B.Sc., ELECTRONICS & COMMUNICATION

Syllabus

Program Code: UEL

2023 - Onwards

MANNAR THIRUMALAI NAICKER COLLEGE

(AUTONOMOUS)

Re-accredited with "A" Grade by NAAC

PASUMALAI, MADURAI – 625 004

GUIDLINESS FOR OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM

(FOR UG PROGRAM FROM 2023 -2024 ONWARDS)

ELIGIBILITY FOR ADMISSION

Candidates seeking admission to the UG Degree program must have passed the Higher Secondary Education (respective groups – Arts / Science) 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.

Subjects of Study

Part I : Tamil / Hindi /

Part II : English

Part III :

1.Core Subjects
2.Allied Subjects
3.Electives

Part IV:

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

Part V :

Extension Activities

ARTS & SCIENCE

CBCS COURSE STRUCTURE FOR UG PROGRAMS

Sem I	Credit	Sem II	Credit	Sem III	Credit	Sem IV	Credit	Sem V	Credit	Sem VI	Credit
1.1. Language - Tamil	3	2.1. Language - Tamil	3	3.1. Language - Tamil	3	4.1. Language - Tamil	3	5.1 Core Course – \CC IX	4	6.1 Core Course – CC XIII	4
1.2 English	3	2.2 English	3	3.2 English	3	4.2 English	3	5.2 Core Course – CC X	4	6.2 Core Course – CC XIV	4
1.3 Core Course – CC I	4	2.3 Core Course – CC III	4	3.3 Core Course – CC V	4	4.3 Core Course – CC VII Core Industry Module	4	5. 3.Core Course CC -XI	4	6.3 Core Course – CC XV	4
1.4 Core Course – CC II	4	2.4 Core Course – CC IV	4	3.4 Core Course – CC VI	4	4.4 Core Course – CC VIII	4	5. 3.Core Course –/ Project with viva-voce CC - XII	4	6.4 Elective -VII Generic/ Discipline Specific	3
1.5 Elective I Generic/ Discipline Specific	3	2.5 Elective II Generic/ Discipline Specific	3	3.5 Elective III Generic/ Discipline Specific	3	4.5 Elective IV Generic/ Discipline Specific	3	5.4 Elective V Generic/ Discipline Specific	3	6.5 Elective VIII Generic/ Discipline Specific	3
1.6 Skill Enhancement Course SEC-1 (NME)	2	2.6 Skill Enhancement Course SEC-2 (NME)	2	3.6 Skill Enhancement Course SEC-4, (Entrepreneurial Skill)	1	4.6 Skill Enhancement Course SEC-6	2	5.5 Elective VI Generic/ Discipline Specific	3	6.6 Extension Activity	1
1.7Ability Enhancement Compulsory Course (AECC) Soft Skill-1	2	2.7 Skill Enhancement Course – SEC-3(NME)	2	3.7 Skill Enhancement Course SEC-5	2	4.7 Skill Enhancement Course SEC-7	2	5.6 Value Education	2	6.7 Professional Competency Skill	2
1.8 Skill Enhancement - (Foundation Course)	2	2.8 Ability Enhancement Compulsory Course (AECC) Soft Skill-2	2	3.7 Ability Enhancement Compulsory Course (AECC) Soft Skill-3	2	4.7 7Ability Enhancement Compulsory Course (AECC) Soft Skill-4	2	5.5 Summer Internship /Industrial Training	2		
				3.8 E.V.S	-	4.8 E.V.S	2				
	23		**23**		**22**		**25**		**26**		**21**
	Total Credit Points										**140**

QUESTION PAPER PATTERN FOR THE CONTINUOUS INTERNAL ASSESSMENT

Note: Duration – 1 hour

(FOR PART I, PART II & PART III)

The components for continuous internal assessment are:

Part –A

Four multiple choice questions (answer all) 4 x01= 04 Marks

Part –B

Two questions (‘either …. or ‘type) 2 x05= 10 Marks

Part –C

Two questions (‘either …. or ‘type) 2 x 08=16 Marks

Total 30 Marks

THE COMPONENTS FOR CONTINUOUS INTERNAL ASSESSMENT ARE:

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

Two tests and their average --15 marks

Seminar /Group discussion / Quiz Test --5 marks

Assignment --5 marks

Total 25 Marks

QUESTION PAPER PATTERN FOR THE SUMMATIVE EXAMINATIONS:

Note: Duration- 3 hours

Part –A

Ten multiple choice questions	10 x01	= 10 Marks

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

Part –B

Five Paragraph questions (‘either …. or ‘type)	5 x 05	= 25 Marks

(One question from each Unit)

Part –C

Five Paragraph questions (‘either …. or ‘type)	5 x 08	= 40 Marks

(One question from each Unit)

Total	75 Marks

PART-IV- SKILL BASED PAPERS / NME:

The Scheme of Examination for Skill Based Papers: (Except Practical Lab Subjects)

QUESTION PAPER PATTERN FOR THE CONTINUOUS INTERNAL ASSESSMENT (SKILL BASED AND NME COURSES) DURATION – 1 HOUR

- 50 MCQs will be asked for each internal assessment tests (50 x 1=50 Marks) and converted for 15 marks

THE COMPONENTS FOR CONTINUOUS INTERNAL ASSESSMENT ARE:

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

SUMMATIVE EXAMINATION PATTERN (SKILL BASED AND NME COURSES) DURATION – 3 HOURS

Pattern of the Question Paper for Skill Based and Non-Major Elective courses (External)

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

(15MCQ's from each unit)

PART-IV- ENVIRONMENTAL STUDIES AND VALUE EDUCATION

QUESTION PAPER PATTERN (INTERNAL ASSESSMENT)

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

50 MCQs will be asked for each internal assessment tests (50 x 1=50 Marks) and converted for 15 marks

Two tests and their average	--	15 marks
Project	--	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.

SUMMATIVE EXAMINATION PATTERN

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

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

(15MCQ's from each unit)

PART V EXTENSION ACTIVITIES: (MAXIMUM MARKS: 100)

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

Internal Examinations - - 25 Marks

Summative Examinations - - 75 Marks

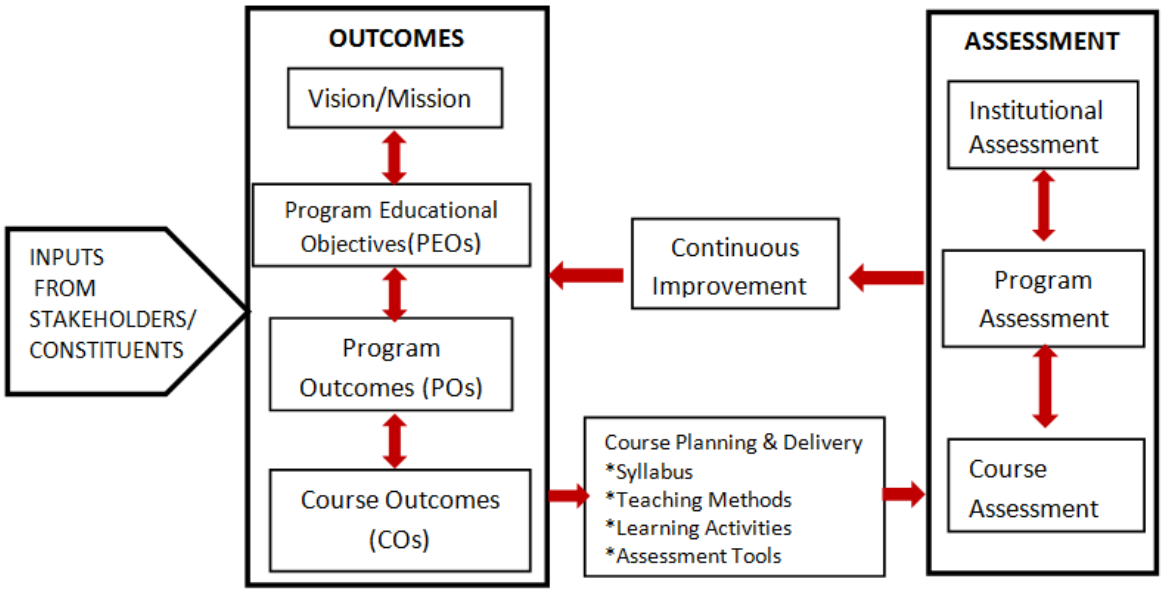
100

OUTCOME BASED EDUCATION:

OBE starts with the identification and articulation of clear and measurable learning outcomes for each course or program. These outcomes describe the skills, knowledge, and abilities that students are expected to acquire. The curriculum, instructional methods, and assessments are aligned with the defined learning outcomes. This ensures that everything taught and evaluated is directly related to what students are expected to learn.

The Learning Outcomes-Based Approach to curriculum planning and transaction in our institution ensures whether the teaching-learning processes are oriented towards enabling students to attain the defined learning outcomes relating to the courses within a programme. The outcome based approach, particularly in the context of undergraduate studies, requires a significant shift from teacher-centric to learner-centric pedagogies and from passive to active/participatory pedagogies.

Assessment Method: The students are assessed with 2 internal examination and the summative examination which includes problem based assignments; practical assignment laboratory reports; observation of practical skills; individual project reports ,case-study reports; team project reports; oral presentations, including seminar presentation; viva voce interviews; computerized adaptive testing; etc. and any other pedagogic approaches as per the context.



INSTITUTIONAL VISION

To Mould the learners into accomplished individuals by providing them with a stimulus for social change through character, confidence and competence.

INSTITUTIONAL MISSION

1. Enlightening the learners on the ethical and environmental issues.

2. Extending holistic training to shape the learners in to committed and competent citizens.

3. Equipping them with soft skills for facing the competitive world.

4. Enriching their employability through career oriented courses.

5. Ensuring accessibility and opportunity to make education affordable to the underprivileged.

Highlights of the Revamped Curriculum:

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising mathematical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced mathematical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The General Studies and Mathematics based problem solving skills are included as mandatory components in the 'Training for Competitive Examinations' course at the final semester, a first of its kind.
- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.

- The Industrial Statistics course is newly introduced in the fourth semester, to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting a Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.
- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest - Artificial Intelligence.

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS),
MADURAI – 625 004
B.SC ELECTRONICS AND COMMUNICATION CURRICULUM
(For the student admitted during the academic year 2023-2024 onwards)

Course Code	Title of the Course	Hrs	Credits	Maximum Marks		
				Int	Ext	Total
FIRST SEMESTER						
Part – I	**Tamil / Alternative Course**					
23UTAGT11	தமிழ் இலக்கிய வரலாறு - I	6	3	25	75	100
Part – II	**English**					
23UENGE11	GENERAL ENGLISH - I	6	3	25	75	100
Part - III	**Core Courses**					
23UELCC11	ELECTRONIC DEVICES	4	4	25	75	100
	ELECTRONIC DEVICES AND CIRCUITS LAB	2	-	-	-	-
Part - III	**Elective Course**					
23UELEC11	APPLIED PHYSICS	4	4	25	75	100
	APPLIED PHYSICS LAB	2	-	-	-	-
Part IV	**Non Major Elective**					
23UELNM11	TROUBLESHOOTING AND MAINTENANCE OF HOME APPLIANCES	2	2	25	75	100
Part IV	**Foundation Course**					
23UELFC11	FUNDAMENTALS OF ELECTRICITY	2	2	25	75	100
Part IV	**Skill Enhancement course**					
23UELSC11	ELECTRONIC MEASUREMENTS	2	2	25	75	100
	Total	30	20	175	525	700
SECOND SEMESTER						
Part – I	**Tamil / Alternative Course**					
23UTAGT21	தமிழ் இலக்கிய வரலாறு – II	6	3	25	75	100
Part – II	**English**					
23UENGE21	GENERAL ENGLISH - II	6	3	25	75	100
Part - III	**Core Courses**					
23UELCC21	ELECTRONIC CIRCUITS	4	4	25	75	100
23UELCP21	ELECTRONIC DEVICES AND CIRCUITS LAB	2	2	25	75	100
Part - III	**Elective Course**					
23UMTEA24	BASIC MATHEMATICS	4	4	25	75	100
23UELEP21	APPLIED PHYSICS LAB	2	2	25	75	100
Part IV	**Non Major Elective**					
23UELNM21	FUNDAMENTALS OF COMPUTING	2	2	25	75	100
Part IV	**Skill Enhancement course**					
23UELSC21	SATELLITE COMMUNICATION	2	2	25	75	100
23UELSC22	CELLULAR PHONES	2	2	25	75	100
	Total	30	24	175	525	700

* **During the first semester all the students will study 2 hours each for 23UELCP21 (Electronic Devices and Circuit Lab) and 23UELEP21 (Applied Physics Lab) for which the marks with due credits will be awarded in the second semester.**


FIRST SEMESTER

Course Name	ELECTRONIC DEVICES			
Course Code	23UELCC11	**L**	**P**	**C**
Category	CORE	4	-	4

COURSE OBJECTIVES:

- To enable the students to understand and gain knowledge on electronic devices.
- To acquaint the students with construction, theory and characteristics of electronic devices.
- To learn and use common electronic components.
- To design electronic circuits to perform realistic tasks.
- To enable the students to understand and gain knowledge on Integrated Circuit fabrication.

UNIT – I PN JUNCTION DIODE **12**

Theory of PN Junction diodes – V-I characteristics – Static and Dynamic resistance – Effect of temperature on diodes – Diffusion Capacitance – Applications: clipper, clamper, voltage Doubler – Avalanche and Zener breakdown mechanisms – Zener diode as a voltage regulator – Tunnel diode.

UNIT - II BIPOLARJUNCTION TRANSISTORS **12**

Transistor types – Transistor action – current components – CB, CE, CC configurations current gain – Input and output characteristics – Transistor as a switch and an amplifier – Comparison of amplifier configurations – Small signal low frequency hybrid model Analysis – Determination of h-parameter from characteristics–High frequency effects– Hybrid-pi model.

UNIT - III FIELDEFFECTTRANSISTORS **12**

Types-comparison of FET and BJT–Characteristics and principal of operation of JFET parameters – JFET as an amplifier – CS, CD, CG configuration – operation of MOSFET as a switch– as a variable resistor– UJT.

UNIT - IV TRANSISTORANDFETBIASINGAND PHOTODEVICES **12**

DC and AC load lines– Operating point – Need for stabilizing the Q point – Bias stability –Fixed Bias – Collector to Basic bias – Self Bias – Bias compensation – Methods of FET biasing– Introduction and theory of operation of Photo Electric devices– LED – Photo tube – LDR –Photo diode and Photo transistor– Solar cell – Optocouplers – simple applications.

UNIT - V INTEGRATEDCIRCUITFABRICATION **12**

Manufacturing process –Silicon wafer preparation – Oxide growth. Photolithography, Epitaxy, Diffusion, Metallization – Construction of BJT – Monolithic diodes – Integrated Resistors –Monolithic capacitors, inductors– Thin and Thick film technology.

Total Lecture Hours **60**

BOOKS FOR STUDY:

- S. Salivahanan, N. Sureskumar and A. Vallavaraj, "Electronic Devices and Circuits", TMH, 1998.
- Millman and Halkias, "Eleectronic device and Circuits", Mc Graw Hill, Vreprint, 1993.

BOOKS FOR REFERENCES:

- V. K. Mehta, Principles of Electronics, S. Chand publications, Delhi, eleventh edition2000.
- R.S. Sedha, **Applied Electronics**,S.Chand&CompanyLtd,NewDelhi,firstEdition,1990

WEB RESOURCES:

- **https://nptel.ac.in/courses/08/108/108108122/**
- **https://nptel.ac.in/courses/08/108/108108112/**
- **https://nptel.ac.in/courses/15/102/115102103/**

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change	**60**	No Changes Made		New Course			

***Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the characteristics and operations of PN junction and special diodes	**K1 to K4**
CO2	Understand the characteristics and operations of bipolar junction transistors	**K1 to K4**
CO3	Understand the characteristics and operations of FET and UJT	**K1 to K4**
CO4	Use the diodes, transistors, optical devices for various applications	**K1 to K4**
CO5	Understand the concepts of integrated circuit fabrication.	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:

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

3- STRONG **2 – MEDIUM** **1 - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**1**	**3**
CO 2	**3**	**2**	**3**	**1**	**1**
CO 3	**3**	**3**	**2**	**2**	**2**
CO 4	**3**	**2**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**2**
WEITAGE	**15**	**13**	**14**	**10**	**11**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100**	**86**	**93**	**66**	**73**

LESSON PLAN:

UNIT	COURSE NAME	HRS	PEDAGOGY
I	**PN JUNCTION DIODE** Theory of PN Junction diodes – V-I characteristics – Static and Dynamic resistance – Effect of temperature on diodes – Diffusion Capacitance – Applications: clipper, clamper, voltage Doubler – Avalanche and Zener breakdown mechanisms – Zener diode as a voltage regulator – Tunnel diode	**12**	**Chalk & Talk, Power Point Presentation**
II	**BIPOLARJUNCTION TRANSISTORS** Transistor types – Transistor action – current components – CB, CE, CC configurations current gain – Input and output characteristics – Transistor as a switch and an amplifier – Comparison of amplifier configurations – Small signal low frequency hybrid model Analysis – Determination of h-parameter from characteristics–High frequency effects– Hybrid-pi model.	**12**	**Chalk & Talk, Power Point Presentation**
III	**FIELDEFFECTTRANSISTORS**	**12**	**Chalk & Talk, Power Point**

	Types-comparison of FET and BJT–Characteristics and principal of operation of JFET parameters – JFET as an amplifier – CS, CD, CG configuration – operation of MOSFET as a switch– as a variable resistor– UJT.		**Presentation**
IV	**TRANSISTORANDFETBIASINGAND PHOTODEVICES** DC and AC load lines– operating point – Need for stabilizing the Q point – Bias stability –Fixed Bias – collector to Basic bias – Self Bias – Bias compensation – Methods of FET biasing – Introduction and theory of Operation of photo electric devices– LED – photo tube – LDR –photo diode and photo transistor– solar cell – optocouplers – simple application.	**12**	**Chalk & Talk, Power Point Presentation**
V	**INTEGRATEDCIRCUITFABRICATION** Manufacturing process –Silicon wafer preparation – oxide growth.Photolithography, Epitaxy,Diffusion, Metallization – Construction of BJT – Monolithic diodes – Integrated Resistors – Monolithic capacitors, inductors– Thin and thick film technology.	**12**	**Chalk & Talk, Power Point Presentation**

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 Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	2	K1&K2	2 (K3&K3)	2 (K3&K3)
	CO2	**K1 – K4**	2	K1&K2	2 (K3&K3)	2 (K3&K3)
CI AII	**CO3**	**K1 – K4**	2	K1&K2	2 (K3&K3)	2 (K3&K3)
	CO4	**K1 – K4**	2	K1&K2	2 (K4&K4)	2 (K4&K4)
Question Pattern CIA I & II		**No. of Questions to be asked**	4		4	4
		No. of Questions to be answered	1		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**2**	**-**	**-**	**2**	**3.6**	**7**
	K2	**2**	**-**	**-**	**2**	**3.6**	
	K3	**-**	**20**	**32**	**52**	**93**	**93**
	K4	**-**	**-**	**-**	**-**	**-**	**-**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	**2**	**-**	**-**	**2**	**3.6**	**7.2**
	K2	**2**	**-**	**-**	**2**	**3.6**	
	K3	**-**	**10**	**16**	**26**	**46.4**	**46.4**
	K4	**-**	**10**	**16**	**26**	**46.4**	**46.4**
	Marks	**4**	**20**	**32**	**56**	**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	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
2	CO2	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
3	CO3	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
4	CO4	K1 – K4	2	K1&K2	2 (K4&K4)	2 (K4&K4)
5	CO5	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(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 (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	-	-	5	3.6	7
K2	5	-	-	5	3.6	
K3	-	40	64	104	74.3	74
K4	-	10	16	26	18.5	19
Marks	10	50	80	140	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

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO 1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO 1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO 2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO 2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO 3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO 3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO 4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO 4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO 5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO 5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions				**PART – B**	**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO 1**	**K3**		
			OR		
11. b)	**Unit - I**	**CO 1**	**K3**		
12. a)	**Unit - II**	**CO 2**	**K3**		
			OR		
12. b)	**Unit - II**	**CO 2**	**K3**		
13. a)	**Unit - III**	**CO 3**	**K3**		
			OR		
13. b)	**Unit - III**	**CO 3**	**K3**		
14. a)	**Unit - IV**	**CO 4**	**K4**		
			OR		
14. b)	**Unit - IV**	**CO 4**	**K4**		
15. a)	**Unit - V**	**CO 5**	**K3**		
			OR		
15. b)	**Unit - V**	**CO 5**	**K3**		

Answer **ALL** the questions				**PART – C**	**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO 1**	**K3**		
			OR		
16. b)	**Unit - I**	**CO 1**	**K3**		
17. a)	**Unit - II**	**CO 2**	**K3**		
			OR		
17. b)	**Unit - II**	**CO 2**	**K3**		
18. a)	**Unit - III**	**CO 3**	**K3**		
			OR		
18. b)	**Unit - III**	**CO 3**	**K3**		
19. a)	**Unit - IV**	**CO 4**	**K4**		
			OR		
19. b)	**Unit - IV**	**CO 4**	**K4**		
20. a)	**Unit - V**	**CO 5**	**K3**		
			OR		
20. b)	**Unit - V**	**CO 5**	**K3**		

Course Name	APPLIED PHYSICS			
Course Code	23UELEC11	**L**	**P**	**C**
Category	ALLIED	4	-	4

COURSE OBJECTIVES:

- To enable the students to understand and gain knowledge about types of magnetic materials and its properties.
- To learn the fundamental relations between Electricity and Magnetism
- To study the basic concepts of network theorems& fundamental laws involved in electrical circuits.
- To study the concepts of resonance circuit.
- To introduce the concepts of AC & DC and principle involved in an electromagnetic devices.

UNIT – I **12**

Dia, Para and Ferro magnetic substances – Properties – Curie temperature. Relation between I and H.- Susceptibility, Determination of Susceptibility of Ferromagnetic materials-Vibrating sample magnetometer, Magnetic alloys. Ultrasonic production-Detection and application.

UNIT - II **12**

Force on a straight conductor carrying current kept in a magnetic field – Moving coil Ballisticgalvanometer- Theory and uses – Coupling between current carrying coils- Wattmeter-Movingiron metal – Electromagnetic Induction- Induced emf- self-induction of a solenoid – Mutualinduction between pair of coils– Coefficient of coupling.

UNIT - III **12**

Ohm‟s law- Kirchoff‟s law- Simple problem- Electric power- Power dissipation on resistance-Power formulae. Analysis of Series. Parallel and Series-Parallel circuits- Star delta network-SuperpositionTheorem-ThevenisTheorem andNortonTheorem-MillmanTheorem–Applications.

