



## SRI VENKATESWARA COLLEGE OF ENGINEERING

(An Autonomous Institution, Affiliated to Anna University, Chennai – 600025)

# B. E. Computer Science and Engineering

### *CURRICULUM AND SYLLABUS REGULATION – 2022 CHOICE BASED CREDIT SYSTEM*

Curriculum Revision No:	Board of Studies recommendation date :	Academic Council Approved date:	
Salient Points of the revision	01.	The courses "Scientific Thoughts in Tamil" in Semester I and "Heritage of Tamil" in Semester II are introduced as per the recommendations of Anna University/Government of Tamil Nadu.	
	02.	The course "Technical Drawing " is introduced in Semester-II in place of "Engineering Drawing" of R2018.	
	03.	The Course Python For Data Science is introduced in Semester II as Lab integrated Course	
	04.	Mini project is introduced in the course Digital Principles and System Design Laboratory	
	05.	Communication Skills development is ensured through Communicative English and Induction Programme	

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## REGULATIONS 2022

### B. E COMPUTER SCIENCE AND ENGINEERING

#### CHOICE BASED CREDIT SYSTEM

#### PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

**Computer Science and Engineering program will prepare its graduates:**

1. Create value to organizations as an employee at various levels, by improving the systems and the processes using appropriate methods and tools learnt from the programme
2. Run an organization successfully with good social responsibility as an entrepreneur, making use of the knowledge and skills acquired from the programme
3. Contribute to the future by fostering research in the chosen area as an erudite scholar, based on the motivation derived from the programme

#### PROGRAM OUTCOMES (POs)

##### POGRADUATE ATTRIBUTES

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

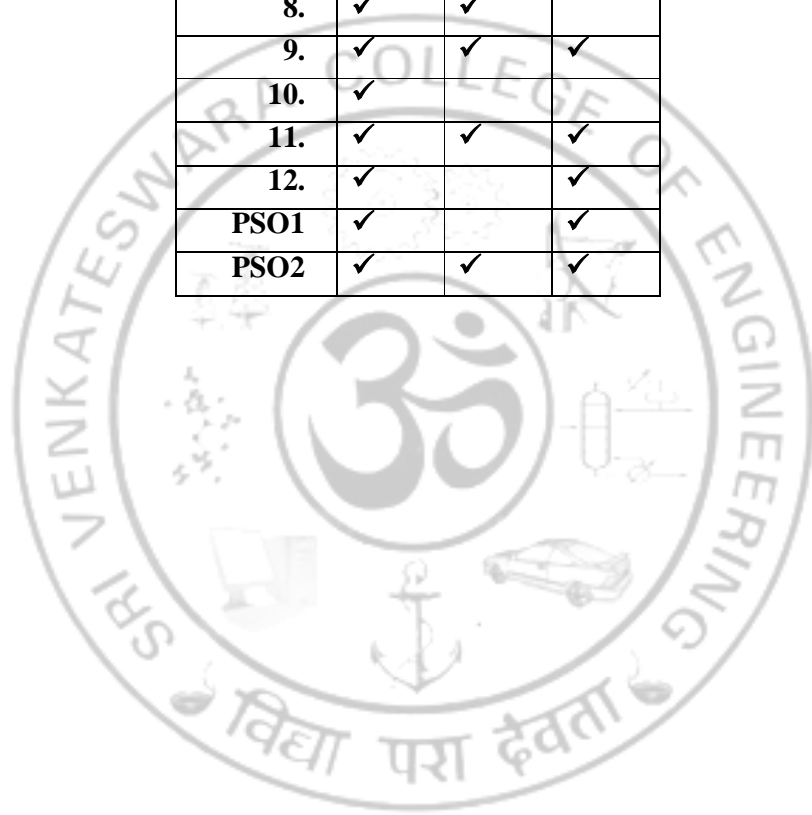
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

#### **PROGRAM SPECIFIC OUTCOMES (PSOs)**

13. Ability to adapt to a rapidly changing environment by learning and employing new programming skills and technologies.
14. Ability to use diverse knowledge across the domains with inter-personnel skills to deliver the Industry need.

**PEO's – PO's& PSO's MAPPING: (Example)**

POs	PEOs		
	I	II	III
1.	✓	✓	✓
2.		✓	✓
3.	✓	✓	✓
4.	✓		
5.	✓	✓	✓
6.		✓	
7.		✓	
8.	✓	✓	
9.	✓	✓	✓
10.	✓		
11.	✓	✓	✓
12.	✓		✓
PSO1	✓		✓
PSO2	✓	✓	✓



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**REGULATIONS 2022**  
**CHOICE BASED CREDIT SYSTEM**

**B.E. COMPUTER SCIENCE AND ENGINEERING**

**CURRICULUM FOR SEMESTERS I TO II AND SYLLABI**  
**FOR SEMESTERS I AND II**

**SEMESTER I**

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY <sup>#</sup>	PERIODS PER WEEK				TOTAL Hours	Prerequisite	Position
				L	T	P	C			
1.	IP22151	Induction Programme (Common to all Branches)					0		Nil	F
<b>Theory Subjects</b>										
2.	HS22151	Tamil language and Heritage of Ancient Tamil Society (Common to all branches)	MC	1	0	0	1	1	NIL	F
3.	HS22152	Communicative English (Common to all Branches)	HS	3	0	0	3	3	NIL	F
4.	MA22151	Applied Mathematics I (Common to all Branches except MR)	BS	3	1	0	4	4	NIL	F
5.	PH22151	Applied Physics (Common to AD, CS, EE, EC, IT)	BS	3	0	0	3	3	NIL	F
6.	CY22151	Applied Chemistry (Common to AD, CS, EE, EC, IT)	BS	3	0	0	3	3	NIL	F
7.	EE22151	Basic Electrical and Electronics Engineering (Common to all Branches except CH, EE, EC)	ES	3	0	0	3	3	NIL	F
8.	IT22101	Programming for Problem Solving (Common to IT, AD, CS, EE, EC)	ES	3	0	0	3	3	NIL	F
<b>Practical Subjects</b>										
9.	PH22161	Physics Laboratory (Common to all Branches except BT)	BS	0	0	2	1	2	NIL	F
10.	EE22111	Basic Electrical and Electronics Engineering Laboratory (Common to all Branches except EC)	ES	0	0	2	1	2	NIL	F
11.	IT22111	Programming for Problem Solving Laboratory (Common to IT, AD, CS, EE, EC)	ES	0	0	3	1.5	3	NIL	F
<b>Total</b>				<b>19</b>	<b>1</b>	<b>7</b>	<b>23.5</b>	<b>27</b>	-	-

**SEMESTER II**

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY <sup>#</sup>	PERIODS PER WEEK				TOTAL Hours	Prerequisite	Position
				L	T	P	C			
<b>Theory Subjects</b>										
1.	HS22251	Science and Technology in Ancient Tamil Society (Common to all Branches)	MC	2	0	0	2	2	NIL	F
2.	HS22252	Technical English (Common to all Branches)	BS	3	0	0	3	3	NIL	F
3.	MA22251	Applied Mathematics II (Common to all Branches except MR)	BS	3	1	0	4	4	NIL	F
4.	ME22251	Technical Drawing (Common to AD, CS, IT)	BS	1	0	2	2	3	NIL	F
5.	CS22201	Python For Data Science	ES	3	1	0	4	4	NIL	F
6.	CS22202	Digital Principles and System Design	PC	3	0	0	3	3	NIL	F
7.	CS22203	Object Oriented Programming	PC	3	0	0	3	3	NIL	F
<b>Practical Subjects</b>										
8.	CS22211	Digital Principles and System Design Laboratory	PC	0	0	3	1.5	3	NIL	F
9.	CS22212	Object Oriented Programming Laboratory	PC	0	0	3	1.5	3	NIL	F
<b>Total</b>				<b>18</b>	<b>2</b>	<b>8</b>	<b>24</b>	<b>28</b>	-	-

<b>HS22152</b>	<b>COMMUNICATIVE ENGLISH (COMMON TO ALL BRANCHES)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES**

- Enable learners to interact fluently on everyday social contexts.
- Train learners to engage in conversations in an academic/scholarly setting.
- Instil confidence in learners to overcome public speaking barriers.
- Develop learners' ability to take notes and in the process, improve their listening skills
- Enhance learners' reading skill through reading text passages for comprehension and contemplation.
- Improve learners' skills to write on topics of general interest and drafting correspondences for general purposes.

**UNIT I**

**9**

Listening - short video clips - conversational scenes from movies, celebrities' speeches /interviews. Speaking - several ways of introducing oneself at several situations, introducing others at several situations, inviting people for several occasions, describing people and their places. Reading - short comprehension passages - making inferences, critical analysis. Writing - completing the incomplete sentences - developing hints from the given information. Grammar - Wh-Questions and Yes or No questions - Parts of speech. Vocabulary development - prefixes - suffixes - articles - countable / uncountable nouns.

