

**THIRUVALLUVAR UNIVERSITY**  
**BACHELOR OF SCIENCE**  
**B.Sc. B.Sc., ELECTRONICS SCIENCE**

DEGREE COURSE  
CBCS PATTERN

(With effect from 2020-2021)

**The Course of Study and the Scheme of Examinations**

S. No.	Part	Study Components		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
<b>SEMESTER I</b>									
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English (CE)	Paper-1	6	4	<b>Communicative English I</b>	25	75	100
3	III	Core Theory	Paper-1	6	4	Fundamentals of Electricity and Electronics	25	75	100
4	III	Core Practical	Practical-1	4	0		0	0	0
5	III	Allied -1	Paper-1	6	3	Basic Mathematics I	25	75	100
<b>6</b>	<b>III</b>	<b>PE</b>	<b>Paper 1</b>	<b>6</b>	<b>3</b>	<b>Professional English I</b>	<b>25</b>	<b>75</b>	<b>100</b>
7	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		<b>Sem. Total</b>		<b>36</b>	<b>20</b>		<b>150</b>	<b>450</b>	<b>600</b>
<b>SEMESTER II</b>									
8	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9	II	English (CE)	Paper-2	6	4	<b>Communicative English II</b>	25	75	100
10	III	Core Theory	Paper-2	5	4	Electromagnetism and AC Circuits	25	75	100
11	III	Core Practical	Practical-1	3	2		25	75	100
12	III	Allied-1	Paper-2	4	3	Basic Mathematics II	25	75	100
<b>13</b>	<b>III</b>	<b>PE</b>	<b>Paper 1</b>	<b>6</b>	<b>3</b>	<b>Professional English II</b>	<b>25</b>	<b>75</b>	<b>100</b>
14	IV	Value Education		2	2	Value Education	25	75	100
15	IV	Soft Skill		2	1	Soft Skill	25	75	100
		<b>Sem. Total</b>		<b>36</b>	<b>25</b>		<b>225</b>	<b>675</b>	<b>900</b>

**THIRUVALLUVAR UNIVERSITY**  
**B.Sc., ELECTRONICS SCIENCE**  
**SYLLABUS**  
**UNDER CBCS PATTERN**  
**(With effect from 2021-2022)**

**SEMESTER I**

**PAPER - 1**  
**FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS**

**COURSE OBJECTIVE**

**The students will learn:**

- Basics of electrostatics, Gauss theorem and its applications
- Concept of a capacitor, various types of capacitors and dielectric constant
- Magnetic effects of current, cells and the measuring instruments like ammeter and voltmeter.
- Basics of p-n junction, rectifying action of a diode, regulated power supplies and wave shaping circuits, and
- Transistor, its three modes of operation and the frequency response of an amplifier.

**UNIT-I**

Electrostatics: 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. Electric dipole - Dipole moment - Intensity and potential due to a dipole - Statement and proof of Gauss law - Application of Gauss law to uniformly charged solid sphere.

**UNIT-II**

Capacitors: Definition and unit of capacity - Capacitance of a parallel plate capacitor - Effect of dielectric on capacity - Capacitors in series and parallel - Energy stored in a charged capacitors - Loss of energy on sharing of charges between two capacitors - Force of attraction between plates of charged parallel plate capacitor - Measurement of potential and dielectric constant. Type of capacitors - Mica capacitor, Electrolytic capacitors, Variable air capacitor - Uses of capacitors.

**UNIT-III**

Electrical Measurements: Carey-Foster bridge - Determination of specific resistance - Potentiometer - Calibration of low voltmeters - Calibration of Low range ammeter. Magnetic Effect of Current: Biot-Savart's law - Principle, construction and theory of a moving coil ballistic galvanometer - Measurement of figure of merit of B.G. - Comparison of capacitors using B.G.

**UNIT-IV**

Diode circuits and power Supplies: Junction diode characteristics - Half and full wave

rectifiers - Expression for efficiency and ripple factor - Construction of low range power peak using diodes - Bridge rectifier - Filter circuits - Zener Diode - Characteristics - Regulated power supply using Zener diode - Clipper and Clamper using diodes. Differentiator and integrator using resistor and capacitor.

