# B.Sc., ELECTRONICS AND COMMUNICATION





### **Program Code: UEL**



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

Total

The components for continuous internal assessment are:

Two tests and their average --15 marks
Seminar / Group discussion --5 marks

Assignment --5 marks

25 Marks

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#### 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 x 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 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)

one question from each citaty

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

<sup>\*\*</sup> 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 ( $45 \times 1=45 \text{ Marks}$ ) and converted for 15 marks

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

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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 ( $75 \times 1=75$  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

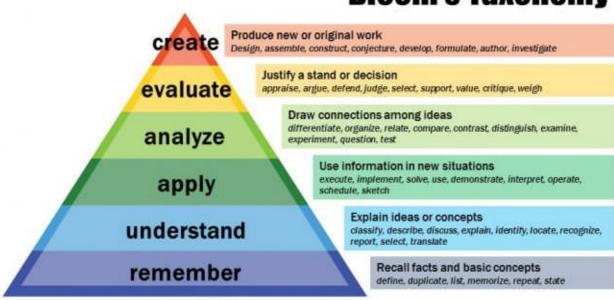
#### The 12 Graduate Attributes\*:

- 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	<b>Life-Long learning:</b> 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**



Vanderbilt University Center for Teaching

	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)
<b>PO1</b> :	Knowledge: Apply the knowledge of mathematics, science fundamentals and technical
	abilities to the solution of complex problems.
<b>PO2</b> :	Problem Analysis: Identify, formulate, and analyze technical problems to arrive at
	substantiated conclusions using principles.
PO3:	<b>Design:</b> 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.
<b>PO4</b> :	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.
<b>PO5</b> :	Individual and team work: Function effectively as an individual, an as a member or
	leader in diverse teams, and in multidisciplinary settings.
<b>PO6</b> :	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	Title of the Course	Hrs	Hrs Credits		Maximum Marks			
Code				Int	Ext	Total		
	FIRST SEMEST	ER						
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	8						
21UELC11	Semiconductor Devices	5	5	25	75	100		
21UELCP1	Electronics-I Lab	4	2	40	60	100		
Part III	Allied Course		9					
21UELA11	<b>7</b> .5	5	25	75	100			
Part IV	Skill Based Course	K	10.					
21UELS11 Electronic Instrumentation			200	25	75	100		
Part IV Mandatory Course			(%					
21UEVG11 Environmental Studies		2	2	25	75	100		
	Total	30	22	190	510	700		
	SECOND SEMES	TER	0	0		I.		
Part – I	Tamil / Alternative Course							
21UTAG21	இ <mark>டைக்கால</mark> இலக்கியமும <mark>்</mark>	6	3	25	75	100		
	ச <mark>ிறுகதையும்</mark>							
Part – II	English							
21UENG21	Communicative English – II	6	3	25	75	100		
Part - III	Core Courses		7					
21UELC21	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	1						
21UELS21	Electronic Communication Systems	2	2	25	75	100		
21UVLG21	Value Education	2	2	25	75	100		
	Total	30	22	190	510	700		
	THIRD SEMEST	ER						
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 SEMES	TER				
Part – I	Tamil / Alternative Course	la.				
21UTAG41	பண்டைய இலக் <mark>கியமும்</mark>	6	3	25	75	100
	புதினமும்	(6)				
Part – II	English	A.º	<b>2</b>			
21UENG41	Communicative English – IV	6	3	25	75	100
Part - III	Core Courses	<i>X</i> )	191			
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	H				
21UELS41	Fiber Optic Communication Systems	2	2	25	75	100
Part IV	N <mark>on Major Elective Course</mark>					
21UELN41	Electronics in Everyday life	2	2	25	75	100
Part V	Extension Activities					
21UEAG40-	NSS, NCC, YRC		1	100	-	100
21UEAG49			- 45	7		
	Total	30	23	290	510	800
	FIFTH SEMEST	ER	3		1	ı
Part - III	Core Courses	711/11/				100
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					100
	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 SEMEST	ER				
Part - III	Core Courses					
21UELC61	8051Microcontroller and Embedded	6	5	25	75	100
	Systems					
21UELPR1	Project	6	4	40	60	100
21UELCP7	8051 Microcontroller and Embedded	3	2	40	60	100
	Systems Lab	970				
21UELCP8	Sensors and Transducer Lab	3	2	40	60	100
Part III	Core Elective Courses		(A)			
	Core Elective – I	1/5	9.5	25	75	100
21UELE61	Satellite Communication	r)	1.04.			
21UELE62	Digital Signal Processing	T.				
21UELE63	Robotics	В	1997			
	Core Elective – II	5	5	25	75	100
21UELE64	VLSI design		14			
21UELE65	Modern Television Engineering		t			
21UELE66	Sensors and Measurements					
Part IV	Skill Based Course		8	9		
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 Cod	e	21UELC11					L	P	C
Category		Core					5	-	5
Nature of co	urse:	EMPLOYABILITY	1	SKILL ORIENTED		ENTREPRENU	JRSH	IP	
Course Obje	ectiv	es:	55	III G OUT	1				1
1. To introd	uce 1	basic semiconductor de	vices	, their characteristics	and	applications.			
		l analysis and <mark>design of</mark>	/ 107	TARREST ASSESSMENT					
		ransistor working princ	*JF						
-		e characte <mark>ristics, worki</mark> t electronic <mark>circuits based o</mark>	_			T & Optoelect	ronic	Devi	ces
		Junction Diode	on the	semiconducting device	28.	<b>G</b> .		1:	5
				T 11. 0	1 .	CO 1	Т.		
		tructure and Conduction		TYACU =					
Extrinsic Se	emic	onduc <mark>tor – Doping – P</mark>	Type	- N Type Semicono	lucto	or - Formation	of PN	I Junc	ction
Diode - For	ward	l Bias <mark>- Reverse Bi</mark> as C	onditi	lon – <mark>Ch</mark> aracteristi <mark>cs.</mark>					
Unit: II	Spe	cial D <mark>iodes</mark>				5		1:	5
Zener Diod	le -	VI Characteristics –	Break	down - Backward	Dio	de – Varactor	Dio	de -	Step
Recovery D	oiode	- Poin <mark>t Contact Diode</mark>	e - Sh	cottkey Diode - Tun	nel l	Diode - Gunn	Diode	e – In	npatt
Diode - PIN	l Dio	ode - PN <mark>PN Di</mark> ode.		WALL LIVE					
Unit: III	Bip	olar Junc <mark>tion Tr</mark> ansis		ווינונלים	18	7		1:	5
Introduction	ı To	Bipolar Junction Tran	nsisto	r – Construction - 7	Fran	sistor Biasing	- Op	eratio	n of
NPN and P	NP T	Гransistor - CB, CE &	CC C	onfiguration - Bias	Stab	ility - Load Li	ne - N	Metho	od of
Biasing: Fi	xed	Bias - Collector to B	ase E	Bias - Voltage Divid	der 1	Bias – Bias C	ompe	nsatio	on –
Thermal rur	ıway	-HeatSink.							
Unit: IV	FE	ր and UJT						1:	5
Introduction	ı to	FET - Construction a	nd O	peration of N-Chan	nel J	FET - Drain	Chara	cteris	stics-
Comparison	of	JFET &BJT - Introdu	iction	to MOSFET - Enl	ance	ement MOSFE	ET –	Deple	etion
MOSFET -	FET	Γ as a Voltage Variabl	e Res	sistor(VVR) - Introd	uctio	on to UJT – C	harac	teristi	ics –
UJT as a Re	elaxa	tion Oscillator.							
Unit: V		toelectronic Devices							5

