

B.Sc., ELECTRONICS AND COMMUNICATION

Syllabus

Program Code: UEL

2020-2021 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.

Duration of the course

The duration of the course shall be three academic years comprising six semesters with two semesters in each academic year.

Subject of Study

- Part I: Tamil
- Part II: English
- Part III:
1. Core Subjects
 2. Allied Subjects
 3. Electives
- Part IV :
1. Non Major Electives
 2. Skill Based Subjects
 3. Environmental Studies
 4. Value Education
- Part V :
- Extension activities

The scheme of Examination

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

Pattern of the questions paper for the continuous Internal Assessment**(For Part I, Part II, Part III, NME & Skilled Paper in Part IV)**

The components for continuous internal assessment are:

Part –A

Four multiple choice questions (answer all) $4 \times 01 = 04$ Marks

Part –B

Three short answers questions (answer all) $3 \times 02 = 06$ Marks

Part –C

Two questions ('either or 'type') $2 \times 05 = 10$ Marks

Part –D

Two questions out of three $2 \times 10 = 20$ Marks

Total 40 Marks

Pattern of the question paper for the Summative Examinations:

Note: Duration- 3 hours

Part –A

Ten multiple choice questions $10 \times 01 = 10$ Marks

No Unit shall be omitted: not more than two questions from each unit.)

Part –B

Short answer questions (one question from each unit) $5 \times 02 = 10$ Marks

Part –C

Five Paragraph questions ('either or 'type') $5 \times 05 = 25$ Marks

(One question from each Unit)

Part –D

Three Essay questions out of five $3 \times 10 = 30$ Marks

(One question from each Unit)

Total 75 Marks

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 two internal assessment tests (45 x 1=45 Marks) and converted for 15 marks

Two tests and their average	--	15 marks*
Project	--	10 marks

Total ----- 25 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)

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

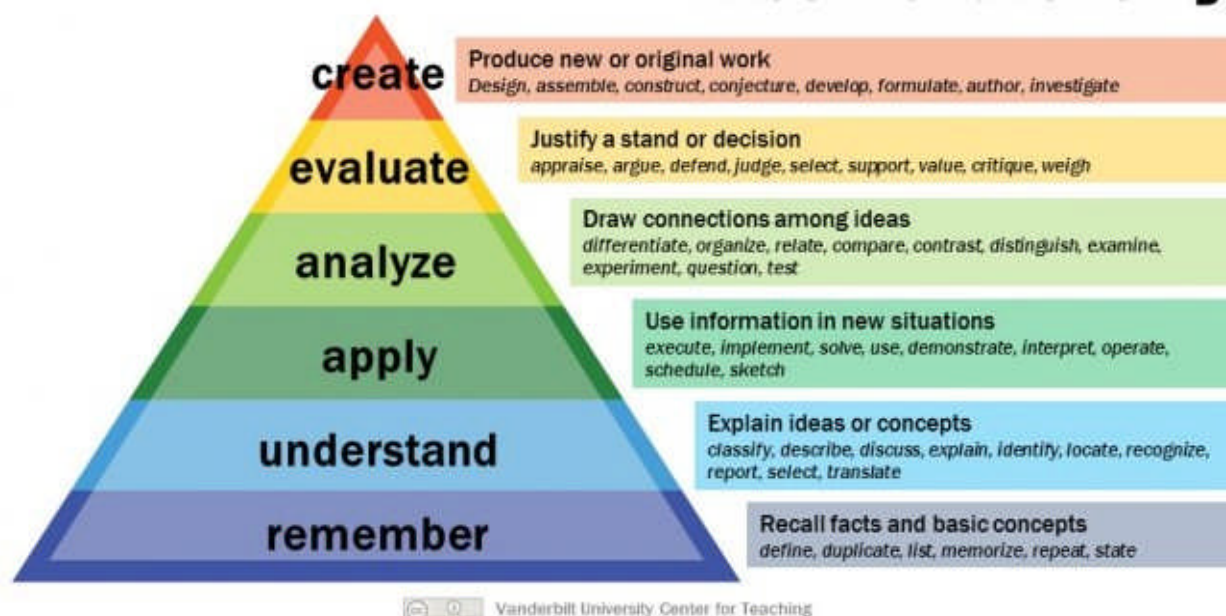
The 12 Graduate Attributes*:

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, review research literature and analyse 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.	Investigation
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 and 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:

Bloom's Taxonomy



PROGRAM 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 socially 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.

PROGRAMME OUTCOMES (POs)

PO1:	Knowledge: Apply the knowledge of mathematics, science fundamentals and technical abilities to the solution of complex problems.
PO2:	Problem Analysis: Identify, formulate, and analyze technical problems to arrive at substantiated conclusions using principles.
PO3:	Design: Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health, safety, cultural, societal and environmental conditions.
PO4:	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern tools including prediction and modeling to technical activities with an understanding of the limitations.
PO5:	Individual and team work: Function effectively as an individual, an as a member or leader in diverse teams, and in multidisciplinary settings.
PO6:	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.

