–LoopandJumpInstructions – I/O Port Programming – Addressing Modes.	18	Chalk & Talk
ш	ARITHMETIC AND LOGICAL OPERATIONS IN ALP & C Arithmetic Instructions and Programs – Unsigned Addition and Subtraction and Unsigned Multiplication and Division – Logic Instructions and Programs – Single Bit Instructions and Programming. Programming with C: Data Types – Time Delay Programming – I/O Programming – Logic Operations Arithmetic Operations	18	Chalk & Talk
IV	8051 INTERRUPTS & PERIPHERALS Basic Registers of Timer – Programming 8051 Timer – Counter Programming – Basics of Serial Communication – 8051 Connection to RS 232 and RS 485 - 8051 Serial Communication Programming – 8051 Interrupts – Programming External Hardware Interrupts	18	Power point presentation
V	REAL WORLD APPLICATIONS Interfacing LCD to the 8051 – Interfacing ADC – Interfacing Sensors to 8051 – Interfacing Stepper Motor – 8051 Interfacing to the Keyboard – Interfacing DAC to the 8051	18	Power point presentation

Course Designed by: Dr.G.Pandeeswari

Mr.A.Velmurugan

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
Inte	Cos	K Level	Section A MCQs		Section B Short Answers		Section C Either or	Section D		
rnal	CUS	K Level	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Open Choice		
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3, K3)	1(K3)		
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3, K3)	1(K3)		
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3, K3)	1(K4)		
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3, K3)	1(K3)		
		No. of Questions to be asked	4		3		4	2		
Pat	stion tern	No. of Questions to be answered	4		3		2	1		
CIA	I & II	Marks for each question	1		2		5	10		
		Total Marks for each section	4		6		10	10		

		D	istribution of	f Marks with	K Level CI	A I & Cl	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	20	40	80	80
I	K4	-	-	-	-	-	-	-
	Marks	4	6	20	20	50	100	100
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	10	30	60	60
II	K4	-	-	-	10	10	20	20
	Marks	4	6	20	30	60	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summ	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
			MCQs		Short An	iswers	Section C	Section D		
S.No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open		
			Questions	Level	Question	Level	Choice)	Choice)		
1	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)		
2	CO2	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)		
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)		
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	(K4)		
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)		
No. of	Question	s to be Asked	10		5	5	10	5		
No.of Questions to be answered		10		5		5	3			
Marks for each question		1		2		5	10			
Total	Marks for	each section	10		10		25	30		
	(Figu	res in parenthe	esis denotes, q	uestions sh	ould be ask	ed with th	e given K leve	l)		

		Dis	tribution of	Marks with	ı K Leve	l				
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %			
K1	5	-	-	-	5	4.16	17			
K2	5	10	-	-	15	12.5	1/			
K3	-	-	40	20	60	50	50			
K4	-	-	10	30	40	33.3	33			
Marks	10	10	50	50	120	100	100			
C	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.									

	-	-	ice Questions)
-	-	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1 2	CO1 CO1	K1 K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6 7	CO3 CO4	K2 K1	
-			
<u>8</u> 9	CO4	K2	
10	CO5 CO5	K1 K2	
-			
		ort Answei uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eit	her/Or Ty	pe)
		uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K3	
20) b	CO5	K3	
			ormance of the students is to be assessed by attempting higher
level of			N
	-	en Choice	
Q.No	CO	Three ques K Level	tions (3x10=30 marks) Questions
21	C01	K Level K3	Questions
21	CO1 CO2	K3 K3	
22	CO2 CO3	K3 K4	
23	CO3	K4 K4	
24	CO4	K4 K4	
23	005	174	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	PROJECT AND VIVA - VOCE									
Course Code	21UELPR1	21UELPR1					Р	С		
Category	Core					-	6	4		
Nature of course: EMPLOYABILITY ✓ SKILL ORIENTED ENTREPRENEU					URSI	HIP				
Course Objecti	Course Objectives:									

- **1.** To provide knowledge of Electronics components and soldering techniques and its package information for electronics circuit design.
- 2. Knowledge for the assembling of electronics circuit with components on PCB (Printed Circuit Board) of circuit design.
- **3.** Design and development of small electronic projects based on hardware and software for electronics systems.
- **4.** To enhance the knowledge on advanced Electronics Projects.
- 5. To enhance technical skills to get adapted in industries.

EXPE	CTED COURSE OUTCOME	K Level			
On the	e successful completion of the course, student will be able to:				
CO1:	CO1: Demonstrate a technical knowledge of their selected project topic				
CO2:	Undertake problem identification, formulation and solution	K4			
CO3:	Design engineering solutions to complex problems utilizing a system approach	K4			
CO4:	Conduct an engineering project	K4			
CO5:	Demonstrate the knowledge, skills and attitudes of a professional electronics students	K4			

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	1	2	1	3	1
CO 2	2	2	2	2	3	3
CO 3	2	3	3	3	1	3
CO 4	3	2	1	2	2	2
CO5	2	2	3	2	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	8051 MICROCONTROLLER AND EMBEDDED SYSTEMS LAB									
Course Code	21UELCP7	L	Р	С						
Category	Core	-	3	2						
Nature of cours	Nature of course: EMPLOYABILITY 🗸 SKILL ORIENTED ENTREPRENEU									
Course Object	Course Objectives:									

1. To introduces the assembly language programming of Microcontroller

2. To develop the assembly language program of Microcontroller using data transfer instruction.

3. To develop the assembly language program of Microcontroller using arithmetic instruction

4. To develop the assembly language program of Microcontroller using branch instruction

5. To develop the student's C and C++ language programming skills and gives practical training of interfacing the peripheral devices with the Microcontroller

List of Experiment

- 1. Addition / Subtraction of 8 / 16 bit Data
- 2. Multiplication / division 8 bit Data
- 3. Block Data Transfer
- 4. Smallest / Largest of N Numbers
- 5. BCD Addition and Subtraction
- 6. To Arrange in Ascending / Descending Order
- 7. Sum of N 8 bit Numbers
- 8. 1's and 2's Compliment of an Array (8 / 16bit)
- 9. UP/DOWN Counter using 7 Segment Display
- 10. Traffic Light Control Interface
- 11. Wave Form Generation
- 12. ADC Interface
- 13. DAC Interface
- 14. Stepper Motor Interface
- 15. Solid State Relay Interface
- 16. DC Motor Interface
- 17. Temperature Controller
- 18. Rolling and Blinking of a Message
- 19. LCD Interface
- 20. Frequency Counter
- 21. Interface with LED.