UNIT - IV **12**

Emf Induced in a coil rotating in a uniform magnetic field- mean, RMS and peak values of alternating currents and emf- power factor in the case of an AC circuit containing 1) resistance 2)inductance3)capacitance4)inductanceandresistance-wattlesscurrent-Acircuits having capacitance and resistance–ACcircuitshavinginductancecapacitanceandresistance-seriesand parallel resonance circuits- Q factor- construction and working of transformers- skin effect-Teslacoil

UNIT - V		12
Production and distribution of three phase AC- Advantages of AC over DC- Dynamic Armaturewinding- Series wound, Shunt wound and Compound wound, dynamics and their characteristics DC motor-Principles of inductive motor-Microphones and Loudspeakers		
	Total Lecture Hours	**60**

BOOKS FOR STUDY:

- Brijlaland Subramaniam-ElectricityandMagnetism

BOOKS FOR REFERENCES:

- ResnickandHalliday,Physics,VolII.,WileyEasternEd. IV.
- SeighalandChopra, ElectricityandMagnetism.

WEB RESOURCES:

- **https://archive.nptel.ac.in/content/storage2/courses/112108150/pdf/Web_Pages/WEBP_M16.pdf**
- **https://archive.nptel.ac.in/courses/108/106/108106172**
- **https://nptel.ac.in/courses/117103065**

Nature of Course	EMPLOYABILITY			SKILL ORIENTED	✓		ENTREPRENEURSHIP				
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		✓	GLOBAL			
Changes Made in the Course	Percentage of Change		100	No Changes Made			New Course		✓		

***Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Summarize the magnetic materials and its applications.	**K1 to K4**
CO2	Explain the knowledge about the principles of electricity and magnetism.	**K1 to K4**
CO3	Understand the concept of Ohm's law, Kirchhoff's law used in an electrical circuit	**K1 to K4**
CO4	Gain the knowledge about resonance circuit.	**K1 to K4**
CO5	Acquire the knowledge on AC&DC circuits and characteristics of an electromagnetic device.	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	1	2	1	2	2	2	3	2
CO2	1	1	1	1	1	2	2	2	1	1

CO3	1	2	1	1	3	2	1	1	2	2
CO4	1	2	2	1	1	3	2	1	2	3
CO5	2	1	2	2	1	2	2	1	2	2

3- STRONG **2 – MEDIUM** **1 - LOW**

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	3	1	1
CO 2	2	2	3	2	2
CO 3	3	3	2	2	2
CO 4	2	3	3	3	3
CO 5	3	3	3	3	2
WEITAGE	13	14	14	11	10
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	86	93	93	73	67

LESSON PLAN:

UNIT	COURSE NAME	HRS	PEDAGOGY
I	Dia, Para and Ferro magnetic substances – Properties – Curie temperature. Relation between I and H.-Susceptibility, Determination of Susceptibility of Ferromagnetic materials-Vibrating sample magnetometer, Magnetic alloys. Ultrasonic production-Detection and application.	12	Chalk & Talk, Power Point Presentation
II	Force on a straight conductor carrying current kept in a magnetic field – Moving coil ballisticgalvanometer- theory and uses – coupling between current carrying coils- wattmeter- Movingiron metal – Electromagnetic Induction- Induced emf- self induction of a solenoid – mutualinductionbetween pair of coils– coefficient ofcoupling.	12	Chalk & Talk, Power Point Presentation
III	Ohm‟s law- Kirchoff‟s law- Simple problem- Electric power- Power dissipation on resistance-Power formulae. Analysis of Series. Parallel and Series-Parallel circuits- Star delta network- superpositiontheorem-Thevenin‟stheoremandNortonTheorems-	12	Chalk & Talk, Power Point Presentation

	Millmantheorem–Applications.		
IV	Emf Induced in a coil rotating in a uniform magnetic field- mean, RMS and peak values ofalternating currents and emf- power factor in the case of an AC circuit containing 1) resistance 2)inductance3)capacitance4)inductanceandresistance-wattlesscurrent-Acircuitshavingcapacitanceandresistance–ACcircuitshavinginductancecapacitanceandresistance-seriesand parallel resonance circuits- Q factor- construction and working of transformers- skin effect-Teslacoil	**12**	**Chalk & Talk, Power Point Presentation**
V	Production and distribution of three phase AC- Advantages of AC over DC- Dynamic Armaturewinding- Series wound, shunt wound and compound wound, dynamics and their characteristicsDCmotor-Principles of inductivemotor-Microphones adLoudspeakers	**12**	**Chalk & Talk, Power Point Presentation**

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 Either or Choice	Section C Either or Choice
			MCQs			
			No. of. Questions	K - Level		
CI AI	CO1	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
	CO2	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
CI AII	CO3	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
	CO4	K1 – K4	2	K1&K2	2 (K4&K4)	2 (K4&K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	1		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2	-	-	2	3.6	7
	K2	2	-	-	2	3.6	
	K3	-	20	32	52	93	93
	K4	-	-	-	-	-	-
	Marks	4	20	32	56	100	100
CIA II	K1	2	-	-	2	3.6	7.2
	K2	2	-	-	2	3.6	
	K3	-	10	16	26	46.4	46.4
	K4	-	10	16	26	46.4	46.4
	Marks	4	20	32	56	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	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
2	CO2	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
3	CO3	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
4	CO4	K1 – K4	2	K1&K2	2 (K4&K4)	2 (K4&K4)
5	CO5	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(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 (Either or Choice**	**Section C (Either/ or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**5**	**-**	**-**	**5**	**3.6**	**7**
K2	**5**	**-**	**-**	**5**	**3.6**	
K3	**-**	**40**	**64**	**104**	**74.3**	**74**
K4	**-**	**10**	**16**	**26**	**18.5**	**19**
Marks	**10**	**50**	**80**	**140**	**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

Q. No.	**Unit**	**CO**	**K-level**		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO 1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO 1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO 2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO 2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO 3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO 3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO 4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO 4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO 5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO 5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions				**PART – B**	**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO 1**	**K3**		
			OR		
11. b)	**Unit - I**	**CO 1**	**K3**		
12. a)	**Unit - II**	**CO 2**	**K3**		
			OR		
12. b)	**Unit - II**	**CO 2**	**K3**		
13. a)	**Unit - III**	**CO 3**	**K3**		
			OR		
13. b)	**Unit - III**	**CO 3**	**K3**		
14. a)	**Unit - IV**	**CO 4**	**K4**		
			OR		
14. b)	**Unit - IV**	**CO 4**	**K4**		
15. a)	**Unit - V**	**CO 5**	**K3**		
			OR		
15. b)	**Unit - V**	**CO 5**	**K3**		

Answer **ALL** the questions				**PART – C**	**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO 1**	**K3**		
			OR		
16. b)	**Unit - I**	**CO 1**	**K3**		
17. a)	**Unit - II**	**CO 2**	**K3**		
			OR		
17. b)	**Unit - II**	**CO 2**	**K3**		
18. a)	**Unit - III**	**CO 3**	**K3**		
			OR		
18. b)	**Unit - III**	**CO 3**	**K3**		
19. a)	**Unit - IV**	**CO 4**	**K4**		
			OR		
19. b)	**Unit - IV**	**CO 4**	**K4**		
20. a)	**Unit - V**	**CO 5**	**K3**		
			OR		
20. b)	**Unit - V**	**CO 5**	**K3**		

Course Name	TROUBLESHOOTING AND MAINTENANCE OF HOME APPLIANCES			
Course Code	23UELNM11	**L**	**P**	**C**
Category	SKILL	2	-	2

COURSE OBJECTIVES:

- To enable the students to understand and gain the knowledge on Electronic components.
- To understand the use of measuring equipments.
- To understand the working concept of heater based home Appliances and how to handle troubleshooting and servicing Problem.
- Understanding the working concept of Motorised appliances and how to handle the troubleshooting and servicing Problem.
- To enable the students to understand and gain the knowledge on Refrigeration appliances and how to handle the troubleshooting and servicing Problem

UNIT - I ELECTRONIC COMPONENTS **06**

Introduction–Passive components–Transformer–Working principle–application–Active devices: Diode–Transistor– Analog IC–amplifier– oscillators and Digital ICs–logic gates–encoder– decoder.

UNIT - II EQUIPMENTSFORSERVICING **06**

Soldering Iron–Flux–lead–Zero defect soldering–Desoldering pump– soldering station–Basics of Multimeter–Measurement of current, voltage and resistance using multimeter–Checkingtransistors and diodes

UNIT - III HEATINGAPPLIANCES **06**

Heater types–working principle– Heating Rod–Iron Box–Iron box with steamer– Toasters– Geysers– Microwave Ovens– Oven –Disassembling and assembling procedure– Fault indicator– Testing and Troubleshooting methods

UNIT - IV MOTORISEDAPPLIANCES **06**

Types of Motors–DC and AC motor– Fans– mixers– blenders–wet grinders– circuit connection-testing methods. Washing machine–Electrical connections–assembly—Electrical connection–Testing and Troubleshooting methods

UNIT - V REFRIGERATIONAPPLIANCES **06**

Fridge– Electrical connection– Compressor–coolants–Automatic defrost circuits –Testing and troubleshooting of refrigerators–Air coolers and Air conditioners– Mounting and fixing of Air Conditioners–testing and troubleshooting methods.

Total Lecture Hours **30**

BOOKS FOR STUDY:

- Eric Kleinert, Troubleshooting and Repairing major appliances, McGraw Hill Professional, third edition,2012.

BOOKS FOR REFERENCES:

- S P Bali, Consumer Electronics, Pearson

WEB RESOURCES:

- **https://archive.nptel.ac.in/courses/112/105/112105248/**
- **https://archive.nptel.ac.in/courses/112/105/112105129/**
- **https://en.wikipedia.org/wiki/Washing_machine**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change	**100**	No Changes Made		New Course	✓		

***Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understanding the knowledge about electronics components.	**K1 to K2**
CO2	Understanding the usage of service equipments.	**K1 to K2**
CO3	Understanding the working concept of heater based home Appliances and how to handle troubleshooting and servicing Problem.	**K1 to K2**
CO4	Understanding the working concept of Motorised appliances and how to handle the troubleshooting and servicing Problem.	**K1 to K2**
CO5	Understanding the working concept of Refrigeration appliances and how to handle the troubleshooting and servicing Problem	**K1 to K2**

MAPPING WITH PROGRAM OUTCOMES:

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

3- STRONG **2 – MEDIUM** **1 - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**1**	**3**
CO 2	**3**	**2**	**3**	**1**	**1**
CO 3	**3**	**3**	**2**	**2**	**2**
CO 4	**3**	**2**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**2**
WEITAGE	**15**	**13**	**14**	**10**	**11**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100**	**86**	**93**	**66**	**73**

LESSON PLAN:

UNIT	COURSE NAME	HRS	PEDAGOGY
I	**ELECTRONICCOMPONENTS** Introduction–Passive components–Transformer–Working principle–application–Active devices: Diode–Transistor– Analog IC–amplifier– oscillators and Digital ICs–logic gates–encoder–decoder.	**06**	**Chalk & Talk, Power Point Presentation**
II	**EQUIPMENTSFORSERVICING** Soldering Iron–Flux–lead–Zero defect soldering–Desoldering pump– soldering station–Basics ofMultimeter–Measurementofcurrent,voltageandresistanceusingmultimeter–Checkingtransistorsand diodes	**06**	**Chalk & Talk, Power Point Presentation**
III	**HEATINGAPPLIANCES** Soldering Iron–Flux–lead–Zero defect soldering–Desoldering pump– soldering station–Basics of Multimeter–Measurement of current, voltage and resistance using multimeter–Checking	**06**	**Chalk & Talk, Power Point Presentation**

	transistors and diodes		
IV	**MOTORISEDAPPLIANCES** Heater types–working principle– Heating Rod–Iron Box–Iron box with steamer– Toasters– Geysers– Microwave Ovens– Oven – Disassembling and assembling procedure– Fault indicator– Testing and Troubleshooting methods	**06**	**Chalk & Talk, Power Point Presentation**
V	**REFRIGERATION APPLIANCES** Fridge– Electrical connection– Compressor–coolants– Automatic defrost circuits –Testing and troubleshooting of refrigerators–Air coolers and Air conditioners– Mounting and fixing of Air Conditioners–testing and troubleshooting methods.	**06**	**Chalk & Talk, Power Point Presentation**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	**Cos**	**K Level**	**Section A**	
			MCQs	
			No. of. Questions	**K - Level**
CI AI	**CO1**	**K1 – K2**	**25**	**K1,K2**
	CO2	**K1 – K2**	**25**	**K1,K2**
CI AII	**CO3**	**K1 – K2**	**25**	**K1,K2**
	CO4	**K1 – K2**	**25**	**K1,K2**
Question Pattern CIA I & II		**No. of Questions to be asked**	**50**	
		No. of Questions to be answered	**50**	
		Marks for each question	**1**	
		Total Marks for each section	**50**	

* Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (Ist Test-2 CO's & IInd Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II					
	K Level	**Section A (Multiple Choice Questions)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**30**	**30**	**60**	**100**
	K2	**20**	**20**	**40**	
	K3				
	K4				
	Marks	**50**	**50**	**100**	**100**
CIA II	**K1**	**30**	**30**	**60**	**100**
	K2	**20**	**20**	**40**	
	K3				
	K4				
	Marks	**50**	**50**	**100**	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)				
S. No	COs	K - Level	Section A (MCQs)	
			No. of Questions	K – Level
1	CO1	K1-K2	15	K1,K2
2	CO2	K1-K2	15	K1,K2
3	CO3	K1-K2	15	K1,K2
4	CO4	K1-K2	15	K1,K2
5	CO5	K1-K2	15	K1,K2
No. of Questions to be Asked			75	
No. of Questions to be answered			75	
Marks for each question			1	
Total Marks for each section			75	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidated %
K1	40	40	53	100
K2	35	35	47	
K3				
K4				
Marks		75	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				

Course Name	FUNDAMENTALS OF ELECTRICITY			
Course Code	23UELFC11	**L**	**P**	**C**
Category	FOUNDATION	2	-	2

COURSE OBJECTIVES:

- To enable the students to understand and gain the knowledge on fundamental electricity laws
- To understand the concept of coulombs theorem and Electric potential energy.
- To learn the working of capacitor and its types
- To understand the concept of Electrical Measurements of thermo EMF and Peltier Effect.
- To enable the students to understand and gain the knowledge on three phase AC Generators and distribution of Three phase AC

UNIT - I **06**

Introduction – Charges and Fields – Coulombs Law – Electric Field – Electric Dipole – Lines of force– Electric Potential–Electric Intensity—Gauss's Law–Differential form of Gauss Law –Applications of Gauss Law.

UNIT - II **06**

Coulombs Theorem–Potential Difference–Electric potential as line Integral of Electric Field– –Electric Potential Energy–Electrical Images.

UNIT - III **06**

Capacitors – Principle of Capacitor – Capacitance of a Spherical Capacitor- Outer and Innersphere earthed – Capacitance of a Cylindrical and Parallel plate capacitor – Effect of Dielectric –Capacitorsin Series andParallel– Typesof Capacitors.

UNIT - IV **06**

Electrical Measurements – Carey Foster Bridge – Potentiometer – Measurement of Thermo EMF using Potentiometer–Peltier Effect–Demonstration of Peltier effect–Thomson effect–Thermodynamics of Thermocouple – Thermo electric Diagrams– Uses.

UNIT - V **06**

Three phase AC Generators – Distribution of three phase AC – AC Dynamo Generator – DC Dynamo – Field Excitation – DC Motor – Magnetic Properties of Materials – Properties of Diamagnetic Materials-Electron Theory of Magnetism –Langevin‟s Theory of Diamagnetism.

Total Lecture Hours **30**

BOOKS FOR STUDY:

- Electricityand magnetism, R Murugeshan,S. Chand &CompanyLtd, 1995.
- Electricity&Magnetism,D.L.Sehgal,K.L.Chopra,N.K.Shegal.

BOOKS FOR REFERENCES:

- Fundamentals of magnetism and Electricity, D.N. Vasudeva S. Chand &CompanyLtd, 2011.

WEB RESOURCES:

- **https://archive.nptel.ac.in/content/storage2/courses**
- **https://www.vedantu.com/physics/capacitor-and-capacitance.**
- **https://unacademy.com/content/jee/study-material/physics/ac-and-dc-generator/**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change		No Changes Made		New Course	✓		

***Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Acquire the knowledge on fundamental laws in electricity.	**K1 to K2**
CO2	Understand concepts of coulombs theorem and Electric potential energy.	**K1 to K2**
CO3	Gain the knowledge about principles and types of capacitor	**K1 to K2**
CO4	Summarize the concept on Electrical Measurements of thermo EMF and Peltier Effect.	**K1 to K2**
CO5	Understand the basic principles on three phase AC Generators and distribution of three phases.	**K1 to K2**

MAPPING WITH PROGRAM OUTCOMES:

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

3- STRONG **2 – MEDIUM** **1 - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**1**	**3**
CO 2	**3**	**2**	**2**	**1**	**1**
CO 3	**3**	**3**	**2**	**2**	**2**
CO 4	**3**	**2**	**3**	**3**	**3**
CO 5	**2**	**3**	**2**	**3**	**2**
WEITAGE	**14**	**13**	**12**	**10**	**11**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**93**	**86**	**80**	**66**	**73**

LESSON PLAN:

UNIT	COURSE NAME	HRS	PEDAGOGY
I	Introduction – Charges and Fields – Coulombs Law – Electric Field – Electric Dipole – Lines of force–Electric Potential–Electric Intensity—Gauss's Law–Differential form of Gauss Law – Applications of Gauss Law	**06**	**Chalk & Talk, Power Point Presentation**
II	Coulombs Theorem–Potential Difference–Electric potential as line Integral of Electric Field—Electric Potential Energy–Electrical Images.	**06**	**Chalk & Talk, Power Point Presentation**
III	Capacitors – Principle of Capacitor – Capacitance of a Spherical Capacitor- Outer and Innersphere earthed – Capacitance of a Cylindrical and Parallel plate capacitor – Effect of Dielectric – Capacitorsin Series andParallel– Typesof Capacitors.	**06**	**Chalk & Talk, Power Point Presentation**
IV	Electrical Measurements – Carey Foster Bridge – Potentiometer – Measurement of Thermo EMF using Potentiometer–Peltier Effect–Demonstration of Peltier effect–Thomson effect–Thermodynamics of Thermocouple – Thermo electric Diagrams–Uses.	**06**	**Chalk & Talk, Power Point Presentation**

V	Three phase AC Generators – Distribution of three phase AC – AC Dynamo Generator – DCDynamo – Field Excitation – DC Motor – Magnetic Properties of Materials – Properties of Diamagnetic Materials-Electron Theory of Magnetism – Langevin"s Theory of Diamagnetism.	**06**	**Chalk & Talk, Power Point Presentation**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	**Cos**	**K Level**	**Section A**	
			MCQs	
			No. of. Questions	**K - Level**
CI AI	**CO1**	**K1 – K2**	**25**	**K1,K2**
	CO2	**K1 – K2**	**25**	**K1,K2**
CI AII	**CO3**	**K1 – K2**	**25**	**K1,K2**
	CO4	**K1 – K2**	**25**	**K1,K2**
Question Pattern CIA I & II		**No. of Questions to be asked**	**50**	
		No. of Questions to be answered	**50**	
		Marks for each question	**1**	
		Total Marks for each section	**50**	

* Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (I^{st} Test-2 CO's & II^{nd} Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II					
	K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100
CIA II	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)				
S. No	COs	K - Level	Section A (MCQs)	
			No. of Questions	K – Level
1	CO1	K1-K2	15	K1,K2
2	CO2	K1-K2	15	K1,K2
3	CO3	K1-K2	15	K1,K2
4	CO4	K1-K2	15	K1,K2
5	CO5	K1-K2	15	K1,K2
No. of Questions to be Asked			75	
No. of Questions to be answered			75	
Marks for each question			1	
Total Marks for each section			75	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	**Section A (Multiple Choice Questions)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**40**	**40**	**53**	**100**
K2	**35**	**35**	**47**	
K3				
K4				
Marks		**75**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				

Course Name	ELECTRONIC MEASUREMENTS			
Course Code	23UELSC11	**L**	**P**	**C**
Category	SKILL	2	-	2

COURSE OBJECTIVES:

- To enable the students to understand and gain knowledge of units and standards used in measurements.
- To understand the measurement of Voltage,CurrentandPower.
- To understand the measurement of Resistance, Inductance and Capacitance
- To understand the concepts of Frequency and Period measurements.
- To enable the students to understand and gain knowledge on waveforms and phase measurements.

UNIT - I INDICATINGINSTRUMENTS **06**

Review of Fundamental and derived units–Measurement Errors–Standards of Measurements–Ammeters, Volt meters, Watt meter and Energy meters–DVM - Digital microvolt meter.

UNIT - II VOLTAGE,CURRENTANDPOWER **06**

Measurement of direct current and voltage–Methods of measuring alternating voltage and currents– Power measuring techniques–Bolometer method–Calorimeter method

UNIT - III RLCMEASUREMENTS **06**

DC resistance–AC Wheatstone bridge–Wien bridge,Twin-T and Bridged,T-null networks–Resistance and Q of resonant circuit–Measurement of low value capacitance

UNIT - IV FREQUENCYANDPERIODMEASUREMENTS **06**

Standards of frequency–Comparison method–Heterodyne frequency meter–Capacitor charge –discharge method –Digital Frequency meter.

UNIT - V WAVEFORMAND PHASEMEASUREMENTS **06**

Wave and distortion analyzers for audio frequency waves–Phase measurements using oscilloscope– Null balance method – Phase shift to pulse conversion method

Total Lecture Hours **30**

BOOKS FOR STUDY:

- SawhneyA.K.,"AcourseinElectricalandElectronicMeasurementsandInstrumentation",Dhanpati Rai&Sons, 11th edition, 1995.
- KushmirE.,"RadioMeasurements"MIRPublishers,Moscow,1978.

BOOKS FOR REFERENCES:

- Terman, F.E., and Petit J. M.,"ElectronicMeasurements"McGrawHillBookCo.,1984.
- CooperW.D.,"ElectronicInstrumentationandMeasurementTechniques",PrenticeHallIndia,3rdRe print 1995.

