THIRUVALLUVAR UNIVERSITY

SERKKADU, VELLORE–632115

B.Sc. ELECTRONICS SCIENCE

SEMESTER - II

SYLLABUS

FROM THE ACADEMIC YEAR

2023 – 2024

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. Electronics Science Curriculum

(For the students admitted during the academic year 2023 – 24 onwards)

SECOND SEMESTER

S.No.	Part	Study Components Course Title		Ins. Hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
1.	I	Language	Paper-2	6	3	Tamil/Other Languages	25	75	100
2.	II	English	Paper-2	4	3	English	25	75	100
3.	II	NMSDC: Language Proficiency for Employability	Paper-1	2	2	Overview of English Communication	25	75	100
4.	III	Core Course –CC III	Paper-2	5	5	Analog Electronics	25	75	100
5.	III	Core Course –CC IV	Paper -3	5	5	Analog Electronics Lab	25	75	100
6.	III	Elective II Generic/ Discipline Specific	Elective II	6	3	Basic Mathematics-II	25	75	100
7.	IV	Skill Enhancement Course SEC-2	Paper2	2	2	Home Appliances	25	75	100
8.	IV	Skill Enhancement Course SEC-3 (Discipline Specific)	Paper 1	2	2	Trouble shooting and Maintenance of Audio and video equipments	25	75	100
		Sem. Total		**32**	**25**		**200**	**600**	**800**

Paper Code		ANALOG ELECTRONICS	L	T	P	C
Paper Code		Core Theory - 2	5	0	0	5
			Syllabus Version		2023-24	

Course Objectives:

To enhance the knowledge of the students in advanced circuits

To gain ability to design and develop own electronic applications

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Describe the working principle of Transistor and its variants.	K1
2	Explain the operation of FET and MOSFET with its application.	K3
3	Describe the working of Oscillators and its types	K6
4	Acquire knowledge in multivibrators	K4
5	Gain the knowledge of regulated power supplies	K2

K1 - Remember; **K2 -** Understand; **K3 -** Apply; **K4 -** Analyze; **K5 -** Evaluate; **K6 -** Create

Unit:1	TRANSISTOR BIASING	12 hours
Transistor biasing methods - Fixed bias - collector to base bias - potential divider bias - stability analysis - thermal runaway - Q point - load line analysis.		
Unit:2	**FIELD EFFECT TRANSISTORS**	**12 hours**
Construction, working characteristics of FET and MOSFET (D and E type) - Parameters of FET - Difference between FET and BJT - Difference between FET and MOSFET - Applications of FET and MOSFET - Advantages of MOSFET.		
Unit:3	**OSCILLATORS**	**12 hours**
Positive feedback - Stability issues - Feedback requirement of oscillations - Barkhausen criterion for oscillation - Hartley, Colpitts, Phase shift and Wien bridge oscillators - Condition for oscillation and frequency derivation - Crystal oscillator.		
Unit:4	**MULTIVIBRATORS**	**12 hours**
Monostable, bistable and astable multivibrators - Schmitt trigger.		
Unit:5	**REGULATED POWER SUPPLY**	**12 hours**

Zener diode as a voltage regulator - fixed voltage regulator ICs - Variable voltage regulator ICs.		
	Total Lecture hours	**60 hours**

Text Book(s)	
1	Electronic Devices and Circuits (Applied Electronics Vol. I) - G.K. Mithal, Khanna Publishers.
2	Principles of Electronics - V.K. Metha, S. Chand & Co., 1991.