PROGRAM SPECIFIC OUTCOME (PSOs)

PSO1:	Connect learning from Core and Disciplinary/Interdisciplinary elective courses of Electronics and Communication Science to assimilate technological advancements in the field for designing suppresses to arrive at the solution to societal problems.
PSO2:	Acquire hardware and software skills pertinent to industry practices in the field of Electronics & Communication Science while acquiring soft skills like persistence, proper solutions through projects and industrial interactions.
PSO3:	Ability to identify indigenous processes and components for producing high quality, 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 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 analog and digital systems.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous), Pasumalai
B.Sc., ELECTRONICS AND COMMUNICATION, Curriculum

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

Course Code	Title of the Course	Hrs	Credits	Maximum Marks		
				Int	Ext	Total
FIRST SEMESTER						
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					
21UELCP1	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 SEMESTER						
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					
21UELCP2	Electronic Circuits	5	5	25	75	100
21UELCP2	Electronics –II Lab	4	2	40	60	100
Part III	Allied Course					
21UMCA21	Probability and Statistics	5	5	25	75	100
Part IV	Skill Based Course					
21UELS21	Electronic Communication Systems	2	2	25	75	100
21UVLG21	Value Education	2	2	25	75	100
	Total	30	22	190	510	700
THIRD SEMESTER						
Part – I	Tamil / Alternative Course					
21UTAG31	காப்பிய இலக்கியமும் உரைநடையும்	6	3	25	75	100
Part – II	English					
21UENG31	Communicative English – III	6	3	25	75	100
Part - III	Core Courses					
21UELCP3	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 SEMESTER						
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	2	40	60	100
Part III	Allied Course					
21UMCA41	Operations Research	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- 21UEAG49	NSS, NCC, YRC	-	1	100	-	100
	Total	30	23	290	510	800
FIFTH SEMESTER						
Part - III	Core Courses					
21UELC51	Microprocessor Interfacing and Its Applications	6	5	25	75	100
21UELC52	Communication Electronics	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 Courses					
	Core Elective – I	5	5	25	75	100
21UELE51	Microwave and Radar systems					
21UELE52	Internet of Things					
21UELE53	Mobile Communication					
	Core Elective– II	5	5	25	75	100
21UELE54	Power Electronics					

21UELE55	PCB design and Fabrication					
21UELE56	Programmable Logic Controller					
Part IV	Skill Based Course					
21UELS51	Bio-Medical Instrumentation	2	2	25	75	100
	Total	30	26	205	495	700
SIXTH SEMESTER						
Part - III	Core Courses					
21UELC61	8051 Microcontroller and Embedded Systems	6	5	25	75	100
21UELPR1	Project	6	4	40	60	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 Courses					
	Core Elective – I	5	5	25	75	100
21UELE61	Satellite Communication					
21UELE62	Digital Signal Processing					
21UELE63	Robotics					
	Core Elective – II	5	5	25	75	100
21UELE64	VLSI design					
21UELE65	Modern Television Engineering					
21UELE66	Sensors and Measurements					
Part IV	Skill Based Course					
21UELS61	Computer Network	2	2	25	75	100
	Total	30	25	220	480	700
	Grand Total	180	140	1285	3015	4300

Semester	Course Code	List of Elective Courses
V	21UELE51	Microwave and Radar systems
V	21UELE52	Internet of Things
V	21UELE53	Mobile Communication
V	21UELE54	Power Electronics
V	21UELE55	PCB design and Fabrication
V	21UELE56	Programmable Logic Controller
VI	21UELE61	Satellite Communication
VI	21UELE62	Digital Signal Processing
VI	21UELE63	Robotics
VI	21UELE64	VLSI design
VI	21UELE65	Modern Television Engineering
VI	21UELE66	Sensors and Measurements





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

Course Name	SEMICONDUCTOR DEVICES							
Course Code	21UELC11					L	P	C
Category	Core					5	-	5
Nature of course:	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENURSHIP			
Course Objectives:								
1. To introduce basic semiconductor devices, their characteristics and applications. 2. To understand analysis and design of simple diode circuits. 3. To learn the transistor working principles. 4. To explain the characteristics, working and applications of FET, UJT & Optoelectronic Devices 5. To implement electronic circuits based on the semiconducting devices.								
Unit: I	PN Junction Diode							15
Energy Band Structure and Conduction in Insulator - Semiconductor, Conductor - Intrinsic and Extrinsic Semiconductor – Doping – P Type – N Type Semiconductor - Formation of PN Junction Diode - Forward Bias - Reverse Bias Condition – Characteristics.								
Unit: II	Special Diodes							15
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 - PNP Diode.								
Unit: III	Bipolar Junction Transistor							15
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 runaway-HeatSink.								
Unit: IV	FET and UJT							15
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 a Relaxation Oscillator.								
Unit: V	Optoelectronic Devices							15

Principles, Operation And Characteristics of Optoelectronic Devices: LDR – Photo Diode - Photo Transistor – Photo Voltaic Cell – Solar Cell – Photo Emissive Sensors – Photo Multiplier – LED – IR Emitter – LCD – Optocouplers

Total Lecture Hours | **75Hrs**

Books for Study:

1. S. Salivahanan, N. Suresh Kumar, A. Vallavaraj, **“Electronics Devices And Circuits”**, Tata McGraw Hill Publishing Company Limited, New Delhi, 8th edition.
2. B. L. Theraja, **“Basic Electronics – Solid State Devices”**, S.Chand&Company Ltd. 2000

Books for References:

1. V. K. Mehta, Principles of Electronics, S.Chand publications, Delhi, eleventh edition 2000.
2. R.S.Sedha, **Applied Electronics**, S.Chand& Company Ltd, New Delhi, first Edition, 1990