WEB RESOURCES:

- **http://nptel.ac.in/courses/10815064/http://nptel.ac.in/courses/108105062/**
- **https://archive.nptel.ac.in/courses/108/105/108105153/**
- **https://onlinecourses.nptel.ac.in/noc19_ee44/preview**

Nature of Course	EMPLOYABILITY			SKILL ORIENTED	✓		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		✓	GLOBAL		
Changes Made in the Course	Percentage of Change	**100%**		No Changes Made			New Course		✓	

***Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Recognize the evolution and history of units and standards in measurements	**K1 to K2**
CO2	Gain the knowledge about measurement of Voltage, Current and Power	**K1 to K2**
CO3	Identify the various parameters that are measurable in Electronics Instrumentation	**K1 to K2**
CO4	Understand the concepts of Frequency and Period measurements.	**K1 to K2**
CO5	Understand and gain knowledge on waveforms and phase measurements.	**K1 to K2**

MAPPING WITH PROGRAM OUTCOMES:

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

3- STRONG **2 – MEDIUM** **1 - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**2**	**3**
CO 2	**3**	**2**	**3**	**2**	**1**
CO 3	**3**	**3**	**2**	**2**	**2**
CO 4	**3**	**2**	**3**	**3**	**3**
CO 5	**2**	**3**	**3**	**3**	**2**
WEITAGE	**14**	**13**	**14**	**12**	**11**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**96**	**86**	**93**	**80**	**73**

LESSON PLAN:

UNIT	COURSE NAME	HRS	PEDAGOGY
I	ReviewofFundamentalandderivedunits–Measurementerrors–Standardsofmeasurements–Ammeters,Voltmeters,Wattmeterand Energymeters–DVM - Digital microvoltmeter.	**06**	**Chalk & Talk, Power Point Presentation**
II	Measurementofdirectcurrentandvoltage–methodsofmeasuringalternatingvoltageandcurrents–Powermeasuringtechniques–Bolometer method–Calorimeter method	**06**	**Chalk & Talk, Power Point Presentation**
III	DCresistance–ACwhetstonebridge–Wienbridge,Twin-TandBridged,Tnullnetworks–Resistanceand Q ofresonant circuit–measurement of lowvalue capacitance	**06**	**Chalk & Talk, Power Point Presentation**
IV	Standardsoffrequency–Comparisonmethod–Heterodynefrequencymeter–Capacitorcharge–dischargemethod –Digital Frequencymeter.	**06**	**Chalk & Talk, Power Point Presentation**

V	Waveanddistortionanalyzersforaudiofrequencywaves– Phasemeasurementsusingoscilloscope– Null balancemethod – Phaseshift to pulseconversion method	**06**	**Chalk & Talk, Power Point Presentation**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	**Cos**	**K Level**	**Section A**	
			MCQs	
			No. of. Questions	**K - Level**
CI AI	**CO1**	**K1 – K2**	**25**	**K1,K2**
	CO2	**K1 – K2**	**25**	**K1,K2**
CI AII	**CO3**	**K1 – K2**	**25**	**K1,K2**
	CO4	**K1 – K2**	**25**	**K1,K2**
Question Pattern CIA I & II		**No. of Questions to be asked**	**50**	
		No. of Questions to be answered	**50**	
		Marks for each question	**1**	
		Total Marks for each section	**50**	

* Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (Ist Test-2 CO's & IInd Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II					
	K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100
CIA II	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)				
S. No	COs	K - Level	Section A (MCQs)	
			No. of Questions	K – Level
1	CO1	K1-K2	15	K1,K2
2	CO2	K1-K2	15	K1,K2
3	CO3	K1-K2	15	K1,K2
4	CO4	K1-K2	15	K1,K2
5	CO5	K1-K2	15	K1,K2
No. of Questions to be Asked			75	
No. of Questions to be answered			75	
Marks for each question			1	
Total Marks for each section			75	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	**Section A (Multiple Choice Questions)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**40**	**40**	**53**	**100**
K2	**35**	**35**	**47**	
K3				
K4				
Marks		**75**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				

Course Name	ELECTRONIC DEVICES AND CIRCUITS LAB			
Course Code	23UELCP21	**L**	**P**	**C**
Category	CORE	-	2	-

COURSE OBJECTIVES:

- TounderstandtheV-I characteristics of electronicdevices.
- Tomakeamplifier and oscillator circuit by use ofelectronic components.
- Toconstructfewapplication circuitsusingsemiconductordevices.
- Tostudythecharacteristics of Operational Amplifier and its uses.
- Tolearnthesimulation of AC and DC Circuits.

Any12Experiments

1. Characteristicsofjunctiondiode.
2. CharacteristicsofZener diode.
3. RCCoupledamplifier
4. Feedbackamplifier
5. Hartleyoscillator
6. Colpitt oscillator
7. CharacteristicofUJT
8. CharacteristicsofSCRandSCRPowercontrol
9. JFETCharacteristics
10. Op-ampcharacteristics
11. Op-ampamplifiers
12. Differentialamplifier,Bridgeamplifiers, Instrumentationamplifier
13. Waveformgenerators
14. Op-ampfilters
15. VoltageControlledOscillator
16. StudyofcircuitanalysisPSPICE
17. SimulationofDCcircuits
18. SimulationofACcircuits
19. Halfandfullwaverectifiers
20. Dual power supply

BOOKS FOR STUDY:

- MicroelectronicsLaboratoryusingsoftwaretoolsPSPICE,
- ORCAD,MULTISIMbyMuhammadH.Rashid-CENGAGELearning-2016

BOOKS FOR REFERENCES:

- **Practical Physics and Electronics,** C.C.Ouseph, U.J.Rao and V.Vijayendran

WEB RESOURCES:

- **https://nptel.ac.in/courses/122/106/122106025/**
- **https://nptel.ac.in/courses/122/106/122106026/**

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change	**50 %**	No Changes Made		New Course			
***Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**								

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the V-I characteristics of Electronic components.	**K1 to K4**
CO2	Construct the amplifier and oscillator circuits	**K1 to K4**
CO3	Construct the rectifier and operational amplifier circuits	**K1 to K4**
CO4	Use diodes, transistors, optical devices for various applications	**K1 to K4**
CO5	Understand the Simulation concepts of AC and DC circuits.	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:

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

3- Advanced Application 2 – Intermediate Development1 – Introductory Level

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5

CO 1	**3**	**3**	**3**	**1**	**3**
CO 2	**3**	**2**	**3**	**1**	**1**
CO 3	**3**	**3**	**2**	**2**	**2**
CO 4	**3**	**2**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**2**
WEITAGE	**15**	**13**	**14**	**10**	**11**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100**	**86**	**93**	**66**	**73**

LESSON PLAN:

UNIT	COURSE NAME	HRS	PEDAGOGY
I	Characteristicsofjunctiondiode. CharacteristicsofZener diode. Common Emitter transistor characteristics Transistor amplifier	**12**	**Practical**
II	CharacteristicsofJFET CharacteristicsofUJT CharacteristicsofSCR	**12**	**Practical**
III	Half wave and Full wave rectifier circuits Bridge rectifier circuit IC regulated power supply	**12**	**Practical**
IV	Inverting and Non- inverting amplifier Summing and differential amplifier Wave form generator using op-amp IC	**12**	**Practical**
V	Hartley oscillator Colpitt oscillator Dual power supply	**12**	**Practical**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	**Cos**	**K Level**	**Aim and Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**
CI AI	**CO1**	**K1**	**5**				
	CO2	**K2**		**5**			
	CO3	**K3**			**5**		
	CO4	**K3**				**5**	
	CO5	**K4**					**5**
Question Pattern CIA		No. of Questions to be asked	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
		Total Marks for each section	**5**	**5**	**5**	**5**	**5**

Distribution of Marks with K Level CIA									
	K Level	**Aim and Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	**5**					**5**	**20**	**20**
	K2		**5**				**5**	**20**	**20**
	K3			**5**	**5**		**10**	**40**	**40**
	K4					**5**	**5**	**20**	**20**
	Marks						**25**	**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

CO 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)							
Internal	**Cos**	**K Level**	**Aim & Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**
CI AI	**CO1**	**K1**	**15**				
	CO2	**K2**		**15**			
	CO3	**K3**			**15**		
	CO4	**K3**				**15**	
	CO5	**K4**					**15**
Question Pattern		No. of Questions to be asked	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**7.5**	**7.5**	**7.5**	**7.5**	**7.5**
		Total Marks for each section	**15**	**15**	**15**	**15**	**15**

Distribution of Marks with K Level								
K Level	**Aim & Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	15					**15**	**20**	**20**
K2		15				**15**	**20**	**20**
K3			15	15		30	40	40
K4					15	15	20	20
Marks						**75**	**100**	**100**

Course Name	APPLIED PHYSICS LAB			
Course Code	23UELEP21	L	P	C
Category	ALLIED	-	2	

COURSE OBJECTIVES:

- To study the calibration of voltmeterandand ammeter using potentiometer.
- To determine the resonance frequency and Q factor in an electrical circuit.
- To understand the V-I characteristic of photovoltaic cell.
- To construct and study the filters.
- To learn how to determine the capacitance and inductance using LCR circuit.

Any12Experiments

1. Potentiometer–calibrationoflowrange ammeter
2. Potentiometer–calibration oflow rangevoltmeter
3. Seriesresonancecircuit–resonancefrequency,Qfactor
4. Potentiometer–calibrationoflowrange ammeter
5. Potentiometer–calibration oflow rangevoltmeter
6. Seriesresonancecircuit–resonancefrequency,Qfactor
   Determinationofthephotovoltaiccellcharacteristics
7. CareyFoster Bridge-determinationofspecificresistance
8. Studyof capacitorfilters and ∏filters
9. LowpassandHighpassfilters
10. DifferentiatingandIntegratingcircuits
11. Usesof CRO– Measurements ofvoltage, current, frequency,phaseanddelaytimes etc.,
12. Temperaturecoefficientofathermistor

BOOKS FOR STUDY:

- A Text of Practical Physics, M.N. Srinivasan, S. Balasubramanian and R. Ranganathan, Sulthan Chand & Sons

BOOKS FOR REFERENCES:

- **Practical Physics and Electronics,** C.C.Ouseph, U.J.Rao and V.Vijayendran

WEB RESOURCES:

- **https://srmvdpcsea2016.files.wordpress.com/2016/09/experiment-61.pdf**
- **https://www.scribd.com/document/70070448/Specific-Resistance-by-CareyFoster-s-Bridge**
- **https://psbrahmachary.files.wordpress.com/2009/05/thermistor.pdf**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change	**100 %**	No Changes Made		New Course	✓		

***Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the principles of calibration of voltmeter ammeter using potentiometer.	**K1 to K4**
CO2	Understand to measure the resonance frequency and Q factor in an electrical circuit.	**K1 to K4**
CO3	Understand the V-I characteristic of photovoltaic cell.	**K1 to K4**
CO4	Understand to construct the filters and integrating circuit.	**K1 to K4**
CO5	Able to measure the capacitance and inductance using LCR circuit	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:

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

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

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**1**	**1**
CO 2	**2**	**2**	**3**	**2**	**2**
CO 3	**3**	**3**	**2**	**2**	**2**
CO 4	**2**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**2**
WEITAGE	**13**	**14**	**14**	**11**	**10**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**86**	**93**	**93**	**73**	**67**

LESSON PLAN:

UNIT	COURSE NAME	HRS	PEDAGOGY
I	1. Potentiometer–calibration of low range ammeter 2. Potentiometer–calibration of low range voltmeter 3. Series resonance circuit– resonance frequency, factor	**12**	**Practical**
II	4. Potentiometer– calibration no flow range ammeter 5. Potentiometer–calibration of low range voltmeter 6. Series resonance circuit– resonance frequency, factor	**12**	**Practical**
III	7. Determination of the photo voltaic cell characteristics 8. Carey Foster Bridge - determination of specific resistance 9. Study of capacitor filters and ∏filters	**12**	**Practical**
IV	10. Low pass and High pass filters 11. Differentiating and Integrating circuits 12. Uses of CRO– Measurements of voltage, current, frequency,	**12**	**Practical**
V	13. Phase and delay times etc., 14.Temperature coefficient of at thermistor	**12**	**Practical**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	**Cos**	**K Level**	**Aim and Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**
CI AI	**CO1**	**K1**	**5**				
	CO2	**K2**		**5**			
	CO3	**K3**			**5**		
	CO4	**K3**				**5**	
	CO5	**K4**					**5**
Question Pattern CIA		No. of Questions to be asked	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
		Total Marks for each section	**5**	**5**	**5**	**5**	**5**

.Distribution of Marks with K Level CIA									
	K Level	**Aim and Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	**5**					**5**	**20**	**20**
	K2		**5**				**5**	**20**	**20**
	K3			**5**	**5**		**10**	**40**	**40**
	K4					**5**	**5**	**20**	**20**
	Marks						**25**	**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

CO 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)							
Internal	**Cos**	**K Level**	**Aim & Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**
CI AI	**CO1**	**K1**	**15**				
	CO2	**K2**		**15**			
	CO3	**K3**			**15**		
	CO4	**K3**				**15**	
	CO5	**K4**					**15**
Question Pattern		No. of Questions to be asked	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**7.5**	**7.5**	**7.5**	**7.5**	**7.5**
		Total Marks for each section	**15**	**15**	**15**	**15**	**15**

Distribution of Marks with K Level								
K Level	**Aim & Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**15**					**15**	**20**	**20**
K2		**15**				**15**	**20**	**20**
K3			**15**	**15**		**30**	**40**	**40**
K4					**15**	**15**	**20**	**20**
Marks						**75**	**100**	**100**


SECOND SEMESTER

Course Name	ELECTRONIC CIRCUITS			
Course Code	23UELCC21	**L**	**P**	**C**
Category	CORE	4	-	4

COURSE OBJECTIVES:

- To gain knowledge on rectifiers and regulators.
- To acquaint the students with construction, theory and characteristics of the electronic amplifier circuits.
- To learn the working principles of feedback amplifier.
- To understand and the working principles of harmonic oscillator
- To enable the students understand and in the knowledge on power amplifier

UNIT - I POWERSUPPLIES **12**

Rectifiers – Half wave and full wave rectifiers – Average and RMS values – Ripple factor – Regulation – Rectification efficiency – Transformer utility factor – filters – inductor, capacitor,L-type, PI type – Ripple factor and regulation – Need for voltage regulation – series and shuntregulators– Comparison–Current limited and protectioncircuits.

UNIT - II SMALLSIGNALAMPLIFIERS **12**

Generalprincipleofoperation–classification–RCCoupledamplifiers–Gainfrequencyresponse – Input, output impedance calculation. Transformer coupled amplifier – Equivalentcircuitat low, medium and high frequencies– Analysis andfrequencyresponse.

UNIT - III FEEDBACKAMPLIFIERS **12**

Basicconceptsoffeedbackamplifiers–characteristics–Effectofnegativefeedbackongain,gainstability, distortion andbandwidth– voltageand current feedbackcircuits.

UNIT - IV HARMONICOSCILLATORS **12**

BarkhausenCriteria–Hartley,ClappandColpitt'soscillator–
RCphaseshiftoscillator,Weinbridgeoscillator– Frequencystabilityof oscillators– Crystal oscillators.

UNIT - V POWERAMPLIFIERS **12**

Classification – Class A, Class B, Class C single ended and push pull operation – complementary symmetry power amplifiers.

Total Lecture Hours	**60**

BOOKS FOR STUDY:

- S.Salivahanan, N. SureskumarandA.Vallavaraj,"ElectronicDevicesandCircuits",TMH, 1998.
- MillmanandHalkias,"EleectronicdeviceandCircuits",McGrawHill,Vreprint,1993.

BOOKS FOR REFERENCES:

- V. K. Mehta, Principles of Electronics, S.Chand publications, Delhi, eleventh edition2000.
- R.S.Sedha,**AppliedElectronics**,S.Chand&CompanyLtd,NewDelhi,firstEdition,1990

WEB RESOURCES:

- **http://www.ee.iitm.ac.in/~ani/2012/ec5135/lectures.htmlLectureNotes**
- **https://nptel.ac.in/courses/108/102/108102097/#IntroductiontoElectroniccircuitsNPTEL.**
- **https://nptel.ac.in/courses/108/102/108102095/AnalogElectroniccircuitsNPTEL.**

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED			ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		✓	GLOBAL		
Changes Made in the Course	Percentage of Change		**40**	No Changes Made			New Course			

***Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand theconceptsofrectifiersandregulators	**K1 to K4**
CO2	Summarizeaboutsmallsignalamplifiers	**K1 to K4**
CO3	Distinguishtheperformanceofnegativeaswellaspositivefeedbackcircuits	**K1 to K4**
CO4	Analysethefunctionsofharmonic oscillator	**K1 to K4**
CO5	Analysethefunctionsofpoweramplifiers	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:

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

3- STRONG **2 – MEDIUM** **1 - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**1**	**3**
CO 2	**3**	**2**	**3**	**1**	**1**
CO 3	**3**	**3**	**2**	**2**	**2**
CO 4	**3**	**2**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**2**
WEITAGE	**15**	**13**	**14**	**10**	**11**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100**	**86**	**93**	**66**	**73**

LESSON PLAN:

UNIT	COURSE NAME	HRS	PEDAGOGY
I	**POWERSUPPLIES** Rectifiers – Half wave and full wave rectifiers – Average and RMS values – Ripple factor –Regulation – Rectification efficiency – Transformer utility factor – filters – inductor, capacitor,L-type, PI type – Ripple factor and regulation – Need for voltage regulation – series and shuntregulators– Comparison–Current limited and protectioncircuits.	**12**	**Chalk & Talk, Power Point Presentation**
II	**SMALLSIGNALAMPLIFIERS** Generalprincipleofoperation–classification– RCCoupledamplifiers–Gainfrequencyresponse – Input, output impedance calculation. Transformer coupled amplifier – Equivalentcircuitat low, medium and high frequencies– Analysis andfrequencyresponse.	**12**	**Chalk & Talk, Power Point Presentation**
III	**FEEDBACKAMPLIFIERS**	**12**	**Chalk & Talk, Power Point Presentation**

	Basicconceptsoffeedbackamplifiers–characteristics– Effectofnegativefeedbackongain,gainstability, distortion andbandwidth– voltageand current feedbackcircuits.		
IV	**HARMONICOSCILLATORS** BarkhausenCriteria–Hartley,ClappandColpitt‟soscillator– RCphaseshiftoscillator,Weinbridgeoscillator– Frequencystabilityof oscillators– crystal oscillators.	**12**	**Chalk & Talk, Power Point Presentation**
V	**POWERAMPLIFIERS** Classification – Class A, Class B, Class C single ended and push pull operation – complementarysymmetrypoweramplifiers. .	**12**	**Chalk & Talk, Power Point Presentation**

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 Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	2	K1&K2	2 (K3&K3)	2 (K3&K3)
	CO2	**K1 – K4**	2	K1&K2	2 (K3&K3)	2 (K3&K3)
CI AII	**CO3**	**K1 – K4**	2	K1&K2	2 (K3&K3)	2 (K3&K3)
	CO4	**K1 – K4**	2	K1&K2	2 (K4&K4)	2 (K4&K4)
Question Pattern CIA I & II		**No. of Questions to be asked**	4		4	4
		No. of Questions to be answered	1		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2	-	-	2	3.6	7
	K2	2	-	-	2	3.6	
	K3	-	20	32	52	93	93
	K4	-	-	-	-	-	-
	Marks	4	20	32	56	100	100
CIA II	K1	2	-	-	2	3.6	7.2
	K2	2	-	-	2	3.6	
	K3	-	10	16	26	46.4	46.4
	K4	-	10	16	26	46.4	46.4
	Marks	4	20	32	56	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	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
2	CO2	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
3	CO3	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
4	CO4	K1 – K4	2	K1&K2	2 (K4&K4)	2 (K4&K4)
5	CO5	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(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 (Either or Choice**	**Section C (Either/ or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**5**	**-**	**-**	**5**	**3.6**	**7**
K2	**5**	**-**	**-**	**5**	**3.6**	
K3	**-**	**40**	**64**	**104**	**74.3**	**74**
K4	**-**	**10**	**16**	**26**	**18.5**	**19**
Marks	**10**	**50**	**80**	**140**	**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

Q. No.	**Unit**	**CO**	**K-level**		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO 1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO 1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO 2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO 2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO 3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO 3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO 4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO 4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO 5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO 5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions				**PART – B**	**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO 1**	**K3**		
			OR		
11. b)	**Unit - I**	**CO 1**	**K3**		
12. a)	**Unit - II**	**CO 2**	**K3**		
			OR		
12. b)	**Unit - II**	**CO 2**	**K3**		
13. a)	**Unit - III**	**CO 3**	**K3**		
			OR		
13. b)	**Unit - III**	**CO 3**	**K3**		
14. a)	**Unit - IV**	**CO 4**	**K4**		
			OR		
14. b)	**Unit - IV**	**CO 4**	**K4**		
15. a)	**Unit - V**	**CO 5**	**K3**		
			OR		
15. b)	**Unit - V**	**CO 5**	**K3**		

Answer **ALL** the questions				**PART – C**	**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO 1**	**K3**		
			OR		
16. b)	**Unit - I**	**CO 1**	**K3**		
17. a)	**Unit - II**	**CO 2**	**K3**		
			OR		
17. b)	**Unit - II**	**CO 2**	**K3**		
18. a)	**Unit - III**	**CO 3**	**K3**		
			OR		
18. b)	**Unit - III**	**CO 3**	**K3**		
19. a)	**Unit - IV**	**CO 4**	**K4**		
			OR		
19. b)	**Unit - IV**	**CO 4**	**K4**		
20. a)	**Unit - V**	**CO 5**	**K3**		
			OR		
20. b)	**Unit - V**	**CO 5**	**K3**		

Course Name	ELECTRONIC DEVICES AND CIRCUITS LAB			
Course Code	23UELCP21	**L**	**P**	**C**
Category	CORE	-	2	2

COURSE OBJECTIVES:

- TounderstandtheV-I characteristics of electronicdevices.
- Tomakeamplifier and oscillator circuit by use ofelectronic components.
- Toconstructfewapplication circuitsusingsemiconductordevices.
- Tostudythecharacteristics of Operational Amplifier and its uses.
- Tolearnthesimulation of AC and DC Circuits.