**UNIT II**

**9**

Listening - customer care voice files, short narratives - identifying problems and developing telephone etiquettes. Speaking - speaking over skype/ whatsapp, making business calls, making self-recorded informative videos, inquiring about a concept/activity, describing a concept/activity. Reading - reading the headlines on news magazines - slogans and taglines from advertisements. Writing - free writing - writing - headlines, slogans and taglines individual inspirations. Grammar- conjunctions, idioms, phrases, quotes. Vocabulary development - guessing the meanings of words in different contexts.

**UNIT III**

**9**

Listening - courtroom scenes from movies, debates and talks from news channels, notes taking. Speaking - language and tone for arguments, discussion, deliberation, contemplation, expressing opinions, reacting to different situations in an alien country. Reading - language used in instruction manuals of household appliances, cookery and other basic instructions. Writing- understanding the structure of texts - use of reference words, discourse markers-coherence, rearranging the jumbled sentences. Grammar - adjectives - degrees of comparison, framing direct and indirect questions. Vocabulary development - concise approach, single word substitution.

**UNIT IV**

**9**

Listening - Sports commentaries, advertisements with users' criticisms; Speaking - for social causes, for promoting a concept, negotiating and bargaining; Reading - review of a product, movie, movement or a system; Writing - writing for advertisements, selling a product; Grammar – Tenses - Simple Past, Present and Future, Continuous - Past, Present and Future; Vocabulary Development - synonyms, antonyms and phrasal verbs.

## UNIT V

9

Listening - video lectures, video demonstration of a concept; Speaking – presenting papers/concepts, delivering short speeches, discourses on health, suggesting natural home remedies, cleanliness, civic sense and responsibilities; Reading - columns and articles on home science; Writing - correspondences of requests, basic enquiry/observation and basic complaints; Grammar - modal verbs, perfect tenses - Vocabulary development - collocations.

**TOTAL : 45 PERIODS**

### REFERENCES:

1. Department of English, Anna University, Mindscapes : English for Technologists and Engineers. Orient Black Swan, Chennai, 2017.
2. Downes and Colm, & quot;Cambridge English for Job-hunting &quot;;, Cambridge University Press, New Delhi, 2008.
3. Murphy and Raymond, & quot;Intermediate English Grammar with Answers&quot;;, Cambridge University Press, 2000.
4. Thomson, A.J., & quot;Practical English Grammar 1 & 2&quot;;, Oxford, 1986.

### Web Link:

1. <http://www.usingenglish.com>
2. <http://www.uefap.com>
3. <https://owl.english.purdue.edu/owl/>
4. [www.learnenglishfeelgood.com/esl-printables-worksheets.html](http://www.learnenglishfeelgood.com/esl-printables-worksheets.html)

### Software

1. Face2Face Advance - Cambridge University Press, 2014
2. English Advance Vocabulary - Cambridge University Press
3. IELTS test preparation - Cambridge University Press 2017
4. Official Guide to the TOEFL Test With CD-ROM, 4<sup>th</sup> Edition
5. CAMBRIDGE Preparation for the TOEFL TEST - Cambridge University Press, 2017

### OUTCOMES:

CO1

Acquire adequate vocabulary for effective communication

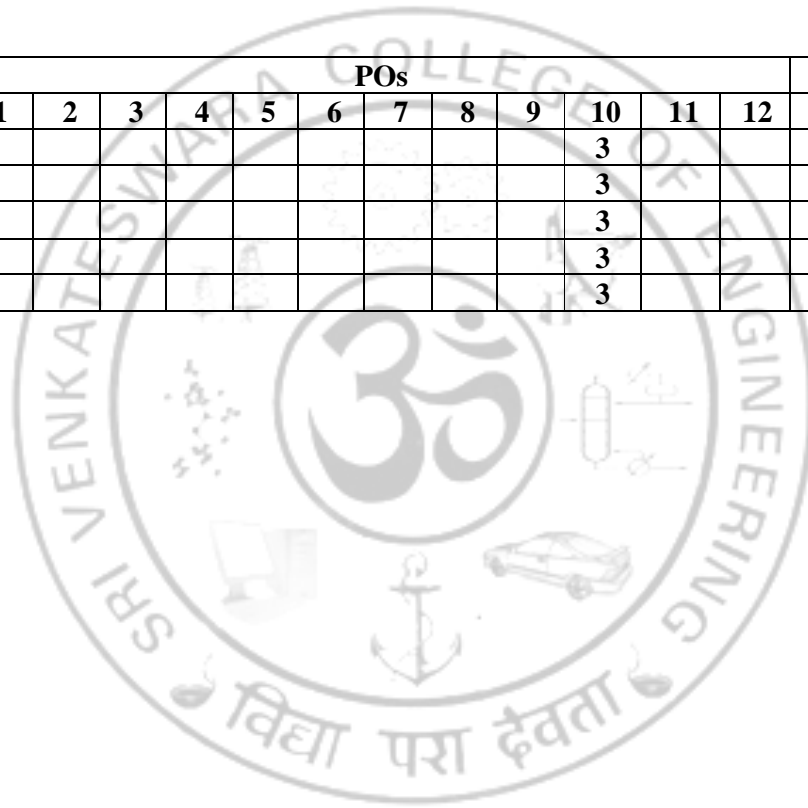
L3



<b>CO2</b>	Listen to formal and informal communication and read articles and infer meanings from specific contexts from magazines and newspapers.	<b>L3</b>
<b>CO3</b>	Participate effectively in informal/casual conversations; introduce themselves and their friends and express opinions in English.	<b>L4</b>
<b>CO4</b>	Comprehend conversations and short talks delivered in English.	<b>L6</b>
<b>CO5</b>	Write short write-ups and personal letters and emails in English	<b>L6</b>

### COURSE ARTICULATION MATRIX

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<b>1.</b>										3				
<b>2.</b>										3				
<b>3.</b>										3				
<b>4.</b>										3				
<b>5.</b>										3				





**REFERENCES:**

1. Bali N.P and Manish Goyal, “A Text book of Engineering Mathematics”, Ninth Edition, Laxmi Publications Pvt. Ltd.,(2014).
2. Glyn James, “Advanced Modern Engineering Mathematics”, 4<sup>th</sup> Edition, Pearson Education,(2016).
3. Ramana B.V, “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, New Delhi, (2013).

**Web Link:**

1. <https://home.iitk.ac.in/~peeyush/102A/Lecture-notes.pdf>
2. <https://www.sydney.edu.au/content/dam/students/documents/mathematics-learning-entre/integration-definite-integral.pdf>

**OUTCOMES:**

<b>CO1</b>	Solve the Eigen value problems in matrices.	<b>L2</b>
<b>CO2</b>	Apply the basic notion of calculus in Engineering problems and to tackle for different geometries	<b>L2</b>
<b>CO3</b>	Perform calculus for more than one variable and its applications in Engineering problems.	<b>L2</b>
<b>CO4</b>	Apply definite integrals for design of three dimensional components	<b>L2</b>
<b>CO5</b>	Evaluate multiple integral in Cartesian and polar coordinates.	<b>L3</b>

**COURSE ARTICULATION MATRIX**

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	3	2									3	2	
2.	3	3	2									3		
3.	3	3	2									3		1
4.	3	3	2									3		
5.	3	3	2									3		1

**OBJECTIVES**

- To enhance the fundamental knowledge in Physics and its applications relevant to various Streams of Engineering and Technology

**UNIT I LASERS AND FIBER OPTICS 9**

Lasers: population of energy levels, Einstein's A and B coefficients derivation – resonant cavity, optical amplification (qualitative) – Nd-YAG laser – CO<sub>2</sub> Laser – Exceimer Laser – Applications. Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibres (material, refractive index, and mode) – losses associated with optical fibers–Fiber optic communication - fibre optic sensors: pressure and displacement - Endoscope.

**UNIT II QUANTUM PHYSICS 9**

Black body radiation – Planck's theory (derivation)- deduction of Wien's and Rayleigh Jean's law – Compton effect: theory and experimental verification – wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent wave equations – particle in a one-dimensional - three dimensional potential box–Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals

**UNIT III CRYSTAL PHYSICS 9**

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – interplanar distances- coordination number and packing factor for SC, BCC, FCC, HCP and Diamond structure (qualitative) - crystal imperfections: point defects, line defects – Burger vectors, stacking faults

**UNIT IV WAVES AND OSCILLATIONS 9**

Travelling waves, Wave equation for string ,Energy and momentum , Resonance Superposition & Reflection, Standing waves, Harmonic oscillations, Damped harmonic motion- Forced oscillations, amplitude resonance - Expression for Resonant frequency, Electrical analogy of mechanical oscillations, Quality factor and sharpness of resonance, Electrical analogy of mechanical oscillators

**UNIT V ELECTROMAGNETIC WAVES 9**

Maxwell's Equations. Vector and Scalar Potentials. Plane waves in Dielectric media. Poynting Theorem and Poynting Vector.- Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density, EM Wave Propagation in Unbounded Media, Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant.