#### **UNIT-V**

Transistor circuits: Characteristics of a transistor in CB, CE modes - Relative merits - Graphical analysis in CE configuration - Transistor as a amplifier - RC coupled Single stage amplifier - Frequency response - Thevenin's and Norton's theorems. Basis logic gates AND, OR, and NOT - Construction using diodes and transistors.

#### **COURSE OUTCOME**

**On completion of this course the students will be able to**

- Outline the basics of electrostatics.
- Explain the concept of a capacitor and its applications.
- Demonstrate electrical measurements and describe magnetic effect of current
- Discuss the basics of P-N junction diode and Zener diode with its applications.
- Describe the working of various configurations of Transistor and digital logic gates.

#### **Text Books:**

1. **Electricity and Magnetism** - M. Narayanamoorthi and Others, National Publishing Co., Chennai.
2. **Electricity and Magnetism** - R. Murugesan, 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.

**ALLIED - 1**  
**PAPER - 1**  
**BASIC MATHEMATICS I**

**COURSE OBJECTIVE**

**To explore the fundamental concepts of Mathematics.**

- To develop logical and problem solving skills; becoming familiar with some of the *basic* techniques used to construct *mathematical*.

**Unit I : Algebra**

Partial fractions, Binomial, Exponential, Logarithmic Series [No Proof] Summation Problem.

**Unit II: Theory of Equations:**

Transformation of equations by increasing, decreasing and multiplying the roots by a constant, Reciprocal Equations, Newton's method (Problem Only)

**Unit III : Matrices**

Square Matrix, Symmetric and Skew symmetric, Orthogonal, Hermitian, Skew Hermitian, Unitary Characteristic equations , eigen values, Cayley Hamilton's Theorem (Problem Only)

**Unit IV : Matrices ( Contd)**

Operations on matrices, Adjoint and inverse of a matrix - Determinant of a matrix, Solving equations by matrix method & Cramer's rule.

**Unit V : Trigonometry**

Expansions of  $\sin n\theta$ ,  $\cos n\theta$ ,  $\tan n\theta$  - Expansions of  $\sin^n \theta$ ,  $\cos^n \theta$  - Expansions of  $\sin\theta$ ,  $\cos\theta$ ,  $\tan\theta$  in terms of  $\theta$  (Simple Problem)

**COURSE OUTCOME**

**On completion of this course the students will be able to**

- Solve problems on Algebra.
- Explain Theory of Equations and its various operations.
- Discuss the methodology of different matrices.

- Explain the different operations on matrices.
- Solve problems on trigonometry.

### **Text Books**

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.

**SEMESTER II**  
**PAPER – 2**  
**ELECTROMAGNETISM AND AC CIRCUITS**

**COURSE OBJECTIVES:**

**The students will learn:**

- The concepts of electromagnetic induction and its applications.
- Resonant circuits with RC, LR and LCR combinations and the power factor of an AC circuit.
- Power generation, three phase AC, DC motors and induction motors.
- Theory of electromagnetic waves and Maxwell's equations.

**UNIT-I**

Electromagnetic Induction: Expression for induced EMF - Self induction of a Solenoid - Mutual induction of a solenoid inductor - coefficient of Self induction of a solenoid inductor - Coefficient of coupling - Determination of self and mutual induction - Measurement of intense magnetic field using search coil - Induction coil - Eddy current and its uses.

**UNIT-II**

Alternating Current: 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 i) Resistance ii) Inductance iii) Capacitance iv) Inductance and Resistance v) capacitance and resistance vi) LCR

**UNIT-III**

AC Circuits: Construction and working of transformers - Losses - Tesla coil - Growth and decay of current in a circuit having L and R - Time constant - Growth and decay of charge in a circuit having C and R - Growth and decay of current in a charge having LCR - condition for discharge to be oscillatory - Frequency of oscillation.

**UNIT-IV**

Electromagnetic Machines: Production and distribution of three phase AC - Star and Delta connections - Advantages of AC over DC - AC and DC dynamos - Armature winding - Series and Shunt dynamos and their characteristics - Working Principles of DC Motor.

**UNIT-V**

Gauss's law for electrostatics and magnetostatics. Faraday's law, Amperes circuital law, Amperes Force law, Maxwell's Equations with statement (Integral & Differential form)

**COURSE OUTCOME**

**On completion of this course the students will be able to**

- Explain the concept of electromagnetic induction and its applications
- Discuss the effect of alternating current on circuits containing passive components.
- Describe the fundamental behavior of AC circuits and solve AC circuit problems.
- Explain the working of Electromagnetic Machines
- Outline the laws of electrostatics and electromagnetism.