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	e Outcomes	K Level
On the	successful completion of the course, student will be able to:	·
<b>CO1:</b>	Explain the structure of the basic Semiconductor Devices	Up to K1
CO2:	Understand the characteristics, operations and application of Diodes and	Up to K2
	Special Diodes	
CO3:	Understand the characteristics and operations of Transistors	Up to K3
<b>CO4:</b>	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

<sup>\*3 –</sup> 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,	15	Chalk & Talk
	Conductor - Intrinsic and Extrinsic Semiconductor – Doping – P Type		Taik
	- N Type Semiconductor - Formation of PN Junction Diode -		
	Forward Bias - Reverse Bias Condition – Characteristics.		
II	Special Diodes	15	Chalk &
11	Zener Diode - VI Characteristics - Breakdown - Backward Diode -	13	Talk
	Varactor Diode - Step Recovery Diode - Point Contact Diode -		Tun
	Shcottkey Diode - Tunnel Diode - Gunn Diode - Impatt Diode - PIN		
	Diode - PNPN Diode		
III	BJT	15	Chalk &
	Introduction To Bipolar Junction Transistor - Construction -		Talk
	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.		
IV	FET and UJT	15	Power point
	Introduction to FET - Construction and Operation of N-Channel JFET		presentation
	- 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.		
V	OPTO ELECTRONIC DEVICES	15	Power point
	Principles, Operation And Characteristics Of Opto Electronic		presentation
	Devices: LDR – Photo Diode - Photo Transistor – Photo Voltaic Cell		
	– Solar Cell – Photo Emissive Sensors – Photo Multiplier – LED – IR		
	Emitter – LCD – Optocouplers.		
	கோபக்கு"		

Course Designed by: 1. Mr. J. Charles Theodore
2. Mr. A. Velmurugan

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

Inte Cos K Level **Section A Section B Section C** Section D Either or Open rnal **MCOs Short Answers** Choice Choice No. of. **K** – No. of. **K** – **Ouestion** Level **Ouestion** Level  $\mathbf{S}$ CO<sub>1</sub> UP TO K2 2(K2&K2)  $\mathbf{CI}$ 2 K1&K2 1 **K1** 1(K2)ΑI CO<sub>2</sub> UP TO K3 2 K1&K2 2 **K2** 2(K2&K2) 2(K3&K3)  $\mathbf{CI}$ CO<sub>3</sub> UP TO K3 2 K1&K2 1 **K**1 2(K2&K2) 1(K2) AII CO<sub>4</sub> UP TO K4 2 K1&K2 2 **K2** 2(K4&K4) 2(K3&K3) Question No. of 4 3 4 3 **Pattern** Questions to be CIA I & II asked 2 2 No. of 4 Questions to be answered

2

6

	Distribution of Marks with K Level CIA I & CIA II										
	K	Section A	Section B	Section C	<b>Section D</b>	Total	% of	Consolidate			
	Level	(Multi <mark>ple</mark>	(Short	(Either /	(Open	Marks	(Marks	of %			
		Choice	Answer	Or	Choice)	/ 3/	without				
		Questions)	<b>Questions</b> )	Choice)	اد فيكانه .		choice)				
	K1	2	2.4		7511411	4	6.67	67			
	K2	2	<b>3</b> 4	20	20	36	60				
CIA	К3	-	V <sub>2</sub>		20	20	33.33	33			
I	K4	-	200	-	5	-	•				
	Marks	4	6	20	30	60	100	100			
	K1	2	2			4	6.67	50			
CIA	<b>K2</b>	2	4	10	10	26	43.33				
II	К3	-	-	10	-	10	16.66	17			
	K4	-	-	-		20	33.33	33			
174	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

Marks for each

question

Total Marks for

each section

1

4

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	MO	MOQs		Short Answers		<b>Section D</b>
			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	К3	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	Question	s to be	10	10 =	5		10	5
Asked			8.8	ിന ജ	Olive			
No.of	Questions	s to be	10		5		5	3
answered				MAA				
Marks for each question			1 /\	VUILL	2		5	10
Total I	Marks for	each section	10 / V		10	2	25	30

(Figures in parenthesis denotes, questions should be asked with the given K level)

Distribution of Marks with K Level										
K	Section A	Section B	Section C	Section D	Total	% of	Consolidated			
Level	(Multiple	(Short	(Either/ or	( Open	Marks	(Marks	%			
	Choice	Answer	Choice)	Choice)		without				
	<b>Questions</b> )	<b>Questions</b> )				choice)				
K1	5	4	10		19	15.83	50			
K2	5	6	20	10	41	34.16				
K3	-	-1.1	1000	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**

		A A 11	Section A (Multiple Choice Questions)
O No	CO	Answer All K Level	Questions (10x1=10 marks) Ouestions
<b>Q.No</b>	CO1	K Level K1	Questions
2	CO1	K1 K2	
3	CO2	K2 K1	
4	CO2	K1 K2	
5	CO2	K2 K1	
6	CO3	K1 K2	
7	CO3	K2 K1	110 4
8	CO4	K1 K2	5 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
9	CO5	K2 K1	
10	CO5	K1 K2	
10	CO3	K2	Section B (Short Answers)
		nswer All	Questions (5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K1	
12	CO2	K1	G G
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
		Angreen Al	Section C (Either/Or Type)  1 Questions (5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K1 K1	Questions
16) b	CO1	K1	
17) a	CO2	K3	
17) b	CO2	K3	The state of the s
18) a	CO3	K2	(90)
18) b	CO3	K2	
19) a	CO4	K4	26
19) b	CO4	K4	
20) a		1	
	CO5	K2	
20) b	CO5	K2 K2	<i>நாயுக்க</i> ரி
20) b	CO5	K2	formance of the students is to be assessed by attempting higher level of K levels
20) b	CO5	K2	of K levels
20) b	CO5	K2 evel of per	
20) b	CO5	K2 evel of per	of K levels Section D (Open Choice)
20) b NB: H	CO5 ligher l	K2 evel of per	of K levels Section D (Open Choice) Answer Any Three questions (3x10=30 marks)
20) b NB: H	CO5 ligher l	K2 evel of per	of K levels Section D (Open Choice) Answer Any Three questions (3x10=30 marks)
20) b NB: F	CO5 ligher l CO CO1	K2 evel of per	of K levels Section D (Open Choice) Answer Any Three questions (3x10=30 marks)
20) b NB: H	CO5 ligher l  CO CO1 CO2	K2 evel of per  A K Level K2 K3	of K levels Section D (Open Choice) Answer Any Three questions (3x10=30 marks)



# 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						
On the	successful completion of the course, student will be able to:					
CO1:	Apply the concept of basic circuit and theorems in practical circuits.	К3				
CO2:	Simplify the circuits using series and parallel equivalents and using	К3				
	Thevenin's and Norton's equivalent circuits practically.					
CO3:	Construct resonance circuits.	K4				
<b>CO4</b> :	Experiment the fundamental operations of the main Semiconductor Electronic	К3				
	Devices					
<b>CO5</b> :	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	0 /1 /)	2(4)	1 2	3	2
CO 2	1	2	(2)///	1\ga	2	1
CO 3	2	1 🚝	3	1	1	2
CO 4	2	2		1	2	1
CO5	1 2	2	3	2	2	2