**TOTAL : 45 PERIODS****TEXT BOOKS:**

- Gaur R.K., Gupta S.L, "Engineering Physics", Dhanput Publications, 2015.
- Shatendra Sharma, Jyotsna Sharma, "Engineering Physics", Pearson, 2006.
- Rajendran V, "Engineering Physics", Tata McGraw Hill, 2009.
- Arumugam M, "Materials Science", Anuradha Publications, 2015.

**REFERENCES:**

1. David Halliday, Robert Resnick, Jearl Walker, "Principles of Physics", 10th Edition, Wiley, 2015.
2. Peter Atkins, Julio De Paula, "Physical Chemistry", 10th Edition., Oxford University Press, 2014.
3. Arthur Beiser, Shobhit Mahajan, Rai Choudhury S, "Concepts of Modern Physics", 7<sup>th</sup> Edition, McGraw Hill Education, 2017.
4. Raghavan V, "Materials Science and Engineering", PHI Learning Pvt. Ltd., 2010

**OUTCOMES:**

- CO1** Develop an understanding about photonics and Fiber Optic communication system **L2**
- CO2** Acquire the knowledge of Quantum mechanics **L3**
- CO3** Classify and demonstrate the fundamentals of crystals and their defects. **L3**
- CO4** Gain knowledge in waves and oscillations **L2**
- CO5** Enable to explore the theory of electromagnetic waves and its propagation **L3**

**COURSE ARTICULATION MATRIX**

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3				2	2				1			1	
2.	3	3	2	2	2	2				1		2		1
3.	3									1			1	
4.	3		2							1				
5.	3	3	2	2	2					1		2		2

**OBJECTIVES**

- To make the students conversant with basics of electrochemistry and batteries.
- To develop an understanding of the laws of photochemistry and its basics.
- To acquaint the students with the basics of nanomaterials, their properties and uses.
- To acquire the basic knowledge on sensors which are essential for the software engineers for develop new devices.
- To enable the students to understand the types of instruments for material analysis and their working principle.

**UNIT I ELECTROCHEMISTRY**

9

Electrodes and electrochemical cells – electrode potential, standard electrode potential, single electrode potential and its determination, types of electrodes – calomel, quinhydrone and glass electrode. Nernst equation - Determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Batteries – Primary (dry cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery) and next generation batteries.

**UNIT II PHOTOCHEMISTRY**

9

Laws of photochemistry – Grotthuss-Draper law, Stark–Einstein law and Lambert Beer Law – determination iron by spectrophotometer. Quantum efficiency – Photo physical processes - internal conversion, inter-system crossing, fluorescence, phosphorescence and photo-sensitization-quenching of fluorescence and its kinetics, Stern-Volmer relationship. Applications of photochemistry.

**UNIT III NANOCHEMISTRY**

9

Basics and scale of nanotechnology, different classes of nanomaterials, Distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Synthesis of nanomaterials, fabrication (lithography) and its applications – Basics of nanophotonics and quantum confined materials (surface plasmon resonance).

**UNIT IV CHEMICAL SENSOR**

9

Sensors, sensor science and technology, types of sensors. Chemical Sensors – characteristics and elements. Electrochemical sensors – voltammetry, potentiometric sensors, amperometric sensors, polarization techniques.

**UNIT V INSTRUMENTATION TECHNIQUES**

9

Treatment of analytical data, including error analysis. Classification of analytical methods and the types of instrumental method - Electromagnetic radiation-UV-visible and IR spectroscopy: principles, instrumentation (Block diagram only) and applications. Separation techniques chromatography: Gas chromatography, liquid chromatography -importance of column technology (packing, capillaries), separation based on increasing number of factor (volatility, solubility, interactions with stationary phase, size)

**TOTAL : 45 PERIODS**

**TEXT BOOKS:**

1. Jain P.C. and Monica Jain, “Engineering Chemistry”, DhanpatRai Publishing Company (P) Ltd., New Delhi, 2010.
2. Dara S.S, Umare S.S, “Engineering Chemistry”, S. Chand & Company Ltd., New Delhi 2010
3. B.K.Sharma, “Instrumental Methods of Chemical Analysis”, 28th Edition, Goel Publishing House, 2012.
4. Skoog, D.A. Holler F.J. Nieman, T.A. Principles of Instrumental Analysis, Cengage Learning India.

**REFERENCES:**

1. Ozin G. A. and Arsenault A. C., "Nanochemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2005.
2. B.R. Puri, L.R. Sharma, M.S. Pathania., "Principles of Physical Chemistry" Vishal Publishing Company, 2008.
3. John Vetelino, AravindReghu, Introduction to Sensors , Taylor & Francis Group, CRC Press, 1st edition, 2010.
4. Peter Gründler, Chemical Sensors, An Introduction for Scientists and Engineers, Springer-Verlag Berlin Heidelberg 2007.

**OUTCOMES:**

CO 1	Describe the electrolytic and electrochemical cell, various fundamental aspects of electrochemistry and batteries	L2
CO 2	Interpret the photochemical reactions and their applications	L2
CO 3	Differentiate the nano and bulk materials, their synthesis and its applications in various fields.	L3
CO 4	Acquire the basic knowledge on chemical sensors to develop an interdisciplinary approach among the students which are essential for the software engineers	L1
CO 5	Develop theoretical principles of UV-visible and IR spectroscopy and separation techniques	L3

**COURSE ARTICULATION MATRIX**

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	3	3	2								3	1	1
2.	3	3				3	3					3		
3.	3	3	3			3	3	1				3		1
4.	3	3	3		1	3	3					3		1
5.	3	3		2		3	3					3	1	

**OBJECTIVES**

- To understand the basic theorems used in Electrical circuits.
- To educate on the different concepts and functions of electrical machines.
- To introduce electron devices and its applications.
- To explain the principles of digital electronics.
- To impart knowledge on the principles of measuring instruments.

**UNIT I****ELECTRICAL CIRCUITS****9**

Ohm's Law – Kirchhoff's Laws - Steady State Solution of DC Circuits using Mesh and Nodal Analysis - Introduction to AC Circuits - Waveforms and RMS Value - Power and Power factor - Single Phase and Three Phase AC Balanced Circuits.

**UNIT II****ELECTRICAL MACHINES****9**

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single phase induction Motor, Single Phase Transformer.

**UNIT III****SEMICONDUCTOR DEVICES AND APPLICATIONS****9**

Characteristics of PN Junction Diode - Zener Effect - Zener Diode - LED, Photo diode and its Characteristics- Half Wave and Full Wave Rectifiers-Voltage Regulation. Bipolar Junction Transistor-Common Emitter Configuration, Characteristics and CE as an Amplifier - Photo transistors

**UNIT IV****DIGITAL ELECTRONICS****9**

Number System Conversion Methods–Simplification of Boolean Expression using K-Map – Half and Full Adders – Flip-Flops – Shift Registers - SISO, SIPO, PISO, PIPO and 4-bit Synchronous and Asynchronous UP Counters.

**UNIT V****MEASURING INSTRUMENTS****9**

Types of Signals: Analog and Digital Signals- Construction and working Principle of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters. Instrumentation Amplifier, – R-2R ladder Type D/A Converter - Flash Type and Successive Approximation Type A/D Converter.

**TOTAL : 45 PERIODS****TEXT BOOKS:**

1. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020.
2. SedhaR.S., "A Text Book of Applied Electronics", S.Chand&Co., 2014.

**REFERENCES:**

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics Engineering", Tata McGraw Hill, 2013.
2. MehtaVK, "Principles of Electronics", S. Chand &CompanyLtd, 2010.



3. M. Morris Mano, "Digital Logic & Computer Engineering", Prentice Hall of India, 2004.
4. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, Fourth Edition, 2007.

**OUTCOMES:**

- |      |  |    |
|------|--|----|
| CO 1 | Compute the electric circuit parameters for simple problems                        | L2 |
| CO 2 | Understand the construction and characteristics of different electrical machines.  | L1 |
| CO 3 | Describe the fundamental behavior of different semiconductor devices and circuits. | L2 |
| CO 4 | Design basic digital circuits using Logic Gates and Flip-Flops.                    | L3 |
| CO 5 | Analyze the operating principle and working of measuring instruments.              | L3 |

**COURSE ARTICULATION MATRIX**

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	3	3	3			2					2		
2.	3	3	3	3			2					2		
3.	3	3	3	3			2					2		
4.	3	3	3	3			2					2		
5.	3	3	3	3			2					2		

<b>IT22101</b>	<b>PROGRAMMING FOR PROBLEM SOLVING (COMMON TO AD/CS/EE/EC/IT)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **OBJECTIVES**

- Learn the organization of a digital computer.
- Learn to think logically and write algorithms or draw flow charts for problems.
- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.