Reference Books	
1	Electronic Devices and Circuits - Jacob Millman and C.C. Halkias, Tata McGraw Hill Publishing Co. Ltd.
2	Physics of Semiconductor Devices - S.M. Sze, Wiley Eastern Limited.
3	Electronic Principles - A.P. Malvino, Tata McGraw Hill Publishing Co. Ltd.
4	A Text Book of Applied Electronics - R.S. Sedha, S. Chand & Co., 2005

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.youtube.com/watch?v=J4oO7PT_nzQ
2	https://www.youtube.com/watch?v=3Ny3wzw0ke0
3	https://www.youtube.com/watch?v=rIMexAWE6Cc
4	https://www.youtube.com/watch?v=9IGAEKzdJ_k
5	https://www.youtube.com/watch?v=drwkJ0ez9iY
6	https://nptel.ac.in/courses/113106062

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	M	S	M	M	M	M	S	L	L	L
CO2	S	M	M	M	M	M	M	S	M	M
CO3	M	L	S	L	S	L	M	S	S	M
CO4	L	M	M	M	M	S	S	M	S	S
CO5	M	S	S	S	S	M	L	M	M	M
*S-Strong; M-Medium; L-Low										

Paper Code		BASIC MATHEMATICS II	L	T	P	C
Paper Type		Elective-II	4	0	0	3
			Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to develop logical and problem solving skills; becoming familiar with some of the basic techniques used to construct mathematical.

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Use Differential Calculus for solving problems.	K3
2	Solve basic application problems described by second order linear differential equations with constant coefficients.	K5
3	Obtain an approximate set of solution function values to a second order boundary value problem using a finite difference equation.	K6
4	Perform Vector analysis to find solutions.	K1
5	Solve problems using Integral Calculus	K4

K1 - Remember; **K2 -** Understand; **K3 -** Apply; **K4 -** Analyze; **K5 -** Evaluate; **K6 –** Create

Unit:1	DIFFERENTIAL CALCULUS	10 hours
Successive differentiation, nth derivative, Leibnitz Theorem (with out proof), Jocobians.		
Unit:2	**ORDINARY DIFFERENTIAL EQUATION**	**10 hours**
Second order linear differential equation with constant coefficient		
Unit:3	**PARTIAL DIFFERENTIAL EQUAITON**	**10 hours**
Formation of equation by elimination of constants and arbitrary functions.		
Unit:4	**VECTOR ANALYSIS**	**10 hours**
Scalar point function, vector point function, gradient, divergence, curl, irrotational, solenoidal, Line and surface integrals.		
Unit:5	**INTEGRAL CALCULUS**	**10 hours**
Integration by part's, Bernoulli's formula, Fourier series for a function in $(-\pi, \pi)$, Even and odd function.		

	Total Lecture hours	**50 hours**

Text Book(s)	
1	P.R.Vittal (2003) Allied Mathematics . Marghan Publications, Chennai
2	P.Balasubramanian and K.G.Subramanian, (1997) Ancillary Mathematics. Vol. I & II. Tata McGraw Hill, New Delhi.

Reference Books	
1	P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand & company Ltd., New Delhi-55.
2	S.P.Rajagopalan and R.Sattanathan,(2005) Allied Mathematics .Vol. I & II. Vikas Publications, New Delhi.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.youtube.com/watch?v=PL7F4ui3Q3o
2	https://www.youtube.com/watch?v=NlCU-9kudkQ
3	https://www.youtube.com/watch?v=Hf8492A5vZ4
4	https://www.youtube.com/watch?v=1qLb0B40YnA
5	https://www.youtube.com/watch?v=NcD9JNPMfUs
6	https://www.digimat.in/nptel/courses/video/111105122/L01.html

Mapping with Programme Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	M	L	S	M	M	L	S	M	L
CO2	M	S	M	L	L	S	S	M	M	S
CO3	L	S	M	S	S	M	M	L	L	S
CO4	S	M	L	L	M	S	L	M	M	S
CO5	S	M	M	L	S	M	S	S	L	L
*S-Strong; M-Medium; L-Low										

Paper Code		HOME APPLIANCES	L	T	P	C
Paper Type		Skill Enhancement Course (SEC - II)	2	0	0	2
			Syllabus Version		2023-24	
Course Objectives:						
To acquire necessary skills/hand on experience/working knowledge on ac/dc, motors, transformers, single phase and three phase connections.						