<sup>\*3 –</sup> 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.	9	Practical
	Verification of Norton's Theorem		
	Verification of Thevenin's Theorem		
II	Verification of Maximum Power Transfer Theorem	9	Practical
	Verification of Superposition Theorem		
III	Series Resonance Circuit	9	Practical
	Parallel Resonance Circuit		
	V-I Characteristics of Junction Diode		
IV	V-I Characteristics of Zener Diode	9	Practical
	Transistor Characteristics of CE Configuration		
	V-I Characteristics of JFET		
	V-I Characteristics of UJT		
V	Characteristics of Solar Cell	9	Practical
	Characteristics of optocoupler		

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)

	BAS	IC ELEC'	TRICIT	<b>[Y</b> .	AND CIRCUITS					
Course Code 21UELA11 L								L	P	C
Category	Allie	ed						5	-	5
Nature of cours	e: EM	PLOYAB	ILITY		SKILL ORIENTED	✓ E	ENTREPREN	IURSI	HIP	
Course Objecti	ves:		3	<u>۽</u>	ID Som	<u> </u>				ı
1. To become fa	miliar	with fund	amental	s o	f resistance and induct	ances				
2. To learn to ty	pes an	d uses of o	capacito	rs.	(Y) (X(Y)) A					
3. To explain the	e basic	concepts	and law	s o	f DC and AC ele <mark>ctrica</mark>	l netw	orks and sol	ve the	m usi	ing
mesh and nodal	analys	sis.		¥۱۱						
4. To study the	concep	ots of Elect	tronic C	ircu	iit network theor <mark>ems.</mark>					
5. To understand	d the c	oncepts of	resonar	nce	circuits and filters.					
Unit: I Res	istors	& Induct	ors 💾		A THE		<b>R</b>		1:	5
Resistors & Inc	ductor	's		-y			5		·	
Types of Resis	tors:	Fixed, Va	riable -	Br	rie <mark>f mention of their</mark>	Const	ruction and	Chara	cteris	stics
Color Coding of	Resis	tors - Con	necting	Res	sistors in Series and Pa	arallel				
Types of Induc	tors:	Fixed, Var	riable- S	elf	and Mutual Inductance	e-Far	aday's Law a	and Le	nz's	Lav
					d in a <mark>n In</mark> ductor-Induc					
	acito		عنا				<b>D</b>		1:	5
Principles of Ca	apacita	nce-Parall	lel Plate	Ca	pacitor-Permittivity-L	Definit	ion of Diele	ctric (	Const	ant
	•									
	-		cu III a	Ca	pacitor-Types of Cap	acitors	s: Air, Paper	, Mica	a, Te	flor
	and 1				pacitor-Types of Cap		_			
Ceramic, Plastic		Electrolyti	c: Cons	truc	ction and Application		_			
Ceramic, Plastic and Parallel - Fa	ctors	El <mark>ectro</mark> lyti Go <mark>verni</mark> ng	c: Cons the Val	truc	ction and Application of Capacitors.		_		in S	erie
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Ceramic, Plastic and Parallel - Fa Unit: III   Ele Potential Differe	ctors ( ctrical ence- I	E <mark>lectrol</mark> yti Go <mark>verni</mark> ng I <b>Element</b> Electr <mark>ic Cu</mark>	c: Cons the Val s and C arrent-E	trud lue <b>irc</b> i lect	ction and Application of Capacitors.  uits  romotive Force - Ohn	- Con	necting Capa v- Kirchhoff'	sVolta	in Solution In In Solution In Solution In Solution In Solution In In Solution In In Solution In In Solution In	erie 5 aw
Ceramic, Plastic and Parallel - Fa Unit: III   Ele Potential Differe Kirchhoff's Cur	ctors (ctrical ence-I	Electrolyti Governing I Elements Electric Cu Law-Analy	c: Cons the Val s and C arrent-E vsis of I	tructue ircu lect Res	ction and Application of Capacitors.  uits  romotive Force - Ohn istance in Series Circ	ns Law	necting Capa v- Kirchhoff' Parallel Circ	sVolta	in Seage Land Se	erie 5 aw erie
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- 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	e 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
<b>CO4:</b>	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	15	1	1	1	<u></u>	3
CO 3	2 2	2	3	2	6 2	2
CO 4	2	1	1	1)	<u> </u>	3
CO5	1	2	3	2	2	2

<sup>\*3 –</sup> 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-	15	Chalk & Talk
	Faraday's Law and Lenz's Law of Electromagnetic Induction-Energy Stored in an Inductor-Inductance in Series and Parallel.		
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	15	Chalk &
	Potential Difference- Electric Current-Electromotive Force - Ohms		Talk
	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.		
IV	Star Delta Conversions (Only Theory) -Superposition Theorem -	15	Power point
	Thevenin's Theorem- Norton's Theorem - Simple Problems - Maximum		Presentation
	Power Transfer Theorem (Only Theory) - Millmans Theorem (Only		110501111111111
	Theory)		
V	AC Circuits	15	Power point
	Introduction To Sinusoidal Wave - RMS Value - Average Value - AC		Presentation
	Circuits with Resistance - Circuits with XL Alone - Circuits with XC		110501111111111
	Alone - Series Reactance And Resistance - Parallel Reactance and		
	Resistance - Series Parallel Reactance and Resistance - Real Power - Series		
	Resonant Circuit – Parallel Resonant Circuit - Q Factor.		

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	Cos	K Level	Sectio	n A	Section	ı B	Section C	Section			
rnal			MC	Qs	Short An	swers	Either or	Section D			
		3.	No. of.	<b>K</b> –	No. of.	K -	Choice	Open			
		2	Questions	Level	Questions	Level		Choice			
CI	CO1	UP TO K2	2	K1&K2	1	<b>K</b> 1	2(K2&K2)	1(K2)			
AI	CO2	UP TO K3	2/	K1&K2	12	<b>K2</b>	2(K3&K3)	2(K3&K3)			
CI	CO3	UP TO K4	-2 4	K1&K2	5111111	K1	2(K2&K2)	1(K2)			
AII	CO4	UP TO K4	2	K1&K2	2 6	K2	2(K3&K3)	2(K3&K3)			
Que	estion	No. of	64		3		4	3			
Pat	tern	Questions to	ે શ		Ti						
CIA	I & II	be asked		ராயக்	311						
		No. of	4		3		2	2			
		Questions to									
		be answered									
		Marks for	1		2		5	10			
		each question									
		Total Marks	4		6		10	20			
		for each									
		section									

	Distribution of Marks with K Level CIA I & CIA II									
	K Section A Section B Section		Section C	Section D	Total	% of	Consolidate			
	Level	(Multiple	(Short	(Either /	(Open	Marks	(Marks	of %		
		Choice	Answer	Or	Choice)		without			
		<b>Questions</b> )	<b>Questions</b> )	Choice)			choice)			
	K1	2	2	-	-	4	6.67			
	K2	2	4	10	10	26	43.33	50		
CIA	К3	-	-	10	20	20	50	50		
I	<b>K4</b>	-	-	-	-	-	-			
	Marks	4	6	20	30	60	100	100		
	K1	2	2	$_{5}$ $\square$ $_{5}$	90°-	4	6.67	50		
CIA	K2	2	402	10	10	26	43.33			
II	К3	-		~10^^	20	30	50	50		
	K4	-			- 9	-	-	-		
	Marks	4	9 6 N	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.