### **UNIT I INTRODUCTION TO PROBLEM SOLVING 9**

Simple model of a Computer – Hardware – Software – Data Representation, Introduction to Computer Networks and Internet, Problem Solving Techniques – Bottom up design and top down design - applications, Introduction to Algorithms and Flow Chart  
Suggested Activities: Case study – Understanding the analysis and design of the Student Management System (SMS).

### **UNIT II C PROGRAMMING BASICS 9**

Introduction to ‘C’ programming – structure of a ‘C’ program – Conversion of simple algorithm to program. Constants, Variables – Data Types – Expressions using operators in ‘C’ – Managing Input and Output operations – Decision Making and Branching – Looping statements – solving simple scientific and statistical problems.  
Suggested Activities: Case study: Dataset creation and Grade calculation in SMS

### **UNIT III ARRAYS AND STRINGS 9**

Array: declaration, initialization. Multi dimensional arrays. Strings: Strings vs Character arrays, string operations  
Suggested Activities - Grade sheet generation in SMS

### **UNIT IV FUNCTIONS AND STRUCTURES 9**

Need for Modular programming, Functions: definition, call, arguments, call by value. Call by reference, Recursion. structures and unions: Need, declaration, Accessing Structure elements, Arrays of structures  
Suggested Activities: Redesigning SMS in terms of modules

### **UNIT V POINTERS AND FILE HANDLING IN C 9**

Pointers : Introduction, pointers to primitive datatypes, pointers to user defined datatypes: arrays and structures, array of pointers, Dynamic Memory Allocation. Files: Read/Write of binary and text files. Preprocessor directives  
Suggested Activities: Mange I/O in SMS using Files

**TOTAL : 45 PERIODS**

**TEXT BOOKS:**

1. Pradip Dey, Manas Ghosh, “Programming in C”, First Edition, Oxford University Press, 2018.
2. R G Dromey, “How to Solve it using Computer”, Pearson,2006

**REFERENCES:**

1. Kernighan,B.W and Ritchie,D.M, “The C Programming language”, Second Edition, Pearson Education, 2015.
2. Yashavant P. Kanetkar. “Let Us C”, BPB Publications, 2011.
3. Byron S Gottfried, “Programming with C”, Schaum’s Outlines, Third Edition, Tata McGrawHill, 2010
4. Reema Thareja, “Programming in C”, 2nd ed., Oxford University Press, 2016

**OUTCOMES:**

<b>CO1</b>	Identify input and output from the real word problem scenarios	<b>L3</b>
<b>CO2</b>	Represent the design flow using Flow-charts and application logic using pseudo code	<b>L3</b>
<b>CO3</b>	Apply appropriate programming constructs to implement a given design using C.	<b>L3</b>
<b>CO4</b>	Debug and customize an existing software developed in C	<b>L5</b>
<b>CO5</b>	Develop a modularized software application In C for the given user requirements	<b>L6</b>

**COURSE ARTICULATION MATRIX**

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<b>1.</b>	<b>1</b>	<b>3</b>							<b>3</b>			<b>2</b>	<b>2</b>	
<b>2.</b>	<b>1</b>	<b>3</b>							<b>3</b>			<b>2</b>	<b>2</b>	<b>1</b>
<b>3.</b>	<b>1</b>		<b>3</b>	<b>2</b>	<b>1</b>				<b>3</b>			<b>2</b>	<b>3</b>	
<b>4.</b>	<b>1</b>		<b>3</b>	<b>2</b>	<b>1</b>				<b>3</b>			<b>2</b>		<b>3</b>
<b>5.</b>	<b>1</b>		<b>3</b>	<b>2</b>	<b>1</b>				<b>3</b>			<b>2</b>	<b>1</b>	<b>3</b>

HS22151

தமிழ் மொழியும் தமிழர் மரபும்  
Tamil Language and Heritage of Tamils  
(Common to all branches)

L	T	P	C
1	0	0	1

**பாடத்தின் நோக்கங்கள்:**

1. தமிழ் மொழியின் தோற்றம் பற்றியும், திணை கருத்துக்கள் வாயிலாக வாழ்வியல் முறைகளை பற்றியும் கற்றுக் கொள்வார்கள்.
2. இந்திய தேசிய சுதந்திர இயக்கத்தில் தமிழர்களின் பங்களிப்பு மற்றும் தமிழர்களின் மேலாண்மை முறைகளை பற்றியும் கற்றுக் கொள்வார்கள்.

**Course Objectives :**

1. They will learn about the origin of the Tamil language and the ways of life through five types of lands.
2. They will also learn about the contribution of Tamils in the Indian National Freedom Movement and the management methods of Tamils.

**அலகு 1 தமிழுக்கும் தொழில்நுட்பக் கல்விக்கும் உள்ள தொடர்பு 3**

**மொழி மற்றும் பாரம்பரியம்:** இந்தியாவில் உள்ள மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழில் செம்மொழி இலக்கியம் - உ.வே. சாமிநாதய்யர். ஆறுமுகநாவலர் பங்களிப்பு - தொழில் நுட்பக் கல்வியில் தமிழ் மொழியின் முக்கியத்துவம்.

## UNIT -1 LANGUAGE AND HERITAGE

**Language families in India** – Dravidan Languages – Tamil as a Classical language – Classical Literature in Tamil – Contribution of U. Ve. Saminathaiyar. Arumuka Navalar – Importance of Tamil language in technical education.

**அலகு2 திணை கருத்துக்கள் 9**

**திணை கருத்துக்கள்:** -ஐந்து வகை நிலங்கள், விலங்குகள், கடவுள்கள், தொழில், வாழ்க்கை முறைகள், இசை, நடனம், உணவு முறை, தமிழர்களின் தாவரங்கள் மற்றும் விலங்கினங்கள் – தொல்காப்பியம் மற்றும் சங்க இலக்கியங்களில் இருந்து அகம் மற்றும் புரம் கருத்து – தமிழ் பற்றிய அறம் கருத்து – கல்வி மற்றும் எழுத்தறிவு சங்க காலம் – சங்ககாலத்தின் பண்டைய நகரங்கள் மற்றும் துறைமுகங்கள் – சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – சோழர்களின் வெளிநாட்டு வெற்றி.

## UNIT -2 THINAI CONCEPTS

Five types of lands, animals, Gods, occupation, life styles, music, dance , food style, Floara and Fauna of Tamils - Agam and puram concept from Tholkappiyam and Sangam Literature – Aram concept of Tamil – Education and Literacy during Sangam Age – Ancient cities and Ports of Sangam Age – Export and Import during Sangam Age - Overseas Conquest of Choloas.

**அலகு3 தமிழரின் மரபு 3**

**இந்திய தேசிய சுதந்திர இயக்கம் மற்றும் இந்திய கலாச்சாரத்திற்கு தமிழர்களின் பங்களிப்பு:-** சுப்ரமணிய பாரதி, வாஞ்சிநாதன், சுப்பிரமணிய சிவா, வீரபாண்டிய கட்ட பொம்மன், வா.ஊ சிதம்பரம் பிள்ளை, தீரன் சின்னமலை, மருது பாண்டிய சகோதரர்கள், பூலி தேவர், திருப்பூர் குமரன், வீரமங்கை வேலு நாச்சியார் - ,தமிழர் இலக்கியங்களில் மேலாண்மை கருத்துக்கள் (கி.

மு. 500 முதல் கி. பி 200 வரை) – அகநானூறு, புறநானூறு, திருக்குறள் ஆகியவற்றில் மேலாண்மைக் கருத்துகள்..

### UNIT -3 HERITAGE OF TAMILS

**Contribution of Tamils to Indian National Freedom Movement and Indian Culture :** Contributions of Subramanya Bharathi, Vanchinathan, Subramaniya Siva, Veerapandiya Kattabomman, V O Chidambaram Pillai, Dheeran Chinnamalai, The Maruthu Pandiyar, Puli Thevar, Tiruppur Kumaran, Veera Mangai Velunachiyar.

**பாடநெறி முடிவுகள் :** படிப்பை வெற்றிகரமாக முடித்தவுடன் , மாணவர்கள் பின்வருவனவற்றைச் செய்ய முடியும்.

**COURSE OUTCOMES :** On completion of the course, the student will be able to

பா .வெ . எண் CO No	பாடத்திட்டத்தின்வெளிப்பாடு Course Outcomes	RBT level
1	மாணவர்கள் தமிழ் மொழித் தோற்றம் பற்றித் தெரிந்து கொள்வார்கள். Students will learn about the origin of the Tamil language	L1
2	தமிழர்களின் வாழ்வியல் முறைகளைத் தெரிந்து கொள்வார்கள். They will know the ways of life of Tamils.	L2
3	தமிழர்களின் சுதந்திர போராட்ட வீரர்களை பற்றியும், மேலாண்மைகளை பற்றியும் தெரிந்து கொள்வார்கள். They will know about the freedom fighters of Tamils and the management of Tamils	L2

**பாடநூல்கள்:**

**பொன். முத்துகுமாரன்** (2002), “தமிழ் மரபு”, காந்தளகம், 68, அண்ணா சாலை, சென்னை 600 002

**பி. டிபுளினிவாச ஐயங்கார்** (தமிழக்கமும் திறனாய்வும்) புலவர் கா. கோவிந்தன் (1988), “தமிழர் வரலாறு (முதல் பகுதி)”, திருநெல்வேலி தென்னிந்திய சைவ சித்தாந்த நூற்பதிப்பு கழகம் ,154, TTK சாலை, சென்னை 18.