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the classification of passive components	K2
2	Integrate trouble shooting skills in equipment servicing	K6
3	Acquire knowledge on operations of home appliances	K4
4	Acquire knowledge on maintenance and safety measures of home appliances	K2
5	Understand test and troubleshooting chart of home appliances	K1
K1 - Remember; **K2 -** Understand; **K3 -** Apply; **K4 -** Analyze; **K5 -** Evaluate; **K6 -** Create		

Unit:1	**ELECTRICAL AND ELECTRONICS**	**6 hours**
Electrical and Electronics Introduction - Direct current (DC)- alternating current (AC) -Voltage, Current, Resistance, Capacitance, Inductance, Electrical conductors and Insulators, Transformers, Electrical energy, Power, Kilowatt hour (kWh), consumption of electrical power.		
Unit:2	**BASICS ELECTRICAL SYSTEMS**	**6 hours**
Single phase and Three phase connections - Basics of House wiring – Switch connection - Electric shock, Overloading, Earthing, Short circuiting, Fuses, MCB, ELCB, Insulation, Inverter, UPS		
Unit:3	**HEATING APPLIANCES**	**6 hours**
Heater types - working principle - Heating Rod - Electric Iron box, Water heater; Induction heater, Microwave oven		
Unit:4	**LIGHTS**	**6 hours**
Concept of illumination, Electric bulbs, CFL, LED lights, Energy efficiency in electrical appliances, IS codes & IE codes		

Unit:5	MOTORIZED APPLIANCES	6 hours
Types of Motors - DC and AC motor - Principles of working, parts and servicing of Electric fan - mixers - wet grinders - circuit connection - testing methods.		
	Total Lecture hours	**30 hours**

Text Book(s)	
1	S. P. Bali, Consumer Electronics (Pearson Education India, 2009)
2	K. P. Anwer, Domestic Appliances Servicing (Scholar Institute, 2018).

Reference Books	
1	T. Linsely, Electronic Servicing and Repairs, 3rd Edition, (Rouledge, 2011).
2	B. L. Theraja, A Text book on Electrical Technology (S. Chand, 2006)

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/
2	https://onlinecourses.nptel.ac.in/noc22_me104/preview

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	M	M	S	L	M
CO2	M	L	M	M	M	S	S	M	S	M
CO3	L	S	L	M	L	L	M	S	S	S
CO4	M	M	S	S	S	M	S	M	L	M
CO5	S	M	M	L	S	S	L	L	M	L
*S-Strong; M-Medium; L-Low										

Paper Code		TROUBLE SHOOTING AND MAINTENANCE OF AUDIO AND VIDEO EQUIPMENTS	L	T	P	C
Paper Type		Skill Enhancement Course (SEC - III)	2	0	0	2
			Syllabus Version		2022-23	
Course Objectives:						
To learn about Home appliances. Trouble shoot the faults in the electronic appliance						

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Explain the working of recording and reproduction.	K2
2	Gain the knowledge of PA system	K6
3	Integrate trouble shooting skills in television	K4
4	Acquire knowledge on maintenance and safety measures of video disc	K2
5	Illustrate the operation of digital access devices used in regular activity.	K1
K1 - Remember; **K2 -** Understand; **K3 -** Apply; **K4 -** Analyze; **K5 -** Evaluate; **K6 -** Create		

Unit:1	**RECORDING AND REPRODUCTION**	**6 hours**
Recording and reproduction principles - Optical recording - Different types - Methods of recording and reproduction - Optical recording on compact disc - play back process - Advantage of compact disc - Trouble shooting in compact disc.		
Unit:2	**PA SYSTEMS**	**6 hours**
Stereophony - Stereophonic recording on disc and reproduction - Hi-Fi Stereo reproducing system - Block diagram of Public Addressing system - Requirement of Public Addressing system - Typical PA installation planning for a public meeting.		
Unit:3	**TELEVISION**	**6 hours**
PAL colour TV transmitters Faults in TV transmitter - PAL colour TV receiver - Faults in colour TV receiver - Testing of TV receiver.		
Unit:4	**VIDEO DISC**	**6 hours**
Video disc format - Video recording on disk - Very High density disk - High definition TV system - Block diagram of MAC encoder - MAC receiver - Advantages.		
Unit:5	**DIGITAL TV**	**6 hours**
Digital TV system - Cable TV concepts set top box - Dish TV and connections - Closed circuit television - Introduction to FLAT LCD and Plasma television systems.		
	Total Lecture hours	**30 hours**