Sumr	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	Cos	K - Level	MO	Qs	Short An	swers	Section C	Section D	
		13.	No. of	K –	No. of	/ K –	(Either /	(Open	
			Questions	Level	Questions	Level	or Choice)	Choice)	
1	CO1	UP TO K2	12 ///	K1&K2	ten In	K1	2(K1&K1)	1(K2)	
2	CO2	К3	2	K1&K2	1	K1	2(K2&K2)	1(K3)	
3	CO3	UP TO K4	2	K1&K2	1 30	<b>K2</b>	2(K3&K3)	1(K4)	
4	CO4	UP TO K4	2	K1&K2	1,0	K2	2(K4&K4)	1(K3)	
5	CO5	UP TO K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)	
No. of	Question	is to be	10	பாயுக	5		10	5	
Asked									
No.of	Question	s to be	10		5		5	3	
answered									
Marks for each question			1		2		5	10	
Total N	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	Section B (Short Answer	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without	Consolidated %			
	<b>Questions</b> )	<b>Questions</b> )				choice)				
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**

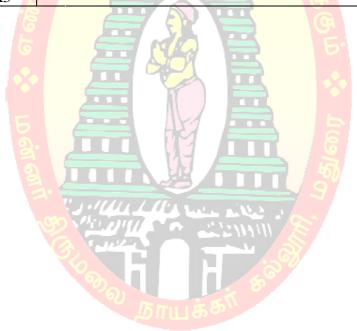
		-	Section A (Multiple Choice Questions)
	A	Answer All	
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1 🤵	55)
6	CO3	K2	1.
7	CO4	K1	J. March Later and a second
8	CO4	K2	אויענייי פי אויענייי פי
9	CO5	K1	Control of the second s
10	CO5	K2	
			Section B (Short Answers)
	A	nswer All	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)
			l Questions $(5 \times 5 = 25 \text{ marks})$
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)

	ring ver ring ringer destrons (exto-20 marks)							
Q.No	CO	K Level	Questions					
21	CO1	K2						
22	CO2	К3	S/4/2/7(0))/3 2					
23	CO3	K4						
24	CO4	К3						
25	CO5	K3	101					





# MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION

(For those who joined in 2021-2022 and after)

Course Na	me I	ELECTRONIC INSTRUMENTATION			
Course Co	de 2	1UELS11	L	P	C
Category	S	kill	2	-	2
Nature of c	ourse:	EMPLOYABILITY   SKILL ORIENTED   ✓ ENTREPRENU	JRSI	HIP	
Course Ob	jective	s:			
1. To imp	art the	knowledge on electronic instruments			
2. To anal	lyze an	d measurement the unknown R, L and C using bridge circuits.			
3. To disp	lay the	concept of CRO and signal generators for practical usage.			
4. To und	erstand	the concept of power measurements.			
5. To enal	ble the	studen <mark>ts to acquire th</mark> e knowledge of digit <mark>al instruments</mark> and its app	licati	ons i	n
electron	nic circ	uits a <mark>nd know the te</mark> chnique of measureme <mark>nts using elect</mark> ronic instr	umer	nts	
Unit: I	Indic	ating Instruments		06	Ó
DC Ammer	ter - Do	C Vo <mark>ltmeter- AC Voltmeter – Mu</mark> ltirange Ammeter <mark>&amp;Volt</mark> meter - S	Series	s & S1	hunt
Type Ohmi	meter -	- Multimeter -Digital Multimeter.			
Unit: II	RLC	Measurements		06	5
Wheatstone	e Bridg	ge - Balance Equation of General AC Bridges - Maxwell - Sche	ring	- Wi	en -
Kelvin brid	_				
Unit: III	Oscil	oscope		06	5
Block diag	ram - (	CRT - <mark>Vertic</mark> al Deflection System - Delay line - Horizontal Deflec	ction	Syste	- m
CRT screen	ns &Gr	aticules - Oscilloscope Probes - Measurement of Frequency, Ampl	itude	& Pl	hase
- Lissajou's	Patter	ns- Digital <mark>storag</mark> e oscilloscope.			
Unit: IV	Meas	urement of Power		06	j
Introduction	n- bolo	meter method of power measurement-Calorimeter method-Watt me	ter-E	Energy	y
meter - Pha		$\mathcal{L}_{\mathcal{L}}$		٥.	,
Unit: V	Signa	l generation & signal analysis		06	5
Function C	Generat	or - Pulse Generator - Wave Analyzer - Harmonic Distortion Analy	zer-	Spect	rum
Analyzer					
		Total Lecture Ho	urs	30 H	lrs
Books for	Study:				
1. H.S. K	alsi (20	002), Electronic Instrumentation, Tata McGraw-Hill Publishing C	Comp	any I	Ltd.,
New De	elhi.				

- 2. A.K.Sahwney, Electrical and Electronic Measurements and Instrumentation. (2006), DhanpatRai& 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	K Level							
On the	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	6 2	2	20	1	1
CO 3	3	3	3	5 2	2	2
CO 4	2	2	நாடி2த் கி	3	2	2
CO5	2	2	3	2	3	2

<sup>\*3 –</sup> Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

### **LESSON PLAN**

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

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)** 

Inte	Cos	K Level	K Level Section A Section B		В	Section C	Section D	
rnal			MC	Qs	Short Ans	swers	Either or	Open
			No. of.	K –	No. of.	K -	Choice	Choice
			Questions	Level	Questions	Level		
CI	CO1	UP TO K2	2	K1&K2	1	K1	2(K1&K1)	1(K2)
ΑI	CO2	UP TO K3	2	K1&K2	2	K2	2(K3&K3)	2(K2&K2)
CI	CO3	UP TO K3	2	K1&K2	1	K1	2(K2&K2)	1(K2)
AII	CO4	UP TO K4	2	K1&K2	0002	K2	2(K3&K3)	2(K3&K3)
Que	estion	No. of	4%		3		4	3
Pat	tern	Questions to		2000	1 1 2			
CIA	I & II	be asked						
		No. of	9 4		3	8	2	2
		Questions to	3			100		
		be answered	<u></u>		1111			
		Marks for	1 📠		2	)9	5	10
		each question				-/ (Gr		
		Total Ma <mark>rks</mark>	4	MA	6	16	10	20
		for each		ANDY				
		section				•	•	

	Distribution of Marks with K Level CIA I & CIA II									
	K	Section A	Section B	Section C	<b>Section D</b>	Total	% of	Consolidate		
	Level	(Multi <mark>ple</mark>	(Short	(Either /	(Open	Marks	(Marks	of %		
		Choice	Answer	Or	Choice)	/ 9/	without			
		<b>Questions</b> )	<b>Questions</b> )	Choice)	الرافيكانية ا		choice)			
	K1	2	2	10	75114111	14	23.33	83		
	K2	2	(3) 4 ···		30	36	60			
CIA	К3	-	0_	10	(e)	10	16.66	17		
1	K4	•	200	-	3	-	-			
	Marks	4	6	20	30	60	100	100		
	K1	2	2		-	4	6.67	50		
CIA	<b>K2</b>	2	4	10	10	26	43.33			
II	К3	-	-	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)

