B.Sc. Electronics Science

Syllabus

Affiliated College

2023 – 2024 onwards

THIRUVALLUVAR UNIVERSITY

(A State University, Accredited with "B+" Grade by NAAC,

Serkadu, Vellore, Tamil Nadu – 632 115

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. Electronics Science Curriculum

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

FIRST SEMESTER

Credits	Title of the Paper	Credits	Hours	Maximum Marks		
				CIA	ESE	Total
Language-I	Tamil/Other Languages	3	6	25	75	100
English (CE)-I	Communicative English I	3	6	25	75	100
Core Theory-I	Basic Electronics	5	5	25	75	100
Core Practical-1	Basic Electronics Lab	5	5	25	75	100
Elective-I	Basic Mathematics-I	3	4	25	75	100
Skill Enhancement Course (SEC - I)	Electronic Communication Systems	2	2	25	75	100
Foundation Course	Fundamentals Of Electronics	2	2	25	75	100
	Total	**23**	**30**	**175**	**525**	**700**

First Semester

Paper Code		BASIC ELECTRONICS	L	T	P	C
Paper type		Core Theory-I	5	0	0	5
			Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to design the amplifiers, feedback amplifiers and power amplifiers.

Expected Course Outcomes:

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

1	Understand the Concept of Network Theorems	K2
2	Study the basic concepts of AC fundamentals	K2
3	Understand the basics of P-N junction diode and Zener diode with its applications.	K2
4	Analyze the working of various configurations of Transistor	K6
5	Outline the concept of feedback amplifiers with parameters involved.	K5

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

Unit:1	NETWORK THEOREMS	12 hours

Ohm's law - Kirchhoff's law - node voltage analysis - mesh current method - super position theorem - Thevenin's theorem - Norton's theorem. Thevenin to Norton Conversion- Star and Delta Conversion.

Unit:2	AC CIRCUITS	12 hours

Introduction To Sinusoidal Wave-RMS Value – Average Value-AC Circuits with Resistance- Circuits with XL Alone – Circuits with XC Alone - Series Reactance And Resistance – Parallel Reactance and Resistance - Series Parallel Reactance and Resistance – Real Power –Series Resonant Circuit – Parallel Resonant Circuit - Q Factor.

Unit:3	DIODE CIRCUITS AND POWER SUPPLIES	12 hours

PN Junction diode - characteristics - Half and full wave rectifiers - Bridge rectifier - Efficiency - ripple factor - Filter circuits - Clipper and Clamper using diodes. Differentiator and integrator using resistor and capacitor - Zener Diode - Characteristics - Regulated power supply using Zener diode

Unit:4	TRANSISTOR CIRCUITS & POWER AMPLIFIERS	12 hours

Characteristics of a transistor in CB, CE modes - Relatively merits - Graphical analysis in CE configuration - Transistor as a amplifier - RC coupled Single stage amplifier - Frequency response. Transformer coupled amplifiers - Multistage amplifiers - Emitter follower. Construction of basic logic gates using diodes and transistors.

Class A and Class B power amplifiers - Single ended and push-pull configurations - Power dissipation and output power calculations.

Unit:5	FEEDBACK AMPLIFIERS	12 hours

Basic concept of feedback amplifiers - Transfer gain with feedback - General characteristics of negative feedback amplifier - Effect of negative feedback on gain - Gain stability - Distortion and bandwidth - Input and output resistance in various types of feedback - Analysis of voltage and current in feedback amplifier circuits.

	Total Lecture hours	60 hours

Text Book(s)	
1	Introduction to Integrated Electronics - V. Vijayendran, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai, 2005.
2	Electronic Circuits and Systems - Y.N. Bapat, Tata McGraw Hill Publishing Co. Ltd.

Reference Books	
1	Electronic Devices and Circuits - G.K. Mithal, Khanna Publishers, Delhi.
2	Hand Book of Electronics - Gupta & Kumar, Pragati Prakashan, Meerut.
3	Electronic Devices and Circuit Theory - R. Boylestad & L. Nashelsky, Prentice Hall of India Private Limited, 6/e.
4	Electronic Devices and Circuits - J.P. Agarwal & Amit Agarwal, Prakasam Publishers.
5	Linear Integrated Circuits - D. Roy Choudhury & Shail Jain, New Age International (P) Limited.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.youtube.com/watch?v=qqiZ2LPkFws
2	https://www.youtube.com/watch?v=Sr-Sm_d3oVE
3	https://www.youtube.com/watch?v=LYQ4J94EDdg
4	https://www.youtube.com/watch?v=8iPRR6iCD8A
5	https://www.youtube.com/watch?v=qrIOoAIWSaQ
6	https://nptel.ac.in/courses/108102112

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

Paper code		**BASIC MATHEMATICS - I**	**L**	**T**	**P**	**C**
Paper type		**Elective - I**	**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	Understand the algebra concepts	K2
2	Analyze the Theory of Equations and its various operations.	K2
3	Evaluate the methodology of different matrices.	K5
4	Understand the different matrices concepts	K2
5	Understand the trigonometry concepts	K2