Web Resources:

1. <https://nptel.ac.in/courses/108/108/108108122/>
2. <https://nptel.ac.in/courses/108/108/108108112/>
3. <https://nptel.ac.in/courses/115/102/115102103/>

Course Outcomes

K Level

On the 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 Diode Energy Band Structure and Conduction in Insulator - Semiconductor, Conductor - Intrinsic and Extrinsic Semiconductor – Doping – P Type – N Type Semiconductor - Formation of PN Junction 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 - Schottky Diode - Tunnel Diode - Gunn Diode – Impatt Diode - PIN Diode - PNP Diode	15	Chalk & Talk
III	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 runaway-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)								
Internal	Cos	K Level	Section A		Section B		Section C Either or Choice	Section D Open Choice
			MCQs		Short Answers			
			No. of Questions	K – Level	No. of Questions	K – Level		
CIAI	CO1	UP TO K2	2	K1&K2	1	K1	2(K2&K2)	1(K2)
	CO2	UP TO K3	2	K1&K2	2	K2	2(K2&K2)	2(K3&K3)
CIAII	CO3	UP TO K3	2	K1&K2	1	K1	2(K2&K2)	1(K2)
	CO4	UP TO K4	2	K1&K2	2	K2	2(K3&K3)	2(K4&K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	3
		No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

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 %
CIA I	K1	2	2	-	-	4	6.67	67
	K2	2	4	20	20	36	60	
	K3	-	-	-	20	20	33.33	33
	K4	-	-	-	-	-	-	
	Marks	4	6	20	30	60	100	100
CIA II	K1	2	2	-	-	4	6.67	50
	K2	2	4	10	10	26	43.33	
	K3	-	-	10	-	10	16.66	17
	K4	-	-	-	-	20	33.33	33
	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.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)

S.No	Cos	K - Level	MOQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Questions	K – Level		
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 Questions to be Asked			10		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	4	10	-	19	15.83	50
K2	5	6	20	10	41	34.16	
K3	-	-	10	30	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.

Summative Examinations - Question Paper – Format

Section A (Multiple Choice Questions)			
Answer All Questions			(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 (Short Answers)			
Answer All Questions			(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 (Either/Or Type)			
Answer All Questions			(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	K2	
18) b	CO3	K2	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K2	
20) b	CO5	K2	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice)			
Answer Any Three questions			(3x10=30 marks)
Q.No	CO	K Level	Questions
21	CO1	K2	
22	CO2	K3	
23	CO3	K4	
24	CO4	K3	
25	CO5	K3	



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

Course Name	ELECTRONICS – I LAB				
Course Code	21UELCP1	L	P	C	
Category	Core	-	4	2	
Nature of course:	EMPLOYABILITY	✓	SKILL ORIENTED	ENTREPRENURSHIP	
Course Objectives:					
1. To understand the fundamental principles of circuit theory and electronic devices. 2. To make use of circuit laws and theorems for measuring the circuit parameters. 3. To construct few applications using semiconductor devices. 4. To study the characteristics of transistor and diodes. 5. To learn the working of resonance circuits practically.					
List of Experiments (Any Ten) 1. Verification of Ohm's Law and Kirchhoff's Laws. 2. Verification of Norton's Theorem 3. Verification of Thevenin's Theorem 4. Verification of Maximum Power Transfer Theorem 5. Verification of Superposition Theorem 6. Series Resonance Circuit 7. Parallel Resonance Circuit 8. V-I Characteristics of Junction Diode 9. V-I Characteristics of Zener Diode 10. Transistor Characteristics of CE Configuration 11. V-I Characteristics of JFET 12. V-I Characteristics of UJT 13. Characteristics of Solar Cell 14. Characteristics of optocoupler					
Web Resources:					
https://nptel.ac.in/courses/122/106/122106025/ https://nptel.ac.in/courses/122/106/122106026/					

Course Outcomes		K Level
On the successful completion of the course, student will be able to:		
CO1:	Apply the concept of basic circuit and theorems in practical circuits.	K3
CO2:	Simplify the circuits using series and parallel equivalents and using Thevenin's and Norton's equivalent circuits practically.	K3
CO3:	Construct resonance circuits.	K4
CO4:	Experiment the fundamental operations of the main Semiconductor Electronic Devices	K3
CO5:	Study and analyze the characteristics of transistor 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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	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
III	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)

Course Name	BASIC ELECTRICITY AND CIRCUITS							
Course Code	21UELA11					L	P	C
Category	Allied					5	-	5
Nature of course:	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENURSHIP			
Course Objectives:								
1. To become familiar with fundamentals of resistance and inductances								
2. To learn to types and uses of capacitors.								
3. To explain the basic concepts and laws of DC and AC electrical networks and solve them using mesh and nodal analysis.								
4. To study the concepts of Electronic Circuit network theorems.								
5. To understand the concepts of resonance circuits and filters.								
Unit: I	Resistors & Inductors							15
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.								
Unit:II	Capacitors							15
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.								
Unit: III	Electrical Elements and Circuits							15
Potential Difference- Electric Current-Electromotive Force - Ohms Law- Kirchhoff's Voltage Law - Kirchhoff'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.								
Unit: IV	Network Theorems							15
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)								
Unit: V	AC Circuits							15
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.								
	Total Lecture Hours							75 Hrs
Books for Study:								

1. S.Salivahanan, N.Suresh Kumar, A.Vallavaraj“**Electronic Devices And Circuits**”-
2. A.Sudhakar and ShyamMohan,**Circuits and Networks Analysis and Synthesis**, Tata MC Graw-Hill Publishing company LTD,NewDelhi,Third edition-2007

Books for References:

1. B.L.Theraja, “**Basic Electronics-Solid State Devices**”,S.Chand Company
2. BernardGrob“**Basic Electronics**”-Tata McGraw-Hill Publishing Company Limited, 9thEdition.