Web H	Web Resources:					
https://	/www.vlab.co.in/ba-nptel-labs-electronics-and-communications					
EXPE	EXPECTED COURSE OUTCOME K L					
On the	successful completion of the course, student will be able to:					
CO1:	Apply the fundamentals of assembly level programming of microcontroller	K4				
CO2:	Design and Develop program for real time interface	K4				
CO3:	Understand the array arrangement in memory cells	K4				
CO4:	Analyze the sensors output and motor control	K4				
CO5:	Design and develop embedded c program for input and output interfacing	K4				

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	1	2	1	3	1
CO 2	2	2	2	2	3	3
CO 3	2	3	3	3	1	3
CO 4	3	2	1	2	2	2
CO5	2	2	3	2	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
Ι	 Addition / Subtraction of 8 / 16 bit Data Multiplication / division 8 bit Data Block Data Transfer Smallest / Largest of N Numbers 	9	Practical
II	 5. To Arrange in Ascending / Descending Order 6. Sum of N 8 bit Numbers 7. 1's and 2's Compliment of an Array (8 / 16bit) 8. UP/DOWN Counter using 7 Segment Display 	9	Practical
III	 9. Traffic Light Control Interface 10. Wave Form Generation 11. ADC Interface 12. DAC Interface 	9	Practical
IV	 13. Stepper Motor Interface 14. Solid State Relay Interface 15. DC Motor Interface 16. Temperature Controller 	9	Practical
V	17. Rolling and Blinking of a Message18. LCD Interface19. Frequency Counter20. Water Level Indicator	9	Practical

Course Designed by: Mr.J.Charles theodore, Dr.D.Sivaranjani.



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	SENSORS AND TRANSDUCERS LAB									
Course Code	21UELCP8	21UELCP8 L P C								
Category	Core					-	3	2		
Nature of course	e: EMPLOYABILITY	√	SKILL ORIENTED		ENTREPRENE	URSI	HIP			
Course Objectiv	ves:									
1. To study	the Characteristics of the	emp	erature sensors.							
2. To study	the characteristics of d	ispla	acement sensors.							
3. To study the characteristics of Vibration measurement transducers.										
4. To study the characteristics of switching devices used in industries.										
5 To develo	5 To develop and design the sensor based Application experiments									

5. To develop and design the sensor based Application experiments

List of Experiment

- 1. Study of RTD, Thermistor characteristics.
- 2. Study of Thermocouples characteristics and cold junction compensation.
- 3. Study of IC Temperature sensors.
- 4. Study of Strain gauge and Load cell characteristics.
- 5. Study of LVDT and Tacho generator characteristics.
- 6. LDR and Opto-coupler characteristics.
- 7. Study of Piezo-electric transducers and vibration measurement using Piezo electric transducer.
- 8. PLL application circuits, Frequency multiplier.
- 9. Study of UJT, IGBT devices.
- 10. Speed control of AC/DC Motors using Thyristor.
- 11. Design and testing of FET input volt meter.
- 12. Phase sensitive detectors.

Web Resources:

https://sl-coep.vlabs.ac.in/						
EXPE	EXPECTED COURSE OUTCOME					
On the	successful completion of the course, student will be able to:					
CO1:	Study the basic concepts of Transducers	K4				
CO2:	Construct and study the Temperature transducers	K4				
CO3:	Construct and study the Displacement transducers	K4				
CO4:	Design the ADC & DAC circuits and study its operation	K4				
CO5:	Design PLL and UJT relaxation oscillator	K4				

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	2	3
CO 3	3	3	3	2	2	1
CO 4	2	2	2	3	3	1
CO5	2	2	3	3	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Study of RTD, Thermistor characteristics.Study of Thermocouples characteristics and cold junction compensation.	9	Practical
II	Study of IC Temperature sensorsStudy of Strain gauge and Load cell characteristics	9	Practical
ш	Study of LVDT and Tacho generator characteristics.LDR and Opto-coupler characteristics	9	Practical
IV	Study of Piezo-electric transducers and vibration measurement usingPiezo electric transducer.PLL application circuits, Frequency multiplier	9	Practical
V	Study of UJT, IGBT devices. Speed control of AC/DC Motors using Thyristor. Design and testing of FET input volt meter Phase sensitive detectors.	9	Practical

Course Designed by: Dr.G.Pandeeswari

Mr.A.Velmurugan



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name SATELLITE COMMUNICATION			
Course Code 21UELE61	L	Р	С
Category Core Elective	5	-	5
Nature of course: EMPLOYABILITY ✓ SKILL ORIENTED ENTREPRENEU	URSH	HP	
Course Objectives: 1. To provide knowledge on fundamentals of Satellite Communication. 2. To understand the concepts of satellite orbits 3. To enhance the knowledge on space segments. 4. To gain on linkage of satellite designs. 5. To apply the concepts of communication in satellite. Unit: I Satellite Systems – Overview		15	
Introduction- Basic concepts of Satellite communications- Frequency allocations for satellite systems. Advantages and applications of satellite communications over oth communications.	ner		
Unit: II Orbital Aspects Of Satellite Systems		15	
Orbital Mechanics- look angle determination- orbit perturbations- Orbital determinat and launch vehicles- orbital effects in communication systems performance.	tion-	launo	ches
Unit: III The Space Segment		15	
Introduction- spacecraft subsystems- attitude and orbit control systems- Telemetry- tra command- power systems- communication subsystems.	cking	g and	
Unit: IV Satellite Link Design		15	
Satellite Link Design Basic transmission theory- system noise temperature and G/T ratio- Design of down lindesign- design of satellite link for specified C/N.	nks-	up lir	ık
Unit: V Applications Of Satellite Systems		15	
INTELSAT Series- INSAT- VSAT- GSM- GPS- INMARSAT-Direct Broadcast satell Direct to home Broadcast (DTH)- Digital audio broadcast (DAB)- World space service TV(BTV)- GRAMSAT.	es- B	usine	SS
Total Lecture Hou	irs	75 H	rs
Books for Study:			
 Timothy Pratt, Charles Bostian, JeremyAllnutt, Satellite Communications, 2nd edit willey 2006. W. L. Pritchard, H. G. Suyderhoud and R. A. Nelson, Satellite Communication Sy Engineering, 2nd edition, Pearson educational p blishers, New Delhi, 2003. Books for References: 			

- 1. Dennis Roddy, **Satellite Communications**, 3rd edition, McGraw Hill, International, 2001.
- 2. Dr D.C. Agarwal, **Satellite Communications**, 4th edition, Khanna Publications, New Delhi, 2001.

Web Resources

- 1. <u>https://nptel.ac.in/courses/117/105/117105131/</u>
- 2. https://www.youtube.com/watch?v=hXa3bTcIGPU
- 3. https://www.youtube.com/watch?v=BvjlBpP4zU8

EXPECTED COURSE OUTCOME						
Course	Course Outcomes					
On the	e successful completion of the course, student will be able to:					
CO1:	Gain knowledge on Satellite Communication and frequency allocations.	K3				
CO2:	Able to analyze satellite mechanism and system performance.	K3				
CO3:	Gain the knowledge on space craft subsystems and TT&C.	K4				
CO4:	Understand the theory of transmission.	K4				
CO5:	Understand the applications of various satellite systems.	K4				

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	2	3
CO 3	3	3	3	2	2	1
CO 4	2	2	2	3	3	1
CO5	2	2	3	3	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Satellite Systems – Overview Introduction- Basic concepts of Satellite communications- Frequency allocations for satellite systems. Advantages and applications of satellite communications over other communications.	15	Chalk & Talk
п	Orbital Aspects Of Satellite Systems Orbital Mechanics- look angle determination- orbit perturbations- Orbital determination- launches and launch vehicles- orbital effects in communication systems performance	15	Chalk & Talk
III	The Space Segment Introduction- spacecraft subsystems- attitude and orbit control systems- Telemetry- tracking and command- power systems- communication subsystems.	15	Chalk & Talk
IV	Satellite Link Design Basic transmission theory- system noise temperature and G/T ratio- Design of down links- up link design- design of satellite link for specified C/N	15	Power point presentation
v	Applications Of Satellite Systems INTELSAT Series- INSAT- VSAT- GSM- GPS- INMARSAT- Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH)- Digital audio broadcast (DAB)- World space services- Business TV(BTV)- GRAMSAT	15	Power point presentation