Text Book(s)	
1	Electronic Instruments and systems, Principles, Maintenance and Troubleshooting - R.G. Gupta Tata Mc Graw Hill Publishing Co.Ltd.
2	Colour Television Theory and Practice - S.P. Bali, Tata Mc Graw Hill Publishing Co.Ltd.

Reference Books	
1	Audio and Video systems - R.G. Gupta Tata Mc Graw Hill Publishing Co.Ltd.
2	Monochrome and Colour Television – R.R. Gulati. New Age Interbational (P) Ltd. New Delhi.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.youtube.com/watch?v=D9_2qtD8flo
2	https://www.youtube.com/watch?v=HksMSVZqB4Y
3	https://www.youtube.com/watch?v=9uCeFhO8H40
4	https://www.youtube.com/watch?v=s4zi1wdKE5k
5	https://www.youtube.com/watch?v=CkR9YyWaAkU

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	M	M	S	L	M
CO2	M	L	M	M	M	S	S	M	S	M
CO3	L	S	L	M	L	L	M	S	S	S
CO4	M	M	S	S	S	M	S	M	L	M
CO5	S	M	M	L	S	S	L	L	M	L
*S-Strong; M-Medium; L-Low										

Paper Code		ANALOG ELECTRONICS LAB	L	T	P	C
Paper type		Core Practical-II	0	0	5	5
			Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to understand the concepts and working of various instruments like CRO, AFO, transistors based elementary amplifier and oscillator circuits

Expected Course Outcomes:

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

1	Design and construct electronic circuits using BJT.	K1
2	Understand the characteristics and operations of FET.	K2
3	Learn all waveform generation technique.	K3
4	Design and construct regulated power supplies.	K5

K1 - Remember; **K2 -** Understand; **K3 -** Apply; **K4 -** Analyze; **K5 -** Evaluate; **K6 -** Create

Minimum of Eight Experiments from the list

1	Transistor as an amplifier
2	Transistor – Emitter follower
3	FET – Characteristics
4	FET as an amplifier
5	FET – Source follower
6	Transistor Hartley oscillator.
7	Transistor Colpitts oscillator.
8	Transistor phase shift oscillator.
9	Astable multivibrator using BJT.
10	Mono stable multivibrator using BJT.
11	Bistable multivibrator using BJT.
12	IC regulated power supply using IC 78XX.
13	Dual regulated power supply using IC 78XX and 79XX.

Total Lecture hours **60 hours**

Text Book(s)

1	K. Craigs and L. Fuentes, Introduction to Electric Circuits: Lab Manual, 10th Ed. (OBU Publishers, 2019).

Reference Books

1	**B.E.S. Practicals -** *R. Sugaraj Samuel & Horsley Solomon* - Department of Electronic Science, C.T.M. College of Arts and Science, Chennai.
2	**Basic Electronics - A Text Lab Manual -** *Zbar, Malvino & Miller* - Tata McGraw Hill.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.youtube.com/watch?v=3h2edx6O6Vc
2	https://www.youtube.com/watch?v=i6n2yHIBjQw
3	https://www.youtube.com/watch?v=zjrSAuhTFPE
4	https://www.youtube.com/watch?v=wvHcm84RsFw
5	https://www.youtube.com/watch?v=SwI_3BPTr0I
6	https://nptel.ac.in/courses/122106025

Mapping with Programme Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	M	L	S	M	M	L	S	M	L
CO2	M	S	M	L	L	S	S	M	M	S
CO3	S	L	M	S	M	L	L	S	S	M
CO4	L	S	M	S	S	M	M	L	L	S
CO5	S	M	M	L	S	M	S	S	M	M
*S-Strong; M-Medium; L-Low										