Web Resources:

1. <https://nptel.ac.in/courses/108/104/108104139/>
2. <https://nptel.ac.in/courses/108/101/108101091/>
3. <https://www.youtube.com/playlist?list=PLFF553CED56CDE25D>
4. <https://www.youtube.com/watch?v=w8Dq8blTmSA>

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:

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	15	Chalk & Talk

	and Parallel - Factors Governing the Value of Capacitors.		
III	Electrical Elements and Circuits Potential Difference- Electric Current-Electromotive Force - Ohms Law- Kirchoff's Voltage 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)								
Internal	Cos	K Level	Section A		Section B		Section C Either or Choice	Section D Open Choice
			MCQs		Short Answers			
			No. of. Questions	K – Level	No. of. Questions	K - Level		
CIAI	CO1	UP TO K2	2	K1&K2	1	K1	2(K2&K2)	1(K2)
	CO2	UP TO K3	2	K1&K2	2	K2	2(K3&K3)	2(K3&K3)
CIAII	CO3	UP TO K4	2	K1&K2	1	K1	2(K2&K2)	1(K2)
	CO4	UP TO K4	2	K1&K2	2	K2	2(K3&K3)	2(K3&K3)
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	3
		No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

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 %
CIA I	K1	2	2	-	-	4	6.67	50
	K2	2	4	10	10	26	43.33	
	K3	-	-	10	20	20	50	
	K4	-	-	-	-	-	-	
	Marks	4	6	20	30	60	100	100
CIA II	K1	2	2	-	-	4	6.67	50
	K2	2	4	10	10	26	43.33	
	K3	-	-	10	20	30	50	
	K4	-	-	-	-	-	-	
	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.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	Cos	K - Level	MOQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Questions	K – Level		
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 Questions to be Asked			10		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	4	10	-	19	15.83	50
K2	5	6	20	10	41	34.16	
K3	-	-	10	30	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.							

Summative Examinations - Question Paper – Format

Section A (Multiple Choice Questions)			
Answer All Questions		(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 (Short Answers)			
Answer All Questions		(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 (Either/Or Type)			
Answer All Questions		(5 x 5 = 25 marks)	
Q.No	CO	K Level	Questions
16) a	CO1	K1	
16) b	CO1	K1	

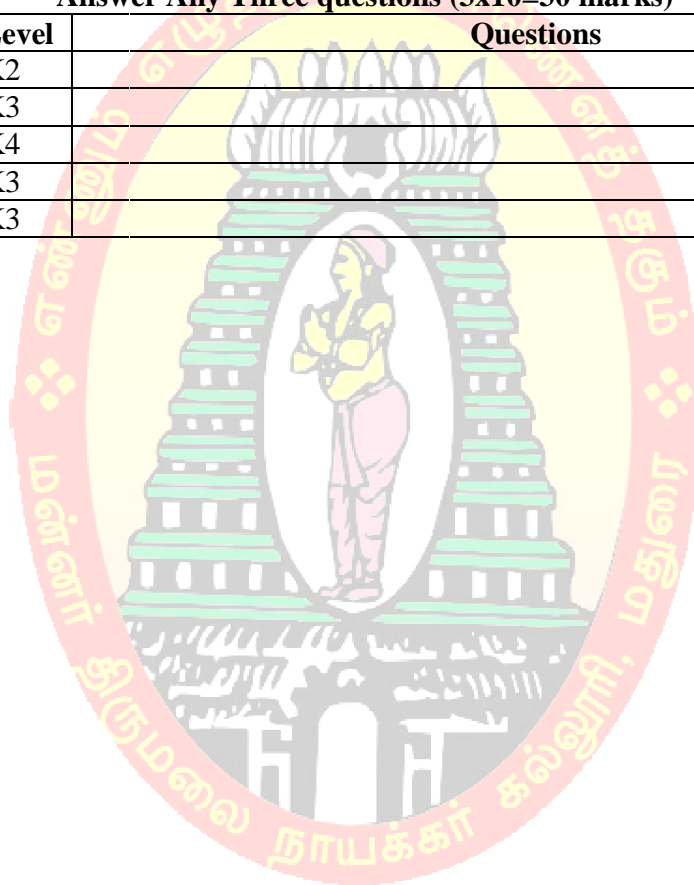
17) a	CO2	K2	
17) b	CO2	K2	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K2	
20) b	CO5	K2	

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

Section D (Open Choice)

Answer Any Three questions (3x10=30 marks)