Course Designed by: Dr.D.Sivaranjani

Mr.J.Charles Theodore

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)											
Inte	Cos	K Level	Section A MCQs		Section B Short Answers		Section C Either or	Sectio n D Open				
rnal			No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choic e				
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3, K3)	1(K3)				
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3, K3)	1(K3)				
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3, K3)	1(K4)				
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3, K3)	1(K3)				
		No. of Questions to be asked	4		3		4	2				
-	estion ttern	No. of Questions to be answered	4		3		2	1				
CIA	I & II	Marks for each question	1		2		5	10				
		Total Marks for each section	4		6		10	10				

		D	istribution of	f Marks with	K Level CI	A I & Cl	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	20	40	80	80
I	K4	-	-	-	-	-	-	-
-	Marks	4	6	20	20	50	100	100
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	10	30	60	60
II	K4	-	-	-	10	10	20	20
	Marks	4	6	20	30	60	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summ	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
			MC	Qs	Short A	nswers	Section C	Section D		
S. No	COs	K - Level	No. of Questions	K – Level	No. of Questio n	K – Level	(Either / or Choice)	(Open Choice)		
1	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)		
2	CO2	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)		
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)		
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	(K4)		
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)		
No. of	Question	s to be Asked	10		5	5	10	5		
No	No.of Questions to be answered		10		5		5	3		
Ma	Marks for each question		1		2		5	10		
Total	Total Marks for each section		10		10		25	30		
	(Figures in parenthesis denotes, questions should be asked with the given K level)									

	Distribution of Marks with K Level										
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %				
K1	5	-	-	-	5	4.16	17				
K2	5	10	-	-	15	12.5	17				
K3	-	-	40	20	60	50	50				
K4	-	-	10	30	40	33.3	33				
Marks	10	10	50	50	120	100	100				

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

		-	ice Questions)
	r All Q CO	uestions K Level	(10x1=10 marks) Questions
Q. No	C01	K Level K1	Questions
2	C01	K1 K2	
3	CO1 CO2	K2 K1	
4	CO2 CO2	K1 K2	
5	CO2 CO3	K2 K1	
6	CO3	K1 K2	
7	CO3	K2 K1	
8	CO4	K1 K2	
<u> </u>	C04 C05	K2 K1	
<u> </u>	CO5	K1 K2	
-			
		ort Answer uestions	(5x2=10 marks)
Q. No	CO	K Level	Questions
11	CO1	K2	*
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eitl	her/Or Ty	pe)
Answe	r All Q	uestions	(5 x 5 = 25 marks)
Q. No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K3	
20) b	CO5	K3	
			ormance of the students is to be assessed by attempting higher
level of			
	-	en Choice) Three ques	
Q. No	CO	K Level	Questions (5x10=50 marks)
21	C01	K Level K3	Questions
$\frac{21}{22}$	CO1 CO2	K3 K3	
22	CO2 CO3	K3 K4	
23	CO3	K4 K4	
24	CO4	K4 K4	
23	COS	1\4	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	DIGITAL SIGNAL P	RO	CESSING						
Course Code	21UELE62					L	Р	С	
Category	Elective					5	-	5	
Nature of cours	of course: EMPLOYABILITY SKILL ORIENTED ✓ ENTREPRI								
1.To understand2. To understand3. To understand4. To understand5. To understandUnit: IDiscIntroduction – E	Introduction – Block diagram representation of discrete time system. Classification of discrete time system – Static versus dynamic system – Time invariant versus time variant system – Linear versus								
	inition of Z transforms -								
	gn of digital filter			-			15	1	
Design of linea bilinear transfor	r phase FIR filter using mation method – Review	v of	design technique for						
	lization of digital linear	-					15)	
	for FIR system: Direct for				Donollal atmost				
structure.	for IIR system: Direct f	orm	-Cascade form struct	ure	- Parallel structu	re-La	uder		
	rete Fourier transform	•					15		
	transform: Definition a		roperties				1.	, 	
	Introduction to radix	-	1	ne	– Decimation i	n tim	e FF	т.	
Decimation in fi		2 10	ast i ourier transform	115	Decimation 1	11 (111)		1	
			aital filtana.				15	,	
	te word length Effects i er representation-Quanti			and	rounding quan	tizoti			
• •	-	Zatio	on noise- muncation	anu	rounding -quan	uzau		01 -	
overflow limit c	ycle oscillation.			-					
				Т	otal Lecture Ho	urs	75 H	rs	
Books for Stud		and	C.C.nonoDrivo Digi	tal	signal and n		ina '	Tata	
	hanan. A. Vallavaraj		• / •			roces	sing,	I ata	
	-Hill publishing compar	•							
-	proakisnandD.G.Manola		0 0 1		0				
	shbabu,"Digital signal a	and]	processing", fourth e	diti	on Scitech 2007.	•			
Books for Refe									
1. P. Rame 2007.	sh Babu, Digital Signa	l Pro	ocessing,SciTech Pub	olic	ations, Chennai,	Fourt	h Edi	tion	
2. Johny R Delhi, 20	Johnson, Introduction	n to	Digital Signal Proc	cess	sing, Pearson Ed	ducati	on, l	New	

Web Resources

- 1. https://nptel.ac.in/courses/108/106/108106151/
- 2. <u>https://swayam-uat-node1.appspot.com/practice_course1/preview</u>
- 3. https://www.mooc-list.com/tags/digital-signal-processing

EXPECTED COURSE OUTCOME					
Course	e Outcomes	K Level			
On the	e successful completion of the course, student will be able to:				
CO1:	Understand Digital Signal Controllers and their Applications	K3			
CO2:	Design digital filters IIR and FIR filters	K3			
CO3:	Develop discrete form and cascade form of FIR and IIR system	K4			
CO4:	Analyze the concept of FFT and DFT	K4			
CO5:	Evaluate finite word length effects in signal processing	K4			

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	2	3
CO 3	3	3	3	2	2	1
CO 4	2	2	2	3	3	1
CO5	2	2	3	3	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	Z-transform: Definition of Z transforms – Inverse Z transform – Properties of Z transform. Discrete time system: Introduction – Block diagram representation of discrete time system. Classification of discrete time system – Static versus dynamic system – Time invariant versus time variant system – Linear versus Nonlinear system – Causal versus Non causal systems – Stable versus unstable systems.	15	Chalk & Talk
Π	Design of digital filter: Design of linear phase FIR filter using windows – IIR filler design: -impulse invariant method- bilinear transformation method – Review of design technique for analog low pass filter.	15	Chalk & Talk
ш	Realization of digital linear system:Basic Structure for FIR system: Direct form – cascade form BasicStructure for IIR system: Direct form -Cascade form structure- Parallelstructure-Ladder structure.	15	Chalk & Talk
IV	Discrete Fourier transform: Definition and properties. FFT algorithm: Introduction to radix 2 fast Fourier transforms – Decimation in time FFT - Decimation in frequency FFT.	15	Power point presentation
V	Finite word length Effects in digital filters: Types of Number representation-Quantization noise- Truncation and rounding -quantization error -overflow limit cycle oscillation.	15	Power point presentation