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

Unit:1	**ALGEBRA**	**10 hours**
Partial fractions, Binomial, Exponential, Logarithmic Series [No Proof] Summation Problem.		
Unit:2	**THEORY OF EQUATIONS**	**10 hours**
Transformation of equations by increasing, decreasing and multiplying the roots by a constant, Reciprocal Equations.		
Unit:3	**MATRICES**	**10 hours**
Square Matrix, Symmetric and Skew symmetric, Orthogonal, Hermitian, Skew Hermitian, Unitary Characteristic equations , eigen values, Cayley Hamilton's Theorem (Problem Only)		
Unit:4	**MATRICES (CONTD)**	**10 hours**
Operations on matrices, Adjoint and inverse of a matrix - Determinant of a matrix, Solving equations by Cramer's rule.		
Unit:5	**TRIGNOMETRY**	**10 hours**
Expansions of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin^n \theta$, $\cos^n \theta$		
	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=it9jv9F8jaA
2	https://www.youtube.com/watch?v=Cp7W8TDjXCQ
3	https://www.youtube.com/watch?v=16LX95gVT_M
4	https://www.youtube.com/watch?v=ZOHMCsdDti0
5	https://www.youtube.com/watch?v=7eHuQXMCOvA
6	https://www.digimat.in/nptel/courses/video/122107036/L01.html

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

Course Code		ELECTRONIC COMMUNICATION SYSTEMS	L	T	P	C
Paper type		Skill Enhancement Course (SEC - I)	2	0	0	2
			Syllabus Version		2023-24	

Course Objectives:
Fundamentals of antenna, their characteristics and types
Amplitude modulation and demodulation and radio wave transmission and reception
Frequency modulation and demodulation and FM radio wave transmission and reception
Principle of analog and digital pulse modulation.

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Illustrate the construction and working of different types of antennas	K2
2	Explain modulation and discuss the different types modulation	K4
3	Explain the concept and principles of amplitude modulation, frequency and pulse modulation.	K3
K1 - Remember; **K2 -** Understand; **K3 -** Apply; **K4 -** Analyze; **K5 -** Evaluate; **K6 –** Create		

Unit:1	ANTENNA	6 hours
Antenna –Efficiency –Directive gain - Bandwidth, Beam width and polarization - Dipole - Folded dipole - Yagi - Uda - Helical - Discone - Parabolic - Dish Antennas		
Unit:2	**WAVE PROPAGATION**	**6 hours**
Ground wave, sky wave and space wave propagation – skip distance – Maximum usable frequency.		
Unit:3	**AMPLITUDE MODULATION**	**6 hours**
Modulation - Needs for Modulation - Types of Modulation - Amplitude Modulation - Block diagram of AM Radio transmitter and super heterodyne Receiver		
Unit:4	**FREQUENCY MODULATION**	**6 hours**
Frequency Modulation - Definition - Derivation of Modulated wave - Block diagram of FM transmitter and receiver.		
Unit:5	**PULSE MODULATION**	**6 hours**
Pulse Modulation - Sampling theorem - PAM, PWM, PPM, PCM		
	Total Lecture hours	**30 hours**

Text Book(s)	
1	Electronic Communication Systems - George Kennedy, McGraw Hill Book Company, 4/e, 2005.
2	Communication Engineering - T.G. Palanivelu, Anuradha Publicatons, 1/e, 2002.

Reference Books	
1	Communication System - Roddy & Coolen, 4/e, Pearson Education, 2005.
2	Principles of Communication Engineering - Anok Singh, 4/e, Sathyaprakasam Publications, 2004.
3	Electronic Communication Systems Wayne Tomasi, 4/e, Pearson Education, 2004.
4	Antennas by J.D.Kraus

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.youtube.com/watch?v=mHvV_Tv8HDQ
2	https://www.youtube.com/watch?v=6Y9n8dMYL-o
3	https://www.youtube.com/watch?v=90dizh1Sl3E
4	https://www.youtube.com/watch?v=oYRMYSlVj1o
5	https://www.youtube.com/watch?v=fSoXIqBlg9M
6	https://nptel.ac.in/courses/117102059

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

Paper code		FUNDAMENTALS OF ELECTRONICS	L	T	P	C
Paper type	Foundation Course		2	0	0	2
			Syllabus Version		2023-24	

Course Objectives:

The main objectives of this course are to:
Provide an adequate knowledge in Basics of electrostatics, electrical measurements, electronics components

Expected Course Outcomes:

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

1	Understand the outline and basics of electrostatics.	K2
2	Understand the concept of a capacitor and its applications.	K2
3	Evaluate the electrical measurements and describe magnetic effect of current	K5
4	Apply the electronic components in network theorems.	K2
5	Understand the basic of Semiconductors	K3

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

Unit:1	ELECTROSTATICS	7 hours

Electric charges - Coulomb's law - Electric field - Electric intensity and electric potential - Relation between electric potential and intensity - Electric intensity and potential due to a uniform charged conducting sphere at a point outside, on, and inside the conductor.