Cos	K - Level	MO	Qs	Short Ans	swers	Section C	Section D
		No. of	K –	No. of	K –	(Either /	(Open
		Questions	Level	Questions	Level	or Choice)	Choice)
CO1	UP TO K2	2	K1&K2	1	K1	2(K1&K1)	1(K2)
CO2	К3	2	K1&K2	1	K1	2(K3&K3)	1(K3)
CO3	UP TO K4	2	K1&K2	1	K2	2(K2&K2)	1(K4)
CO4	UP TO K4	2	K1&K2	1	K2	2(K4&K4)	1(K3)
CO5	UP TO K3	2	K1&K2	1	K2	2(K2&K2)	1(K3)
Question	s to be	10		5		10	5
		Z 8	ിഥ ഭ	6/100			
Questions	s to be	10		5		5	3
answered			MAA	9			
Marks for each question		1 /		2		5	10
Total Marks for each section		10 / V		10	<b>3</b>	25	30
	CO1 CO2 CO3 CO4 CO5 Question Questionsed for each	CO1 UP TO K2 CO2 K3 CO3 UP TO K4 CO4 UP TO K4 CO5 UP TO K3 Questions to be Questions to be ed for each question	No. of Questions	No. of Questions   K - Level	No. of Questions   K - Questions	No. of Questions   K -   No. of Level   Questions   Level	No. of Questions   K - Questions   Level   Questions   Level   Or Choice

(Figures in parenthesis denotes, questions should be asked with the given K level)

	Distribution of Marks with K Level									
K	Section A	Section B	Section C	Section D	Total	% of	Consolidated			
Level	(Multiple	(Short	(Either/ or	( Open	Marks	(Marks	%			
	Choice	Answer	Choice)	Choice)	7	without				
	<b>Questions</b> )	<b>Questions</b> )	1/2			choice)				
K1	5	4	10		19	15.8	50			
K2	5	6'	1/1/2000 A	10	41	34.16				
К3	-	9	1/10	30	40	33.33	33			
K4	-	6	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**

		A A 11	Section A (Multiple Choice Questions)
O No	CO	Answer All K Level	Questions (10x1=10 marks) Ouestions
<b>Q.No</b>	CO1	K Level K1	Questions
2	CO1	K1 K2	
3	CO2	K2 K1	
4	CO2	K1 K2	
5	CO2	K2 K1	
6	CO3	K1 K2	
7	CO3	K2 K1	110 4
8	CO4	K1 K2	5 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
9	CO5	K2 K1	
10	CO5	K1 K2	
10	CO3	K2	Section B (Short Answers)
		nswer All	Questions (5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K1	
12	CO2	K1	G G
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
		Angreen Al	Section C (Either/Or Type)  1 Questions (5 x 5 = 25 marks)
Q.No	CO	K Level	Questions
16) a	CO1	K1 K1	Questions
16) b	CO1	K1	
17) a	CO2	K3	
17) b	CO2	K3	The state of the s
18) a	CO3	K2	(90)
18) b	CO3	K2	
19) a	CO4	K4	26
19) b	CO4	K4	
20) a		1	
	CO5	K2	
20) b	CO5	K2 K2	<i>நாயுக்க</i> ரி
20) b	CO5	K2	formance of the students is to be assessed by attempting higher level of K levels
20) b	CO5	K2	of K levels
20) b	CO5	K2 evel of per	
20) b	CO5	K2 evel of per	of K levels Section D (Open Choice)
20) b NB: H	CO5 ligher l	K2 evel of per	of K levels Section D (Open Choice) Answer Any Three questions (3x10=30 marks)
20) b NB: H	CO5 ligher l	K2 evel of per	of K levels Section D (Open Choice) Answer Any Three questions (3x10=30 marks)
20) b NB: F	CO5 ligher l CO CO1	K2 evel of per	of K levels Section D (Open Choice) Answer Any Three questions (3x10=30 marks)
20) b NB: H	CO5 ligher l  CO CO1 CO2	K2 evel of per  A K Level K2 K3	of K levels Section D (Open Choice) Answer Any Three questions (3x10=30 marks)





# 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 Objectiv	res:	00 CO				•		
<ul><li>2. To acquaint to circuits.</li><li>3. To learn the second control of the second</li></ul>	he students with construence working principles of p	owledge on rectifiers and uction, theory and character ower amplifier.  es of feedback amplifier.		ronic	ampl	ifier		
5. To enable the	e studen <mark>ts understand</mark> ar	nd gain the knowledge on	oscillator and multi	ivibra	tor			
	ifiers and Regulators	iers – Calculation of RMS	(GA		1			
types-Inductor F Regulator – Zen Protection – Con	ilter – Capacitor Filter er Diode as a Regula struction of DC Power	lity Factor – Peak Inverse er – LC Filter – Pi Filt etor – Transistor Shunt a Supply.	<mark>er - Volta</mark> ge Doub	oler –	- Vol Over	ltage load		
	ll Sig <mark>nal Ampl</mark> ifiers		E C		1			
		e Trans <mark>isto</mark> r Amplifier – Coupled Amplifier – Tune						
	er Am <mark>plifier</mark> s		19		1:			
Maximum Colle	ctor Effic <mark>iency</mark> of Clas	n of Class A, Class B, Cl ss A Power Amplifier Symmetry Push Pull Am	– <mark>Clas</mark> s B Push Pu					
	back Amplifiers		9)/		1:	5		
Basic concepts Feedback on Gai	of feedback – Positiven, Bandwidth and Dis	e Feedback – Negative tortion – Noise – Voltage Current Shunt Feedback.						
	llators And Multivibr				1			
Bridge Oscillat	ors –Peizo Electric	ator – Colpitts Oscillator Crystal and its Ef civibrator – BistableMultiv	fects – Crystal	Osc	illato			
			Total Lecture Ho	urs	75H	rs		
<b>Books for Study</b>	:							
Edition,1980	•	s of Electronics,S.Chand Chand& Company Ltd, N	•			First		

**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 Electronics, Chand Company Ltd, 2000.

#### 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. https://nptel.ac.in/courses/108/102/108102095/Analog Electronic circuits NPTEL.

Course	Course Outcomes							
On the	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						
	80							
<b>CO3:</b>	Analyse the functions of power amplifiers	UP TO K3						
<b>CO4:</b>	Distinguish the performance of negative as well as positive feedback circuits	UP TO K4						
<b>CO5</b> :	Design oscillators and multivibrators	UP TO K4						

#### CO & PO Mapping:

	TI O					
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

<sup>\*3 –</sup> Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

### **LESSON PLAN**

UNIT	Course Name	Hrs	Pedagogy
I	Rectifiers and Regulators	15	Chalk & Talk
	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.		
II	Small Signal Amplifiers	15	Chalk & Talk
	Transistor as an Amplifier -Single Stage Transistor Amplifier -		
	Frequency Response – Bandwidth – RC Coupled Amplifier -		
	Transformer Coupled Amplifier – Tuned Amplifier – FET		
	Amplifier.		

III	Power Amplifiers	15	Chalk & Talk
	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.		
IV	Feedback Amplifiers	15	Power point
	Basic concepts of feedback - Positive Feedback - Negative		Presentation
	Feedback – Effects of Negative Feedback on Gain, Bandwidth and		
	Distortion - Noise - Voltage Series Feedback- Voltage Shunt		
	Feedback – Current Series Feedback – Current Shunt Feedback.		
V	Oscillators And Multivibrators	15	Power point
	Barkhausen Criterion – Hartley Oscillator – Colpitts Oscillator –		Presentation
	Phase Shift Oscillator - Wein Bridge Oscillators - Peizo Electric		
	Crystal and its Effects – Crystal Oscillator – Astable Multivibrator –		
	Monostablemultivibrator – BistableMultivibrator – Schmitt Trigger.		