Course Designed by: Dr.G.Pandeeswari, Mr.A.Velmurugan

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
			Sectio	on A	Section	n B	Section C	Section			
Inte	Cos	K Level	MC	Qs	Short An	swers	Either or	D			
rnal	000	ii Levei	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Open Choice			
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3, K3)	1(K3)			
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3, K3)	1(K3)			
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3, K3)	1(K4)			
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3, K3)	1(K3)			
		No. of Questions to be asked	4		3		4	2			
-	estion ttern	No. of Questions to be answered	4		3		2	1			
CIA	I & II	Marks for each question	1		2		5	10			
		Total Marks for each section	4		6		10	10			

		D	istribution of	f Marks with	K Level CI	AI&C	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	20	40	80	80
I	K4	-	-	-	-	-	-	-
-	Marks	4	6	20	20	50	100	100
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	10	30	60	60
II	K4	-	-	-	10	10	20	20
	Marks	4	6	20	30	60	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summ	native Exa	mination – Bl	ue Print Artic	ulation Ma	apping – K I	level with	Course Outco	omes (COs)
			MCC	Qs	Short An	iswers	Section C	Section D
S. No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open
			Questions	Level	Question	Level	Choice)	Choice)
1	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)
2	CO2	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	(K4)
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)
No. of	Questions	s to be Asked	10		5	5	10	5
No.of Questions to be answered		10		5		5	3	
Marks for each question		1		2		5	10	
Total Marks for each section		10		10		25	30	
	(Figures in parenthesis denotes, questions should be asked with the given K level)							

	Distribution of Marks with K Level									
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %			
K1	5	-	-	-	5	4.16	17			
K2	5	10	-	-	15	12.5	1/			
K3	-	-	40	20	60	50	50			
K4	-	-	10	30	40	33.3	33			
Marks	10	10	50	50	120	100	100			
C	NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.									

		-	ce Questions)
Answer	_		(10x1=10 marks)
Q. No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
		rt Answers	
Answer	_		(5x2=10 marks)
Q. No	CO	K Level	Questions
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
		er/Or Typ	e)
Answer	All Qu	estions	(5 x 5 = 25 marks)
Q. No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Hig level of l			rmance of the students is to be assessed by attempting higher
		n Choice)	
		nree questi	ons (3x10=30 marks)
Q. No	CO	K Level	Questions
21	CO1	K1 Level K3	<u>Yutsuons</u>
21	CO1 CO2	K3 K3	
22	CO2 CO3	K3 K4	
23	CO3	K4 K4	
24	C04	K4 K4	
23	COS	174	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	ROBOTICS			
Course Code	21UELE63	L	Р	С
Category	Core Elective	5	-	5
Nature of cours	NEURS	HIP		
Course Objecti	ives:			
1. 1. To far	niliarize the students with the fundamental concepts of Robots.			
2. To under	rstand the various concepts of Drives and Control systems.			
3. Gain kno	owledge on types of sensors and Vision Systems Robots.			
4. To under	rstand the Robot end effectors			
5. To under	rstand the concepts of Robot Motion analysis and control.			
	otic Systems		15	5
Basic Structure	of Robots – Accuracy, Resolution and Repeatability of Robot	- Class	ificat	ion:
	Robotic System – Continuous Path Robotic System - Cartesiar			
Spherical - Artic		- 5		
-	ves and Control Systems		15	5
	ems - Hydraulic Motor – DC Servo Motors – Stepper Motor – Co	ntrol Loo		
	ier - Control Loops using Voltage Amplifier.		-po u	58
	sors and Vision Systems		15	
	lucers and Sensors – Tactile Sensors – Proximity and Range	Sensors		
	e Processing and Analysis – Image Data Reduction – Segmen			
	ject Recognition by Rasbperry Pi and Jetson Nano.	nunon	100	ture
	ot End Effectors		15	5
Types of end E	ffectors - Mechanical Grippers: Types of Gripper Mechanisms -	Vacuur	n Cu	os –
	ers – Adhesive Grippers – Robot end Effector Interface.		-	
	ot Motion Analysis and Control		15	5
	Manipulator Kinematics – Robot Dynamics – Configuration of a R	obot Co	ntroll	er –
	mputer Control – Flexible Manufacturing Systems – Head Changi			
	cation in Welding, Painting and Assembly.	0 11		
	Total Lecture	Hours	75 H	rs
Books for Stud	y:			
1. M.P.Gro	over, Mitchellweiss, Roger.N.Nagel, NicholasG.Odrey, IIndus	strial R	lobot	ics–
Technol	ogy, Programming And Application , McGraw-Hill, 2008.			
	-Control in Robotics and Automation: Sensor Based Inte	gration	", Al	lied
Publishe	ers, Chennai, 1998.	0		
Books for Refe	rences:			
1. Deb. S.R	R., -Robotics Technology And Flexible Automation, John Wil	ey, USA	1992	
2. Klafter R.	D., Chimielewski T.A., Negin M., -Robotic Engineering - An i	integrat	ed	
	ntice Hall of India, New Delhi, 1994	5		
Web Resource				
	ptel.ac.in/courses/112/105/112105249/Introduction to Robots			
	ptel.ac.in/courses/112/101/112101098/Robotics and Automatio	n		
- 11055771				

EXPE	CTED COURSE OUTCOME	
Course	e Outcomes	K Level
On the	e successful completion of the course, student will be able to:	
CO1:	Scribe the working concept and types of Robots	K3
CO2:	Apply the knowledge of types of sensors and actuators	K3
CO3:	Programming Languages for Robot design models	K4
CO4:	Understand the concept of Mobile Robotic Locomotion	K4
CO5:	Study the various applications of Robots	K4

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	2	3
CO 3	3	3	3	2	2	1
CO 4	2	2	2	3	3	1
CO5	2	2	3	3	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
	Robotic Systems	15	Chalk &
	Basic Structure of Robots – Accuracy, Resolution and Repeatability		Talk
Ι	of Robot – Classification: Point to Point Robotic System –		
	Continuous Path Robotic System - Cartesian – Cylindrical – Spherical		
	- Articulated Robots		<u> </u>
	Drives and Control Systems	15	Chalk &
II	Hydraulic Systems - Hydraulic Motor – DC Servo Motors – Stepper		Talk
	Motor – Control Loops using Current Amplifier - Control Loops		
	using Voltage Amplifier.		~
	Sensors and Vision Systems	15	Chalk &
	Sensors: Transducers and Sensors – Tactile Sensors – Proximity and		Talk
III	Range Sensors – Vision Systems: Image Processing and Analysis –		
	Image Data Reduction – Segmentation – Feature Extraction – Object		
	Recognition by Rasbperry Pi and Jetson Nano.		
	Robot End Effectors	15	Power point
IV	Types of end Effectors – Mechanical Grippers: Types of Gripper		presentation
- '	Mechanisms – Vacuum Cups – Magnetic Grippers – Adhesive		
	Grippers – Robot end Effector Interface.		
	Robot Motion Analysis and Control	15	Power point
	Introduction to Manipulator Kinematics – Robot Dynamics –		presentation
V	Configuration of a Robot Controller – Hierarchical Computer Control		
	– Flexible Manufacturing Systems – Head Changing Application of		
	Robots – Application in Welding, Painting and Assembly.		