Unit:2	RESISTORS	7 hours

Types of Resistors: Fixed, Variable - Brief mention of their Construction and Characteristics - Color Coding of Resistors - Connecting Resistors in Series and Parallel. Testing of Resistance using Multimeter.

Unit:3	INDUCTORS	7 hours

Types of Inductors: Fixed, Variable- Self and Mutual Inductance-Faraday's Law and Lenz's Law Of Electromagnetic Induction-Energy Stored In An Inductor-Inductance In Series And Parallel- Testing of Inductance using Multimeter.

Unit:4	CAPACITORS	7 hours

Principles of Capacitance-Parallel Plate Capacitor-Permittivity-Definition of Dielectric Constant - Dielectric Strength-Energy Stored in a charged Capacitor-Types of Capacitors: Air, Paper, Mica, Teflon, Ceramic, Plastic and Electrolytic: Construction and Application- Capacitors in Series and Parallel. Testing of Capacitor using Multimeter.

Unit:5	INTRODUCTION TO SEMICONDUCTORS	7 hours

Classification of solids - conductors, insulators and semiconductors – energy band diagram - Intrinsic semiconductors - extrinsic semiconductors - doping of impurities- P type - N type - electron and hole current – Basic Concepts of Diode and Transistor.

Total Lecture hours	35 hours

Text Book(s)	
1	Electricity and Magnetism - M. Narayanamoorthi and Others, National Publishing Co.,chennai
2	Electricity and Magnetism - R. Murugeshan, S. Chand & Co. Ltd., New Delhi, Revised Edition, 2006.
3	Principles of Electronics - V.K. Mehta, S. Chand & Co., 4/e, 2001.
4	Basic Electronics - B.L. Theraja, S. Chand & Co., 4/e, 2001.
5	Applied Electronics – R.S.Sedha S. Chand & Co., 1/e 1990,Reprint 2018.

Reference Books	
1	Electricity and Magnetism - Brijlal & Subrahmanyam, Ratan Prakashan Mandir, Agra.
2	Fundamentals of Electricity and Magnetism - B.D. Duggal & C.L. Chhabra, Shoban Lal Nagin Chand & Co., Jallundur.
3	Physics, Vol. II - Resnick, Halliday & Krane, 5/e, John Wiley & Sons, Inc.,.
4	Basic Electronics - B. Grob, McGraw - hill, 6/e, NY, 1989.
5	Elements of Electronics - Bagde & Singh, S. Chand & Co.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.youtube.com/watch?v=OXyR2VaxgYo
2	https://www.youtube.com/watch?v=_c9I2-OwKCc
3	https://www.youtube.com/watch?v=211aWRuv7XI
4	https://youtu.be/UGGaGUPF2fg
5	https://www.youtube.com/watch?v=5MLVr9r6Vzk
6	https://www.digimat.in/nptel/courses/video/108105112/L01.html

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

Paper Code		Basic Electronics Lab	L	T	P	C
Paper type		Core Practical-I	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 Multimeter, CRO, AFO, PN Junction Diode, Zener diode, transistor, construction of power supply, logic gates, wave shaping circuits.

Expected Course Outcomes:

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

1	Remember the value of resistance by color coding and multimeter.	K1
2	Understand the characteristics of diode and Transistor with its applications.	K2
3	Analyze the working CRO.	K3
4	Analyze the function of Wave shaping circuits	K5

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

Minimum of Eight Experiments from the list	
1	Study of Multimeter – Checking of Components.
2	Study of Colour Coding of Resistors & Connecting Resistance in Series and Parallel.
3	Verification of Ohm’s Law.
4	Verification of Kirchhoff’s Law
5	Verification of Thevenin’s Theorem
6	Verification of Norton’s Theorem
7	Uses of CRO - Measurement of voltage, current, frequency and phase - Displaying waveforms and Lissajou’s figures - Study Experiment.
8	Half wave rectifier using PN junction Diode.
9	Full wave rectifier using PN junction Diode.
10	Characteristics of PN junction diode.
11	Characteristics of Zener diode.
12	Regulated power supply using Zener diode.
13	Transistor characteristics in CE mode.
14	Clipping and clamping circuits.
15	Differentiating and integrating circuits using R and C.
16	Basic logic gates (AND, OR, NOT) using diode & transistor.

Total Lecture hours	**60 hours**

Text Book(s)	
1	Electricity and Magnetism - M. Narayanamoorthi & Others, National Publishing Co., Chennai.
2	Electricity and Magnetism - R. Murugeshan, S. Chand & Co. Ltd., New Delhi, Revised Edition, 2006.

Reference Books	
1	Electricity and Magnetism - Brijlal & Subrahmanyam, Ratan Prakashan Mandir, Agra.
2	Fundamentals of Electricity and Magnetism - B.D. Duggal & C.L. Chhabra, Shoban Lal Nagin Chand & Co., Jallundur.
3	Physics, Vol. II - Resnick, Halliday & Krane, 5/e, John Wiley & Sons, Inc.

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										