Q.No	CO	K Level	Questions
21	CO1	K2	
22	CO2	K3	
23	CO3	K4	
24	CO4	K3	
25	CO5	K3	





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

Course Name	ELECTRONIC INSTRUMENTATION							
Course Code	21UELS11					L	P	C
Category	Skill					2	-	2
Nature of course:	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENURSHIP			
Course Objectives:								
1. To impart the knowledge on electronic instruments								
2. To analyze and measurement the unknown R, L and C using bridge circuits.								
3. To display the concept of CRO and signal generators for practical usage.								
4. To understand the concept of power measurements.								
5. To enable the students to acquire the knowledge of digital instruments and its applications in electronic circuits and know the technique of measurements using electronic instruments								
Unit: I	Indicating Instruments						06	
DC Ammeter - DC Voltmeter- AC Voltmeter – Multirange Ammeter & Voltmeter - Series & Shunt Type Ohmmeter – Multimeter -Digital Multimeter.								
Unit: II	RLC Measurements						06	
Wheatstone Bridge - Balance Equation of General AC Bridges - Maxwell - Schering - Wien - Kelvin bridge.								
Unit: III	Oscilloscope						06	
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.								
Unit: IV	Measurement of Power						06	
Introduction- bolometer method of power measurement-Calorimeter method-Watt meter-Energy meter - Phase meter.								
Unit: V	Signal generation & signal analysis						06	
Function Generator - Pulse Generator - Wave Analyzer - Harmonic Distortion Analyzer-Spectrum Analyzer								
	Total Lecture Hours						30 Hrs	
Books for Study:								
1. H.S. Kalsi (2002), Electronic Instrumentation, Tata McGraw-Hill Publishing Company Ltd., New Delhi.								

2. A.K.Sahwney, Electrical and Electronic Measurements and Instrumentation. (2006), Dhanpat Rai & Co.(P) Ltd., New Delhi.
3. S.Salivahanan, N.Sureshkumar, A.Vallavaraj, Electronic Devices and Circuits - (1999), Tata McGraw-Hill Publishing Company Ltd, New Delhi.

Books for References:

1. Ramachandran, Measurements and Instruments, Priya Publishers, Trichy.
2. B.R.Gupta, Electronics and Instrumentation, (2003), S.Chand & Company Ltd, New Delhi, Third Edition, 2008.
3. V.A.Bakshi, A.V.Bakshi, **Measurements and Instrumentation**, Technical Publications, Pune, First Edition, 2008.

Web Resources:

<http://nptel.ac.in/courses/108105064/> <http://nptel.ac.in/courses/108105062/>

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
II	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

Learning Outcome Based Education & Assessment (LOBE)								
Formative Examination - Blue Print								
Articulation Mapping – K Levels with Course Outcomes (COs)								
Internal	Cos	K Level	Section A		Section B		Section C Either or Choice	Section D Open Choice
			MCQs		Short Answers			
			No. of. Questions	K – Level	No. of. Questions	K - Level		
CIA I	CO1	UP TO K2	2	K1&K2	1	K1	2(K1&K1)	1(K2)
	CO2	UP TO K3	2	K1&K2	2	K2	2(K3&K3)	2(K2&K2)
CIA II	CO3	UP TO K3	2	K1&K2	1	K1	2(K2&K2)	1(K2)
	CO4	UP TO K4	2	K1&K2	2	K2	2(K3&K3)	2(K3&K3)
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	3
		No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

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 %
CIA I	K1	2	2	10	-	14	23.33	83
	K2	2	4	---	30	36	60	
	K3	-	-	10	---	10	16.66	17
	K4	-	-	-	-	-	-	
	Marks	4	6	20	30	60	100	100
CIA II	K1	2	2	-	-	4	6.67	50
	K2	2	4	10	10	26	43.33	
	K3	-	-	10	20	30	50	50
	K4	-	-	-	--	---	---	--
	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.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)

S.No	Cos	K - Level	MOQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Questions	K – Level		
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 Questions to be Asked			10		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	4	10	-	19	15.8	50
K2	5	6	20	10	41	34.16	
K3	-	-	10	30	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.

Summative Examinations - Question Paper – Format

Section A (Multiple Choice Questions)			
Answer All Questions (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 (Short Answers)			
Answer All Questions (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 (Either/Or Type)			
Answer All Questions (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	K2	
18) b	CO3	K2	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K2	
20) b	CO5	K2	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice)			
Answer Any Three questions (3x10=30 marks)			
Q.No	CO	K Level	Questions
21	CO1	K2	
22	CO2	K3	
23	CO3	K4	
24	CO4	K3	
25	CO5	K3	





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

Course Name	ELECTRONIC CIRCUITS					
Course Code	21UELC21			L	P	C
Category	Core			5	-	5
Nature of course:	EMPLOYABILITY		SKILL ORIENTED		ENTREPRENURSHIP	✓
Course Objectives:						
1. To highlight the students to gain knowledge on rectifiers and regulators.						
2. To acquaint the students with construction, theory and characteristics of the electronic amplifier circuits.						
3. To learn the working principles of power amplifier.						
4. To understand the working principles of feedback amplifier.						
5. To enable the students understand and gain the knowledge on oscillator and multivibrator						
Unit: I	Rectifiers and Regulators					15
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.						
Unit: II	Small Signal Amplifiers					15
Transistor as an Amplifier -Single Stage Transistor Amplifier – Frequency Response – Bandwidth – RC Coupled Amplifier -Transformer Coupled Amplifier – Tuned Amplifier – FET Amplifier.						
Unit: III	Power Amplifiers					15
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.						
Unit: IV	Feedback Amplifiers					15
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.						
Unit: V	Oscillators And Multivibrators					15
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.						
	Total Lecture Hours					75Hrs
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.Salivahanan, N. Sureskumar and A. Vallavaraj, **Electronic Devices and Circuits**, Tata McGraw-Hill Publishing Company Ltd, New Delhi, Second Edition, 2011
2. B.L.Theraja, —Basic Electronicsl, Chand Company Ltd, 2000.