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	Cos	K Level	Section	on A	Section B		Section C	Section				
rnal		2	MC	Qs	Short Answers		Either or	Section D				
		3	No. of.	K –	No. of.	K -	Choice	Open				
		3.	Questions	Level	Questions	Level		Choice				
CI	CO1	UP TO K2	2	K1&K2	1 -	<b>K</b> 1	2(K2&K2)	1(K2)				
AI	CO2	UP TO K3	<b>-2 -4</b>	K1&K2	21121	K2	2(K3&K3)	2(K3&K3)				
CI	CO3	UP TO K4	2	K1&K2	1.0	K1	2(K2&K2)	1(K2)				
AII	CO4	UP TO K4	0.2	K1&K2	2	K2	2(K4&K4)	2(K3&K3)				
Question		No. of	4	Property S	3		4	3				
Pattern		Questions to be		)II M Q								
CIA I & II		asked										
		No. of	4		3		2	2				
		Questions to be										
		answered										
		Marks for each	1		2		5	10				
		question										
		Total Marks	4		6		10	20				
		for each										
		section										

	Distribution of Marks with K Level CIA I & CIA II									
	K	Section A	Section B	Section C	Section D	Total	% of	Consolidate		
	Level	(Multiple	(Short	(Either /	(Open	Marks	(Marks	of %		
		Choice	Answer	Or	Choice)		without			
		<b>Questions</b> )	<b>Questions</b> )	Choice)			choice)			
	K1	2	2	-	-	4	6.67	50		
	<b>K2</b>	2	4	10	10	26	43.33			
CIA	<b>K3</b>	•	-	10	20	30	50	50		
I	<b>K4</b>	•	-	-	-	-	-			
	Marks	4	6	20	30	60	100	100		
	K1	2	2	ALIC AL	-	4	6.67	50		
CIA	<b>K2</b>	2	4 8	10	10	26	43.33			
II	К3	-	. (1/6)	-	20	20	33.33	33		
	K4	-	6-/	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.

Sumr	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)									
S.No	Cos	K - Level	MO	Qs	Short Ans	swers	Section C	Section D		
		크 1	No. of	K –	No. of	K –	(Either /	(Open		
		3	Questions	Level	Questions	Level	or Choice)	Choice)		
1	CO1	UP TO K2	2	K1&K2	1	K1	2(K1&K1)	1(K2)		
2	CO2	К3	2	K1&K2	- 7-17, ·	K1	2(K2&K2)	1(K3)		
3	CO3	UP TO K4	-2	K1&K2	22/11/11	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	10	<b>K2</b>	2(K3&K3)	1(K2)		
No. of	Question	is to be	10		5		10	5		
Asked				BITTLE	511					
No.of	Question	s to be	10		5		5	3		
answered										
Marks for each question		1		2		5	10			
Total Marks for each section		10		10		25	30			
	(Figure	s in parenthe	sis <del>denotes, q</del>	questions sl	hou <mark>ld be ask</mark>	ed with	the given K le	evel)		

	Distribution of Marks with K Level												
K Level	Section A (Multiple Choice	Section B (Short Answer	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without	Consolidated %						
	<b>Questions</b> )	<b>Questions</b> )				choice)							
K1	5	4	10	-	219	15.83	50						
K2	5	6	10	20	41	34.16							
К3	-	-	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**

		·/S	
		6	Section A (Multiple Choice Questions)
		Answer All	
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1 🤗	
6	CO3	K2 🔀	50
7	CO4	K1	
8	CO4	K2	The state of the same of the s
9	CO5	K1	الادانات م المالات
10	CO5	K2	
			Section B (Short Answers)
	A	nswer All	Questions (5x2=10 marks)
Q.No	CO	K Level	Questions
11	CO1	K1	2011/01/07
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
		•	Section C (Either/Or Type)
		Answer Al	l Questions $(5 \times 5 = 25 \text{ marks})$
Q.No	CO	K Level	Questions
16) a	CO1	K1	
16) b	CO1	K1	
17) a	CO2	К3	
·			

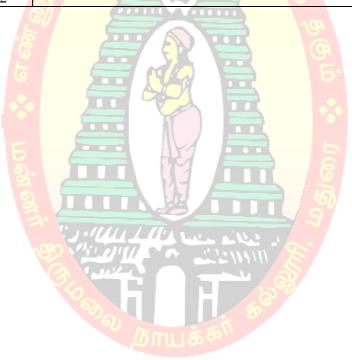
17) b	CO2	K3	
18) a	CO3	K4	
18) b	CO3	K4	
19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K2	
20) b	CO5	K2	

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	5 MAM 1 2
23	CO3	K4	
24	CO4	K3	S VIII S S
25	CO5	K2	





## MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION

<b>Course Name</b>	ELECTRONICS – II LAB				
<b>Course Code</b>	21UELCP2		L	P	C
Category	Core			4	2
Nature of cours	se: EMPLOYABILITY SKILL ORIENTED	ENTREPREN	URSI	HP	<b>√</b>
Course Object	ives:				
1. To construc	ct regulated power supplies practically.				
	and the workin <mark>g of rectifi</mark> ers practically.				
	clipping and clamping circuits practically.				
•	the working of amplifiers and oscillator practically.				
	ent the working of multivibrators using transistor.	0.09			
	List of Ex <mark>periment (Any</mark> Ten)				
<ol> <li>Clippers</li> </ol>	and Cl <mark>ampers</mark>				
2. DC Regi	ulated P <mark>ower Supply using Zener Diode</mark>				
3. Dual por	wer supply				
4. IC Regu	lated Power Supply				
5. Rectifier	· (Half <mark>&amp;Full Wave</mark> )				
6. Bridge l	Rectifier William Will				
7. Voltage	Doubler 2				
8. CE Amp	olifier.				
9. Emitter	Follower				
10. Hartley	Oscillator				
11. Colpitts	Oscillator				

- 12. Wein Bridge Oscillator
- 13. Astable Multivaibrators
- 14. Monostable Multivaibrators
- 15. Bistable Multivaibrator
- 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			
<b>CO4:</b>	Construct different Multivibrator circuits using Transistor	К6			
CO5:	Construct and Analysevarious Electronics Circuits practically.	K6			

#### CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	1	1	$M^2M$	61	3	2
CO 2	1	2	2	1	2	1
CO 3	2	1	3 ( )	1 (4)	1	2
CO 4	2	2 🚈	1	1	2	1
CO5	1 /5	2	3	2	2	2