Course Designed by: Dr.D.Sivaranjani, Dr.G.Pandeeswari.

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
Inte	Cos	K Level	Section A MCQs		Section B Short Answers		Section C Either or	Section D	
rnal	COS	K Level	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Open Choice	
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3, K3)	1(K3)	
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3, K3)	1(K3)	
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3, K3)	1(K4)	
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3, K3)	1(K3)	
		No. of Questions to be asked	4		3		4	2	
~	stion tern	No. of Questions to be answered	4		3		2	1	
CIA	I & II	Marks for each question	1		2		5	10	
		Total Marks for each section	4		6		10	10	

		D	istribution of	f Marks with	K Level CI	A I & Cl	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	20	40	80	80
I	K4	-	-	-	-	-	-	-
•	Marks	4	6	20	20	50	100	100
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	10	30	60	60
II	K4	-	-	-	10	10	20	20
	Marks	4	6	20	30	60	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summa	ative Exa	mination – Blu	e Print Articu	ilation Ma	pping – K L	evel with	Course Outco	mes (COs)
			MCO	Qs	Short Answers		Section C	Section D
S. No	COs	K - Level	No. of	K –	No. of	K –	(Either / or	(Open
			Questions	Level	Question	Level	Choice)	Choice)
1	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)
2	CO2	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	(K4)
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)
No. of	Questions	to be Asked	10		5	5	10	5
No.of Q	uestions to	be answered	10		5		5	3
Marks for each question		1		2		5	10	
Total N	Total Marks for each section				10		25	30
	(Figure	es in parenthes	sis denotes, qu	estions sho	ould be aske	d with the	e given K level))

		Dis	tribution of	Marks with	n K Leve	l			
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %		
K1	5	-	-	-	5	4.16	17		
K2	5	10	-	-	15	12.5	1/		
K3	-	-	40	20	60	50	50		
K4	_	-	10	30	40	33.3	33		
Marks	10	10	50	50	120	100	100		
NB: Hig	NB: Higher level of performance of the students is to be assessed by attempting higher level								
of K lev	els.								

		-	ce Questions)
Answer Q. No	All Que	K Level	(10x1=10 marks)
Q. NO	C01	K Level K1	Questions
2	C01	K1 K2	
3	CO1 CO2	K2 K1	
4	CO2 CO2	K1 K2	
<u>4</u> 5	CO2 CO3	K2 K1	
6	CO3	K1 K2	
7	CO3	<u>K2</u> K1	
8	CO4	K1 K2	
<u> </u>	C04 C05	K2 K1	
10	CO5	K1 K2	
-		t Answers	
Answer			(5x2=10 marks)
Q. No	CO	K Level	Ouestions
11	C01	K2	Zucotiono
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
		er/Or Typ	e)
Answer		• •	(5 x 5 = 25 marks)
Q. No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Hig level of l			rmance of the students is to be assessed by attempting higher
-		n Choice)	
	-	ree questi	ons (3x10=30 marks)
Q. No	ĊO	K Level	Questions
21	CO1	K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
25	CO5	K4	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	VLSI DESIGN					
Course Code	21UELE64			L	Р	С
Category	Core Elective			5	-	5
Nature of cours	e: EMPLOYABILITY	SKILL ORIENTED	✓ ENTREPRENE	URSI	HIP	
Course Object	ives:					
-	ide knowledge on VLSI					
	rstand the electrical prop					
	rstand the design rules for					
-	knowledge on VLSI phy					
	knowledge to apply test	principles.				
	SI Technology				15	
		Testing – Super integrati				
1	1	itors – Crossovers – NM	OS - PMOS - CMC	DS - I	BICM	IOS
^	esses – comparison					
	ctrical Properties of MC				15	
		ain to source voltage (Vd	ý 1			
•		trans-conductance gm an	d output conductanc	e gds	s – fig	gure
	pass transistor- pull – up	to pull – down ratio.				
Unit: III Des	0				15	
0	5 5	rules with examples - De	·		0	
-		andard unit of capacitanc	e – Inverter delays	– Pro	paga	tion
	of MOS circuits – limitat					
	SI Physical Design And				15	
		lacement – Routing – P	ower Delay Estimation	ation	- Cl	ock
Routing – Powe	U					
	Styles: Full Custom – S	Semi custom – Standard	Cells – Gate Array	$s - \mathbf{I}$	FPGA	s –
CPLDs.						
	ting Of VLSI Circuits				15	
-		binational Circuit Testing	g, Sequential Circuit	t Test	ing, '	Гest
Bench Techniq	les.					
			Total Lecture Ho	urs	75 H	rs
Books for Stud	ly:					
1. Basic V	LSI Design, Douglas,	3rd Edition, A. Pucknell	, Kamran Eshraghi	an, P	HI, N	New
Delhi, 2	011.					
2. Modern	VLSI design , Wayne	Wolf, 3rdEdition, Pear	rson Education, Ne	ew D	elhi,	4th
impress	ion 2008.					
Books for Refe	erences:					

1. **Introduction to VLSI Circuits and Systems**, John .P. Uyemura, John Wiley, Student Edition, New Delhi, Reprint 2006.

2. Principles of CMOS VLSI Design, N.H.E Weste, K.Eshraghian, Adisson Wesley, 2nd Edition,

New Delhi.

3.**Application Specific Integrated Circuits,** Michel John Sebastian Smith, Addison Wesley, Indian Edition, 4th Indian Reprint 2001, New Delhi

Web Resources

- 1. https://nptel.ac.in/courses/117/101/117101058/
- 2. https://www.youtube.com/watch?v=9SnR3M3CIm4
- 3. https://www.youtube.com/watch?v=Y8FvvzcocT4

EXPE	EXPECTED COURSE OUTCOME						
Course	Course Outcomes						
On the	e successful completion of the course, student will be able to:						
CO1:	Gain the knowledge on fabrication principles.						
CO2:	Able to analyze the electrical properties of MOS transistors.						
CO3:	Apply the appropriate layout design rule to create a VLSI layout for a design.	K4					
CO4:	Understand the physical design steps and gain the knowledge on types of VLSI design styles	K4					
CO5:	Gain the knowledge, analyze and apply test principles to evaluate the VLSI designs.	K4					

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	2	3
CO 3	3	3	3	2	2	1
CO 4	2	2	2	3	3	1
CO5	2	2	3	3	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	VLSI Technology Fabrication sequence – process flow – Testing – Super integration concepts – Integrated Passive components – MOS Resistors and capacitors – Crossovers – NMOS – PMOS – CMOS – BICMOS fabrication processes – comparison.	15	Chalk & Talk
П	Electrical Properties of MOS Devices Drain to source current (Ids) versus Drain to source voltage (Vds) relationships – MOS transistor threshold voltage (Vt) – MOS transistor trans-conductance gm and output conductance gds – figure of merit (ω 0) – pass transistor- pull – up to pull – down ratio.	15	Chalk & Talk
ш	Design Processes VLSI design flow - stick diagram design rules with examples - Design rules for Layout diagrams of digital circuits– sheet resistance Rs –standard unit of capacitance – Inverter delays – Propagation delays- scaling of MOS circuits – limitations of scaling.	15	Chalk & Talk
IV	VLSI Physical Design And Styles Physical Design: Floor Planning – Placement – Routing – Power Delay Estimation – Clock Routing – Power Routing. VLSI Design Styles:Full Custom – Semi custom – Standard Cells – Gate Arrays – FPGAs – CPLDs.	15	Power point presentation
V	Testing Of VLSI Circuits Test Principles-BIST-Test Bench- Combinational Circuit Testing, Sequential Circuit Testing, Test Bench Techniques.	15	Power point presentation

Course Designed by: Mr.A.Velmurugan Dr.G.Pandeeswari.