Web Resources:

1. <http://www.ee.iitm.ac.in/~ani/2012/ec5135/lectures.html>Lecture Notes
2. [https://nptel.ac.in/courses/108/102/108102097/#Introduction to Electronic circuits NPTEL.](https://nptel.ac.in/courses/108/102/108102097/#Introduction%20to%20Electronic%20circuits)
3. [https://nptel.ac.in/courses/108/102/108102095/Analog Electronic circuits NPTEL.](https://nptel.ac.in/courses/108/102/108102095/Analog%20Electronic%20circuits)

Course Outcomes**K Level**

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

CO1:	Understand the concepts of rectifiers and regulators	UP TO K2
CO2:	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
II	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

III	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 –Piezo 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)								
Internal	Cos	K Level	Section A		Section B		Section C Either or Choice	Section D Open Choice
			MCQs		Short Answers			
			No. of. Questions	K – Level	No. of. Questions	K - Level		
CI AI	CO1	UP TO K2	2	K1&K2	1	K1	2(K2&K2)	1(K2)
	CO2	UP TO K3	2	K1&K2	2	K2	2(K3&K3)	2(K3&K3)
CI AII	CO3	UP TO K4	2	K1&K2	1	K1	2(K2&K2)	1(K2)
	CO4	UP TO K4	2	K1&K2	2	K2	2(K4&K4)	2(K3&K3)
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	3
		No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

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 %
CIA I	K1	2	2	-	-	4	6.67	50
	K2	2	4	10	10	26	43.33	
	K3	-	-	10	20	30	50	50
	K4	-	-	-	-	-	-	
	Marks	4	6	20	30	60	100	100
CIA II	K1	2	2	-	-	4	6.67	50
	K2	2	4	10	10	26	43.33	
	K3	-	-	---	20	20	33.33	33
	K4	-	-	10	--	10	16.67	17
	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.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	Cos	K - Level	MOQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Questions	K – Level		
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 Questions to be Asked			10		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	4	10	-	219	15.83	50
K2	5	6	10	20	41	34.16	
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.

Summative Examinations - Question Paper – Format

Section A (Multiple Choice Questions)			
Answer All Questions (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 (Short Answers)			
Answer All Questions (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 (Either/Or Type)			
Answer All Questions (5 x 5 = 25 marks)			
Q.No	CO	K Level	Questions
16) a	CO1	K1	
16) b	CO1	K1	
17) a	CO2	K3	

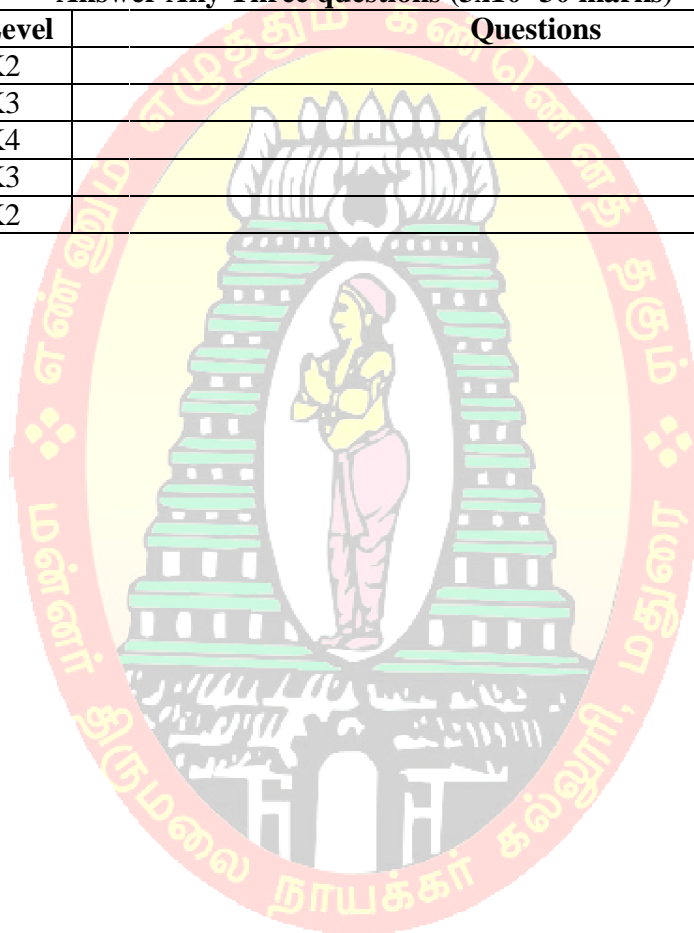
17) b	CO2	K3	
18) a	CO3	K4	
18) b	CO3	K4	
19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K2	
20) b	CO5	K2	

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

Section D (Open Choice)

Answer Any Three questions (3x10=30 marks)