Any12Experiments

1. Characteristicsofjunctiondiode.
2. CharacteristicsofZener diode.
3. RCCoupledamplifier
4. Feedbackamplifier
5. Hartleyoscillator
6. Colpitt oscillator
7. CharacteristicofUJT
8. CharacteristicsofSCRandSCRPowercontrol
9. JFETCharacteristics
10. Op-ampcharacteristics
11. Op-ampamplifiers
12. Differentialamplifier,Bridgeamplifiers, Instrumentationamplifier
13. Waveformgenerators
14. Op-ampfilters
15. VoltageControlledOscillator
16. StudyofcircuitanalysisPSPICE
17. SimulationofDCcircuits
18. SimulationofACcircuits
19. Halfandfullwaverectifiers
20. Dual power supply

BOOKS FOR STUDY:

- Microelectronics Laboratory using software tools PSPICE,
- ORCAD,MULTISIMbyMuhammadH.Rashid-CENGAGELearning-2016

BOOKS FOR REFERENCES:

- **Practical Physics and Electronics,** C.C.Ouseph, U.J.Rao and V.Vijayendran

WEB RESOURCES:

- **https://nptel.ac.in/courses/122/106/122106025/**
- **https://nptel.ac.in/courses/122/106/122106026/**

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change	**50 %**	No Changes Made		New Course			

***Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the V-I characteristics of Electronic components.	**K1 to K4**
CO2	Construct the amplifier and oscillator circuits	**K1 to K4**
CO3	Construct the rectifier and operational amplifier circuits	**K1 to K4**
CO4	Use diodes, transistors, optical devices for various applications	**K1 to K4**
CO5	Understand the Simulation concepts of AC and DC circuits.	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:

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

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

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**1**	**3**
CO 2	**3**	**2**	**3**	**1**	**1**
CO 3	**3**	**3**	**2**	**2**	**2**
CO 4	**3**	**2**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**2**
WEITAGE	**15**	**13**	**14**	**10**	**11**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100**	**86**	**93**	**66**	**73**

LESSON PLAN:

UNIT	COURSE NAME	HRS	PEDAGOGY
I	Characteristics of junction diode. Characteristics of Zener diode. Common Emitter transistor characteristics Transistor amplifier	**12**	**Practical**
II	Characteristics of JFET Characteristics of UJT Characteristics of SCR	**12**	**Practical**
III	Half wave and Full wave rectifier circuits Bridge rectifier circuit IC regulated power supply	**12**	**Practical**
IV	Inverting and Non- inverting amplifier Summing and differential amplifier Wave form generator using op-amp IC	**12**	**Practical**
V	Hartley oscillator Colpitt oscillator Dual power supply	**12**	**Practical**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	**Cos**	**K Level**	**Aim and Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**
CI AI	**CO1**	**K1**	**5**				
	CO2	**K2**		**5**			
	CO3	**K3**			**5**		
	CO4	**K3**				**5**	
	CO5	**K4**					**5**
Question Pattern CIA		No. of Questions to be asked	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
		Total Marks for each section	**5**	**5**	**5**	**5**	**5**

Distribution of Marks with K Level CIA									
	K Level	**Aim and Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	**5**					**5**	**20**	**20**
	K2		**5**				**5**	**20**	**20**
	K3			**5**	**5**		**10**	**40**	**40**
	K4					**5**	**5**	**20**	**20**
	Marks						**25**	**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

CO 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)							
Internal	**Cos**	**K Level**	**Aim & Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**
CI AI	**CO1**	**K1**	**15**				
	CO2	**K2**		**15**			
	CO3	**K3**			**15**		
	CO4	**K3**				**15**	
	CO5	**K4**					**15**
Question Pattern		No. of Questions to be asked	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**7.5**	**7.5**	**7.5**	**7.5**	**7.5**
		Total Marks for each section	**15**	**15**	**15**	**15**	**15**

Distribution of Marks with K Level								
K Level	**Aim & Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	15					**15**	**20**	**20**
K2		15				**15**	**20**	**20**
K3			15	15		30	40	40
K4					15	15	20	20
Marks						**75**	**100**	**100**

Course Name	BASIC MATHEMATICS			
Course Code	23UMTEA24	**L**	**P**	**C**
Category	CORE	4	-	4

COURSE OBJECTIVES:

- To enable the students can understand the concepts of Divergence of a Vector Function , Important Vector Identities and related theorem
- This course introduces the abstract concepts of matrices.
- To study the basic concepts of complex number .
- Introduce the basic knowledge of differential equation and related problems.
- To enable the students to study fourior transforms and some concepts of properties fourier transform and properties of laplace transform.

UNIT - I VECTORS **12**

Gradient of a Scalar Field- Divergence of a Vector Function- Curl of a Vector Function and its Physical Significance- Important Vector Identities- Gauss Divergence Theorem(Statement and simple Problem only)- Deductions from Gauss Divergence Theorem(Statement and simple Problem only)- Stoke's Theorem(Statement and simple Problem only)- Deductions from Stoke's Theorem(Statement and simple Problem only)- Green‟s Theorem(Statement and simple Problem only)- Green‟s Theorem in a plane(Statement and simple Problem only).

UNIT - II MATRICES **12**

Rank of a Matrix- Vector as Matrices and Vector-spaces- Solutions of Linear Equations- Linear Transformations-Similarity Transformation- Eigen Values, Eigen-Vector; Characteristic Equation of a Matrix.

UNIT - III COMPLEX NUMBERS **12**

Complex Numbers- Review of Algebraic Operations of Complex Numbers- Complex Conjugates- Modulus and Argument of a Complex Numbers- Graphical Representation on Argand Diagram and Trigonometric Form- Some Definitions Underlying Complex Analysis- Functions of Complex Variable- Limit, Continuity and Differentiability- Definition: Analytic Function- The Necessary and Sufficient Conditions for f(z) to be Analytic: Cauchy-Riemann Differential Equations.

UNIT - IV DIFFERENTIAL EQUATIONS **12**

Order and Degree of a Differential Equation- Solution of First Order Differential Equation by the Method of Separation of Variables- Linear Differential Equation of First Order and its Solution.

UNIT - V FOURIER TRANSFORMAND LAPLACE TRANSFORM **12**

Properties of Fourier Transform-Fourier Transform of a Derivative-Fourier and cosine Transform of Derivatives (simple problem) - Laplace Transform- Properties of Laplace Transforms- Laplace Transform of Derivatives of a Function (simple problem).

Total Lecture Hours **60**

BOOKS FOR STUDY:

- Mathematical Physics – H.K.Dass, Dr. Rama verma -S.Chand& Company Pvt.Ltd.(Sixth Revised Edition, 2013)

Unit 1

Chapter 2- sections 2.1-2.11

Chapter 3-sections 3.1-3.9

Unit 2

Chapter 39 – sections 39.1 - 39.3

Chapter 40-sections 40.2,40.3

Chapter 41- Sectons 41.1 - 41.3

Unit 3

Chapter 20 – Sections 20.1 - 20.15

Chapter 22 – Sections 22.1 - 22.12

Unit 4

Chapter 13 – Sections 13.1 - 13.3

Chapter 12 – Sections 12.1 - 12.7

Chapter 14 – Sections 14.3

Unit 5

Chapter 45 – Sections 45.1 - 45.8,45.13,45.17,45.18

- **Chapter 46 – Sections 46.1 - 46.4,46.8 - 46.19**

BOOKS FOR REFERENCES:

- Mathematical Physics with Classical Mechanics – SathyaPrakash (Sultan Chand & Sons Sixth Revised edition 2012).
- Mathematical Physics – H.K.Dass, Dr. Rama verma -S.Chand& Company Pvt.Ltd.(Sixth Revised Edition, 2013)
- Mathematical Physics- B.D. Gupta,4th edition Vikas Publishing company Ltd.2013
- Mathematical Physics -S.L. Kakani, C. Hemarajani. 2nd Edition CBS Publishers &Distributors Pvt., LTD., 2010

WEB RESOURCES:

- **https://nptel.ac.in/courses/122104018**
- **https://archive.nptel.ac.in/courses/111/108/111108081/**
- **https://onlinecourses.nptel.ac.in/noc22_ma41/preview**

Nature of Course	EMPLOYABILITY			SKILL ORIENTED	✓		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		✓	GLOBAL		
Changes Made in the Course	Percentage of Change	**25 %**		No Changes Made			New Course			
***Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**										

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Compute divergence and curl of vectors	**K1 to K4**
CO2	Define basic concepts of matrices and solve linear equations.	**K1 to K4**
CO3	Understand the concepts Complex Numbers Some Definitions Underlying Complex Analysis, Limit, Continuity and Differentiability.	**K1 to K4**
CO4	Solve basic application problems described by first order linear differential equation with constant coefficients.	**K1 to K4**
CO5	Calculate the finite Fourier transform ,Fourier cosine of elementary functions from the definition	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:

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

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	2	2	3	3	3
CO 2	2	2	3	2	3
CO 3	2	3	2	2	3
CO 4	2	2	2	3	2
CO 5	3	3	2	2	3
WEIGHTAGE	11	12	12	12	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	0.022	0.024	0.024	0.024	0.028

LESSON PLAN:			
UNIT		**HRS**	**PEDAGOGY**
I	Gradient of a Scalar Field- Divergence of a Vector Function- Curl of a Vector Function and its Physical Significance- Important Vector Identities- Gauss Divergence Theorem(Statement and simple Problem only)- Deductions from Gauss Divergence Theorem(Statement and simple Problem only)- Stoke's Theorem(Statement and simple Problem only)- Deductions from Stoke's Theorem(Statement and simple Problem only)- Green‟s Theorem(Statement and simple Problem only)- Green‟s Theorem in a plane(Statement and simple Problem only).	**12**	**Chalk & Talk, Power Point Presentation**
II	Rank of a Matrix- Vector as Matrices and Vector-spaces- Solutions of Linear Equations- Linear Transformations-Similarity Transformation- Eigen Values, Eigen-Vector; Characteristic Equation of a Matrix.	**12**	**Chalk & Talk, Power Point Presentation**
III	Complex Numbers- Review of Algebraic Operations of Complex Numbers- Complex Conjugates- Modulus and Argument of a Complex Numbers- Graphical Representation on Argand Diagram and Trigonometric Form- Some Definitions Underlying Complex Analysis- Functions of Complex Variable- Limit, Continuity and Differentiability- Definition: Analytic Function- The Necessary and Sufficient Conditions for f(z) to be Analytic: Cauchy-Riemann Differential Equations.	**12**	**Chalk & Talk, Power Point Presentation**
IV	Order and Degree of a Differential Equation- Solution of First Order Differential Equation by the Method of Separation of Variables- Linear Differential Equation of First Order and its Solution.	**12**	**Chalk & Talk, Power Point Presentation**
V	Properties of Fourier Transform-Fourier Transform of a Derivative-Fourie and cosine Transform of Derivatives (simple problem) - Laplace Transform- Properties of Laplace Transforms- Laplace Transform of Derivatives of a Function (simple problem).	**12**	**Chalk & Talk, Power Point Presentation**

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 Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K – Level**		
CI AI	**CO1**	**K1 – K4**	2	K1&K2	2 (K3&K3)	2 (K3&K3)
	CO2	**K1 – K4**	2	K1&K2	2 (K3&K3)	2 (K3&K3)
CI AII	**CO3**	**K1 – K4**	2	K1&K2	2 (K3&K3)	2 (K3&K3)
	CO4	**K1 – K4**	2	K1&K2	2 (K4&K4)	2 (K4&K4)
Question Pattern CIA I & II		**No. of Questions to be asked**	4		4	4
		No. of Questions to be answered	1		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**2**	**-**	**-**	**2**	**3.6**	**7**
	K2	**2**	**-**	**-**	**2**	**3.6**	
	K3	**-**	**20**	**32**	**52**	**93**	**93**
	K4	**-**	**-**	**-**	**-**	**-**	**-**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	**2**	**-**	**-**	**2**	**3.6**	**7.2**
	K2	**2**	**-**	**-**	**2**	**3.6**	
	K3	**-**	**10**	**16**	**26**	**46.4**	**46.4**
	K4	**-**	**10**	**16**	**26**	**46.4**	**46.4**
	Marks	**4**	**20**	**32**	**56**	**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	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
2	CO2	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
3	CO3	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
4	CO4	K1 – K4	2	K1&K2	2 (K4&K4)	2 (K4&K4)
5	CO5	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(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 (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	-	-	5	3.6	7
K2	5	-	-	5	3.6	
K3	-	40	64	104	74.3	74
K4	-	10	16	26	18.5	19
Marks	10	50	80	140	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

Q. No.	Unit	CO	K-level		
Answer ALL the questions				PART – A	(10 x 1 = 10 Marks)
1.	Unit - I	CO1	K1		
				a)	b)
				c)	d)
2.	Unit - I	CO1	K2		
				a)	b)
				c)	d)
3.	Unit - II	CO2	K1		
				a)	b)
				c)	d)
4.	Unit - II	CO2	K2		
				a)	b)
				c)	d)
5.	Unit - III	CO3	K1		
				a)	b)
				c)	d)
6.	Unit - III	CO3	K2		
				a)	b)
				c)	d)
7.	Unit - IV	CO4	K1		
				a)	b)
				c)	d)
8.	Unit - IV	CO4	K2		
				a)	b)
				c)	d)
9.	Unit - V	CO5	K1		
				a)	b)
				c)	d)
10.	Unit - V	CO5	K2		
				a)	b)
				c)	d)

Answer ALL the questions			PART – B	(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K3	
		OR		
11. b)	Unit - I	CO1	K3	
12. a)	Unit - II	CO2	K3	
		OR		
12. b)	Unit - II	CO2	K3	
13. a)	Unit - III	CO3	K3	
		OR		
13. b)	Unit - III	CO3	K3	
14. a)	Unit - IV	CO4	K4	
		OR		
14. b)	Unit - IV	CO4	K4	
15. a)	Unit - V	CO5	K3	
		OR		
15. b)	Unit - V	CO5	K3	

Answer ALL the questions			PART – C	(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K3	
		OR		
16. b)	Unit - I	CO1	K3	
17. a)	Unit - II	CO2	K3	
		OR		
17. b)	Unit - II	CO2	K3	
18. a)	Unit - III	CO3	K3	
		OR		
18. b)	Unit - III	CO3	K3	
19. a)	Unit - IV	CO4	K4	
		OR		
19. b)	Unit - IV	CO4	K4	
20. a)	Unit - V	CO5	K3	
		OR		
20. b)	Unit - V	CO5	K3	

Course Name	APPLIED PHYSICS LAB			
Course Code	23UELEP21	L	P	C
Category	ALLIED	-	2	2

COURSE OBJECTIVES:

- To study the calibration of voltmeter and ammeter using potentiometer.
- To determine the resonance frequency and Q factor in an electrical circuit.
- To understand the V-I characteristic of photovoltaic cell.
- To construct and study the filters.
- To learn how to determine the capacitance and inductance using LCR circuit.

Any12Experiments

1. Potentiometer–calibrationoflowrange ammeter
2. Potentiometer–calibration oflow rangevoltmeter
3. Seriesresonancecircuit–resonancefrequency,Qfactor
4. Potentiometer–calibrationoflowrange ammeter
5. Potentiometer–calibration oflow rangevoltmeter
6. Seriesresonancecircuit–resonancefrequency,Qfactor
   Determinationofthephotovoltaiccellcharacteristics
7. CareyFoster Bridge-determinationofspecificresistance
8. Studyof capacitorfilters and ∏filters
9. LowpassandHighpassfilters
10. DifferentiatingandIntegratingcircuits
11. Usesof CRO– Measurements ofvoltage, current, frequency,phaseanddelaytimes etc.,
12. Temperaturecoefficientofathermistor

BOOKS FOR STUDY:

- A Text of Practical Physics, M.N. Srinivasan, S. Balasubramanian and R. Ranganathan, Sulthan Chand & Sons

BOOKS FOR REFERENCES:

- **Practical Physics and Electronics,** C.C.Ouseph, U.J.Rao and V.Vijayendran

WEB RESOURCES:

- **https://srmvdpcsea2016.files.wordpress.com/2016/09/experiment-61.pdf**
- **https://www.scribd.com/document/70070448/Specific-Resistance-by-CareyFoster-s-Bridge**
- **https://psbrahmachary.files.wordpress.com/2009/05/thermistor.pdf**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change	**100 %**	No Changes Made		New Course	✓		

***Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the principles of calibration of voltmeter ammeter using potentiometer.	**K1 to K4**
CO2	Understand to measure the resonance frequency and Q factor in an electrical circuit.	**K1 to K4**
CO3	Understand the V-I characteristic of photovoltaic cell.	**K1 to K4**
CO4	Understand to construct the filters and integrating circuit.	**K1 to K4**
CO5	Able to measure the capacitance and inductance using LCR circuit	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:

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

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

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**1**	**1**
CO 2	**2**	**2**	**3**	**2**	**2**
CO 3	**3**	**3**	**2**	**2**	**2**
CO 4	**2**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**2**
WEITAGE	**13**	**14**	**14**	**11**	**10**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**86**	**93**	**93**	**73**	**67**

LESSON PLAN:

UNIT	COURSE NAME	HRS	PEDAGOGY
I	14. Potentiometer–calibration of low range ammeter 15. Potentiometer–calibration of low range voltmeter 16. Series resonance circuit– resonance frequency, factor	**12**	**Practical**
II	17. Potentiometer– calibration no flow range ammeter 18. Potentiometer–calibration of low range voltmeter 19. Series resonance circuit– resonance frequency, factor	**12**	**Practical**
III	20. Determination of the photo voltaic cell characteristics 21. Carey Foster Bridge - determination of specific resistance 22. Study of capacitor filters and ∏filters	**12**	**Practical**
IV	23. Low pass and High pass filters 24. Differentiating and Integrating circuits 25. Uses of CRO– Measurements of voltage, current, frequency,	**12**	**Practical**
V	26. Phase and delay times etc., 14.Temperature coefficient of at thermistor	**12**	**Practical**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	**Cos**	**K Level**	**Aim and Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**
CI AI	**CO1**	**K1**	**5**				
	CO2	**K2**		**5**			
	CO3	**K3**			**5**		
	CO4	**K3**				**5**	
	CO5	**K4**					**5**
Question Pattern CIA		No. of Questions to be asked	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
		Total Marks for each section	**5**	**5**	**5**	**5**	**5**

.Distribution of Marks with K Level CIA									
	K Level	**Aim and Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	**5**					**5**	**20**	**20**
	K2		**5**				**5**	**20**	**20**
	K3			**5**	**5**		**10**	**40**	**40**
	K4					**5**	**5**	**20**	**20**
	Marks						**25**	**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

CO 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)							
Internal	**Cos**	**K Level**	**Aim & Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**
CI AI	**CO1**	**K1**	**15**				
	CO2	**K2**		**15**			
	CO3	**K3**			**15**		
	CO4	**K3**				**15**	
	CO5	**K4**					**15**
Question Pattern		No. of Questions to be asked	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**7.5**	**7.5**	**7.5**	**7.5**	**7.5**
		Total Marks for each section	**15**	**15**	**15**	**15**	**15**

Distribution of Marks with K Level								
K Level	**Aim & Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**15**					**15**	**20**	**20**
K2		**15**				**15**	**20**	**20**
K3			**15**	**15**		**30**	**40**	**40**
K4					**15**	**15**	**20**	**20**
Marks						**75**	**100**	**100**

Course Name	SATELLITE COMMUNICATION			
Course Code	23UELSC21	**L**	**P**	**C**
Category	SKILL	2	-	2

COURSE OBJECTIVES:

- To gain knowledge about the history of satellites and Ionosphere.
- To gain knowledge on Transponders and Antennas.
- To understand the satellite constructions.
- To know the concept of multiplexing, time and frequency multiplexing in Earth stations.
- To know the concept of FDMA and TDMA.

UNIT - I	**INTRODUCTION**	**06**

Historical progress, Orbits of Satellites, Types – low, medium, geostationary – maincharacteristics – angle, shape and period – Ionosphere

UNIT - II	**SATELLITE LINKS**	**06**

General characteristics, delay, transponders, earth station, antenna and earth Coverage, altitudecontrol.

UNIT - III	**SATELLITE CONSTRUCTIONS**	**06**

Subsystems and functions, antennas, transponders, power supplies Command & telemetry, thrustand stabilization.

UNIT - IV	**EARTH STATION**	**06**

General block schematics, transmitter and receivers, antenna System & tracking – Multiplexing,space, time and frequency multiplexing

UNIT - V	**MULTIPLE ACCESS PRINCIPLE**	**06**

FDMA, spade system, TDMA – system concept of configuration - System timing, frame formatbasic principles of spread spectrum. Multiple accesses

Total Lecture Hours	**30**

BOOKS FOR STUDY:

- J MARTIN, Communication Satellites(PH)
- J JSpilker, Digital Communication by Satellites(PH)
- R.M. Gagliardi, Satellite Communications-CBS

BOOKS FOR REFERENCES:

- M. Mitra Satellite Communications

WEB RESOURCES:

- **https://archive.nptel.ac.in/courses/117/105/117105131/**
- **https://archive.nptel.ac.in/noc/courses/noc17/SEM2/noc17-ec14/**
- **https://nptel.ac.in/courses/117104115**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change	**100**	No Changes Made		New Course	✓		
***Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**								

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Explain the history of satellites and understand the structure of Ionosphere	**K1 to K2**
CO2	Understand the characteristics, transponders and altitude control.	**K1 to K2**
CO3	Understand the subsystems, power supplies etc for satellite construction.	**K1 to K2**
CO4	Understand the blocks of Transmitters and Receivers	**K1 to K2**
CO5	Understand the concepts of FDMA and TDMA	**K1 to K2**

MAPPING WITH PROGRAM OUTCOMES:

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

3- STRONG **2 – MEDIUM** **1 - LOW**

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	3	1	3

CO 2	**3**	**2**	**2**	**1**	**1**
CO 3	**3**	**3**	**2**	**2**	**2**
CO 4	**3**	**2**	**3**	**3**	**3**
CO 5	**2**	**3**	**2**	**3**	**2**
WEITAGE	**14**	**13**	**12**	**10**	**11**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**93**	**86**	**80**	**66**	**73**

LESSON PLAN:

UNIT	COURSE NAME	HRS	PEDAGOGY
I	**INTRODUCTION** Historical progress, Orbits of Satellites, Types – low, medium, geostationary – maincharacteristics – angle, shape and period – Ionosphere	**06**	**Chalk & Talk, Power Point Presentation**
II	**SATELLITE LINKS** General characteristics, delay, transponders, earth station, antenna and earth Coverage, altitudecontrol.	**06**	**Chalk & Talk, Power Point Presentation**
III	**SATELLITE CONSTRUCTIONS** Subsystems and functions, antennas, transponders, power supplies Command & telemetry, thrustand stabilization.	**06**	**Chalk & Talk, Power Point Presentation**
IV	**EARTH STATION** General block schematics, transmitter and receivers, antenna System & tracking – Multiplexing,space, time and frequency multiplexing	**06**	**Chalk & Talk, Power Point Presentation**
V	**MULTIPLE ACCESS PRINCIPLE** FDMA, spade system, TDMA – system concept of configuration - System timing, frame formatbasic principles of spread spectrum. Multiple accesses	**06**	**Chalk & Talk, Power Point Presentation**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	**Cos**	**K Level**	**Section A**	
			MCQs	
			No. of. Questions	**K - Level**
CI AI	**CO1**	**K1 – K2**	**25**	**K1,K2**
	CO2	**K1 – K2**	**25**	**K1,K2**
CI AII	**CO3**	**K1 – K2**	**25**	**K1,K2**
	CO4	**K1 – K2**	**25**	**K1,K2**
Question Pattern CIA I & II		**No. of Questions to be asked**	**50**	
		No. of Questions to be answered	**50**	
		Marks for each question	**1**	
		Total Marks for each section	**50**	

* Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (Ist Test-2 CO's & IInd Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II					
	K Level	**Section A (Multiple Choice Questions)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**30**	**30**	**60**	**100**
	K2	**20**	**20**	**40**	
	K3				
	K4				
	Marks	**50**	**50**	**100**	**100**
CIA II	**K1**	**30**	**30**	**60**	**100**
	K2	**20**	**20**	**40**	
	K3				
	K4				
	Marks	**50**	**50**	**100**	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)				
S. No	**COs**	**K - Level**	**Section A (MCQs)**	
			No. of Questions	**K – Level**
1	**CO1**	**K1-K2**	**15**	**K1,K2**
2	**CO2**	**K1-K2**	**15**	**K1,K2**
3	**CO3**	**K1-K2**	**15**	**K1,K2**
4	**CO4**	**K1-K2**	**15**	**K1,K2**
5	**CO5**	**K1-K2**	**15**	**K1,K2**
No. of Questions to be Asked			**75**	
No. of Questions to be answered			**75**	
Marks for each question			**1**	
Total Marks for each section			**75**	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	**Section A (Multiple Choice Questions)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**40**	**40**	**53**	**100**
K2	**35**	**35**	**47**	
K3				
K4				
Marks		**75**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				

Course Name	CELLULAR PHONES			
Course Code	23UELSC22	L	P	C
Category	SKILL	2	-	2

COURSE OBJECTIVES:

- To understand the working of a Telephone system.
- To understand the concepts of GSM, CDMA, GPS. etc.
- To gain knowledge on Mobile OS
- To understand IMEI Number Detection, Mobile GSM Utility Codes
- To understand the card readers and virus protections.