<sup>\*3 –</sup> Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

#### LESSON PLAN

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

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 Na	ıme	Probabil	ity and Stat	istic	cs						
Course Co	ode	21UMCA2	21						L	P	C
Category		Allied							5	-	5
Nature of course: EMPLOYABILITY   SKILL ORIENTED   ENTREPRENUR										HIP	<b>√</b>
Course Ob	ojecti	ves:	8	) <u>B</u>		000	1				1
varied compu	appli ter ne	cations in eatworks etc.		nd s	cience 1	ike <mark>d</mark> ise <mark>ase m</mark>		istical analysis r ing, climate pre			
Unit: I			ntral Tender			ann	7	200		1:	5
Introductio	$\frac{1}{n-A}$	rithmetic m	ean – Partiti	ion '	Values -	- Mode - Geo	met	ric Mean & Har	moni	c	
Mean(prob		• /		9	3.1			0			
Unit: II	Me	asures of Di	spersion		A OF					1:	5
Introductio	$\frac{1}{n-N}$	Measures of	dispersion(p	rob	lems on	ly)		***			
Unit: III	Cor	relation and	Regression					Ь		1:	5
Introductio	n – C	Correlation –	Rank Corre	lati	on – Re	gression		6			
Unit: IV	Pro	bability	1111		The second	ATTITUTE OF THE PARTY OF THE PA		9		1:	5
Probability	- Inti	oduction -C	<mark>ond</mark> itional P	rob	ability -	- Mathematica	l Ex	pectations (Prob	olems	sonly	r)
Unit: V	Spe	cial Distrib <mark>i</mark>	itions	4	394	الترانيات		7		1:	5
Introductio	n – E	Binomial Dis	stribution – I	Pois	son Dis	tribution -Nor	mal	Distribution.( P.	roble	ems of	nly)
			୍ଚିତ୍			- 15 17	To	otal Lecture Ho	urs	75 H	Irs
<b>Books for</b>	Stud	<b>y:</b>		4	DITULE.	8000					
Arumugam	n. S.	and Than	gapandi Isa	ac.	A., "S	Statistics", N	lew	Gamma Publi	shing	g Ho	use,
Palayamko	tai, 2	011.									
	J	Jnit I	- Chapter	2: \$	Sections	3:2.0-2.4					
	J	Jnit II	- Chapter	3: \$	Sections	: 3.0 & 3.1(f	ull)				
	J	Jnit III	- Chapter	6: \$	Sections	: 6.0-6.3					
	J	Jnit IV	- Chapter	11:	Section	s: 11.0-11.2,					
	(	Chapter12 : S	Section: 12.4			ŕ					
	J	Jnit V	- Chapter	13:	Section	s: 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	e 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.	К3
CO2:	Determine the relationship between quantitative variables and extend	К3
	regression Analysis.	
CO3:	Recall and apply a comprehensive set of Probability ideas.	K1
<b>CO4:</b>	Find, interpret and analyze the measure of central tendencies, Moment	К3
	Generating function and Characteristic function of random variables.	
CO5:	Relate, Analyze and Demonstrate the knowledge of using various distributions	K2
	for statistical analysis.	

#### 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 - (6)	3	2
CO 4	3	2 00 /5/11	2 85 T	3	3
CO 5	3	2	3	3	3

<sup>\*3 –</sup> 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

	native E	ning Outco <mark>me Bas</mark> Examinatio <mark>n - Blue</mark> Mapping <mark>– K Lev</mark>	Print	J.K.		<b>BE</b> ) (3)		
Inte	Cos	K Level	Section A	The state of the s	Section B		Section C	Section D
rnal			MCQs		Short Answ	ers	Either or	Open
		5	No. of. Questions	K - Level	No. of. Questions	K - Level	Choice	Choice
CI	CO1	CO1	K2	2	K1	1/6	K2	5(k2)
AI	CO2	CO2	К3	2	Up to K2	2 50	Up to K3	5( k2 & k3)
CI	CO3	CO3	K3////	2	K1	/1	K2	5(k2)
AII	CO4	CO4	K3	2	K2	2	Up to K3	5( k3)
Ques Patte CIA		No. of Questions to be asked	4 - L		3		4	3
		No. of Questions to be answered	4	ாயக்	3,11		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 Section A Section B Section C Section D Total % of										
	Level	(Multiple	(Short	(Either /	(Open	Marks	(Marks	of %			
		Choice	Answer	Or	Choice)		without				
		<b>Questions</b> )	<b>Questions</b> )	Choice)			choice)				
	K1	2	2	-	-	4	6.67	50			
	K2	2	4	10	10	26	43.33				
CIA	К3	-	-	10	10	20	33.33	33.33			
Ι	K4	-	-	-	10	10	16.67	16.67			
	Marks	4	6	20	30	60	100	100			
	K1	2	2	3	COTO	4	6.67	50			
CIA II	K2	2	4	10	10	26	43.33				
	К3	-	5 / /s	10	10	20	33.33	33.33			
	K4	- 4	Y / (1)	THE STATE OF	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.

Sumn	native Ex	amina <mark>tion –</mark> 1	Blue Print A	rticulatio	n Mapping	– K Leve	el with Cours	se
Outco	mes (CC	Os)		THE		1 6		
S.No	COs	K - Level	K - Level MOQs Short Answers Se			<b>Section C</b>	Section D	
		\ <u>9</u> \	No. of	K –	No. of	K –	(Either /	(Open
		13.	Questions	Level	Question	Level	or Choice)	Choice)
1	CO 1	K1 💍	2 1/1/1/	K1	1 2111111	K1	2 (K3& K3)	1 (K2)
2	CO 2	К3	2	K1	1	K1	2 (K3 &K3)	1 (K3)
3	CO 3	К3	2	K1&K2	1 50	K2	2 (K3 &K4)	1 (K3)
4	CO 4	K4	2	K1&K2	, <b>1</b> 5\\	K2	2 (K3 &K4)	1 (K3)
5	CO 5	K4	2	K1&K2	1	K2	2 (K3 &K4)	1 (K4)
No. of Asked	Question	ns to be	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	r each section	10		10		25	30
(Figur	res in pai	renthesis den	otes, question	s should	be asked wi	ith the gi	ven K level)	

]	Distribution of Marks with K Level												
K	Section A Section B Section C Section D Total % of Consolidat												
Level	(Multiple	(Short	(Either/ or	( Open	Marks	(Marks	%						
	Choice	Answer	Choice)	Choice)		without							
	<b>Questions</b> )	<b>Questions</b> )				choice)							
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 g\ L	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	n A (M	ultiple C	hoi <mark>ce Questions)</mark>
		uestions	
Q.No	CO	K	Questions
		Level	
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	<u>s</u> .
6	CO3	K2	2 45
7	CO4	K1	
8	CO4	K2	" J. Market Land Land Land Land Land Land Land Land
9	CO5	K1	CONTRACTOR OF COMMENTS
10	CO5	K2	The same of the sa
		ort Ansv	
		uestions	· · · · · · · · · · · · · · · · · · ·
Q.No	CO	K	Questions
		Level	அரயக்
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
		ther/Or '	
		uestions	
Q.No	CO	K	Questions
		Level	
16) a			

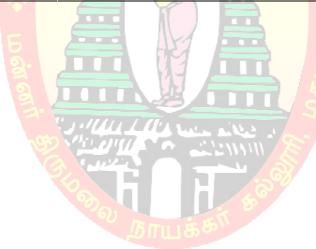
16) b	CO1	K1	
17) a	CO1	K2	
17) b	CO2	K1	
18) a	CO2	K2	
18) b	CO3	K1	
19) a	CO3	K2	
19) b	CO4	K1	
20) a	CO4	K2	
20) b	CO5	K1	

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)

7 X 11 15 VV C	Ally	ımce qe	icstions	(3A10=30 Ha1 K3)
Q.No	CO	K	Questions	
		Level	<b>3</b>	
21	CO1	K3		
22	CO2	К3	- Eg	
23	CO3	K3	7	
24	CO4	K4	0	
25	CO5	K4		





## MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF ELECTRONICS AND COMMUNICATION

(For those who joined in 2021-2022 and after)