**டாக்டர். கே. கே. பிள்ளை** (2009), “தமிழக வரலாறு மக்களும் பண்பாடும்”, உலக தமிழாராய்ச்சி நிறுவனம், தரமணி , சென்னை 600113

**முனைவர். ச. இராஜேந்திரன்** (2004), “தமிழில் சொல்லாக்கம்”, தஞ்சாவூர் தமிழ் பல்கலைக் கழகம் வெளியீடு

<b>PH22161</b>	<b>PHYSICS LABORATORY (COMMON TO ALL BRANCHES EXCEPT BT)</b>	<b>L 0</b>	<b>T 0</b>	<b>P 3</b>	<b>C 1.5</b>
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**OBJECTIVES**

- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

**List of Experiments**

- a) Determination of Wavelength, and particle size using Laser.  
b) Determination of acceptance angle in an optical fiber.
- Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.
- Determination of wavelength of mercury spectrum – spectrometer grating.
- Determination of thermal conductivity of a bad conductor – Lee’s Disc method.
- Determination of Young’s modulus by Non uniform bending method.
- Determination of specific resistance of a given coil of wire – Carey Foster’s Bridge.
- Determination of Rigidity modulus of a given wire -Torsional Pendulum
- Energy band gap of a Semiconductor**
- Determine the Hysteresis loss of a given Specimen
- Calibration of Voltmeter & Ammeter using potentiometer.**

**TOTAL: 45 PERIODS**

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

Standalone desktops with C compiler 30 Nos. or Server with C compiler supporting 30 terminals or more

**OUTCOMES:**

**At the end of the course, the student should be able to:**

The hands on exercises undergone by the students will help them to apply physics principles of, optics and thermal physics to evaluate engineering properties of materials.

**REFERENCES:**

- "Physics Laboratory practical manual", 1st Revised Edition by Faculty members, 2018.**

**Course outcomes**

CO 1	Analyze the physical principle involved in the various instruments; also relate the principle to new application.	L4
CO 2	Comprehend the Experiments in the areas of optics, mechanics and thermal physics to nurture the concepts in all branches of Engineering.	L3
CO 3	Apply the basic concepts of Physical Science to think innovatively and also improve the creative skills that are essential for engineering.	L3
CO 4	Evaluate the process and outcomes of an experiment quantitatively and qualitatively	L3
CO 5	Extend the scope of an investigation whether or not results come out as expected	L3

## COURSE ARTICULATION MATRIX

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	3	2	3	2				3	1		2	2	
2.	3	3		3		2			3	1		2	2	
3.	3	3	2	3	2	2			3	1		2	1	2
4.	3	3		3					3	1		2		
5.	3	3		3	2				3	1		2		1



<b>EE22111</b>	<b>BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY (COMMON TO ALL BRANCHES EXCEPT EC)</b>	<b>L T P C</b>
		<b>0 0 2 1</b>

**OBJECTIVES**

- To provide exposure to the students with hands on experience in basic of Electrical and Electronics wiring connection and measurements.
- To introduce the students to Electrical Machines and basic laws of Electrical Circuits.

**List of Experiments**

1. Wiring – Residential house wiring and Stair case wiring.
2. (a) AC Analysis- Measurement of electrical quantities–voltage, current, power, and power factor using RLC.  
(b) Study of three phase system.
3. Energy conservation - Measurement and comparison of energy for incandescent lamp and LED lamp.
4. (a) Identification of circuit components (Resistor, Capacitor, Diode and BJT) and soldering practice.  
(b) Signal Measurement- Measurement of peak to peak, RMS, average, period, frequency of signals using CRO.
5. (a) VI Characteristics of Solar photovoltaic panel.  
(b) Design of Solar PV Array and Battery sizing for Residential solar PV system.
6. Design a 5V/12V Regulated Power Supply using FWR and IC7805 / IC7812.
7. DC Analysis- Verification of Ohm’s Law and Kirchhoff’s Laws.
8. Study of Transformer and motor characteristics.

**TOTAL: 30 PERIODS**

**OUTCOMES:**

**At the end of the course, the student should be able to:**

CO 1	Wiring of basic electrical system and measurement of electrical parameters.	<b>4</b>
CO 2	Verify the basic laws of Electric circuits and select various Electrical Machines.	<b>4</b>
CO 3	Construct electronic circuits and design solar photovoltaic system.	<b>4</b>
CO 4	Apply the concept of three-phase system.	<b>4</b>
CO 5	Construct a fixed voltage regulated power supply.	<b>4</b>



## COURSE ARTICULATION MATRIX

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	3	3	3					2			2		
2.	3	3	3	3					2			2		
3.	3	3	3	3					2			2		
4.	3	3	3	3					2			2		
5.	3	3	3	3					2			2		



<b>IT22111</b>	<b>PROGRAMMING FOR PROBLEM SOLVING LABORATORY (COMMON TO IT, AD, CS, EE, EC)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**OBJECTIVES**

- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.

**List of Experiments**

1. Usage of Basic Linux commands
2. C Programming using Simple statements and expressions.
3. Scientific problem solving using decision making and looping.
4. Simple programming for one dimensional and two dimensional arrays.
5. Solving problems using Strings
6. C Programming using Pointers
7. C Programming using user defined functions (Pass by value and Pass by reference)
8. C Programming using Recursion
9. C Programming using structures and union
10. C Programming using enumerated data types
11. C Programming using macros and storage classes
12. C Programming using Files
13. Develop modularized application for any one of the following scenarios Scenarios:  
 Student Management System  
 Stock Management System  
 Banking Application  
 Ticket Reservation System

**TOTAL: 45 PERIODS**

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

Hardware/Software Requirements (For a batch of 30 students)  
 Computer with Windows/Linux OS and C compiler -30 No.s

**OUTCOMES:**

**At the end of the course, the student should be able to:**

<b>CO1</b>	Apply appropriate programming constructs to solve problems.	<b>L3</b>
<b>CO2</b>	Design, implement, test and debug programs that use the basic features of C.	<b>L5</b>
<b>CO3</b>	Design modularized applications in C to solve real world problems.	<b>L6</b>
<b>CO4</b>	Use C pointers and dynamically allocated memory to solve complex problems	<b>L4</b>
<b>CO5</b>	Apply file operations to develop solutions for real-world problems	<b>L3</b>

## COURSE ARTICULATION MATRIX

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	1	3							3			2	2	1
2.	1	3							3			2		
3.	1		3	2	1				3			2	2	1
4.	1		3	2	1				3			2		2
5.	1		3	2	1				3			2	1	1



HS22251

அறிவியல் மற்றும் தொழில்நுட்பத்தில் தமிழ்  
Science and Technology in Ancient Tamil Society  
(Common to all branches)

L	T	P	C
2	0	0	2

பாடத்தின் நோக்கங்கள் :

1. அறிவியலில் தமிழின் பயன்பாடு பற்றி தெரிந்து கொள்வார்கள்.
2. தொழில்நுட்பத்தில் தமிழ் பாரம்பரியத்தின் தாக்கம் பற்றி அறிந்து கொள்வார்கள்.

Course Objectives :

- 1.They will know about the use of Tamil in science.
2. Learn about the impact of Tamil heritage on technology.

அலகு 1

அறிவியல் தமிழ்

6

கருவி உருவாக்கம் – ஆராய்ச்சி மேம்பாடு – கல்வி வளர்ச்சி – அறிவியல் தமிழ் சொற்கள் உருவாக்கம்.

UNIT -1 SCIENTIFIC TAMIL

Tool Development - Research Development - Educational Development - Scientific Tamil words Creation.

அலகு 2

தொழில்நுட்பத்தில் தமிழ்

24

வடிவமைப்பு மற்றும் கட்டுமான தொழில்நுட்பம் : சங்க காலத்தில் கட்டுமானப் பொருட்கள் – சோழர்களின் பெரியகோவில்கள் மற்றும் பிற வழிபாட்டுதலங்கள் – பல்லவர்களின் சிற்பங்கள் மற்றும் கோவில்கள் (மாமல்லபுரம்) - நாயக்கன் கால கோவில்கள் (மதுரை மீனாட்சி அம்மன் கோவில்), திருமலை நாயக்கர் மஹால், செட்டிநாட்டு வீடுகள்.