UNIT - I **06**

Working of a Telephone - Local Exchange - Initiating a call - Calling a Number - Making a Connection - Answering a Call - Conversation - Ending a Call - Hook Switch - Transmitter - Receiver - Ringer - Cellular Mobile Telephone System - Mobile Phone Service Area.

UNIT - II **06**

GSM - CDMA - GPRS - EDGE - WCDMA - UMTS - HSDPA - Satellite Phones - GPS - Mobile Browsers - WAP.

UNIT - III **06**

Types of: Wireless Options, Batteries, Memory Cards, Messaging, Ring Tones, Keypad Types, Display Types. Handset Form Factor - Mobile OS.

UNIT - IV **06**

Hardware/Software Repairing - Various Locks - Installation of: UFS Driver, UFS Suite & Flashing Files - IMEI Number Detection - Mobile GSM Utility Codes (Any Five)

UNIT - V **06**

Ultrasonic Cleaner - Computer Connectors - SIM Card Reader - Memory Card Reader - Mobile Virus - Virus Prevention - Removing Virus - Health Hazards with Mobiles - SAR.

Total Lecture Hours **30**

BOOKS FOR STUDY:

- Modern Mobile Phone Introduction & Servicing – Manahar Lotia
  Unit - I
- Modern Mobile Phone Repair Using Computer Software & Service Devices – ManaharLotia- Units I, IV & V
- Modern Mobile Phone Unlocking & Utility Codes For GSM & CDMA Phones – ManaharLotia - Unit – IV.
- Mobile Telephony - Digit Magazine - Supplement - Jan 2006 - Jasubhai Digital Media Publications. Unit II & III

BOOKS FOR REFERENCES:

- Blue Tooth Technology – CSR Prabhu & APrathap Reddi – PHI
- Mobile & Personal Communication Systems & Services - Raj Pandya - PHI

WEB RESOURCES:

- **https://nptel.ac.in/courses/106105082**
- **https://www.academia.edu/29219522/REPAIR_AND_MAINTENANCE_OF_MOBILE_CELL_PHONES_Mobile_Phone_Repair_and_Maintenance**
- **https://joyofandroid.com/basics-troubleshooting-android-phones/**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change	**100**	No Changes Made		New Course	✓		
***Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**								

COURSE OUTCOMES:		K LEVEL
After studying this course, the students will be able to:		
CO1	Understand of the working of a Telephone, Cellular Mobile Telephone System, and Mobile Phone Service Area.	K1 to K2
CO2	Understand GSM, CDMA, GPS concepts.	K1 to K2
CO3	Gain knowledge about keypad, display, mobile OS.	K1 to K2
CO4	Understand the concepts of hardware and software repairing.	K1 to K2
CO5	Understand the SIM card reader, Memory card readers, and virus protections for cellular phones.	K1 to K2

MAPPING WITH PROGRAM OUTCOMES:

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

3- STRONG 2 – MEDIUM 1 - LOW

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	3	2	3
CO 2	3	2	3	2	1
CO 3	3	3	2	2	2
CO 4	3	2	3	3	3
CO 5	3	3	3	3	2
WEITAGE	15	13	14	12	11
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100	86	93	80	73

LESSON PLAN:

UNIT	COURSE NAME	HRS	PEDAGOGY
I	Working of a Telephone - Local Exchange - Initiating a call - Calling a Number - Making a Connection - Answering a Call - Conversation - Ending a Call - Hook Switch - Transmitter - Receiver - Ringer - Cellular Mobile Telephone System - Mobile	06	Chalk & Talk, Power Point Presentation

	Phone Service Area.		
II	GSM - CDMA - GPRS - EDGE - WCDMA - UMTS - HSDPA - Satellite Phones - GPS – Mobile Browsers - WAP.	**06**	**Chalk & Talk, Power Point Presentation**
III	Types of: Wireless Options, Batteries, Memory Cards, Messaging, Ring Tones, Keypad Types, Display Types. Handset Form Factor - Mobile OS.	**06**	**Chalk & Talk, Power Point Presentation**
IV	Hardware/Software Repairing - Various Locks - Installation of: UFS Driver, UFS Suite & Flashing Files - IMEI Number Detection - Mobile GSM Utility Codes (Any Five)	**06**	**Chalk & Talk, Power Point Presentation**
V	Ultrasonic Cleaner - Computer Connectors - SIM Card Reader - Memory Card Reader - Mobile Virus - Virus Prevention - Removing Virus - Health Hazards with Mobiles - SAR.	**06**	**Chalk & Talk, Power Point Presentation**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	**Cos**	**K Level**	**Section A**	
			MCQs	
			No. of. Questions	**K - Level**
CI AI	**CO1**	**K1 – K2**	**25**	**K1,K2**
	CO2	**K1 – K2**	**25**	**K1,K2**
CI AII	**CO3**	**K1 – K2**	**25**	**K1,K2**
	CO4	**K1 – K2**	**25**	**K1,K2**
Question Pattern CIA I & II		**No. of Questions to be asked**	**50**	
		No. of Questions to be answered	**50**	
		Marks for each question	**1**	
		Total Marks for each section	**50**	

* Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (Ist Test-2 CO's & IInd Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II					
	K Level	**Section A (Multiple Choice Questions)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**30**	**30**	**60**	**100**
	K2	**20**	**20**	**40**	
	K3				
	K4				
	Marks	**50**	**50**	**100**	**100**
CIA II	**K1**	**30**	**30**	**60**	**100**
	K2	**20**	**20**	**40**	
	K3				
	K4				
	Marks	**50**	**50**	**100**	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)				
S. No	**COs**	**K - Level**	**Section A (MCQs)**	
			No. of Questions	**K – Level**
1	**CO1**	**K1-K2**	**15**	**K1,K2**
2	**CO2**	**K1-K2**	**15**	**K1,K2**
3	**CO3**	**K1-K2**	**15**	**K1,K2**
4	**CO4**	**K1-K2**	**15**	**K1,K2**
5	**CO5**	**K1-K2**	**15**	**K1,K2**
No. of Questions to be Asked			**75**	
No. of Questions to be answered			**75**	
Marks for each question			**1**	
Total Marks for each section			**75**	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	**Section A (Multiple Choice Questions)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**40**	**40**	**53**	**100**
K2	**35**	**35**	**47**	
K3				
K4				
Marks		**75**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				

Course Name	FUNDAMENTALS OF COMPUTING			
Course Code	23UELNM21	L	P	C
Category	SKILL	2	-	2

COURSE OBJECTIVES:

- To understand the overview, application, evolution of computers.
- To understand the number systems and computer codes.
- To understand the computer software and internet terminologies.
- To plan a computer program.
- To understand the office packages.

UNIT - I INTRODUCTION TO COMPUTERS 06

Overview of Computers – Applications of Computers - Evolution of the Computers-Computer Generations – Classification of computers – Basic computer organization

UNIT - II NUMBER SYSTEMS AND COMPUTER CODES 06

Decimal System - Binary System - Hexadecimal System – Octal System – 4-bit BCD systems – 8-bit BCD Systems – 16-bit Unicode - Conversion of Numbers.

UNIT - III COMPUTER SOFTWARE 06

Overview of Computer Software – Types of Computer software – System Management Programs – System Development Programs – Standard Application programs – Applications programs – Software Development Steps – Internet Terminologies – Internet Applications.

UNIT - IV PROBLEM SOLVING 06

Introduction – Planning the computer program – Problem solving – Structuring the logic – Application Software packages.

UNIT - V OFFICE AUTOMATION 06

Introduction to Office packages – MS Word – MS Excel – MS PowerPoint – MS Access.

Total Lecture Hours 30

BOOKS FOR STUDY:

- Fundamentals of Computing by E.Balagurusamy, McGrawHill, Second Edition.
  Unit I: Chap1-1.1 to 1.8;
  Unit II: Chap 1-1.9 to 1.17;
  Unit III: Chap 2;
  Unit IV: Chap 3-3.1 to 3.5;
  Unit V: Chap 3-3.6 to 3.10

BOOKS FOR REFERENCES:

- Digital fundamentals – Floyd & Jain – Pearson Education
- Introduction to computers – Norton – McGraw Hill
- Computer fundamentals – B.Ram – New Age International
- Computer fundamentals – Jaggi and Jain

WEB RESOURCES:

- **https://www.tutorialspoint.com/basics_of_computers/basics_of_computers_introduction.htm**
- **https://archive.nptel.ac.in/courses/106/105/106105214/**
- **https://www.rgycsm.org/uploads/books/MICROSOFT-OFFICE-BOOK.pdf**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change	**100**	No Changes Made		New Course	✓		
***Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**								

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Gain knowledge on application and on evolution of computers.	**K1 to K2**
CO2	Gain knowledge on number systems and computer codes.	**K1 to K2**
CO3	Understand the computer software and internet terminologies.	**K1 to K2**
CO4	Gain knowledge to plan a computer program.	**K1 to K2**
CO5	Understand the office packages.	**K1 to K2**

MAPPING WITH PROGRAM OUTCOMES:

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

CO5	2	1	3	2	1	1	2	1	2	2
3- STRONG				2 – MEDIUM					1 - LOW	

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	3	1	3
CO 2	3	2	3	1	1
CO 3	2	3	2	2	2
CO 4	3	2	3	3	3
CO 5	2	3	3	3	2
WEITAGE	13	13	14	10	11
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	86	86	93	66	73

LESSON PLAN:

UNIT	COURSE NAME	HRS	PEDAGOGY
I	**INTRODUCTION TO COMPUTERS** Overview of Computers – Applications of Computers - Evolution of the Computers-Computer Generations – Classification of computers – Basic computer organization	06	Chalk & Talk, Power Point Presentation
II	**NUMBER SYSTEMS AND COMPUTER CODES** Decimal System - Binary System - Hexadecimal System – Octal System – 4-bit BCD systems– 8-bit BCD Systems – 16-bit Unicode - Conversion of Numbers.	06	Chalk & Talk, Power Point Presentation
III	**COMPUTER SOFTWARE** Overview of Computer Software – Types of Computer software – System Management Programs – System Development Programs – Standard Application programs – Applications programs – Software Development Steps – Internet Terminologies – Internet Applications.	06	Chalk & Talk, Power Point Presentation
IV	**PROBLEM SOLVING**	06	Chalk & Talk, Power Point

	Introduction – Planning the computer program – Problem solving – Structuring the logic – Application Software packages.		**Presentation**
V	**OFFICE AUTOMATION** Introduction to Office packages – MS Word – MS Excel – MS PowerPoint – MS Access.	**06**	**Chalk & Talk, Power Point Presentation**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	**Cos**	**K Level**	**Section A**	
			MCQs	
			No. of. Questions	**K - Level**
CI AI	**CO1**	**K1 – K2**	**25**	**K1,K2**
	CO2	**K1 – K2**	**25**	**K1,K2**
CI AII	**CO3**	**K1 – K2**	**25**	**K1,K2**
	CO4	**K1 – K2**	**25**	**K1,K2**
Question Pattern CIA I & II		**No. of Questions to be asked**	**50**	
		No. of Questions to be answered	**50**	
		Marks for each question	**1**	
		Total Marks for each section	**50**	

***** Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (Ist Test-2 CO's & IInd Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II					
	K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100
CIA II	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)				
S. No	COs	K - Level	Section A (MCQs)	
			No. of Questions	K – Level
1	CO1	K1-K2	15	K1,K2
2	CO2	K1-K2	15	K1,K2
3	CO3	K1-K2	15	K1,K2
4	CO4	K1-K2	15	K1,K2
5	CO5	K1-K2	15	K1,K2
No. of Questions to be Asked			75	
No. of Questions to be answered			75	
Marks for each question			1	
Total Marks for each section			75	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	**Section A (Multiple Choice Questions)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**40**	**40**	**53**	**100**
K2	**35**	**35**	**47**	
K3				
K4				
Marks		**75**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				

B.Sc., ELECTRONICS & COMMUNICATION

Syllabus

Program Code: UEL

2023 - Onwards

MANNAR THIRUMALAI NAICKER COLLEGE

(AUTONOMOUS)

Re-accredited with "A" Grade by NAAC

PASUMALAI, MADURAI – 625 004

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS), MADURAI – 625 004

B.SC ELECTRONICS AND COMMUNICATION CURRICULUM

(For the students admitted from the academic year 2023-2024 onwards)

Course Code	Title of the Course	Hrs	Credits	Maximum Marks		
				Int	Ext	Total
THIRD SEMESTER						
Part – I	**Tamil / Alternative course**					
23UTAGT31	தமிழக வரலாறும் பண்பாடும்	6	3	25	75	100
Part – II	**English**					
23UENGE31	GENERAL ENGLISH - III	6	3	25	75	100
Part - III	**Core courses**					
23UELCC31	DIGITAL ELECTRONICS	4	4	25	75	100
23UELCP31	DIGITAL ELECTRONICS LAB	4	4	25	75	100
Part - III	**Allied courses**					
23UCSAC31	PROGRAMMING IN C&C++	4	4	25	75	100
23UCSAP31	COMPUTER PROGRAMMING C&C++ LAB	2	1	25	75	100
Part - IV	**Skill Based courses**					
23UELSC31	ELECTRONIC EQUIPMENTS AND SERVICING	1	1	25	75	100
23UELSC32	ANTENNA AND WAVE PROPAGATION	2	1	25	75	100
Part - IV	**Mandatory course**					
23UEVSG41	ENVIRONMENTAL STUDIES	1	-	-	-	-
	Total	30	21	200	600	800
FOURTH SEMESTER						
Part – I	**Tamil / Alternative course**					
23UTAGT41	தமிழும் அறிவியலும்	6	3	25	75	100
Part – II	**English**					
23UENGE41	GENERAL ENGLISH - IV	6	3	25	75	100
Part - III	**Core courses**					
23UELCC41	LINEAR INTEGRATED CIRCUITS	5	5	25	75	100
23UELCP41	LINEAR INTEGRATED CIRCUITS LAB	4	4	25	75	100
Part - III	**Allied course**					
23UMTAC44	NUMERICAL METHODS	4	4	25	75	100
Part - IV	**Skill Based courses**					
23UELSC41	FIBER OPTIC COMMUNICATION SYSTEMS	2	2	25	75	100
23UELSC42	TELEVISION SYSTEMS	2	2	25	75	100
Part - IV	**Mandatory course**					
23UEVSG41	ENVIRONMENTAL STUDIES	1	2	25	75	100
	Total	30	24	225	675	900


THIRD SEMESTER

Course Name	DIGITAL ELECTRONICS			
Course Code	23UELCC31	**L**	**P**	**C**
Category	CORE	4	-	4

COURSE OBJECTIVES:

- To acquire the basic knowledge of Number systems, Digital logic circuits and its applications.
- To outline the formal procedures for the analysis and design of combinational circuits.
- To acquire the basic knowledge of Arithmetic and Sequential logic circuits.
- To learn the concept of A/D, D/A conversions and their types.
- To encourage the students to learn the concepts of memories.

UNIT - I NUMBER SYSTEM AND BOOLEAN ALGEBRA 12

Review of binary, octal, decimal and hexadecimal number systems- Presentation of signed numbers- Floating point number representation- Boolean algebra: Postulates and theorems- Canonical forms of logic operations-SOP- POS- Logic gates.

UNIT - II COMBINATIONAL AND SEQUENTIAL LOGIC 12

Standard representation of logic function- Simplifications through karnaugh map implementation using standard logic gates- Encoders and Decoders- Multiplexers and Demultiplexers- RS, JK, JK Master-slave, D and T flip flops.

UNIT - III ARITMETIC CIRCUTS AND SEQUENTIAL CIRCUITS 12

Half adder, full adder, Half subtractor- Full Subractor- Parallel adder, binary adder/subtractor- BCD adder/subtractor- binary multiplier and divider.

Counters and Registers: Asynchronous and synchronous counter-Binary and BCD counter-UP/Down counter- Shift registers- 4 bit serial-in –serial out shift register- Ring counter- Johnson counter.

UNIT - IV DAC and ADC 12

DAC: Introduction– weighted resistor DAC- R-2R ladder network method- DAC parallel voltage R-2R ladder.

ADC: Successive Approximation Register- Dual slope- Parallel flash ADC- A/D converter using voltage to time conversion.

UNIT - V MEMORY DEVICES 12

Introduction- Temporary and Permanent Memory- ROM- PROM- EPROM-EEPROM- Read/ Write operation-Application-Comparison of Semiconductor Memories.

Total Lecture Hours 60

BOOKS FOR STUDY:

- S.Salivahanan and S.Arivazahagan. "Digital Circuits and Design", Vikas Publishing House Ltd., 2000.
- Digital principles & Applications – Malvino Leach. 6th edition.
- Thomas. L. Floyd – Digital Electronics.
- Digital Logic and computer Design –M.Moriss Mano.

BOOKS FOR REFERENCES:

- Tocci T.I "Digital systems: Principle and Applications", Sixth edition, PHI 1997.
- Mano M.M, "Digital logic and complete design" PHI 1992.
- Palmer, J.E and Periman, D.E, "Introduction to Digital systems" Schaum outline series McGraw Hill, 1993

WEB RESOURCES:

- **https://www.iitmanagement.com/images/Gallery/DIP-EE-4TH%20SEM%20-%20DE.pdf**
- **https://nptel.ac.in/courses/117106086**
- **https://archive.nptel.ac.in/courses/108/105/108105113/**
- **https://www.sathyabama.ac.in/sites/default/files/course-material/2020-10/note_1474198148.PDF**
- **https://www.tutorialspoint.com/computer_logical_organization/memory_devices.htm**

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED			ENTREPRENEURSHIP					
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL			GLOBAL		✓		
Changes Made in the Course	Percentage of Change		**25**	No Changes Made			New Course					

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the basics of Number system and gates	**K1 to K4**
CO2	Realize the operation of various logic gates and analysing the outputs	**K1 to K4**
CO3	Analyse and design the combinational and sequential logic circuits	**K1 to K4**
CO4	Use the A/D and D/A conversion in real time applications	**K1 to K4**
CO5	Understand the basics of memory devices	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:										
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**

CO1	S	S	M	M	S	M	M	M	S	M
CO2	L	S	M	L	L	M	M	M	L	L
CO3	M	M	L	S	S	M	L	L	M	M
CO4	L	M	M	L	L	S	M	S	M	S
CO5	S	L	M	M	L	M	M	L	M	M

S- STRONG M – MEDIUM L - LOW

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	3	2	3
CO 2	3	2	3	3	2
CO 3	3	3	2	2	2
CO 4	3	2	3	3	3
CO 5	3	3	3	3	2
WEIGHTAGE	15	13	14	10	12
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100	86	93	86	80

LESSON PLAN:

UNIT	DIGITAL ELECTRONICS	HRS	PEDAGOGY
I	**NUMBER SYSTEM AND BOOLEAN ALGEBRA** Review of binary, octal, decimal and hexadecimal number systems- Presentation of signed numbers- Floating point number representation- Boolean algebra: Postulates and theorems- Canonical forms of logic operations-SOP- POS- Logic gates.	12	Chalk & Talk, Power Point Presentation
II	**COMBINATIONAL AND SEQUENTIAL LOGIC** Standard representation of logic function- Simplifications through karnaugh map implementation using standard logic gates- Encoders and Decoders- Multiplexers and Demultiplexers- RS, JK, JK Master-slave, D and T flip flops.	12	Chalk & Talk, Power Point Presentation
III	**ARITMETIC CIRCUTS AND SEQUENTIAL CIRCUITS** Half adder, full adder, Half subtractor- Full Subractor- Parallel adder, binary adder/subtractor- BCD adder/subtractor- binary multiplier and divider. **Counters and Registers:** Asynchronous and synchronous counter- Binary and BCD counter-UP/Down counter- Shift registers- 4 bit serial-in –serial out shift register- Ring counter- Johnson counter.	12	Chalk & Talk, Power Point Presentation

IV	**DAC and ADC** **DAC:** Introduction– weighted resistor DAC- R-2R ladder network method- DAC parallel voltage R-2R ladder. **ADC:** Successive approximation register- Dual slope- Parallel flash ADC- A/D converter using voltage to time conversion.	**12**	**Chalk & Talk, Power Point Presentation**
V	**MEMORY DEVICES** Introduction- Temporary and permanent memory- ROM- PROM- EPROM-EEPROM- Read/ Write operation-Application-Comparison of Semiconductor Memories.	**12**	**Chalk & Talk, Power Point Presentation**

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 Either or Choice	Section C Either or Choice
			MCQs			
			No. of. Questions	K - Level		
CI AI	CO1	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
	CO2	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
CI AII	CO3	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
	CO4	K1 – K4	2	K1&K2	2 (K4&K4)	2 (K4&K4)
Question Pattern CIA I & II		No. of Questions to be asked		4		4
		No. of Questions to be answered		1		2
		Marks for each question		1		5
		Total Marks for each section		4		10

Distribution of Marks with K Level CIA I & CIA II

	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2	-	-	2	3.6	7
	K2	2	-	-	2	3.6	
	K3	-	20	32	52	93	93
	K4	-	-	-	-	-	-
	Marks	4	20	32	56	100	100
CIA II	K1	2	-	-	2	3.6	7.2
	K2	2	-	-	2	3.6	
	K3	-	10	16	26	46.4	46.4
	K4	-	10	16	26	46.4	46.4
	Marks	4	20	32	56	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	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
2	CO2	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
3	CO3	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
4	CO4	K1 – K4	2	K1&K2	2 (K4&K4)	2 (K4&K4)
5	CO5	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(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 (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5	-	-	5	**3.6**	**7**
K2	5	-	-	5	**3.6**	
K3	-	40	64	104	**74.3**	74
K4	-	10	16	26	**18.5**	19
Marks	**10**	**50**	**80**	**140**	**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

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**	**K3**	
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**	**K4**	
		OR		
14. b)	**Unit - IV**	**CO4**	**K4**	
15. a)	**Unit - V**	**CO5**	**K3**	
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K3**	
		OR		
16. b)	**Unit - I**	**CO1**	**K3**	
17. a)	**Unit - II**	**CO2**	**K3**	
		OR		
17. b)	**Unit - II**	**CO2**	**K3**	
18. a)	**Unit - III**	**CO3**	**K3**	
		OR		
18. b)	**Unit - III**	**CO3**	**K3**	
19. a)	**Unit - IV**	**CO4**	**K4**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K4**	
20. a)	**Unit - V**	**CO5**	**K3**	
		OR		
20. b)	**Unit - V**	**CO5**	**K3**	

Course Name	DIGITAL ELECTRONICS LAB			
Course Code	23UELCP31	**L**	**P**	**C**
Category	CORE	-	4	4

COURSE OBJECTIVES:

- To design the logic gates using Active and Passive components.
- To construct Arithmetic and Combinational Logic circuits.
- To construct few applications using digital ICs (Shift registers and Counters).
- To construct pulse generation and Schmitt circuits using logic gates.
- To study and design ADC, DAC circuits and analyze its outputs.