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
Inte	Cos	K Level	Section A MCQs		Section B Short Answers		Section C Either or	Section D		
rnal	03	K Level	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Open Choice		
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3, K3)	1(K3)		
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3, K3)	1(K3)		
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3, K3)	1(K4)		
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3, K3)	1(K3)		
		No. of Questions to be asked	4		3		4	2		
Pat	stion tern	No. of Questions to be answered	4		3		2	1		
CIA	I & II	Marks for each question	1		2		5	10		
		Total Marks for each section	4		6		10	10		

		D	istribution of	f Marks with	K Level CI	A I & Cl	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	20	40	80	80
I	K4	-	-	-	-	-	-	-
	Marks	4	6	20	20	50	100	100
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	10	30	60	60
II	K4	-	-	-	10	10	20	20
	Marks	4	6	20	30	60	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summ	native Exa	mination – Bl	ue Print Artic	ulation Ma	oping – K I	evel with	Course Outco	omes (COs)
			MC	Qs	Short A	nswers	Section C	Section D
S.No	COs	K - Level	No. of Questions	K – Level	No. of Questio n	K – Level	(Either / or Choice)	(Open Choice)
1	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)
2	CO2	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	(K4)
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)
No. of	Question	s to be Asked	10		5	5	10	5
No	o.of Questi answe		10		5		5	3
Ma	Marks for each question		1		2		5	10
Total	Total Marks for each section		10		10		25	30
	(Figu	res in parenthe	esis denotes, q	uestions sho	ould be ask	ed with th	e given K leve	l)

		Dis	tribution of	Marks with	n K Leve	1	
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	-	-	-	5	4.16	17
K2	5	10	-	-	15	12.5	17
K3	-	-	40	20	60	50	50
K4	-	-	10	30	40	33.3	33
Marks	10	10	50	50	120	100	100

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

Section	A (Mu	ltiple Cho	vice Questions)
Answe	r All Q	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (Sho	ort Answei	rs)
Answe	~	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
		her/Or Ty	
	-	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4 CO5	K4 K3	
20) a 20) b	CO5	K3	
/			commance of the students is to be assessed by attempting higher
level of			formance of the students is to be assessed by attempting higher
		en Choice	
	-	Three ques	
Q.No	CO	K Level	Questions
21	C01	K Level K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
25	CO5	K4	
			1

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	MODERN TELEVISIO	N SYSTEM				
Course Code	21UELE65			L	Р	C
Category	Core Elective			5	-	5
Nature of cours	e: EMPLOYABILITY	SKILL ORIENTED	✓ ENTREPF	RENEURS	HIP	
Course Objection1.To impa2.To impa3.To acqui4.To unde5.To gainUnit: IFunAspect ration NVSB transissiMonochrome anUnit: IICamera TubesCharacteristics -Construction anTV Transmitte	ives: rt the knowledge on func rstand the principles of the rstand different types of knowledge on Advanced damentals Of Televisio fumber of scanning lines on – Complete channel nd Color TV and vice-ven nera Tubes & TV Tran – Types of camera tube – d working of Vidicon an	lamentals of Television. cansmitter and receiver. essentials of colour televis Colour TV systems. Television systems. n – Scanning -Interlaced so width –VSB reception - rsa smitter	ision. canningCom TV standards- otoemissive pr es.	posite vide Compatib	15 o sig	nal - with
	entials of Color Televisi	al exciter- Aural exciter-]	Diplexer		15	5
Three color theo luminance and c	ory - Luminance, Hue and color difference signals.	d saturation - Color teleview em - PAL color TV system		-Values of		<u>,</u>
	evision Receiver				15	5
Block diagram	-Tuners-IF and RF stage	s-Wave trap circuits- Viens- Viens- Viens- Viens- Vertical Output stage-			on- S	Sync
-	lern Television Systems	÷ *	6	-	15	5
Concepts of LC	D, LED, Plasma TVs- 4I	K-O LED- Q LED TV-Ca	able TV- DTH	•		
			Total Lectur	re Hours	75 H	lrs
Books for Stud	y:					
Edition 2006, N 2. R.R.Gulati, Books for Refe 1. A.M Dhake, - 2. R.P.Bali, -	w Age International (P) Monochrome & Color T rences: —Television and Video Color Television, Theory	n Practice, Principles, Te Publishers. elevision", New Age Inte Engineering", 2nd ed., Th y and Practicell, Tata McC	ernational Publ	isher, 2003		rd
2. https://v	nptel.ac.in/courses/117/2	102/117102059/Introduc h?reload=9&v=EAybxc			<u>1</u>	

Course	Outcomes	K Level						
On th	On the successful completion of the course, student will be able to:							
CO1:	Acquire knowledge on television fundamentals.	K3						
CO2:	Study on Transmitter and receiver standards	K3						
CO3:	Understand the Picture tube of color TV	K4						
CO4:	Knowledge on performance of Color TV systems.	K4						
CO5:	Familiarize Advanced TV Systems	K4						

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	2	3
CO 3	3	3	3	2	2	1
CO 4	2	2	2	3	3	1
CO5	2	2	3	3	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level <u>LESSON PLAN</u>

Unit	Course Name	Hrs	Pedagogy
Ι	Fundamentals Of Television Aspect ratio - Number of scanning lines – Scanning -Interlaced scanningComposite video signal - VSB transmission – Complete channel width –VSB reception -TV standards- Compatibility with Monochrome and Colour tv and vice-versa	15	Chalk & Talk
П	Camera Tubes & TV Transmitter Camera Tubes Characteristics – Types of camera tube – photoconductive and photoemissive principles – Construction and working of Vidicon and Plumbicon camera tubes. TV Transmitter Block diagram of TV Transmitter- Visual exciter- Aural exciter- Diplexer	15	Chalk & Talk
III	Essentials of Color Television and Systems Three colour theory - Luminance, Hue and saturation - Colour television cameras -Values of luminance and colour difference signals.NTSC colour TV systems - SECAM system - PAL colour TV systems.	15	Chalk & Talk
IV	Television Receiver Block diagram-Tuners-IF and RF stages-Wave trap circuits- Video detector-DC restoration- Sync separator-Vertical and Horizontal Systems-Vertical Output stage- EHT generation.	15	Power point presentation
V	Advanced Television Systems Concepts of LCD, LED, Plasma TVs- 4K-O LED- Q LED TV-Cable TV- DTH.	15	Power point presentation