உற்பத்தி தொழில் நுட்பம் : கப்பல் கட்டும் கலை, உலோகவியல் ஆய்வுகள், தங்கம், தாமிரம், இரும்பு பற்றிய அறிவு – தொல்பொருள் சான்றுகள் – சுட்டக் களிமண் மணிகள், சங்கு மணிகள், எலும்பு மணிகள்.

விவசாயம் மற்றும் நீர்ப்பாசன தொழில்நுட்பம் : அணைகள், ஏரிகள், குளங்கள், மதகுகள், சோழர் கால குமுழி தூம்பு ஆகியவற்றின் முக்கியத்துவம் – கால்நடை பராமரிப்பு, கால்நடைகளின் பயன்பாட்டிற்காக வடிவமைக்கப்பட்ட கிணறுகள். விவசாயம் மற்றும் வேளாண் செயலாக்கம் – கடல் பற்றிய அறிவு – மீன் பிடித்தல், முத்து குளித்தல், சங்கு சேகரித்தல்.

தமிழ் கணிணி: அறிவியல் தமிழ் வளர்ச்சி – தமிழ் கணிணி, தமிழ் புத்தகங்களின் டிஜிட்டல்மயமாக்கல், தமிழ் டிஜிட்டல் நூலகம், தமிழ் மென்பொருள் உருவாக்கம் – தமிழ் மெய் நிகர் அகாடமி – சொற்குவை திட்டம்.

தமிழின் எதிர்காலமும் தகவல் தொழில்நுட்பமும்- உலகமயமாக்கலும் தகவல் தொழில்நுட்பமும் – கணிணிக்கு தமிழ் கற்று கொடுத்தல் – தமிழ்மொழித் தொழில்நுட்பத்தில் வளங்கள்.

UNIT -2 TAMIL IN TECHNOLOGY

**Design and Construction Technology :** Building materials in Sangam age – Great temples of Cholas and other workshop places – Sculptures and Temples of Pallavas (Mamallapuram) – Temples of Nayakas period (Madurai Meenakshi amman temple), Thirumalai Nayakar Mahal, Chetti Nadu Houses.

**Manufacturing Technology :** Art of Ship building, Metallurgical studies, Knowledge about Gold, Copper, Iron – Archeological evidences – Terracotta beads, Shell beads, Bone beads.

**Agriculture and Irrigation Technology:** Dams, Tank, ponds, sluice, Significance of Kumuzhi Thoompu of Cholas period- Animal Husbandry, Wells designed for cattle use. Agriculture and Agro processing, - Knowledge about Sea – Fisheries, Pearl, Conche diving.

**Tamil Computing :** Development of Scientific Tamil – Tamil Computing, Digitization of Tamil books,

Tamil Digital Library, Development of Tamil Softwares – Tamil virtual Academy – Sorkuvai project. Future of Tamil and Information Technology- Globalization and Information Technology-Teaching Tamil for Computer-Resources in Tamil Language Technology.

**பாடநெறி முடிவுகள் :** படிப்பை வெற்றிகரமாக முடித்தவுடன், மாணவர்கள் பின்வருவனவற்றைச் செய்ய முடியும்.

**COURSE OUTCOMES :** On completion of the course, the student will be able to

பா .வெ . எண் CO No	பாடத்திட்டத்தின்வெளிப்பாடு Course Outcomes	RBT level
1	அறிவியலில் தமிழ் மொழியின் பயன்பாடு பற்றி தெரிந்து கொள்வார்கள் They will know about the use of Tamil language in science	L2
2	பல்வேறு தொழில்நுட்பத்தில் தமிழ்மொழியின் தாக்கம் பற்றி அறிந்து கொள்வார்கள் They will learn about the influence of Tamil language in various technologies	L3

**பாடநூல்கள்:**

டாக்டர், வா.செ .குழந்தைசாமி (1985), "அறிவியல் தமிழ்" , பாரதி பதிப்பகம், 126/108, உஸ்மான் சாலை, தியாகராய நகர் , சென்னை 600017

சுப. திண்ணப்பன், (1995), "கணிசியும் தமிழ் கற்பித்தலும்", புலமை வெளியீடு, 38-B மண்ணத்தோட்டத் தெரு, ஆழ்வார்பேட்டை, சென்னை 600018

மு. பொன்னவைக்கோ, (2003), "வளர்தமிழில் அறிவியல் – இணையத் தமிழ்", அனைத்திந்திய அறிவியல் தமிழ்க் கழகம், தஞ்சாவூர் 615 005.

துரை. மணிகண்டன், (2008), "இணையமும் தமிழும்", நல்நிலம் பதிப்பகம், 7-3, சிமேட்லி சாலை, தியாகராய நகர், சென்னை 600 017.

**COURSE OBJECTIVES:**

1. To enable learners to define and understand technical communication and scientific writing.
2. To expose learners to nuances of seminar presentation, group discussion, and public speaking.
3. To expose learners to writing for scientific purposes.
4. To expose learners to drafting correspondences for business purposes.
5. To expose learners to writing for documenting purposes.
6. To enable students to have a holistic understanding of job interviews and recruiting process.

**UNIT I****9**

**Listening** - AV files pertaining to manufacturing processes of products, scientific documentaries; **Speaking** - syllable division and word stress, intonation, sharing opinions; **Reading** - news articles related to science and technology; **Writing** - definitions, instruction, recommendation, data interpretation, resume; **Grammar** - tenses and their aspects, sentence connectors - discourse markers, sequential words, active and passive voice, subject-verb agreement.

**UNIT II****9**

**Listening** - AV pertaining to marketing strategies, peer reading and pronunciation; **Speaking** - turn taking, sharing opinions; conducting and attending a meeting, understanding the nuances of spoken communication among internal audience and external audience; **Reading** - analytical documents, descriptive documents; **Writing** - fliers, brochures, resume - letter of application, checklists; **Grammar** - modal verbs, clauses - types and uses, conditional clauses, articles.

**UNIT III****9**

**Listening** - AV related to how to use components, scientific description, **Speaking** - speaking for motivation and initiation, speaking at a seminar presentation; **Reading** - scientific journals, papers; **Writing** - Technical descriptions - process description, purpose and function, PowerPoint, Google forms, user manuals; **Grammar** - phrasal verbs, prepositions, technical and scientific affixes.

**UNIT IV****9**

**Listening** - scientific debates, crisis management; **Speaking** - handling conflicts, speaking about the loss of benefits, progress or decline of business, identifying the connotative meanings, **Reading**- documented evidences of uses and functions of a product, review of a product, **Writing** - memos, follow-up letters, reports - proposal, project, progress reports, sales reports, reports on industrial visits, executive summary. **Grammar** - reported speech and tag questions, sentence structure - comparative, imperative, cause and effect, infinitive of result.

**UNIT V****9**

**Listening** - AV of Group discussions, panel discussions, face to face interviews for recruitment purposes; **Speaking**- speaking at group discussions, interviewing a

personality, answering at the interviews; **Reading** - WebPages of topnotch engineering companies, **Writing** - blogging, e-mails, letter of complaint, minutes of the meeting; **Grammar** - one word substitution, collocations, better word/sentence substitution (rephrasing the content/improvising ideas).

**TOTAL: 45 PERIODS**

**Suggested Activities [task based]** - case study, guest lectures as models, problem solving, understanding teamwork.

**OUTCOMES:**

At the end of the course, learners will be able to:

1. understand the nuances of technical communication and scientific writing.
2. present papers and give seminars.
3. discuss in groups and brainstorm.
4. draft business correspondences and write for documenting purposes.
5. face job interviews with confidence.

**REFERENCES:**

1. Department of English, Anna University. "Mindscapes: English for Technologists and Engineers", Orient Blackswan, Chennai, 2012.
2. Downes, Colm, "Cambridge English for Job-hunting", Cambridge University Press, New Delhi, 2008.
3. Murphy, Raymond, "Intermediate English Grammar with Answers", Cambridge University Press, 2000.
4. Thomson, A.J., "Practical English Grammar 1 & 2", Oxford, 1986.
5. Herbert A J, "The Structure of Technical English", Longman, 1965.