Any12 Experiments

. 1. Study of logic gates using Active and Passive components

. 2. Construction and testing of half adder and full adder

. 3. BCD to seven segment decoder

. 4. Study of Encoder

. 5. Study of Decoder

. 6. Study of Multiplexer

. 7. Study of De-multiplexer

. 8. Study of R-S, J-K, D type flip flops

. 9. Study of digital ICs 74LS244, 74LS245, 74LS688

30. Shift registers using flip-flops(4 bit)

31. Ring counter

32. Johnson counter

33. Modulus Counter

34. Pulse Generation using gates

35. Schmitt trigger using gates

36. Study of ADC

37. Study of DAC

BOOKS FOR STUDY:

- Digital Electronics Practical manual prepared by Department faculty.

BOOKS FOR REFERENCES:

- Practical Physics and Electronics, C.C.Ouseph, U.J.Rao and V.Vijayendran
- Electronics Practical, Swathi Gupta, Shweta Gupta, Narosa Publishing House.

WEB RESOURCES:

- https://www.ssit.edu.in/dept/assignment/declabmanual.pdf
- https://bhagwantuniversity.ac.in/wp-content/uploads/2016/01/de-lab.pdf

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change	**10**	No Changes Made		New Course			

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the design of logical gates using Active and Passive components	**K1 to K4**
CO2	Construct the Arithmetic and combinational logic circuits	**K1 to K4**
CO3	Construct the sequential logic circuits such as flip flops, shift registers and counters	**K1 to K4**
CO4	Understand the pulse generation and Schmitt trigger circuit	**K1 to K4**
CO5	Design the ADC and DAC circuits using relevant ICs.	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	L	M	S	S	M	M	S	M
CO2	M	L	M	S	L	M	M	M	L	S
CO3	M	M	S	M	S	M	L	S	M	M
CO4	L	M	M	L	M	S	M	S	S	S
CO5	M	L	M	M	L	M	S	M	M	L

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	3	2	3
CO 2	3	2	3	3	2

CO 3	**3**	**3**	**2**	**2**	**2**
CO 4	**3**	**2**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**2**
WEIGHTAGE	**15**	**13**	**14**	**13**	**12**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100**	**86**	**93**	**86**	**80**

LESSON PLAN:

UNIT	DIGITAL ELECTRONICS LAB	HRS	PEDAGOGY
I	Study of logic gates using Active and Passive components Construction and testing of half adder and full adder	**12**	**Practical**
II	BCD to seven segment decoder Study of Encoder Study of Decoder.	**12**	**Practical**
III	Study of Multiplexer Study of Demultiplexer Study of R-S, J-K, D type flip flops	**12**	**Practical**
IV	Study of digital ICs 74LS244, 74LS245, 74LS688 Shift registers using flip-flops(4 bit) Ring counter	**12**	**Practical**
V	Pulse Generation using gates Schmitt trigger using gates . Study of ADC Study of DAC	**12**	**Practical**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	**Cos**	**K Level**	**Aim and Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**
CI AI	**CO1**	**K1**	**5**				
	CO2	**K2**		**5**			
	CO3	**K3**			**5**		
	CO4	**K3**				**5**	
	CO5	**K4**					**5**
Question Pattern CIA		No. of Questions to be asked	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
		Total Marks for each section	**5**	**5**	**5**	**5**	**5**

Distribution of Marks with K Level CIA									
	K Level	**Aim and Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	5					**5**	**20**	**20**
	K2		5				**5**	**20**	**20**
	K3			5	5		10	40	40
	K4					5	5	20	20
	Marks						**25**	**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

CO 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)							
Internal	**Cos**	**K Level**	**Aim & Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**
CI AI	**CO1**	**K1**	**15**				
	CO2	**K2**		**15**			
	CO3	**K3**			**15**		
	CO4	**K3**				**15**	
	CO5	**K4**					**15**
Question Pattern		No. of Questions to be asked	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**7.5**	**7.5**	**7.5**	**7.5**	**7.5**
		Total Marks for each section	**15**	**15**	**15**	**15**	**15**

Distribution of Marks with K Level								
K Level	**Aim & Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	15					**15**	**20**	**20**
K2		15				**15**	**20**	**20**
K3			15	15		30	40	40
K4					15	15	20	20
Marks						**75**	**100**	**100**

Course Name	PROGRAMMING IN C AND C++			
Course Code	23UCSAC31	**L**	**P**	**C**
Category	ALLIED	4	-	4

COURSE OBJECTIVES:

- To make students understand the concepts of C programming.
- To impart knowledge about arrays and functions
- To make the students learn structures and files
- To apply the OOPs concept in C++programming.
- To know the concepts of classes and objects

UNIT - I INTRODUCTION TO C **12**

Basic Structure of C program – Constants, variables and Data types –Operators and Expressions –Decision Making and Branching – Decision Making and Looping

UNIT - II ARRAYS AND FUNCTIONS **12**

Introduction – Array – One-Dimensional Arrays – Two Dimensional Arrays -Multidimensional arrays – Character arrays and Strings –Declaring and Initializing String Variables – String-Handling Functions – User-Defined functions

UNIT - III POINTERS , STRUCTURE AND UNIONS **12**

Introduction – Pointers– Understanding pointers – Declaring pointer variables – Initialization of pointer variables – Accessing a variable through its pointer- Array of pointers Defining a Structure – Declaring, Accessing Structure Variables- Array of structures – structures and Functions – Unions

UNIT - IV INTRODUCTION TO C++ **12**

Introduction -Structure of C++ program – Tokens – Keywords – Identifiers and constants – Basic Data types – Derived data types – user defined data type – operators – Scope resolution operator - type compatibility – symbolic constants – type cast operator - operator overloading – operator precedence – expressions and their types, manipulators

UNIT - V CLASSES AND OBJECTS **12**

Specifying a class– defining member functions – Arrays within a class – Array of objects –constructor – parameterized constructors– constructors with default arguments – Copy constructors – Destructors. Inheritance – Defining derived class – single inheritance – multilevel Inheritance – multiple inheritances – hierarchical inheritance – hybrid inheritance – abstract classes- Polymorphism - Virtual functions

Total Lecture Hours **60**

BOOKS FOR STUDY:

- Programming in Ansi C by E.Balagurusamy, McGraw Hill, Seventh Edition.
  Unit I: Chap 1,2,3,5,6 ; Unit II: Chap 7,8,9,11 ; Unit III: 10,12.
- Object Oriented Programming with C++ by E.Balagurusamy , Tata McGraw hill 7e.

BOOKS FOR REFERENCES:

- C programming made easy by N.Rajaram 1998 scitech publications.
- Computer science A structured programming approach using C-Behrouz A.Forouzan-3rdEdition-CENGAGE Learning.
- A Workbook on C++-Sumit Mittu-2013- CENGAGE Learning.

WEB RESOURCES:

- **https://nptel.ac.in/courses/117/105/117105135/**
- **https://www.tutorialspoint.com/c/index.htm**
- **http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html**
- **https://nptel.ac.in/courses/106/105/106105171/**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change	**100**	No Changes Made		New Course	✓		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Control the sequence of the program and give logical outputs	**K1 to K4**
CO2	Implement strings in your C program	**K1 to K4**
CO3	Manage I/O operations in your C program	**K1 to K4**
CO4	Apply the basic concept of OOPs and familiarize to write C++ program	**K1 to K4**
CO5	Manage I/O operations in your C++ program	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	L	S	L	M	M	S	L	M
CO2	S	L	M	S	M	S	L	M	S	L
CO3	L	M	S	L	S	M	S	S	L	M
CO4	S	L	S	M	L	S	L	L	M	S
CO5	M	S	L	L	L	S	S	M	L	M

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**3**	**3**
CO 2	**3**	**3**	**3**	**3**	**2**
CO 3	**3**	**3**	**3**	**3**	**2**
CO 4	**3**	**3**	**3**	**3**	**2**
CO 5	**3**	**2**	**3**	**3**	**3**
WEIGHTAGE	**15**	**14**	**15**	**15**	**12**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100%**	**93%**	**100%**	**100%**	**80%**

LESSON PLAN:

UNIT	PROGRAMMING IN C AND C++	HRS	PEDAGOGY
I	Basic Structure of C program – Constants, variables and Data types – Operators and Expressions –Decision Making and Branching – Decision Making and Looping	**12**	**LCD, BLACK BOARD**
II	Introduction – Array – One-Dimensional Arrays – Two Dimensional Arrays -Multidimensional arrays – Character arrays and Strings – Declaring and Initializing String Variables – String-Handling Functions – User-Defined functions	**12**	**LCD, BLACK BOARD**
III	Introduction – Pointers– Understanding pointers – Declaring pointer variables – Initialization of pointer variables – Accessing a variable through its pointer- Array of pointers Defining a Structure – Declaring, Accessing Structure Variables- Array of structures – structures and Functions – Unions	**12**	**LCD, BLACK BOARD**
IV	Introduction -Structure of C++ program – Tokens – Keywords – Identifiers and constants – Basic Data types – Derived data types – user defined data type – operators – Scope resolution operator - type compatibility – symbolic constants – type cast operator - operator overloading – operator precedence – expressions and their types, manipulators	**12**	**LCD, BLACK BOARD**
V	Specifying a class– defining member functions – Arrays within a class – Array of objects –constructor – parameterized constructors– constructors with default arguments – Copy constructors – Destructors. Inheritance – Defining derived class – single inheritance – multilevel Inheritance – multiple inheritances – hierarchical inheritance – hybrid inheritance – abstract classes- Polymorphism - Virtual functions	**12**	**LCD, BLACK BOARD**

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 Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
	CO2	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
CI AII	**CO3**	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
	CO4	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
Question Pattern CIA I & II		**No. of Questions to be asked**	**4**		**4**	**4**
		No. of Questions to be answered	**4**		**2**	**2**
		Marks for each question	**1**		**5**	**8**
		Total Marks for each section	**4**		**10**	**16**

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			32	32	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			32	32	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**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	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
2	CO2	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
3	CO3	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
4	CO4	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
5	CO5	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(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 (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.57	3.57
K2	5			5	3.57	3.57
K3		50		50	35.72	35.72
K4			80	80	57.14	57.14
Marks	10	50	80	140	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

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**	**K3**	
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**	**K3**	
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**	**K3**	
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K4**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K4**	
20. a)	**Unit - V**	**CO5**	**K4**	
		OR		
20. b)	**Unit - V**	**CO5**	**K4**	

Course Name	PROGRAMMING IN C & C++ LAB			
Course Code	23UCSAP31	L	P	C
Category	ALLIED PRACTICAL	-	2	2

COURSE OBJECTIVES:

- To make students understand the concepts of C programming.
- To impart knowledge about arrays and functions
- To make the students learn structures and files
- To apply the OOPs concept in C++programming.
- To know the concepts of classes and objects.

LIST OF PROGRAMS **30**

1. Write a C & C ++ program using formula like simple interest, sum of n natural numbers
2. Write a C & C ++ program using if… else statement to find biggest, smallest of 3 numbers
3. Write a C & C ++ program using for loop to find factorial of a number
4. Write a C & C ++ program using do…while loop to generate Fibonacci series
5. Write a C ++ program using class for sorting of numbers.
6. Write a C++ program using function over loading to find area and circumference of a circle.
7. Write a C++ program using friend function to find average of numbers
8. Write a C++ program using single inheritance to prepare student mark sheet
9. Write a C++ program using multiple inheritance to perform linear search
10. Write a C++ program using multi level inheritance to perform matrix addition

Total Lecture Hours	**30**

BOOKS FOR STUDY:

- Programming in Ansi C by E.Balagurusamy, McGraw Hill, Seventh Edition.
- Object Oriented Programming with C++ by E.Balagurusamy , Tata McGraw hill 7e.

BOOKS FOR REFERENCES:

- C programming made easy by N.Rajaram 1998 scitech publications.
- Computer science A structured programming approach using C-Behrouz A.Forouzan-3rdEdition-CENGAGE Learning.
- A Workbook on C++-Sumit Mittu-2013- CENGAGE Learning.

WEB RESOURCES:

- https://nptel.ac.in/courses/117/105/117105135/
- https://www.tutorialspoint.com/c/index.htm
- http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html
- https://nptel.ac.in/courses/106/105/106105171/

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	✓
Changes Made in the Course	Percentage of Change	**100%**	No Changes Made		New Course	✓		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Control the sequence of the program and give logical outputs	**K1 to K4**
CO2	Implement strings in your C& C++ program	**K1 to K4**
CO3	Manage I/O operations in your C & C++program	**K1 to K4**
CO4	Apply the basic concept of OOPs and familiarize to write C++ program	**K1 to K4**
CO5	Manage I/O operations in your C & C++ program	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	M	M	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:						
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO 1	**3**	**3**	**3**	**3**	**3**	**3**
CO 2	**3**	**3**	**2**	**3**	**3**	**3**
CO 3	**3**	**3**	**3**	**2**	**3**	**2**
CO 4	**3**	**2**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**3**	**3**
WEIGHTAGE	**15**	**14**	**13**	**13**	**15**	**13**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100%**	**93%**	**93%**	**93%**	**100%**	**93%**

LESSON PLAN:

S. No.	PROGRAMMING in C & C++ LAB	HRS	PEDAGOGY
1.	Write a C & C ++ program using formula like simple interest, sum of n natural numbers	60	LCD, HANDS ON TRAINING
2.	Write a C & C ++ program using if… else statement to find biggest, smallest of 3 numbers		
3.	Write a C & C ++ program using for loop to find factorial of a number Write a C & C ++ program using do…while loop to generate Fibonacci series		
4.	Write a C ++ program using class for sorting of numbers.		
5.	Write a C++ program using function over loading to find area and circumference of a circle.		
6.			
7.	Write a C++ program using friend function to find average of numbers		
8.	Write a C++ program using single inheritance to prepare student mark sheet		
9.	Write a C++ program using multiple inheritance to perform linear search		
10.	Write a C++ program using multi level inheritance to perform matrix addition		

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	**Cos**	**K Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding & Implementation**	**Debugging & Outpu**
CIA	**CO1**	**K1**	**5**				
	CO2	**K2**		**5**			
	CO3	**K3**			**5**		
	CO4	**K4**				**5**	
	CO5	**K4**					**5**
Question Pattern CIA		**No. of Questions to be asked**	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
		Total Marks for each section	**5**	**5**	**5**	**5**	**5**

Distribution of Marks with K Level CIA									
	K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	5					**5**	**20**	**20**
	K2		5				**5**	**20**	**20**
	K3			5			5	20	20
	K4				5	5	10	40	40
	Marks						**25**	**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**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding& Implementation**	**Debugging & Output**
1	**CO1**	**K1**	**15**				
2	**CO2**	**K2**		**15**			
3	**CO3**	**K3**			**15**		
4	**CO4**	**K4**				**15**	
5	**CO5**	**K4**					**15**
No. of Questions to be Asked			**2**	**2**	**2**	**2**	**2**
No. of Questions to be answered			**2**	**2**	**2**	**2**	**2**
Marks for each question			**7.5**	**7.5**	**7.5**	**7.5**	**7.5**
Total Marks for each section			**15**	**15**	**15**	**15**	**15**
(Figures in parenthesis denotes, questions should be asked with the given K level)							

Distribution of Marks with K Level CIA									
	K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	15					**15**	**20**	**20**
	K2		15				**15**	**20**	**20**
	K3			15			15	20	20
	K4				15	1 5	30	40	40
	Marks						**75**	**100**	**100**

Course Name	ELECTRONIC EQUIPMENTS AND SERVICING			
Course Code	23UELSC31	L	P	C
Category	SKILL	1	-	1

COURSE OBJECTIVES:

- To impart the knowledge on alignment and servicing of equipments.
- To gain knowledge about the Receiver circuit and alignments.
- To understand the knowledge about the Receiver servicing.
- To enable the students to acquire knowledge of troubleshooting heating appliances.
- To enable the students to acquire the knowledge of troubleshooting refrigeration appliances

UNIT - I	**ALIGNMENT AND SERVICING EQUIPMENTS**	**3**

Multimeter- VTVM- Digital Multimeter- high voltage probe- RF and AF signal generator-Operation and Application

UNIT - II	**RECEIVER CIRCUIT AND ALIGNMENT**	**3**

Camera- TV transmitter & receiver-2 band radio receiver circuit- Alignment BW TV circuit- alignment of color TV receiver.

UNIT - III	**RECEIVER SERVICING**	**3**

Trouble shooting procedure- Trouble shooting monochrome receiver- servicing of various functional blocks- trouble shooting color receiver servicing circuit modules- Safety precautions in TV servicing- Troubleshooting in 2 band radio receiver.

UNIT - IV	**HEATING APPLIANCES**	**3**

Heater types–working principle– Heating Rod–Iron Box–Iron box with steamer– Toasters–Geysers– Microwave Ovens– Oven –Disassembling and assembling procedure– Fault indicator– Testing and Troubleshooting methods.

UNIT - V	**REFRIGERATION APPLIANCES**	**3**

Fridge– Electrical connection– Compressor–Coolants–Automatic defrost circuits –Testing and Troubleshooting of refrigerators–Air coolers and Air conditioners– Mounting and fixing of Air Conditioners–Testing and Troubleshooting methods.

Total Lecture Hours	**15**

BOOKS FOR STUDY:

- Gulati R.R., "Monochrome and Color Televisions", Eastern India (For Units I,II and III)
- S P Bali, Consumer Electronics, Pearson

BOOKS FOR REFERENCES:

- Troubleshooting and Maintenance of Electronics Equipments, A.K.Lal.
- Troubleshooting Electronic Equipment, Dr R.S. Khandpur , Second Edition.

WEB RESOURCES:

- **https://archive.nptel.ac.in/courses/112/105/112105248/**
- **https://archive.nptel.ac.in/courses/112/105/112105129/**
- **https://en.wikipedia.org/wiki/Washing_machine/**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP					
Curriculum Relevance	LOCAL		REGIONAL	✓	NATIONAL		GLOBAL			
Changes Made in the Course	Percentage of Change	**40**	No Changes Made		New Course					

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Gain the knowledge on alignment and servicing equipment	**K1 & K2**
CO2	Gain the knowledge about the Receiver circuit and alignment.	**K1 & K2**
CO3	Understand the knowledge about the Receiver servicing.	**K1 & K2**
CO4	The students to acquire the knowledge of troubleshooting heating appliances	**K1 & K2**
CO5	The students to acquire the knowledge of troubleshooting refrigeration appliances	**K1 & K2**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	S	S	M	M	S	L	M
CO2	M	M	L	M	L	M	M	S	M	M
CO3	S	S	M	S	M	S	L	S	L	S
CO4	S	M	S	M	L	L	S	S	M	S
CO5	S	S	S	M	M	M	M	S	M	M

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**1**	**2**	**3**
CO 2	**3**	**2**	**1**	**2**	**2**
CO 3	**3**	**2**	**2**	**1**	**3**
CO 4	**3**	**3**	**2**	**1**	**2**
CO 5	**3**	**2**	**3**	**2**	**2**
WEIGHTAGE	**15**	**13**	**9**	**8**	**12**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100**	**87**	**60**	**53**	**80**

LESSON PLAN:

UNIT	ELECTRONIC EQUIPMENTS AND SERVICING	HRS	PEDAGOGY
I	**ALIGNMENT AND SERVICING EQUIPMENTS** Multimeter- VTVM- Digital Multimeter- high voltage probe- RF and AF signal generator-Operation and Application.	**3**	**Chalk & Talk, Power Point Presentation**
II	**RECEIVER CIRCUIT AND ALIGNMENT** Camera- TV transmitter & receiver-2 band radio receiver circuit-Alignment BW TV circuit- alignment of color TV receiver.	**3**	**Chalk & Talk, Power Point Presentation**
III	**RECEIVER SERVICING** Trouble shooting procedure- Trouble shooting monochrome receiver-servicing of various functional blocks- trouble shooting color receiver servicing circuit modules- Safety precautions in TV servicing-Troubleshooting in 2 band radio receiver..	**3**	**Chalk & Talk, Power Point Presentation**
IV	**HEATING APPLIANCES** Heater types–working principle– Heating Rod–Iron Box–Iron box with steamer– Toasters–Geysers– Microwave Ovens– Oven –Disassembling and assembling procedure– Fault indicator– Testing and Troubleshooting methods.	**3**	**Chalk & Talk, Power Point Presentation**
V	**REFRIGERATION APPLIANCES** Fridge– Electrical connection– Compressor–coolants–Automatic defrost circuits –Testing and Troubleshooting of refrigerators–Air coolers and Air conditioners– Mounting and fixing of AirConditioners–Testing and Troubleshooting methods.	**3**	**Chalk & Talk, Power Point Presentation**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	**Cos**	**K Level**	**Section A**	
			MCQs	
			No. of. Questions	**K - Level**
CI AI	**CO1**	**K1 – K2**	**25**	**K1,K2**
	CO2	**K1 – K2**	**25**	**K1,K2**
CI AII	**CO3**	**K1 – K2**	**25**	**K1,K2**
	CO4	**K1 – K2**	**25**	**K1,K2**
Question Pattern CIA I & II		**No. of Questions to be asked**	**50**	
		No. of Questions to be answered	**50**	
		Marks for each question	**1**	
		Total Marks for each section	**50**	

* Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (Ist Test-2 CO's & IInd Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II					
	K Level	**Section A (Multiple Choice Questions)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**30**	**30**	**60**	**100**
	K2	**20**	**20**	**40**	
	K3				
	K4				
	Marks	**50**	**50**	**100**	**100**
CIA II	**K1**	**30**	**30**	**60**	**100**
	K2	**20**	**20**	**40**	
	K3				
	K4				
	Marks	**50**	**50**	**100**	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)				
S. No	**COs**	**K - Level**	**Section A (MCQs)**	
			No. of Questions	**K – Level**
1	**CO1**	**K1-K2**	**15**	**K1,K2**
2	**CO2**	**K1-K2**	**15**	**K1,K2**
3	**CO3**	**K1-K2**	**15**	**K1,K2**
4	**CO4**	**K1-K2**	**15**	**K1,K2**
5	**CO5**	**K1-K2**	**15**	**K1,K2**
No. of Questions to be Asked			**75**	
No. of Questions to be answered			**75**	
Marks for each question			**1**	
Total Marks for each section			**75**	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	**Section A (Multiple Choice Questions)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**40**	**40**	**53**	**100**
K2	**35**	**35**	**47**	
K3				
K4				
Marks		**75**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				

Course Name	ANTENNAS AND WAVE PROPAGATION			
Course Code	23UELSC32	**L**	**P**	**C**
Category	SKILL	2	-	2

COURSE OBJECTIVES:

- To impart knowledge of Radiation Principle and Antenna terminologies.
- To gain knowledge of fundamentals of antenna.
- To understand the concepts of Antenna arrays.
- To impart the knowledge of antenna types.
- To gain knowledge about propagation of waves.