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)										
Inte	Con		Section A MCQs		Section B Short Answers		Section C	Sectio n D			
rnal	Cos	K Level	No. of. Questions	K - Level	No. of. Questions	K - Level	Either or Choice	Open Choic e			
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3, K3)	1(K3)			
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3, K3)	1(K3)			
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3, K3)	1(K4)			
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3, K3)	1(K3)			
		No. of Questions to be asked	4		3		4	2			
~	estion tern	No. of Questions to be answered	4		3		2	1			
CIA	I & II	Marks for each question	1		2		5	10			
		Total Marks for each section	4		6		10	10			

		D	istribution of	f Marks with	K Level CI	A I & Cl	AII	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	20	40	80	80
I	K4	-	-	-	-	-	-	-
-	Marks	4	6	20	20	50	100	100
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	10	30	60	60
II	K4	-	-	-	10	10	20	20
	Marks	4	6	20	30	60	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

S	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
			MCQs		Short Answers		Section C	Section D			
S.No	COs	K - Level	No. of Questions	K – Level	No. of Questio n	K – Level	Section C (Either / or Choice)	Section D (Open Choice)			
1	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)			
2	CO2	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)			
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)			
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	(K4)			
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)			
No.	of Quest Aske	ions to be ed	10		5	5	10	5			
No	of Questi. answe	ions to be red	10		5		5	3			
Mar	ks for eac	h question	1		2		5	10			
Total N	Marks for	each section	10		10		25	30			
	(Figures	in parenthesi	is denotes, qu	estions sh	ould be as	ked with	the given K l	evel)			

		Dis	stribution of	Marks with	n K Leve	l	
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	-	-	-	5	4.16	17
K2	5	10	-	-	15	12.5	1/
K3	-	-	40	20	60	50	50
K4	_	_	10	30	40	33.3	33
Marks	10	10	50	50	120	100	100
NB: Hig of K lev	gher level of p els.	erformance o	of the students	s is to be asso	essed by a	attempting	higher level

Section	A (Mu	iltiple Cho	ice Questions)
Answe	r All Q	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (Sho	ort Answei	rs)
Answe	r All Q	uestions	(5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eit	her/Or Ty	
	-	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K3	
20) b	CO5	K3	
			ormance of the students is to be assessed by attempting higher
level of			<u>\</u>
	_	en Choice	
	CO	Three ques K Level	
Q.No 21	C01	K Level K3	Questions
21	CO1 CO2	K3 K3	
22	CO2 CO3	K3 K4	
23	CO3	K4 K4	
24	CO4	K4 K4	
25	005	174	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	SENSORS AND MEA	ASUR	RMENTS		-	T	
Course Code	21UELE66				L	Р	C
Category	Core Elective				5	-	5
Nature of cours	e: EMPLOYABILITY	S	KILL ORIENTED	✓ ENTREPRENE	EURS	HIP	
Course Objecti	ves:	1 1					1
1. To famil	iarize the students with	the kn	nowledge of transduc	cers and it types.			
	rstand the operation of D						
	rstand the working princ			ation sensors.			
-	knowledge about flow s						
	erstand the working of flo			ors.			
	nsducer classification a					15	5
	lectrical transducer - cla						
	ve type - platinum resista	ance t	hermometer-thermis	stors - Quartz therm	omete	er -	
	d - optical pyrometer.						
	blacement and Strain S					15	5
	sduction-digital transduc						
	tors affecting strain mea		• •			n of	
	gauge-types of electrica		in gauge-gauge tech	niques and other fac	ctors		
	ration and pressure Ser					15	
	naracteristics- analysis o	f vibr	ation sensing device	e-vibration sensing of	device	s-sig	nal
	ock measurement.						
Pressure				1			
	phragms-piezoelectric p			ng element pressure	e sens	ors –	4
	10 V Measurements for	Indus	stry.				
Unit: IV Flov			1 .			15	
	ssification-head type flo			comagnetic flow me	eter-m	echar	ncal
	mometer-ultrasonic flow	mete	er.			4	-
	ce and Torque Sensor	1	11 1 .1 . 1	1 1.0	1	15	
	orce measuring sensor-lo			-digital force transc	lucer-	hydra	aulic
load cell-electro	nic weighting system-to	rque i	measurement			8 7 1 1	r
				Total Lecture Ho	ours	75 H	rs
Books for Stud	y:						
1. C.S.Ran	gan,G R Sarma VSV ma	ni" In	strumentation dev	ices & systems, Ta	ta M c	grav	V
hill publ	ishing company private	ltd, D	elhiIInd edition,	-		-	
Books for Refe	rences:						
1 D.D. (1) (Name I C	1		002
	Sensors and Transduce		e	•			
	ir, Sensors and Tran	nsauo	cers, newnes, Copyri	gni,OxfordUniversi	uy,U.I	к, I	nirc
Edition							
Wah Dasauna							

Web Resources

2. 3.	https://www.youtube.com/watch?v=1uPTyjxZzyo https://www.youtube.com/watch?v=q8UuRkOQ9A0 https://www.youtube.com/watch?v=nv3GuJArjNU	
EXPE	CTED COURSE OUTCOME	
Cours	e Outcomes	K Level
On the	e successful completion of the course, student will be able to:	
CO1:	Remembering the concept of a transducer	K3
CO2:	Understand the principle of displacement and strain gauge techniques	K3
CO3:	Identify the concept of pressure sensors.	K4
CO4:	Classify types of flow meters.	K4
CO5:	Evaluate force and torque of sensors and transducers	K4

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	2	2	3
CO 3	3	3	3	2	2	1
CO 4	2	2	2	3	3	1
CO5	2	2	3	3	2	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
Ι	Introduction - Electrical transducer - classification-basic requirement - Mechanical temperature sensors - resistive type - platinum resistance thermometer-thermistors - Quartz thermometer -radiation method optical pyrometer.	15	Chalk & Talk
п	Principle of transduction-digital transducer-level measurements Introduction-factors affecting strain measurement-types of strain gauge-theory of operation of resistance strain gauge-types of electrical strain gauge-gauge techniques and other factors	15	Chalk & Talk
Ш	Introduction - characteristics- analysis of vibration sensing device- vibration sensing devices-signal conditioners-shock measurement. Pressure Introduction-diaphragms-piezoelectric pressure transducer-vibrating element pressure sensors – 4 to 20 mA – 0 to 10 V Measurements for Industry.	15	Chalk & Talk
IV	Introduction-classification-head type flow meter-rota meter- electromagnetic flow meter-mechanical flow meter-Anemometer- ultrasonic flow meter.	15	Power point presentation
V	Force and Torque Introduction - force measuring sensor-load cell elastic transducer- digital force transducer-hydraulic load cell-electronic weighting system-torque measurement	15	Power point presentation

Course Designed by: Mr.A.Velmurugan. Mr.J.Charles Theodore

	Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)									
Inte	Cos	K L ovol	Section A MCQs		Section B Short Answers		Section C Either or	Section D		
rnal	Cos	K Level	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Open Choice		
CI	CO1	Up to K3	2	K1&K2	1	K2	2(K3, K3)	1(K3)		
AI	CO2	Up to K3	2	K1&K2	2	K2	2(K3, K3)	1(K3)		
CI	CO3	Up to K4	2	K1&K2	1	K2	2(K3, K3)	1(K4)		
AII	CO4	Up to K4	2	K1&K2	2	K2	2(K3, K3)	1(K3)		
		No. of Questions to be asked	4		3		4	2		
~	stion tern	No. of Questions to be answered	4		3		2	1		
CIA	I & II	Marks for each question	1		2		5	10		
		Total Marks for each section	4		6		10	10		