**Text Books:**

1. **Electricity and Magnetism** - *M. Narayanamoorthi & Others*, National Publishing Co., Chennai.
2. **Electricity and Magnetism** - *R. Murugesan*, 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.

## CORE PRACTICAL

### Practical - 1

#### **COURSE OBJECTIVES:**

**After performing these experiments, the students will learn:**

understand the concepts and working of various instruments like Multimeter, CRO, AFO, galvanometer and its conversion into voltmeter and ammeter, PN Junction Diode, Zener diode, transistor, construction of power supply, logic gates, wave shaping circuits.

#### **Experiments:**

1. Study of Multimeter – Checking of Components.
2. Colour Coding of Resistors & Resistance in Series and Parallel.
3. Verification of Ohm's Law.
4. Characteristics of PN junction diode.
5. Half wave rectifier using PN junction Diode.
6. Full wave rectifier using PN junction Diode.
7. Characteristics of Zener diode.
8. Regulated power supply using Zener diode.
9. Transistor characteristics in CE mode.
10. Conversion of galvanometer into voltmeter, ammeter and ohmmeter.
11. Uses of CRO - Measurement of voltage, current, frequency and phase - Displaying waveforms and Lissajou's figures - Study Experiment.
12. Transistor single stage amplifier - Frequency response.
13. Construction of low range power supply using rectifying diodes (5 V to 12 V).
14. Basic logic gates (AND, OR) using diodes.
15. Basic logic gates (AND, OR, NOT) using transistor.
16. Differentiating and integrating circuits using R and C.
17. Clipping and clamping circuits.
18. Uses of LDR and relay.

#### **OUTCOME**

**On completion of this course the students will be able to**

- Identify the value of resistance by color coding and multimeter.
- Examine the characteristics of PN junction diode, Zener diode and Transistor with its applications.
- Demonstrate the working of galvanometer and CRO.
- Analyze the functionality of Transistor single stage amplifier, power supply, differentiator, integrator, clipper, clamper, LDR and relay
- Construct basic logic gates using diodes and transistor.

**Text Books:**

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

**Reference Books:**

1. **A Text Book of Practical Physics** - M.N. Srinivasan & others - Sultan Chand & Sons, New Delhi.
2. **Practical Physics** - St. Joseph's College, Tiruchirappalli.
3. **Practical Physics** - M. Arul Thalpathi, Comtek Publishers, Kanchipuram.

**ALLIED - 1  
PAPER - 2**

**BASIC MATHEMATICS II**

**COURSE OBJECTIVE:**

**The students will learn:**

- To explore the fundamental concepts of Mathematics.
- To introduce the *basic* concepts required to understand, construct, solve and interpret differential equations.

**Unit I : DIFFERENTIAL CALCULUS**

Successive differentiation, nth derivative, Leibnitz Theorem (with out proof), Jacobians, Maxima and minima.

**Unit II: ORDINARY DIFFERENTIAL EQUATION**

*Second order linear differential equation with constant coefficient*

**Unit III : PARTIAL DIFFERENTIAL EQUATION**

Formation of equation by elimination of constants and arbitrary functions. Complete intergrals & general intergrals, Four standard types.

**Unit IV : VECTOR ANALYSIS**

Scalar point function, vector point function, gradient, divergence, curl, irrotational, solenoidal, Line and surface integrals; Gauss, Green, Stoke's theorem (Statement Only)

**Unit V : INTEGRAL CALCULUS**

Integration by part's, Bernoulli's formula, Properties of definite Integral, Reduction formulae for  $\int \sin^n x \, dx$ ,  $\int \cos^n x \, dx$ , Fourier series for a function in  $(-\pi, \pi)$ , even and odd function

## **COURSE OUTCOME**

**On completion of this course the students will be able to**

- Use Differential Calculus for solving problems.
- Solve *basic* application problems described by second order linear *differential equations* with constant coefficients.
- Obtain an approximate set of solution function values to a second order boundary value problem using a finite *difference equation*.
- Perform Vector analysis to find solutions.
- Solve problems using Integral Calculus

### **Text Books**

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.

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