**Web Link:**

1. <http://www.usingenglish.com>
2. <http://www.uefap.com3>
3. <https://owl.english.purdue.edu/owl/>
4. [www.learnenglishfeelgood.com/esl-printables-worksheets.html](http://www.learnenglishfeelgood.com/esl-printables-worksheets.html)

**Software**

1. Face2Face Advance - Cambridge University Press, 2014
2. English Advance Vocabulary - Cambridge University Press
3. IELTS test preparation - Cambridge University Press 2017
4. Official Guide to the TOEFL Test With CD-ROM, 4<sup>th</sup> Edition
5. CAMBRIDGE Preparation for the TOEFL TEST - Cambridge University Press, 2017

SL.NO	STATEMENT	RBT LEVEL
CO1.	Understand the nuances of technical communication and scientific writing	L3
CO2.	Present papers and give seminars	L6
CO3.	Discuss in groups and brainstorm	L6
CO4.	Draft business correspondences and write for documenting purposes	L6
CO5.	Face job interviews with confidence	L6

## COURSE ARTICULATION MATRIX

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.										3				
2.										3				
3.										3				
4.										3				
5.										3				
<b>Average</b>										<b>3</b>				

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)





**MA22251**

**APPLIED MATHEMATICS – II**

**L T P C**  
**3 1 0 4**

(Common to all except Marine Engineering)

**COURSE OBJECTIVES:**

The Student should be made to:

1. Acquire the concepts of vector calculus needed for problems in all engineering disciplines and compute different types of integrals using Green's, Stokes' and Divergence theorems.
2. Skilled at the techniques of solving ordinary differential equations that model engineering problems.
3. Extend their ability of using Laplace transforms to create a new domain in which it is easier to handle the problem that is being investigated.
4. Explain geometry of a complex plane and state properties of analytic functions.
5. Understand the standard techniques of complex variable theory so as to apply them with confidence in application areas such as heat conduction, elasticity, fluid dynamics and flow of electric current.

**UNIT I VECTOR CALCULUS**

**12**

Gradient, divergence and curl - Directional derivative - Vector identities – Irrotational and solenoidal vector fields - Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Verification and application in evaluating line, surface and volume integrals.

**UNIT II ORDINARY DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS**

**12**

Differential equations of first order – Equations of the first order and first degree – Linear equations – Higher order linear differential equations with constant coefficients - Method of variation of parameters - Cauchy's and Legendre's linear equations - Simultaneous first order linear equations with constant coefficients – Applications of Linear differential equations – Oscillatory electrical circuit – Deflection of beams.

**UNIT III LAPLACE TRANSFORM**

**12**

Conditions for existence - Transform of elementary functions - Transforms of unit step function and impulse functions – Basic properties – Shifting theorems - Transforms of derivatives and integrals of functions - Derivatives and integrals of transforms - Initial and final value theorems - Transform of periodic functions. Inverse Laplace transforms - Convolution theorem – Application to solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

**UNIT IV ANALYTIC FUNCTIONS**

**12**

Analytic functions - Necessary and sufficient conditions (Cauchy-Riemann equations) - Properties of analytic function - Harmonic conjugates - Construction of analytic functions - Conformal mapping – Mapping by functions  $W = Z + C$ ,  $CZ$ ,  $1/Z$ ,  $Z^2$  – Joukowski's transformation- Bilinear transformation.

## UNIT V COMPLEX INTEGRATION

12

Cauchy's integral theorem - Cauchy's integral formula - Taylor's and Laurent's series expansions - Singular points - Residues - Cauchy's Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semi-circular contour.

**TOTAL: 60 PERIODS**

### OUTCOMES:

Upon successful completion of the course, students should be able to:

1. Interpret the fundamentals of vector calculus and execute evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems.
2. Solve first order linear, homogeneous differential equations and use series solution method to solve second order differential equations.
3. Determine the methods to solve differential equations using Laplace transforms and Inverse Laplace transforms.
4. Explain Analytic functions and Categorize transformations.
5. Perform Complex integration to evaluate real definite integrals using Cauchy integral theorem and Cauchy's residue theorem.

### TEXT BOOKS:

1. Erwin Kreyszing, Herbert Kreyszing, Edward Norminton, "Advanced Engineering Mathematics", 10<sup>th</sup> Edition, John Wiley, (2015).
2. Grewal .B.S, Grewal .J.S "Higher Engineering Mathematics", 43<sup>rd</sup> Edition, Khanna Publications, Delhi, (2015).

### REFERENCES:

1. Dass, H.K., and Rajnish Verma, "Higher Engineering Mathematics", S.Chand Private Ltd., 2011.
2. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, (2013).
3. Bali N. P and Manish Goyal, "A Text book of Engineering Mathematics", 9<sup>th</sup> edition, Laxmi Publications(p) Ltd., 2014.

### WEB LINK:

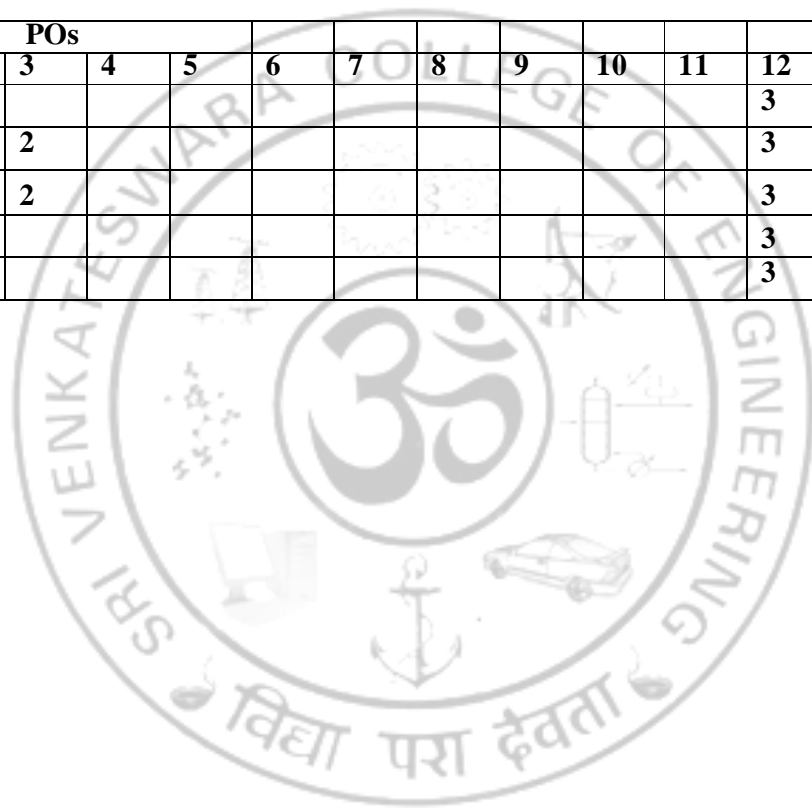
1. <https://nptel.ac.in/courses/111/105/111105134/>
2. <https://nptel.ac.in/courses/111/105/111105121/>

Course Outcomes	Upon completion of the course, students will be able to:	RBT* Level
CO1	Interpret the fundamentals of vector calculus and execute evaluation of line, surface and volume integrals using Gauss,	L3

	Stokes and Green's theorems.	
<b>CO2</b>	Solve first order linear, homogeneous differential equations and use series solution method to solve second order differential equations.	<b>L3</b>
<b>CO3</b>	Determine the methods to solve differential equations using Laplace transforms and Inverse Laplace transforms.	<b>L3</b>
<b>CO4</b>	Explain Analytic functions and Categorize transformations.	<b>L3</b>
<b>CO5</b>	Perform Complex integration to evaluate real definite integrals using Cauchy integral theorem and Cauchy's residue theorem.	<b>L3</b>

### COURSE ARTICULATION MATRIX

COs	POs														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	3	3										3			
2.	3	3	2									3			
3.	3	3	2									3			
4.	3	3										3			
5.	3	3										3			



ME22251

**TECHNICAL DRAWING**  
(Common to AD, CS and IT)

L	T	P	C
1	0	2	2

**OBJECTIVES :**

- This course will introduce the students to build their ability to read drawings and interpret the position and form of simple geometries.

**UNIT 0 CONCEPTS AND CONVENTIONS AND GEOMETRIC CONSTRUCTION (NOT FOR EXAM) 2**

Importance of drawing in engineering applications - Use of drafting instruments - BIS conventions and specifications - Size, layout and folding of drawing sheets - Lettering and dimensioning. Geometric construction - to draw perpendiculars, parallel lines, divide a line and circle, to draw equilateral triangle, square, regular polygons.

**UNIT I CONICS, CYCLOID, AND INVOLUTES 7**

Geometric construction - Curves used in engineering practices: Conics - Construction of parabola and hyperbola by eccentricity method - Construction of ellipse by Concentric circle method - Drawing of tangents and normal to the above curves - Construction of cycloid in a straight line only - Drawing of tangents and normal to the above curve. Construction of involutes of square, pentagon and circle - Drawing of tangents and normal to the above involutes.

**UNIT II PROJECTION OF LINES AND PLANE SURFACES 9**

Orthographic projection – First angle projection - Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method. Projection of planes (polygonal and circular surfaces) inclined to one of the principal planes and perpendicular to other by rotating object method.

**UNIT III PROJECTION OF SOLIDS 9**

Projection of simple solids like prisms, pyramids, cylinder, cone when the axis is inclined to one of the principal planes and parallel to the other by rotating object method.