			Distribution	of Marks with	K Level CIA	I & CIA	II	
	K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either / Or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	20	40	80	80
I	K4	-	-	-	-	-	-	-
-	Marks	4	6	20	20	50	100	100
	K1	2	-	-	-	2	4	20
	K2	2	6	-	-	8	16	20
CIA	K3	-	-	20	10	30	60	60
II	K4	-	-	-	10	10	20	20
	Marks	4	6	20	30	60	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summ	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
			MC	Qs	Short A	nswers	Section C	Section D	
S.No	COs	K - Level	No. of Questions	K – Level	No. of Questio n	K – Level	(Either / or Choice)	(Open Choice)	
1	CO1	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)	
2	CO2	Up to K3	2	K1&K2	1	K2	2(K3&K3)	(K3)	
3	CO3	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)	
4	CO4	Up to K4	2	K1&K2	1	K2	2(K4&K4)	(K4)	
5	CO5	Up to K4	2	K1&K2	1	K2	2(K3&K3)	(K4)	
No. of	Question	s to be Asked	10		5	5	10	5	
No	o.of Questi answe		10		5		5	3	
Marks for each question		1		2		5	10		
Total Marks for each section		10		10		25	30		
	(Figures in parenthesis denotes, questions should be asked with the given K level)								

	Distribution of Marks with K Level								
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %		
K1	5	-	-	-	5	4.16	17		
K2	5	10	-	-	15	12.5	1/		
K3	-	-	40	20	60	50	50		
K4	-	-	10	30	40	33.3	33		
Marks	10	10	50	50	120	100	100		

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

		-	ice Questions)
Answei	r All Q	uestions	(10x1=10 marks)
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section	B (Sho	ort Answei	rs)
Answer	r All Q	uestions	(5x2=10 marks)
Q.No	СО	K Level	Questions
11	CO1	K2	
12	CO2	K2	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section	C (Eit	her/Or Ty	pe)
Answer	r All Q	uestions	(5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K3	
16) b	CO1	K3	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Hi	gher le	vel of perf	formance of the students is to be assessed by attempting higher
level of			
	•	en Choice	
		Three ques	
Q.No	CO	K Level	Questions
21	CO1	K3	
22	CO2	K3	
23	CO3	K4	
24	CO4	K4	
	CO5	K4	

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION (For those who joined in 2021-2022 and after)

Course Name	COMPUTER NETW	VORKS				
Course Code	21UELS61			L	Р	С
Category	Skill			2	-	2
NATURE OF COURSE:	EMPLOYABILITY	SKILL ORIENTED	ENTREPR	ENEU	RSH	IP
COURSE OB	JECTIVES:					
• . To develop	an understanding of co	mputer networking basics.				
• Familiarize t	he student with the basi	c taxonomy and terminolog	y of the computer	netwo	orkin	g
area.						
•	• 1	k topologies and protocols				
.• Independent	ly understand basic con	nputer network technology.				
• To know the	various security servic	es of network				
Unit: I Int	troduction:				0	6
Data Commun	ication-Networks-Proto	cols and Standards-Netwo	rk Models: Lay	ered 7	Fasks	-The
	yers in the OSI Model-7	CCP/IP Protocol suite.				
	ysical Layer:				-	6
		- Unguided media: Wirel		VANs	Ce	llulaı
		llular Telephony-Satellite N				
		Detection and Correction:			0	6
	U U	Block Codes- Cylic Codes.				
	twork Layer:				0	6
-		elivery– Forwarding – Multie	cast Routing Proto	ocols.		
	twork Security:					6
	-	entiality – Message Integri	ty – Message A	uthen	ticati	on –
Digital Signatu	re – Entity Authenticati	on.				
			Total Lecture	Hou	rs 3	0
Books for Stud						
		munications and Networkin	ig, TataMcGraw	Hill	Educ	ation
	nited, New Delhi, Four					
	: Chapter1 – Section: 1.	1, 1.2, 1.4.				
-	2 – Section: 2.1- 2.4	1.7.0				
	: Chapter 7 – Section: 7					
-	16 - Section: 16.1, 16.2					
	: Chapter 10 – Section:					
-	: 11 – Section:11.1-11.5					
	: Chapter 22 – Section: 2					
	: Chapter 31 – Section:	31.1-31.0				
Book for Refer		Notwork Dranting II-11 C	India Marro Dall	E E	, DJ	
1. AndrewS.1 2014.	anenbaum, Computer	Network, Prentice Hall of	India, New Delh	i, Fift	n Edi	ition
2. PrakashC.C	Dete Communic	ations & Computer Networ	ulso Duantias Hall	of Tr	dia	Mary

Delhi, Third Edition, 2006.

3. W	illiam Stallings, Data and Computer Communications, Prentice Hall of Ir	idia, New
D	elhi, Seventh Edition, 2004.	
Web	Resources	
1. ht	tps://www.journals.elsevier.com/computer-networks	
2. ht	tps://www.tutorialspoint.com/computer_fundamentals/computer_networking.h	t <u>ml</u>
3. ht	tps://www.guru99.com/types-of-computer-network.html	
EXPI	ECTED COURSE OUTCOME	K Level
CO1:	Explain about building blocks of Computer Network, Components and Transmission media.	K3
CO2:	Demonstrate the Functionalities and Protocols in the layers of ISO/OSI Network Model.	K3
CO3:	Make use of the Data link layer protocols in Error detection and correction.	K3
CO4:	Apply Suitable Routing Strategies for a given network and choose appropriate access control, congestion control and congestion avoidance technique for given Traffic scenario	К3
CO5:	Assess the functions of Application layer Paradigms and Protocols and design for the real time applications.	K4

CO & PO Mappings:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	2	2	3	2
CO 2	2	2	2	2	3	2
CO 3	2	1	2	2	2	2
CO 4	2	2	2	2	1	2
CO 5	2	3	2	2	1	2

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

UNIT	COMPUTER NETWORKS	Hrs	Mode
I	Introduction: Data Communication-Networks-Protocols and Standards- Network Models: Layered Tasks-The OSI Model-Layers in the OSI Model-TCP/IP Protocol suite.	15	Lecture, Chalk, PPT, ICT
II	Physical Layer : Transmission Media: Guided media- Unguided media: Wireless- Wireless WANs : Cellular Telephone and Satellite Networks –Cellular Telephony-Satellite Networks.	15	Lecture, Chalk, PPT, ICT
ш	Data Link Layer: Error Detection and Correction: Introduction – Block Coding- Linear Block Codes- Cyclic Codes.	15	Lecture, Chalk, PPT, ICT
IV	Network Layer: Delivery, Forwarding and Routing: Delivery– Forwarding – Multicast Routing Protocols.	15	Lecture, Chalk, PPT, ICT
V	Network Security: Security services – Message confidentiality – Message Integrity – Message Authentication – Digital Signature – Entity Authentication.	15	Lecture, Chalk, PPT, ICT

Course Designed by: Dr.T.Sujithra