Q.No	CO	K Level	Questions
21	CO1	K2	
22	CO2	K3	
23	CO3	K4	
24	CO4	K3	
25	CO5	K2	





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

Course Name	ELECTRONICS – II LAB				
Course Code	21UELCP2	L	P	C	
Category	Core		4	2	
Nature of course:	EMPLOYABILITY	SKILL ORIENTED	ENTREPRENURSHIP	✓	
Course Objectives:					
1. To construct regulated power supplies practically. 2. To understand the working of rectifiers practically. 3. To design clipping and clamping circuits practically. 4. To analyse the working of amplifiers and oscillator practically. 5. To experiment the working of multivibrators using transistor.					
List of Experiment (Any Ten) 1. Clippers and Clampers 2. DC Regulated Power Supply using Zener Diode 3. Dual power supply 4. IC Regulated Power Supply 5. Rectifier (Half & Full Wave) 6. Bridge Rectifier 7. Voltage Doubler 8. CE Amplifier. 9. Emitter Follower 10. Hartley Oscillator 11. Colpitts Oscillator 12. Wein Bridge Oscillator 13. Astable Multivibrators 14. Monostable Multivibrators 15. Bistable Multivibrator 16. Schmitt Trigger					
Web Resources:					
1. https://nptel.ac.in/courses/122/106/122106025/ 2. https://nptel.ac.in/courses/122/106/122106026/					
Course Outcomes				K Level	

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

CO1:	Construct power supply and rectifier circuits practically.	K6
CO2:	Construct Amplifier circuits	K6
CO3:	Construct different Oscillator circuits	K6
CO4:	Construct different Multivibrator circuits using Transistor	K6
CO5:	Construct and Analyse various Electronics Circuits practically.	K6

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
I	Clippers and Clampers DC Regulated Power Supply using Zener Diode Dual power supply	9	Practical
II	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	Astable Multivibrators Monostable Multivibrators Bistable Multivibrator Schmitt Trigger	9	Practical

Course Designed by: **1. Mr. M. Satheeshkumar**

3. 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	P	C
Category	Allied					5	-	5
Nature of course:	EMPLOYABILITY	✓	SKILL ORIENTED	✓	ENTREPRENURSHIP	✓		
Course Objectives:								
<ul style="list-style-type: none">To provide students with the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science like disease modeling, climate prediction and computer networks etc.To Apply laws of probability to concrete problems..								
Unit: I	Measures of Central Tendencies :							15
Introduction – Arithmetic mean – Partition Values – Mode – Geometric Mean & Harmonic Mean(problems only)								
Unit: II	Measures of Dispersion							15
Introduction – Measures of dispersion(problems only)								
Unit: III	Correlation and Regression							15
Introduction – Correlation – Rank Correlation – Regression								
Unit: IV	Probability							15
Probability- Introduction -Conditional Probability – Mathematical Expectations (Problems only)								
Unit: V	Special Distributions							15
Introduction – Binomial Distribution – Poisson Distribution -Normal Distribution.(Problems only)								
							Total Lecture Hours	75 Hrs
Books for Study:								
Arumugam. S. and Thangapandi Isaac. A., “Statistics”, New Gamma Publishing House, Palayamkotai, 2011.								
Unit I - Chapter 2: Sections : 2.0 – 2.4								
Unit II - Chapter 3: Sections : 3.0 & 3.1(full)								
Unit III - Chapter 6: Sections: 6.0-6.3								
Unit IV - Chapter11: Sections: 11.0-11.2, Chapter12 : Section: 12.4								
Unit V - Chapter13: Sections: 13.0 – 13.3								

Books for Reference:

1. Vittal. P.R., **Mathematical Statistics**, Margham Publications, Chennai, 2013.
2. Gupta. S.C. and Kapoor. V.K., “**Fundamentals of Mathematical Statistics**”, Eleventh edition, Sultan Chand & sons, New Delhi, 2007.
3. Gupta. S.C. and Kapoor. V.K., “**Elements of Mathematical Statistics**”, Third Edition, Sultan Chand & Sons, Educational Publishers, New Delhi, 2015.

Web Resources:

<https://nptel.ac.in/courses/111/105/111105041/>

<https://www.classcentral.com/course/swayam-probability-and-statistics-5228>

Course Outcomes**K Level**

On the successful completion of the course, the students will be able to

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
CO 1	3	2	2	3	3
CO 2	3	3	3	3	2
CO 3	3	3	3	3	2
CO 4	3	2	2	3	3
CO 5	3	2	3	3	3

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

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	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)								
Internal	Cos	K Level	Section A		Section B		Section C Either or Choice	Section D Open Choice
			MCQs		Short Answers			
			No. of. Questions	K - Level	No. of. Questions	K - Level		
CI AI	CO1	CO1	K2	2	K1	1	K2	5(k2)
	CO2	CO2	K3	2	Up to K2	2	Up to K3	5(k2 & k3)
CI AII	CO3	CO3	K3	2	K1	1	K2	5(k2)
	CO4	CO4	K3	2	K2	2	Up to K3	5(k3)
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	3
		No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

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 %
CIA I	K1	2	2	-	-	4	6.67	50
	K2	2	4	10	10	26	43.33	
	K3	-	-	10	10	20	33.33	33.33
	K4	-	-	-	10	10	16.67	16.67
	Marks	4	6	20	30	60	100	100
CIA II	K1	2	2	-	-	4	6.67	50
	K2	2	4	10	10	26	43.33	
	K3	-	-	10	10	20	33.33	33.33
	K4	-	-	-	10	10	16.67	16.67
	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.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MOQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
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 Questions to be Asked			10		5		5	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	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: Higher level of performance of the students is to be assessed by attempting higher level of K levels.							