Course Na	Course Name   ELECTRONIC COMMUNICATION SYSTEMS							
Course Code 21UELS21 L								
Category Skill 2								
Nature of c	ours	e: EMPLOYABILITY   SKILL ORIENTED   ✓ ENTREPREN	URSF	HP				
Course Ob	jecti	ves:						
2. To und 3. To ac 4. To incut 5. To com Unit: I  Introduction Electromage	erstancequirulcate upare Intu	e concept of Analog communication system and the concept of digital communication system be knowledge on Amplitude and Frequency modulation. The principle of mobile communication at satellite communication and contrast the communication systems by self-study.  Toduction:  communication - Elements of a communication system - need for spectrum and typical applications - some communication systems - communication			ion-			
communica				0.4				
Unit: II		alog C <mark>ommunication:  uplitude modulation-Angle modulation-Frequency modulation-Tr</mark>	anem:	00				
receiver of			ansm	ittei	and			
Unit: III		ital Communication:		00	<u> </u>			
Digital puls	se mo	odulation <mark>-PCM</mark> -Sampling-Quantizing-coding-delta modulation-wirele	ess					
communica	ation.	CO VICTORIAN CONTRACTOR OF THE						
Unit: IV	Mo	bile Communication:		00	5			
Introductio	n: Ce	ell Mobile Tel <mark>ephone system – Group of special m</mark> obile (GSM) – N	Aultip	le ac	cess			
techniques	(TDI	MA, FDMA, CDMA) – GPRS- Introduction to Mobile Communicatio	n Spe	ectrur	n.			
Unit: V	Sate	ellite Communication:		00	Ó			
Introductio	Introduction – Active and passive satellite- structure of satellite communication-satellite orbits-							
Application	ı-Att	tude and orbit control system-TT&C-communication subsystems.						
		Total Lecture Ho	urs	30H	rs			
Books for	Stud	y:						
1. Simon	Hayk	in, Communications Systems, Wiley India, New Delhi, 4 <sup>th</sup> Edition, R	Reprin	t. 200	)7.			

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, 1<sup>st</sup> 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	Course Outcomes							
On the	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 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	<b>J</b> PO 5	PO 6
CO 1	3	3	2	2	2	3
CO 2	3	2	2	$\sim 2$	1	1
CO 3	3	3,22	3	2	2	2
CO 4	2	2	2	3	2	2
CO5	2	2	3	2	3	2

<sup>\*3 –</sup> Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

#### **LESSON PLAN**

UNIT	Course Name	Hrs	Pedagogy
I	Introduction:	6	Chalk & Talk
	Introduction to communication- Elements of a communication systemneed for modulation- Electromagnetic spectrum and typical applications-some communication systems- classification of communication systems.		

II	Analog communication:	6	Chalk & Talk
	Introduction-Amplitude modulation-Angle modulation-Frequency modulation-Transmitter and receiver of AM and FM		
III	Digital communication:	6	Chalk & Talk
	Digital pulse modulation-PCM-Sampling-Quantizing-coding-delta		
	modulation-wireless communication		
IV	Mobile Communication:	6	Power point
	Introduction: Cell Mobile Telephone system – Group of special		Presentation
	mobile (GSM) - Multiple access techniques (TDMA, FDMA,		
	CDMA-GPRS- Introduction to Mobile Communication Spectrum.		
V	Satellite communication:	6	Power point
	Introduction – Active and passive satellite- structure of satellite		Presentation
	communication-satellite orbits-Application-Attitude and orbit		
	control system-TT&C-communication subsystems.		

Course Designed by: Mr.M. Satheeshkumar

M<mark>r. A. Velmu</mark>rugan

		Learnin	<mark>ig O</mark> utcome	Based Edu	cation & A	ssessmer	nt (LOBE)	
			<b>Formative</b>	<b>Examination</b>	on - Blue Pr	int		
		<b>Articulation</b>	<mark>Ma</mark> pping –	K Levels w	ith Course	Outcom	es (COs)	
Inte	Cos	K Level	Section A		Section B		Section C	Section D
rnal		5	MO	CQs Short A		swers	Either or	Open
		<b>9.</b>	No. of.	K-	No. of.	<b>K</b> -	Choice	Choice
		2	Questio	Level	Question	Level		
		3	ns		S	1 20		
CI	CO1	UP TO K2	2	K1&K2	1	<b>K</b> 1	2	1(K2)
ΑI		- cto	1,444		اد المالية		(K2&K2)	
	CO2	UP TO K3	<b>—2 —</b>	K1&K2	21112	<b>K2</b>	2	2(K3&K3)
		16	144				(K3&K3)	
CI	CO3	UP TO K4	2	K1&K2	10	K1	2	1(K2)
AII			100.V		· 8		(K2&K2)	
	CO4	UP TO K4	2	K1&K2	2	<b>K2</b>	2	2(K3&K3)
							(K3&K3)	
Que	estion	No. of	4		3		4	3
Pat	tern	Questions to be						
CIA	I & II	asked						
		No. of	4		3		2	2
		Questions to be						
		answered						
		Marks for each	1		2		5	10
		question						
		Total Marks for	4		6		10	20
		each section						

	Distribution of Marks with K Level CIA I & CIA II								
	K	Section A	Section B	Section C	Section D	Total	% of	Consolidate	
	Level	(Multiple	(Short	(Either /	(Open	Marks	(Marks	of %	
		Choice	Answer	Or	Choice)		without		
		<b>Questions</b> )	<b>Questions</b> )	Choice)			choice)		
	K1	2	2	-	-	4	6.67	50	
	K2	2	4	10	10	26	43.33		
CIA	К3	-	-	10	20	30	50	50	
Ι	K4	-	-	-	-	-	-		
	Marks	4	6	20	30	60	100	100	
	K1	2	2 5	<u> </u>	Suor S	4	6.67	50	
CIA	K2	2	4	10	10	26	43.33		
II	К3	-	0-//	10	20	30	50	50	
	<b>K4</b>	-	0 / /		\\\\\\	3/			
	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.

Sumr	Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)										
S.No	COs	K - Level	MO	Qs	Short Ans	swers	Section C	Section D			
		2	No. of	K –	No. of	K –	(Either /	(Open			
		3	Questions	Level	Questions	Level	or Choice)	Choice)			
1	CO1	UP TO K2	2	K1&K2	1	K1	2(K1&K1)	1(K2)			
2	CO2	К3	2	K1&K2		K1	2(K3&K3)	1(K2)			
3	CO3	UP TO K4	2	K1&K2	-211111	K2	2(K3&K3)	1(K3)			
4	CO4	UP TO K4	2	K1&K2	1 6	K2	2(K4&K4)	1(K3)			
5	CO5	UP TO K3	2	K1&K2	10	K2	2(K2&K2)	1(K3)			
No. of	Question	is to be	10		5		10	5			
Asked				5111116	5)\\						
No.of	No.of Questions to be			No.of Questions to be		10		5		5	3
answei	answered										
Marks for each question			1		2		5	10			
Total N	Total Marks for each section				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	Section B (Short Answer	Section C (Either/ or Choice)	Section D ( Open Choice)	Total Marks	% of (Marks without	Consolidated %			
	<b>Questions</b> )	<b>Questions</b> )				choice)				
K1	5	4	10	ı	19	15.83	50			
K2	5	6	10	20	41	34.16				
K3	-	-	20	30	50	41.66	42			
K4	-	-	10	ජා <sub>මණිත</sub>	10	8.33	8			
Marks	10	10	50	50 6	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**

		13	
			Section A (Multiple Choice Questions)
		Answer All	
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1 🕥	(Qc
4	CO2	K2	
5	CO3	K1 🥛	
6	CO3	K2	A Tradition of the same of the
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
			Section B (Short Answers)
	A	nswer 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 Al	l Questions $(5 \times 5 = 25 \text{ marks})$
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	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 K4performance 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)** 

	This was a find that the desirate (this to mains)						
Q.No	CO	K Level	Questions				
21	CO1	K2					
22	CO2	K2					
23	CO3	К3					
24	CO4	K3					
25	CO5	K3					