UNIT - I RADIATION PRINCIPLES AND ANTENNA TERMINOLOGIES 6

Principle of radiation isotropic radiator – Antenna terminologies – reciprocity theorem – Friis formula.

UNIT - II ANTENNA FUNDAMENTALS 6

Radiations from an oscillation dipole- short linear antennas Half wave dipole as a basic radiating element – folded unipole and dipole antenna shunt fed dipoles – antennas- loop antenna – Standing wave radiators.

UNIT - III ANTENNA ARRAYS 6

Pattern multiplication-arrays of two driven antennas-Broadside arrays-end fire arrays- collinear arrays-parasitic arrays-linear arrays with ‘n’ isotropic point sources-stacked arrays- Traveling wave radiators**.**

UNIT - IV ANTENNA PRACTICE 6

Antenna for low frequencies – Beverage antenna- Antenna for Medium frequencies –Tower antenna –-Balloons-Resonant V-inverted antenna – Rhombic arrays for MUSA- Diversity reception-Yagi antenna-comer reflector –-turnstile antenna-Helical antenna-Horn Antenna- Lens Antenna- Log periodic antenna.

UNIT - V WAVE PROPAGATION 6

Propagation in free space-propagation around the earth-surface wave and its propagation- structure of the ionosphere-propagation of plane waves in an ionized medium-Determination of critical frequencies-maximum usable frequency-Effect of earth’s magnetic field- ionosphere variations-fading-refractive index of troposphere-effect of surface irregularities- scatter propagation.

Total Lecture Hours 30

BOOKS FOR STUDY:

- Antenna and Wave Propagation-K.D.Prasad-III Reprint Edition, 2012-13-Satyaprakashan.

UNIT –I-Chap-4;
UNIT –II-Chap-5;
UNIT –III-Chap-7;
UNIT –IV-Chap-8 & 9;
UNIT –V-Chap-11.

BOOKS FOR REFERENCES:

- Antennas for All Applications-John D.Kraus- IIIEdition-IIReprint-TMH-2003.
- Electronic Communication Systems, Kennedy, Davis, Fourth Edition , Tata McGRA Hill.

WEB RESOURCES:

- **https://archive.nptel.ac.in/courses/117/107/117107035/**
- **https://mrcet.com/downloads/digital_notes/ECE/III%20Year/ANTENNA%20AND%20WAVE%20PROPAGATIONS.pdf**
- **https://biet.ac.in/pdfs/ANTENNAS%20AND%20PROPAGATION%20(%20EC601%20PC).pdf/**

Nature of Course	EMPLOYABILITY			SKILL ORIENTED		✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		✓	GLOBAL		
Changes Made in the Course	Percentage of Change			No Changes Made			New Course		✓	

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the knowledge of radiation principle and Antenna terminologies.	**K1 & K2**
CO2	Gain the knowledge of fundamentals of antenna.	**K1 & K2**
CO3	Understand the concepts of Antenna arrays.	**K1 & K2**
CO4	Gain the knowledge of antenna types.	**K1 & K2**
CO5	Gain knowledge about propagation of waves	**K1 & K2**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	L	L	M	M	M	S	M	S
CO2	M	M	L	L	L	M	S	S	M	M
CO3	L	L	L	M	M	M	M	S	M	M

CO4	S	S	M	M	L	M	M	S	L	M
CO5	S	S	S	M	M	S	M	S	M	M

S- STRONG M – MEDIUM L - LOW

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	2	2	2
CO 2	2	3	1	2	2
CO 3	3	3	1	2	2
CO 4	3	3	2	3	2
CO 5	2	3	2	2	2
WEIGHTAGE	13	15	8	11	10
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	87	100	53	73	67

LESSON PLAN:

UNIT	ANTENNAS AND WAVE PROPAGATION	HRS	PEDAGOGY
I	**RADIATION PRINCIPLE AND ANTENNA TERMINOLGIES** Principle of radiation isotropic radiator – Antenna terminologies – reciprocity theorem – Friis formula.	6	Chalk & Talk, Power Point Presentation
II	**ANTENNA FUNDAMENTALS** Radiations from an oscillation dipole- short linear antennas Half wave dipole as a basic radiating element – folded unipole and dipole antenna shunt fed dipoles – antennas- loop antenna – Standing wave radiators.	6	Chalk & Talk, Power Point Presentation
III	**ANTENNA ARRAYS** Pattern multiplication-arrays of two driven antennas-Broadside arrays-end fire arrays- collinear arrays-parasitic arrays-linear arrays with 'n' isotropic point sources-stacked arrays- Traveling wave radiators	6	Chalk & Talk, Power Point Presentation
IV	Antenna for low frequencies – Beverage antenna- Antenna for Medium frequencies –tower antenna –- balloons-Resonant V-inverted antenna – Rhombic arrays for MUSA- Diversity reception-Yagi antenna-comer reflector –-turnstile antenna-Helical antenna-Horn Antenna- Lens Antenna- Log periodic antenna.	6	Chalk & Talk, Power Point Presentation
V	**WAVE PROPAGATION** Propagation in free space-propagation around the earth-surface wave	6	Chalk & Talk, Power Point

	and its propagation- structure of the ionosphere-propagation of plane waves in an ionized medium-Determination of critical frequencies-maximum usable frequency-Effect of earth's magnetic field- ionosphere variations-fading-refractive index of troposphere-effect of surface irregularities- scatter propagation.		**Presentation**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	**Cos**	**K Level**	**Section A**	
			MCQs	
			No. of. Questions	**K - Level**
CI AI	**CO1**	**K1 – K2**	**25**	**K1,K2**
	CO2	**K1 – K2**	**25**	**K1,K2**
CI AII	**CO3**	**K1 – K2**	**25**	**K1,K2**
	CO4	**K1 – K2**	**25**	**K1,K2**
Question Pattern CIA I & II		**No. of Questions to be asked**	**50**	
		No. of Questions to be answered	**50**	
		Marks for each question	**1**	
		Total Marks for each section	**50**	

* Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (I^{st} Test-2 CO's & II^{nd} Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II					
	K Level	Section A (Multiple Choice Questions)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100
CIA II	K1	30	30	60	100
	K2	20	20	40	
	K3				
	K4				
	Marks	50	50	100	100

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

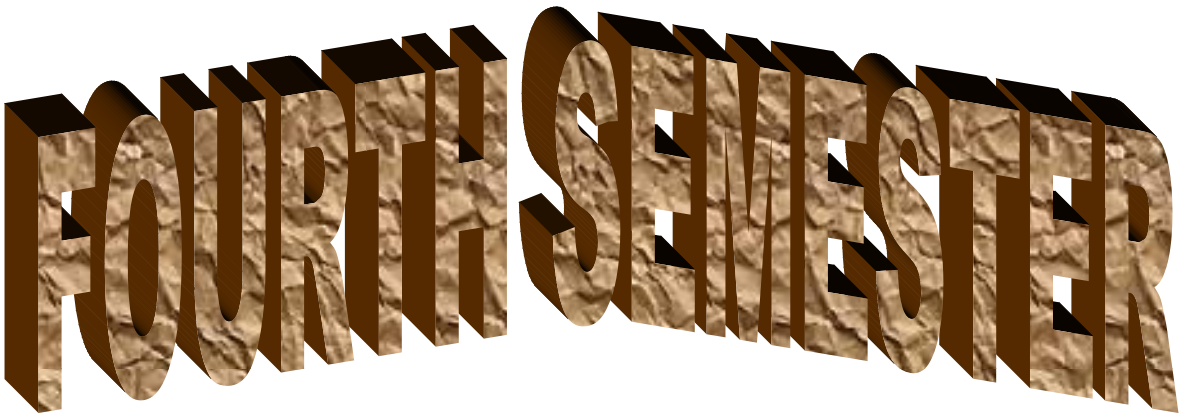
K4- Examining, analyzing, presentation and make inferences with evidences

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)				
S. No	COs	K - Level	Section A (MCQs)	
			No. of Questions	K – Level
1	CO1	K1-K2	15	K1,K2
2	CO2	K1-K2	15	K1,K2
3	CO3	K1-K2	15	K1,K2
4	CO4	K1-K2	15	K1,K2
5	CO5	K1-K2	15	K1,K2
No. of Questions to be Asked			75	
No. of Questions to be answered			75	
Marks for each question			1	
Total Marks for each section			75	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	**Section A (Multiple Choice Questions)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**40**	**40**	**53**	**100**
K2	**35**	**35**	**47**	
K3				
K4				
Marks		**75**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				


FOURTH SEMESTER

Course Name	LINEAR INTEGRATED CIRCUITS			
Course Code	23UELCC41	**L**	**P**	**C**
Category	CORE	4	-	4

COURSE OBJECTIVES:

- To impart the knowledge on Op-amp Characteristics.
- To Gain knowledge about the linear application of an Op-amp.
- To understand the knowledge about the nonlinear applications of an Op-amp.
- To enable the students to acquire the knowledge of regulators and generators
- To enable the students to acquire the knowledge of special functions of ICs (555, 565 and 566) in various circuits

UNIT - I OPERATIONAL AMPLIFIER **12**

Introduction – Internal structure- Parameters and Characteristics of practical & an ideal operation amplifier- circuit schematic of op Amp 741 – Internal Block diagram.

Operational Amplifier Characteristics: Input bias and offset currents – Input and output offset voltages – Thermal voltage drift – Offset response characteristics – CMRR –input & output resistance – Stability – Limitations – Frequency response –Slew rate – Transfer characteristics.

UNIT - II LINEAR APPLICATION OF OPERATIONAL AMPLIFIERS **12**

Inverting and non –inverting amplifiers – Summing amplifier – Differential amplifier- Instrumentation amplifier – Voltage to current, Current to voltage converters – Sample and Hold Circuit - Differentiator-Integrator. Op-amp filters-Low pass filter – High pass filter.

UNIT - III NON LINEAR APPLICATION OF OPERATIONAL AMPLIFIERS **12**

Precision peak detector – Rectifier- Clipper &Clamper -Voltage limiters-Comparators – Threshold Comparators –Zero crossing detector –Schmitt Trigger.

UNIT - IV WAVEFORM GENERATORS & VOLTAGE REGULATORS **12**

Square wave generator- Triangular wave generator- Saw tooth wave generator Using UA 741-IC Voltage regulators – Elements of IC 723 voltage regulators-Dual Power Supply.

UNIT - V SPECIAL FUNCTIONS IC'S **12**

555 Timer functional block diagram and description – Mono-stable and A-stable operation – applications – VCO (NE 566) Voltage Block diagram – PLL (NE 565) Block diagram – Frequency multiplier- FSK Demodulator - Voltage to frequency conversion – frequency to voltage conversion – IC LF398 .

Total Lecture Hours **60**

BOOKS FOR STUDY:

- Linear Integrated Circuits – Muhammad H. Rashit – CENGAGE Learning 2014

Unit I - 2.1to 2.3

Unit III – 4.1 to 4.5

Unit IV – 4.6 to 4.8,4.16

Unit V – 4.9 to 4.15

- Roy Choudhury and Shail, Linear Integrated Circuits, Wiley Ltd, New Age Int. Ltd. -3E-2009.
- UNIT- II- 4.1 to 4.11

BOOKS FOR REFERENCES:

- Op-Amps & Linear Integrated Circuits, Gaykwad AR Prentice Hall of India 3rd Edition, New Delhi, 1993.

WEB RESOURCES:

- **https://www.digimat.in/nptel/courses/video/108108111/L01.html**
- **https://www.youtube.com/watch?v=clTAOpONnMs**
- **https://www.digimat.in/nptel/courses/video/108102112/L01.html**

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change	**25**	No Changes Made		New Course			

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the characteristics of Op-Amp	**K1 to K4**
CO2	Gain the Knowledge about the linear applications of an Op- amp	**K1 to K4**
CO3	Gain the Knowledge about the nonlinear applications of an Op- amp	**K1 to K4**
CO4	Understand the working of regulators and generators.	**K1 to K4**
CO5	Apply the concepts of special functions of ICs (555, 565 and 566) in various circuits.	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	S	S	M	M	S	L	M
CO2	M	M	L	M	L	M	M	S	M	M
CO3	S	S	M	S	M	S	L	S	L	S
CO4	S	M	S	M	L	L	S	S	M	S
CO5	S	S	S	M	M	M	M	S	M	M

S- STRONG	M – MEDIUM	L - LOW

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	1	2	3
CO 2	3	2	1	2	2
CO 3	3	2	2	1	3
CO 4	3	3	2	1	2
CO 5	3	2	3	2	2
WEIGHTAGE	15	13	9	8	12
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100	87	60	53	80

LESSON PLAN:

UNIT	LINEAR INTEGRATED CIRCUITS	HRS	PEDAGOGY
I	**OPERATIONAL AMPLIFIER** Introduction – Internal structure- Parameters and Characteristics of practical & an ideal operation amplifier- circuit schematic of op Amp 741 – Internal Block diagram. Operational Amplifier Characteristics: Input bias and offset currents – Input and output offset voltages – Thermal voltage drift – Offset response characteristics – CMRR –input & output resistance – Stability – Limitations – Frequency response –Slew rate – Transfer characteristics.	12	Chalk & Talk, Power Point Presentation
II	**LINEAR APPLICTION OF OPERATIONAL AMPLIFIER** Inverting and non –inverting amplifiers – Summing amplifier – Differential amplifier- Instrumentation amplifier – Voltage to current, Current to voltage converters – Sample and hold Circuit - Differentiator-Integrator. Op-amp filters-Low pass filter – High pass filter.	12	Chalk & Talk, Power Point Presentation
III	**NON LINEAR APPLICTION OF OPERATIONAL AMPLIFIER** Precision peak detector – Rectifier- Clipper &Clamper -Voltage limiters-Comparators – Threshold Comparators –Zero crossing detector –Schmitt Trigger.	12	Chalk & Talk, Power Point Presentation
IV	**WAVEFORM GENERATORS & VOLTAGE REGULATORS** Square wave generator- Triangular wave generator- Saw tooth wave generator Using UA741-IC voltage regulators – Elements of IC 723 voltage regulators-Dual Power Supply.	12	Chalk & Talk, Power Point Presentation

V	**SPECIAL FUNCTIONS IC'S** 555 Timer functional block diagram and description – Mono-stable and a-stable operation – applications – VCO (NE 566) Voltage Block diagram – PLL (NE 565) Block diagram – Frequency multiplier- FSK Demodulator – Voltage to frequency conversion – frequency to voltage conversion – LF398 –Sample and hold circuit .	**12**	**Chalk & Talk, Power Point Presentation**

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 Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	**2**	**K1**	**2(K3&K3)**	**2(K3&K3)**
	CO2	**K1 – K4**	**2**	**K2**	**2(K3&K3)**	**2(K3&K3)**
CI AII	**CO3**	**K1 – K4**	**2**	**K1**	**2(K3&K3)**	**2(K4&K4)**
	CO4	**K1 – K4**	**2**	**K2**	**2(K3&K3)**	**2(K4&K4)**
Question Pattern CIA I & II		**No. of Questions to be asked**	**4**		**4**	**4**
		No. of Questions to be answered	**4**		**2**	**2**
		Marks for each question	**1**		**5**	**8**
		Total Marks for each section	**4**		**10**	**16**

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	-	-	2	**3.6**	**7**
	K2	2	-	-	2	**3.6**	
	K3	-	20	32	52	**93**	**93**
	K4	-	-	-	-	**-**	**-**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	2	-	-	2	**3.6**	**7.2**
	K2	2	-	-	2	**3.6**	
	K3	-	10	16	26	**46.4**	**46.4**
	K4	-	10	16	26	**46.4**	**46.4**
	Marks	**4**	**20**	**32**	**56**	**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	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
2	CO2	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
3	CO3	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K4&K4)
4	CO4	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K4&K4)
5	CO5	K1 – K4	2	K1&K2	2 (K3&K3)	2 (K3&K3)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(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 (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.5	7
K2	5			5	3.5	
K3		50	48	98	70	93
K4			32	32	23	
Marks	10	50	80	140	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

Q. No.	Unit	CO	K-level		
Answer ALL the questions				PART – A	(10 x 1 = 10 Marks)
1.	Unit - I	CO1	K1		
				a)	b)
				c)	d)
2.	Unit - I	CO1	K2		
				a)	b)
				c)	d)
3.	Unit - II	CO2	K1		
				a)	b)
				c)	d)
4.	Unit - II	CO2	K2		
				a)	b)
				c)	d)
5.	Unit - III	CO3	K1		
				a)	b)
				c)	d)
6.	Unit - III	CO3	K2		
				a)	b)
				c)	d)
7.	Unit - IV	CO4	K1		
				a)	b)
				c)	d)
8.	Unit - IV	CO4	K2		
				a)	b)
				c)	d)
9.	Unit - V	CO5	K1		
				a)	b)
				c)	d)
10.	Unit - V	CO5	K2		
				a)	b)
				c)	d)

Answer ALL the questions		PART – B		(5 x 5 = 25 Marks)
11. a)	Unit - I	CO1	K3	
		OR		
11. b)	Unit - I	CO1	K3	
12. a)	Unit - II	CO2	K3	
		OR		
12. b)	Unit - II	CO2	K3	
13. a)	Unit - III	CO3	K3	
		OR		
13. b)	Unit - III	CO3	K3	
14. a)	Unit - IV	CO4	K3	
		OR		
14. b)	Unit - IV	CO4	K3	
15. a)	Unit - V	CO5	K3	
		OR		
15. b)	Unit - V	CO5	K3	

Answer ALL the questions		PART – C		(5 x 8 = 40 Marks)
16. a)	Unit - I	CO1	K3	
		OR		
16. b)	Unit - I	CO1	K3	
17. a)	Unit - II	CO2	K3	
		OR		
17. b)	Unit - II	CO2	K3	
18. a)	Unit - III	CO3	K4	
		OR		
18. b)	Unit - III	CO3	K4	
19. a)	Unit - IV	CO4	K4	
		OR		
19. b)	Unit - IV	CO4	K4	
20. a)	Unit - V	CO5	K3	
		OR		
20. b)	Unit - V	CO5	K3	

Course Name	LINEAR INTEGRATED CIRCUIT LAB			
Course Code	23UELCP41	**L**	**P**	**C**
Category	CORE	-	4	4

COURSE OBJECTIVES:

- To understand the basic knowledge of op-amp characteristics in practically.
- To prepare students to perform the analysis and design of op-amp IC 741 based circuits.
- Students shall learn and construct the op-amp oscillators.
- To prepare students to design IC 555 timer based circuits.
- To design mini project based on practical circuits

Any12 Experiments

1. Op-amp characteristics – Slew rate, CMRR
2. Op-amp operations – Amplifiers – inv, non-inv, summing.
3. Waveform generators – using op-amp,
4. Sinusoidal oscillators- using op-amp
5. Comparator.
6. Schmitt trigger.
7. Astable multivibrator Using IC 555.
8. Mono stable multivibrator Using IC 555.
9. Bi-stable multivibrator Using IC 555.
10. Voltage Controlled Oscillator-566.
11. Phase locked loop using 565.
12. Timer using IC 555.
13. Differentiator & Integrator.
14. Sample & Hold circuit.
15. Low pass & High pass filter.
16. ADC – 0804 – 8 bit single channel.
17. DAC
18. Voltage to Current convertor.
19. Current to Voltage convertor.

BOOKS FOR STUDY:

- Linear Integrated Circuits Practical manual prepared by Department faculty.

BOOKS FOR REFERENCES:

- Practical Physics and Electronics, C.C.Ouseph, U.J.Rao and V.Vijayendran
- Electronics Practical, Swathi Gupta, Shweta Gupta, Narosa Publishing House.

WEB RESOURCES:

- https://www.youtube.com/watch?v=Oyd0OwFq7RE
- https://www.youtube.com/watch?v=2EjSXEm0iRI
- https://www.youtube.com/watch?v=elFW0qMqxlI
- https://www.youtube.com/watch?v=d_F-aD5wyNw

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change	**60**	No Changes Made		New Course			

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Able to understand the basic knowledge of op-amp characteristics in practically	**K1 to K4**
CO2	Able perform the analysis and design of op-amp IC741 based circuits.	**K1 to K4**
CO3	Gain the knowledge learn and construct the op-amp oscillators.	**K1 to K4**
CO4	Understand to Construct design IC 555 timer based circuits.	**K1 to K4**
CO5	Gain the knowledge of design mini project based above practical circuit.	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	L	M	S	S	M	S	S	M
CO2	M	L	M	S	L	M	M	S	M	S
CO3	M	M	S	M	S	M	L	S	M	M
CO4	M	M	M	L	M	S	M	S	S	S
CO5	S	L	M	M	L	M	S	S	M	M

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**2**	**3**
CO 2	**3**	**1**	**2**	**3**	**2**
CO 3	**3**	**3**	**2**	**2**	**3**
CO 4	**3**	**2**	**3**	**3**	**3**
CO 5	**3**	**3**	**2**	**2**	**2**
WEIGHTAGE	**15**	**12**	**12**	**12**	**13**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100**	**80**	**80**	**80**	**86**

LESSON PLAN:

UNIT	LINEAR INTEGRATED CIRCUIT LAB	HRS	PEDAGOGY
I	Op-amp characteristics – slew rate, CMRR Op-amp operations – Amplifiers – inverting, non-inverting, summing. Waveform generators – using op-amp, Sinusoidal oscillators- using op-amp	**12**	**Practical**
II	Comparator. Schmitt trigger. Astable multivibrator Using IC 555. Mono stable multivibrator Using IC 555	**12**	**Practical**
III	Bi-stable multivibrator Using IC 555. Voltage controlled oscillator-566. Phase locked loop using 565. Timer using IC 555.	**12**	**Practical**
IV	Differentiator & Integrator. Sample & Hold circuit. Low pass & High pass filter. ADC – 0804 – 8 bit single channel	**12**	**Practical**
V	DAC Voltage to current convertor. Current to voltage convertor	**12**	**Practical**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	**Cos**	**K Level**	**Aim and Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**
CIAI	**CO1**	**K1**	**5**				
	CO2	**K2**		**5**			
	CO3	**K3**			**5**		
	CO4	**K3**				**5**	
	CO5	**K4**					**5**
Question Pattern CIA		No. of Questions to be asked	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
		Total Marks for each section	**5**	**5**	**5**	**5**	**5**

Distribution of Marks with K Level CIA									
	K Level	**Aim and Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	5					**5**	**20**	**20**
	K2		5				**5**	**20**	**20**
	K3			5	5		10	40	40
	K4					5	5	20	20
	Marks						**25**	**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

CO 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)							
Internal	**Cos**	**K Level**	**Aim & Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**
CI AI	**CO1**	**K1**	**15**				
	CO2	**K2**		**15**			
	CO3	**K3**			**15**		
	CO4	**K3**				**15**	
	CO5	**K4**					**15**
Question Pattern		No. of Questions to be asked	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**7.5**	**7.5**	**7.5**	**7.5**	**7.5**
		Total Marks for each section	**15**	**15**	**15**	**15**	**15**

Distribution of Marks with K Level								
K Level	**Aim & Apparatus**	**Circuit diagram**	**Circuit construction**	**Readings &Calculation**	**Result**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	15					**15**	**20**	**20**
K2		15				**15**	**20**	**20**
K3			15	15		30	40	40
K4					15	15	20	20
Marks						**75**	**100**	**100**

Course Name	NUMERICAL METHODS			
Course Code	23UMTAC44	**L**	**P**	**C**
Category	ALLIED	4	-	4

COURSE OBJECTIVES:

- To enable the students can understand the methods of Iteration, bisection, Regula Falsi, Newton-Raphson.
- This course introduces the simultaneous equations.
- To study the basic concepts of interpolations.
- Introduce the basic knowledge of numerical differentiation and related problems.
- To enable the students to study the methods of Euler's, Taylor's and Range-Kutta.