Summative Examinations - Question Paper – Format

Section A (Multiple Choice Questions)			
Answer All Questions (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 (Short Answers)			
Answer All Questions (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 (Either/Or Type)			
Answer All Questions (5 x 5 = 25 marks)			
Q.No	CO	K Level	Questions
16) a			

16) b	CO1	K1	
17) a	CO1	K2	
17) b	CO2	K1	
18) a	CO2	K2	
18) b	CO3	K1	
19) a	CO3	K2	
19) b	CO4	K1	
20) a	CO4	K2	
20) b	CO5	K1	

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

Section D (Open Choice)

Answer Any Three questions

(3x10=30 marks)

Q.No	CO	K Level	Questions
21	CO1	K3	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	



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	P	C
Category	Skill			2	-	2
Nature of course:	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENURSHIP	
Course Objectives:						
1. To define the concept of Analog communication system 2. To understand the concept of digital communication system 3. To acquire knowledge on Amplitude and Frequency modulation. 4. To inculcate the principle of mobile communication& satellite communication 5. To compare and contrast the communication systems by self-study.						
Unit: I	Introduction:					06
Introduction to communication- Elements of a communication system- -need for modulation- Electromagnetic spectrum and typical applications-some communication systems- classification of communication systems.						
Unit: II	Analog Communication:					06
Introduction-Amplitude modulation-Angle modulation-Frequency modulation-Transmitter and receiver of AM and FM.						
Unit: III	Digital Communication:					06
Digital pulse modulation-PCM-Sampling-Quantizing-coding-delta modulation-wireless communication.						
Unit: IV	Mobile Communication:					06
Introduction: Cell Mobile Telephone system – Group of special mobile (GSM) – Multiple access techniques (TDMA, FDMA, CDMA) –GPRS- Introduction to Mobile Communication Spectrum.						
Unit: V	Satellite Communication:					06
Introduction – Active and passive satellite- structure of satellite communication-satellite orbits- Application-Attitude and orbit control system-TT&C-communication subsystems.						
	Total Lecture Hours					30Hrs
Books for Study:						
1. Simon Haykin, Communications Systems, Wiley India, New Delhi, 4 th Edition, Reprint. 2007. 2. K.S.Srinivasan, Principles of Communication System, Anuradha Publications, New Delhi, First Edition, Reprint 2007..						

3. MonojitMitra, Satellite Communication, Prentice Hall of India, New Delhi, First Edition, 2005.

Books for References:

1. Simon Haykin, Analog and Digital Communications, Wiley India, New Delhi, 1st Edition, Reprint. 2003
2. B.P.Lathi, Communication Systems, Wiley Eastern University Edition, USA, First Edition Reprint 1994.
3. B.P.Lathi, Modern Digital and Analog Communication Systems, Prism Books Private Ltd, Newyork, Second Edition, 1993.

Web Resources:

1. https://swayam.gov.in/nd1_noc20_ee16/preview
2. https://swayam.gov.in/nd1_noc19_ee47/preview

Course 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 the modulation and demodulation concepts in communication systems.	UP TO K3
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:

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 system- -need 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
III	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

Learning Outcome Based Education & Assessment (LOBE)								
Formative Examination - Blue Print								
Articulation Mapping – K Levels with Course Outcomes (COs)								
Internal	Cos	K Level	Section A		Section B		Section C Either or Choice	Section D Open Choice
			MCQs		Short Answers			
			No. of. Questions	K – Level	No. of. Questions	K - Level		
CIAI	CO1	UP TO K2	2	K1&K2	1	K1	2 (K2&K2)	1(K2)
	CO2	UP TO K3	2	K1&K2	2	K2	2 (K3&K3)	2(K3&K3)
CIAII	CO3	UP TO K4	2	K1&K2	1	K1	2 (K2&K2)	1(K2)
	CO4	UP TO K4	2	K1&K2	2	K2	2 (K3&K3)	2(K3&K3)
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	3
		No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

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 %
CIA I	K1	2	2	-	-	4	6.67	50
	K2	2	4	10	10	26	43.33	
	K3	-	-	10	20	30	50	50
	K4	-	-	-	-	-	-	
	Marks	4	6	20	30	60	100	100
CIA II	K1	2	2	-	-	4	6.67	50
	K2	2	4	10	10	26	43.33	
	K3	-	-	10	20	30	50	50
	K4	-	-	-	---	--	--	--
	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.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	COs	K - Level	MOQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Questions	K – Level		
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(K2)
3	CO3	UP TO K4	2	K1&K2	1	K2	2(K3&K3)	1(K3)
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 Questions to be Asked			10		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	4	10	-	19	15.83	50
K2	5	6	10	20	41	34.16	
K3	-	-	20	30	50	41.66	42
K4	-	-	10	--	10	8.33	8
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.							

Summative Examinations - Question Paper – Format

Section A (Multiple Choice Questions)			
Answer All Questions		(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 (Short Answers)			
Answer All Questions		(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 (Either/Or Type)			
Answer All Questions		(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	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K2	
20) b	CO5	K2	

NB: Higher level of K4 performance of the students is to be assessed by attempting higher level of K levels

Section D (Open Choice)

Answer Any Three questions (3x10=30 marks)

Q.No	CO	K Level	Questions
21	CO1	K2	
22	CO2	K2	
23	CO3	K3	
24	CO4	K3	
25	CO5	K3	