UNIT - I	**ALGEBRAIC AND TRANSCENDENTAL EQUATIONS**	**12**
Iteration method –Regula Falsi method – Newton-Raphson Method.		
UNIT - II	**SIMULTANEOUS EQUATIONS**	**12**
Gauss Elimination method – calculation of inverse of matrix– Gauss-Jordan method.		
UNIT - III	**INTERPOLATION**	**12**
Newton's interpolation formula–Forward and Backward interpolation–Lagrange's interpolation formula – Inverse interpolation.		
UNIT - IV	**NUMERICAL DIFFERENTIATION**	**12**
Newton's forward and back ward difference formula – Numerical Integration: Trapezoidal rule – Simpson's rule. Eigen values and Eigen vectors of a matrix.		
UNIT - V	**NUMERICAL SOLUTION OF DIFFERENTIAL EQUATION**	**12**
Euler's method-Taylor's series method–Runge-Kutta method.		
	Total Lecture Hours	**60**

BOOKS FOR STUDY:

1. Numericalmethods", S. Arumugam, A. ThangapandiIssac, and A. Somasundaram - SCITECH Publications, Second edition.

Unit 1
Chapter 3 - Sections 3.2, 3.4and3.5;
Unit 2
Chapter4 – Sections 4.3 to 4.5;
Unit 3
Chapter 7 - 7.1, 7.3 and7.6;
Unit 4
Chapter 8 - 8.1, 8.2, 8.5,chap5;
Unit 5
Chapter 10 -10.1,10.3,10.4

BOOKS FOR REFERENCES:

- Numerical methods a programming-based approach Arunkumarjalan, UtpalSarkar- Universities Press 2015
- Numerical methods T.Veerajan and J.Ramchandran 2nd edition Tata McGraw Hill 2006.

WEB RESOURCES:

- **https://csw.uobaghdad.edu.iq/wp-content/uploads/sites/30/uploads/computer%20science/Lectures/2nd%20year/NUM%20ANALYSIS.pdf**
- **https://www.cuemath.com/algebra/simultaneous-equations/**
- **https://www.sciencedirect.com/topics/mathematics/numerical-differentiation**

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change		No Changes Made		New Course	✓		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Compute the methods of Iteration, bisection, RegulaFalsi, Newton-Raphson.	**K1 to K4**
CO2	Define basic concepts of simultaneous equations.	**K1 to K4**
CO3	Understand the concepts of interpolation	**K1 to K4**
CO4	Solve basic application problems described by Newton's forward and backward.	**K1 to K4**
CO5	Compute the methods of Euler's, Taylor's and Range-Kutta	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:										
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	L	M	L	M	M	M	S	M
CO2	L	L	L	L	L	M	M	M	L	L
CO3	L	M	L	L	S	M	L	L	M	M
CO4	L	M	M	L	L	S	M	L	M	S
CO5	M	L	M	M	L	M	M	L	M	M
S- STRONG				M – MEDIUM					L - LOW	

CO / PO MAPPING:					
COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	2	2	3	3	3
CO 2	2	2	3	2	3
CO 3	2	3	2	2	3
CO 4	2	2	2	3	2
CO 5	3	3	2	2	3
WEIGHTAGE	11	12	12	12	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	73	80	80	80	93

LESSON PLAN:			
UNIT		HRS	PEDAGOGY
I	Errors in Numerical computation – Iteration method – bisection method – RegulaFalsi method – Newton-Raphson Method.	12	Chalk & Talk, Power Point Presentation
II	Gauss Elimination method – calculation of inverse of matrix– Gauss-Seidal Iteration method-Relaxation Method.	12	Chalk & Talk, Power Point Presentation
III	Newton's interpolation formula–central difference interpolation formula–Lagrange's interpolation formula – Inverse interpolation.	12	Chalk & Talk, Power Point Presentation
IV	Newton's forward and back ward difference formula – Numerical Integration: Trapezoidal rule – Simpson's rule. Eigen values and Eigen vectors of a matrix.	12	Chalk & Talk, Power Point Presentation
V	Euler's method-Taylor's series method–Runge-Kuttamethod.	12	Chalk & Talk, Power Point Presentation

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 Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K – Level**		
CI AI	**CO1**	**K1 – K4**	**2**	**K1&K2**	**2 (K3&K3)**	**2 (K3&K3)**
	CO2	**K1 – K4**	**2**	**K1&K2**	**2 (K3&K3)**	**2 (K3&K3)**
CI AII	**CO3**	**K1 – K4**	**2**	**K1&K2**	**2 (K3&K3)**	**2 (K3&K3)**
	CO4	**K1 – K4**	**2**	**K1&K2**	**2 (K4&K4)**	**2 (K4&K4)**
Question Pattern CIA I & II		No. of Questions to be asked	**4**		**4**	**4**
		No. of Questions to be answered	**1**		**2**	**2**
		Marks for each question	**1**		**5**	**8**
		Total Marks for each section	**4**		**10**	**16**

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	-	-	2	**3.6**	**7**
	K2	2	-	-	2	**3.6**	
	K3	-	20	32	52	**93**	**93**
	K4	-	-	-	-	**-**	**-**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	2	-	-	2	**3.6**	**7.2**
	K2	2	-	-	2	**3.6**	
	K3	-	10	16	26	**46.4**	**46.4**
	K4	-	10	16	26	**46.4**	**46.4**
	Marks	**4**	**20**	**32**	**56**	**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	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	**K1 – K4**	**2**	**K1&K2**	**2 (K3&K3)**	**2 (K3&K3)**
2	CO2	**K1 – K4**	**2**	**K1&K2**	**2 (K3&K3)**	**2 (K3&K3)**
3	CO3	**K1 – K4**	**2**	**K1&K2**	**2 (K3&K3)**	**2 (K3&K3)**
4	CO4	**K1 – K4**	**2**	**K1&K2**	**2 (K4&K4)**	**2 (K4&K4)**
5	CO5	**K1 – K4**	**2**	**K1&K2**	**2 (K3&K3)**	**2 (K3&K3)**
No. of Questions to be Asked			**10**		**10**	**10**
No. of Questions to be answered			**10**		**5**	**5**
Marks for each question			**1**		**5**	**8**
Total Marks for each section			**10**		**25**	**40**
(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 (Either or Choice**	**Section C (Either/ or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	5	-	-	5	**3.6**	**7**
K2	5	-	-	5	**3.6**	
K3	-	40	64	104	**74.3**	**74**
K4	-	10	16	26	**18.5**	**19**
Marks	**10**	**50**	**80**	**140**	**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

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO 1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO 2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO 2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO 3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO 3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO 4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO 4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO 5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO 5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions **PART – B**				**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO 1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO 1**	**K3**	
12. a)	**Unit - II**	**CO 2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO 2**	**K3**	
13. a)	**Unit - III**	**CO 3**	**K3**	
		OR		
13. b)	**Unit - III**	**CO 3**	**K3**	
14. a)	**Unit - IV**	**CO 4**	**K4**	
		OR		
14. b)	**Unit - IV**	**CO 4**	**K4**	
15. a)	**Unit - V**	**CO 5**	**K3**	
		OR		
15. b)	**Unit - V**	**CO 5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K3**	
		OR		
16. b)	**Unit - I**	**CO 1**	**K3**	
17. a)	**Unit - II**	**CO 2**	**K3**	
		OR		
17. b)	**Unit - II**	**CO 2**	**K3**	
18. a)	**Unit - III**	**CO 3**	**K3**	
		OR		
18. b)	**Unit - III**	**CO 3**	**K3**	
19. a)	**Unit - IV**	**CO 4**	**K4**	
		OR		
19. b)	**Unit - IV**	**CO 4**	**K4**	
20. a)	**Unit - V**	**CO 5**	**K3**	
		OR		
20. b)	**Unit - V**	**CO 5**	**K3**	

Course Name	FIBER OPTIC COMMUNICATION			
Course Code	23UELSC41	**L**	**P**	**C**
Category	SKILL	2	-	2

COURSE OBJECTIVES:

- To remember the theory of Fiber Optic Communication.
- To describe the different characteristics of Optical Fiber.
- To understand the operation of different types of Optical sources
- To understand the classifications of different types of Optical detector.
- To gain knowledge of an optical fiber system.

UNIT - I	**OVERVIEW OF OPTICAL FIBER COMMUNICATIONS**	**06**

Introduction-Evolution of fiber optic systems-Elements of optical fiber transmission link Block diagrams of general communication system-comparison with other communication systems- different types of optical fiber applications.

UNIT - II	**OPTICAL FIBER STRUCTURES, WAVEGUIDING & FABRICATION**	**06**

Nature of light-Optical fiber modes and configuration-Single mode fibers-Graded –Index fiber -Fiber material-Fiber fabrication-Fiber optic cables- Total internal reflection –acceptance angle –numerical aperture.

UNIT - III	**SIGNAL DEGRADATION IN OPTICAL FIBERS**	**06**

Attenuation-Signal distortion in Optical wave guides-Pulse broadening in graded index wave guides-Mode coupling-design optimization of Single mode Fibers.

UNIT - IV	**OPTICAL SOURCES**	**06**

Light- Emitting Diodes- Introduction to Laser Diodes-Light source Linearity - Power launching and coupling - Source to Fiber-Fiber to Fiber-LED Coupling to Single- Mode fibers-Fiber Splicing.

UNIT - V	**OPTICAL DETECTION**	**06**

Physical principles of Photodiodes-Photo detector noise-Detector Response time-Avalanche Multiplication Noise-Structure for InGaAs APDs -Comparison of photo Detectors-Fundamentals of Receiver Operation-Digital receiver Performance

Total Lecture Hours	**30**

BOOKS FOR STUDY:

- 1. Optical Fiber Communications-Gerd Keiser-III-International Edition 2000- TMH

Unit-I-Chap-1.1 to1.3;

Unit-II-chap-2.1 to 2.10;

Unit-III-3.1 to3.5;

Unit-IV-4.1 to 4.6 & 5.1 to 5.6;

Unit-V-6.1 to 6.7 & 7.1 to 7.5.

BOOKS FOR REFERENCES:

- Fiber Optic Communication System D.C.Agarwal.
- Optic Fiber Communication john M.Senior.
- Fiber optic in Tele communication, N.Sharma.TMH.
- An introduction to optical fiber, Allen H. Cherin, TMH

WEB RESOURCES:

- **https://nptel.ac.in/courses/108/106/108106167/**
- **https://nptel.ac.in/courses/117/101/117101054/**
- **https://nptel.ac.in/courses/108/104/108104113/**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED		✓	ENTREPRENEURSHIP				
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		✓	GLOBAL		
Changes Made in the Course	Percentage of Change	**25%**	No Changes Made		New Course					

***Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the fundamentals of optical fiber	**K1 to K4**
CO2	Gain the knowledge about the optical fiber structures, wave guiding & fabrication	**K1 to K4**
CO3	Use and working of optical sources	**K1 to K4**
CO4	Understand the working of optical detectors	**K1 to K4**
CO5	Understanding the concept of optical fiber communication system	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**
CO2	**M**	**S**	**L**	**M**	**M**	**S**	**M**	**S**	**L**	**M**

CO3	L	M	M	L	L	M	L	M	M	L
CO4	S	M	M	M	L	M	S	M	M	M
CO5	M	L	M	S	M	L	M	L	M	S

S- STRONG M – MEDIUM L - LOW

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	3	2	3
CO 2	3	2	3	3	2
CO 3	3	3	2	2	2
CO 4	3	2	3	3	3
CO 5	3	3	3	3	2
WEIGHTAGE	15	13	14	10	12
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100	86	93	86	80

LESSON PLAN:

UNIT		HRS	PEDAGOGY
I	**OVERVIEW OF OPTICAL FIBER COMMUNICATIONS** Introduction-Evolution of fiber optic systems-Elements of optical fiber transmission link Block diagrams of general communication system-comparison with other communication systems- different types of optical fiber applications	06	Chalk & Talk, Power Point Presentation
II	**OPTICAL FIBER STRUCTURES, WAVEGUIDING & FABRIUCATION** Nature of light-Optical fiber modes and configuration-Single mode fibers-Graded –Index fiber -Fiber material-Fiber fabrication-Fiber optic cables- Total internal reflection –acceptance angle –numerical aperture.	06	Chalk & Talk, Power Point Presentation
III	**SIGNAL DEGRADATION IN OPTICAL FIBERS** Attenuation-Signal distortion in Optical wave guides-Pulse broadening in graded index wave guides-Mode coupling-design optimization of Single mode Fibers.	06	Chalk & Talk, Power Point Presentation
IV	**OPTICAL SOURCES** Light- Emitting Diodes- Introduction to Laser Diodes-Light source Linearity - Power launching and coupling - Source to Fiber-Fiber to Fiber-LED Coupling to Single- Mode fibers-Fiber Splicing	06	Chalk & Talk, Power Point Presentation
V	**OPTICAL DETECTION** Physical principles of Photodiodes-Photo detector noise-Detector Response time-Avalanche Multiplication Noise-Structure for InGaAs APDs -Comparison of photo Detectors-Fundamentals of Receiver Operation-Digital receiver Performance	06	Chalk & Talk, Power Point Presentation

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	**Cos**	**K Level**	**Section A**	
			MCQs	
			No. of. Questions	**K - Level**
CI AI	**CO1**	**K1 – K2**	**25**	**K1,K2**
	CO2	**K1 – K2**	**25**	**K1,K2**
CI AII	**CO3**	**K1 – K2**	**25**	**K1,K2**
	CO4	**K1 – K2**	**25**	**K1,K2**
Question Pattern CIA I & II		**No. of Questions to be asked**	**50**	
		No. of Questions to be answered	**50**	
		Marks for each question	**1**	
		Total Marks for each section	**50**	

* Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (Ist Test-2 CO's & IInd Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II					
	K Level	**Section A (Multiple Choice Questions)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**30**	**30**	**60**	**100**
	K2	**20**	**20**	**40**	
	K3				
	K4				
	Marks	**50**	**50**	**100**	**100**
CIA II	**K1**	**30**	**30**	**60**	**100**
	K2	**20**	**20**	**40**	
	K3				
	K4				
	Marks	**50**	**50**	**100**	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)				
S. No	**COs**	**K - Level**	**Section A (MCQs)**	
			No. of Questions	**K – Level**
1	**CO1**	**K1-K2**	**15**	**K1,K2**
2	**CO2**	**K1-K2**	**15**	**K1,K2**
3	**CO3**	**K1-K2**	**15**	**K1,K2**
4	**CO4**	**K1-K2**	**15**	**K1,K2**
5	**CO5**	**K1-K2**	**15**	**K1,K2**
No. of Questions to be Asked			**75**	
No. of Questions to be answered			**75**	
Marks for each question			**1**	
Total Marks for each section			**75**	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	**Section A (Multiple Choice Questions)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**40**	**40**	**53**	**100**
K2	**35**	**35**	**47**	
K3				
K4				
Marks		**75**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				

Course Name	TELEVISION SYSTEMS			
Course Code	23UELSC42	**L**	**P**	**C**
Category	SKILL	2	-	2

COURSE OBJECTIVES:

- To impart the knowledge on fundamentals of Television.
- To understand the principles of transmitter and receiver.
- To acquire the knowledge of the essentials of colour television.
- To understand different types of colour TV systems.
- To gain knowledge on Advanced Television systems

UNIT - I TELEVISION PICTURE AND STANDARDS **6**

Geometric forms and aspect ratio of the picture – image continuity-Number of scanning lines – Interlaced Scanning- Picture resolution –Positive and Negative modulation – Vestigial Side Band signals – Standard Channel Bandwidth.

UNIT - II CAMERA TUBES **6**

Basic Principles– Image orthicon – Videocon – Plumb icon –Silicon diode array – Solid state image scanners.

UNIT - III TELEVISION TRANSMITTERS **6**

Introduction– Television signal Propagation – Transmitting Antennas – Satellite Television – Cable television – Cable signal distribution.

UNIT - IV TELEVISION RECEIVER **6**

Monochrome Receiver block diagram – Receiving antennas – Balun and IF filters – RF tuners -VHF tuners – IF sub system – Video amplifier requirements –Sync separation-Frame Deflection Circuits –Line Deflection Circuits- EHT generation-picture tube.

UNIT - V COLOUR TELEVISION **6**

Nature of colour- Colour Receiver block diagram - compatability with monochrome and vice versa –Three color theory-chromatic diagram-Luminance-Hue –Saturation-Colour TV Tubes -Automatic Degaussing circuit. Advance TV systems: Flat panel display- Smart TV-Display.

Total Lecture Hours **30**

BOOKS FOR STUDY:

- Television and Video Engineering, SalaiThillaiThilagam. J SCITECH Publications 2015.

Unit- I-1.1;
Unit-II-1.2;
Unit- III-2.1&5.1;
Unit-IV-2.2 -2.9;
Unit –V-3.1-3.3&5.6

BOOKS FOR REFERENCES:

- Modem Television practice R. R. Gulati, Third Edition, New Age,Reprint:2008
- Monochrome and color television R. R. Gulati, Reprint:1999

WEB RESOURCES:

- **https://nptel.ac.in/courses/117/102/117102059/Introductiontocommunication**
- **https://www.youtube.com/watch?reload=9&v=EAybxdgS2T4TVTransmission**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change	**25**	No Changes Made		New Course			

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Acquire knowledge on television fundamentals.	**K1 to K4**
CO2	Understand the Picture tube of color TV	**K1 to K4**
CO3	Study on Transmitter and receiver standards	**K1 to K4**
CO4	Knowledge on performance of Color TV systems.	**K1 to K4**
CO5	Familiarize Advanced TV Systems	**K1 to K4**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	M	S	M	M	S	M	S
CO2	M	S	L	M	M	S	S	S	L	M
CO3	L	M	S	S	L	M	M	S	S	L
CO4	S	M	M	M	S	S	S	M	M	M
CO5	M	L	M	S	M	L	M	L	M	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**2**	**3**	**3**	**3**	**3**
CO 2	**3**	**2**	**3**	**3**	**2**
CO 3	**2**	**3**	**3**	**3**	**2**
CO 4	**3**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**2**
WEIGHTAGE	**13**	**14**	**15**	**15**	**12**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**86**	**93**	**100**	**100**	**80**

LESSON PLAN:

UNIT	ELECTRONIC EQUIPMENTS AND SERVICING	HRS	PEDAGOGY
I	**TELEVISION PICTURE AND STANDARDS** Geometric forms and aspect ratio of the picture – image continuity- Number of scanning lines – Interlaced Scanning- Picture resolution – Positive and Negative modulation – Vestigial Side Band signals – Standard Channel Bandwidth.	**6**	**Chalk & Talk, Power Point Presentation**
II	**CAMERA TUBES** Basic Principles– Image orthicon – Videocon – Plumb icon –Silicon diode array – Solid state image scanners.	**6**	**Chalk & Talk, Power Point Presentation**
III	**TELEVISION TRANSMITTERS** Introduction– Television signal Propagation – Transmitting Antennas – Satellite Television – cable television – Cable signal distribution.	**6**	**Chalk & Talk, Power Point Presentation**
IV	**TELEVISION RECEIVER** Monochrome Receiver block diagram – Receiving antennas – Balun and IF filters – RF tuners -VHF tuners – IF sub system – Video amplifier requirements –Sync separation-Frame Deflection Circuits –Line Deflection Circuits- EHT generation-picture tube.	**6**	**Chalk & Talk, Power Point Presentation**
V	**COLOUR TELEVISION** Nature of colour- Colour Receiver block diagram - compatability with monochrome and vice versa –Three color theory-chromatic diagram-Luminance-Hue –Saturation-Colour TV Tubes -Automatic Degaussing circuit. Advance TV systems: Flat panel display- Smart TV-Display.	**6**	**Chalk & Talk, Power Point Presentation**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)				
Internal	**Cos**	**K Level**	**Section A**	
			MCQs	
			No. of. Questions	**K - Level**
CI AI	**CO1**	**K1 – K2**	**25**	**K1,K2**
	CO2	**K1 – K2**	**25**	**K1,K2**
CI AII	**CO3**	**K1 – K2**	**25**	**K1,K2**
	CO4	**K1 – K2**	**25**	**K1,K2**
Question Pattern CIA I & II		**No. of Questions to be asked**	**50**	
		No. of Questions to be answered	**50**	
		Marks for each question	**1**	
		Total Marks for each section	**50**	

* Two Formative examinations will be conducted as a part of Continuous Internal Assessment under which, 50 MCQ's will be asked [50X1=50 marks] from any 4 CO's. (Ist Test-2 CO's & IInd Test-2 CO's) in equal weightage

Distribution of Marks with K Level CIA I & CIA II					
	K Level	**Section A (Multiple Choice Questions)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**30**	**30**	**60**	**100**
	K2	**20**	**20**	**40**	
	K3				
	K4				
	Marks	**50**	**50**	**100**	**100**
CIA II	**K1**	**30**	**30**	**60**	**100**
	K2	**20**	**20**	**40**	
	K3				
	K4				
	Marks	**50**	**50**	**100**	**100**

K1- Remembering and recalling facts with specific answers

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

K3- Application oriented- Solving Problems

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

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

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)				
S. No	**COs**	**K - Level**	**Section A (MCQs)**	
			No. of Questions	**K – Level**
1	**CO1**	**K1-K2**	**15**	**K1,K2**
2	**CO2**	**K1-K2**	**15**	**K1,K2**
3	**CO3**	**K1-K2**	**15**	**K1,K2**
4	**CO4**	**K1-K2**	**15**	**K1,K2**
5	**CO5**	**K1-K2**	**15**	**K1,K2**
No. of Questions to be Asked			**75**	
No. of Questions to be answered			**75**	
Marks for each question			**1**	
Total Marks for each section			**75**	
(Figures in parenthesis denotes, questions should be asked with the given K level)				

In summative examinations, 75 MCQ's will be asked [75X1=75 marks] from all 5 CO's in equal weightage.

Distribution of Marks with K Level				
K Level	**Section A (Multiple Choice Questions)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**40**	**40**	**53**	**100**
K2	**35**	**35**	**47**	
K3				
K4				
Marks		**75**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.				