**UNIT IV DEVELOPMENT OF SURFACES 9**

Development of Surfaces – Development of lateral surfaces of simple solids - Parallel line Development – Prisms, Cylinder - Radial line development – Pyramids and Cone.

**UNIT V ORTHOGRAPHIC AND ISOMETRIC PROJECTION 9**

Isometric view of simple solids -Free Hand Drawing - Orthographic Projection - Orthographic views of simple blocks from their Isometric view

**TOTAL : 45 (15 L+30P) PERIODS**

**OUTCOMES :** On Completion of the course the student will be able to

CO 1	<b>Construct</b> conic sections, cycloid and involutes as per drawing standards.	L3
CO 2	<b>Draw</b> orthographic projections of lines and plane surfaces.	L2
CO 3	<b>Sketch</b> orthographic projections of simple solids.	L2
CO 4	<b>Develop</b> the lateral surfaces of simple solids.	L2
CO 5	<b>Sketch</b> the orthographic projections of a given isometric view using free hand.	L3

**TEXT BOOKS:**

1. Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 53rd Edition, 2019.
2. Dhananjay M. Kulkarni, A.P. Rastogi, Ashoke K. Sarkar, “Engineering Graphics with AutoCAD”, PHI Learning Private Ltd., 2009.
3. Venugopal K. and Prabhu Raja V., “Engineering Drawing + AutoCAD”, New Age International (P) Limited, 6<sup>th</sup> edition, 2022

**REFERENCES :**

1. Dhananjay A Jolhe, “Engineering Drawing with an Introduction to AutoCAD”, Tata McGraw-Hill Publishing Company Limited., 2008
2. Parthasarathy N. S. and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.
3. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson Education India, 2nd Edition, 2009.
4. Natrajan K.V., “A Text Book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2018.

**WEB RESOURCES:**

1. <https://nptel.ac.in/courses/112105294>
2. <https://nptel.ac.in/courses/112103019>

**COURSE ARTICULATION MATRIX**

COs	PROGRAM OUTCOMES														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1										1					
CO2										2					
CO3										2					
CO4										3					
CO5										3					

1- Weak, 2 – Moderate, 3 - Strong

**OBJECTIVES**

The Student should be made to:

- Acquire knowledge on the mathematical background for understanding data science.
- Learn the basics of Python programming.
- Be familiar in performing array manipulation using NumPy.
- Understand the concepts of storing, retrieving and manipulating data using Pandas.
- Create appealing plots to understand the trend and pattern of data in the simple and efficient way.

**UNIT I STATISTICS FOR DATA SCIENCE 12**

Descriptive statistics, notion of probability, distributions, mean, variance, covariance, covariance matrix, understanding univariate and multivariate normal distributions, introduction to hypothesis testing, confidence interval for estimates.

**UNIT II INTRODUCTION TO PYTHON 12**

Types and Operation: Numeric Types, String Fundamentals, List and Dictionaries, Tuples, Files, Statements: Assignments, Expressions, if tests, while and for loops, Functions: Function Basics, Scopes, Arguments, Modules: Module Coding Basics, Module Packages.

**UNIT III INTRODUCTION TO NUMPY 12**

Understanding Data Types in Python, The Basics of NumPy Arrays, Computation on NumPy Arrays: Universal Functions, Aggregations: Min, Max, and Everything in Between Computation on Arrays, Comparisons, Masks, and Boolean, Fancy Indexing, Sorting Arrays, Structured Data: NumPy's Structured Arrays.

**UNIT IV DATA MANIPULATION WITH PANDAS 12**

Installing and Using Pandas, Introducing Pandas Objects, Data Indexing and Selection, Operating on Data in Pandas, Handling Missing Data, Hierarchical Indexing, Combining Datasets: Concat and Append, Combining Datasets: Merge and Join, Aggregation and Grouping, Pivot Tables, Vectorized String Operations, Working with Time Series, High-Performance Pandas: eval() and query().

**UNIT V VISUALIZATION WITH MATPLOTLIB 12**

Matplotlib, Simple Line Plots, Simple Scatter, Visualizing Errors, Density and Contour Plots, Histograms, Binnings, and Density, Customizing Plot Legends, Customizing Colorbars, Multiple Subplots, Text and Annotation, Customizing Ticks, Customizing Matplotlib: Configurations and Stylesheets, Three-Dimensional Plotting in Matplotlib, Geographic Data with Basemap, Visualization with Seaborn.

**TOTAL : 60 PERIODS**

## COURSE OUTCOMES:

<b>CO1</b>	Students will be able to understand the mathematical foundation for data science.	<b>L2</b>
<b>CO2</b>	Students will be able to solve computational problems in python.	<b>L3</b>
<b>CO3</b>	Students will be able to handle python arrays using NumPy package.	<b>L3</b>
<b>CO4</b>	Students will be able to manipulate data using Pandas.	<b>L3</b>
<b>CO5</b>	Students will be able to understand the pattern of data by graphical displays using Matplotlib.	<b>L2</b>

## LIST OF EXPERIMENTS:

1. Write a python program to perform all statistical operations using statistics package.
2. Write a python program to remove the punctuations from the string.
3. Write a python function to print the sum of numbers if and only if the number is even.
4. Write a python module to perform binary search.
5. Write a python program to create a structured array using NumPy containing employee details such as employee name, department, designation and salary. Now sort by name, if the salary is greater than 25000.
6. Write a python program to create structured arrays using NumPy containing student details such as student name, register number, marks in 5 subjects. Apply aggregation function to implement the following:
  - i. Find the total marks, average marks of each student.
  - ii. Identify the maximum and minimum mark subjectwise.
  - iii. Find the topper of the class.
  - iv. Find the pass percentage for each subject.
  - v. Find the class pass percentage.
7. Write a python program to create a dataframe using pandas. Perform the following operations on the dataframe.
  - i. Data Selection
  - ii. Data Indexing
  - iii. Handling missing data in nominal attributes
  - iv. Handling missing data in numeric attributes
  - v. Grouping operations
8. Write a python program to implement the following plots using Matplotlib
  - i. Line plot
  - ii. Scatter plot
  - iii. Density plot
  - iv. Box plot
  - v. Histogram

**TEXT BOOKS:**

1. Douglas C. Montgomery and George C. Runger, Applied Statistics and Probability for Engineers, Sixth Edition, Wiley Publication, 2016.
2. Mark Lutz, Learning Python, Fifth Edition, O'Reilly Publication, 2013. (Revised in 2020)
3. Jake VanderPlas, Python Data Science Handbook - Essential Tools for Working with Data, Second Edition, O'Reilly Publication, 2022.
4. Wes McKinney, Python for Data Analysis, Third Edition, O'Reilly Publication, 2022.
5. David Beazley and Brian K. Jones, Python Cookbook, Third Edition, O'Reilly Publication, 2013.

**OUTCOMES:**

<b>CO1</b>	Students will be able to understand the mathematical foundation for data science.	<b>L2</b>
<b>CO2</b>	Students will be able to solve computational problems in python.	<b>L3</b>
<b>CO3</b>	Students will be able to handle python arrays using NumPy package.	<b>L3</b>
<b>CO4</b>	Students will be able to manipulate data using Pandas.	<b>L3</b>
<b>CO5</b>	Students will be able to understand the pattern of data by graphical displays using Matplotlib.	<b>L2</b>

**COURSE ARTICULATION MATRIX**

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	3							2	3		3		3
2.	3	3	2						3			3	2	2
3.	3	3	2						2	3		3	2	
4.	3	3										3		3
5.	3	3								3		3	2	





**TEXT BOOKS:**

1. “Digital Design with An Introduction to Verilog HDL, VHDL and System Verilog” by M. Morris Mano and Michael D. Ciletti, 6th Edition, Pearson, 2017.

**REFERENCES:**

1. John F. Wakerly, “Digital Design Principles and Practices”, Fourth Edition, Pearson Education, 2007
2. Charles H. Roth Jr, “Fundamentals of Logic Design”, Fifth Edition – Jaico Publishing House, Mumbai, 2003
3. Donald D. Givone, “Digital Principles and Design”, Tata Mcgraw Hill, 2003
4. Kharate G. K., “Digital Electronics”, Oxford University Press, 2010.
5. <http://www.learnabout-electronics.org/Digital/dig44.php>

**COURSE OUTCOMES:**

<b>CO1</b>	Students will be able to learn the different types of number systems and simplification of Boolean functions	L1
<b>CO2</b>	Students will be able to understand various logic gates and their usage	L2
<b>CO3</b>	Students will be able to study, analyze and design various combinational circuits and its implementation using VHDL	L4
<b>CO4</b>	Students will be able to understand the different type of memory and their structures	L2
<b>CO5</b>	Students will be able to study, analyze of RTL notation register operations in a clocked sequential circuit	L4

**COURSE ARTICULATION MATRIX**

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	3							2	3		3		3
2.	3	3	2						3			3	2	2
3.	3	3	2						2	3		3	2	
4.	3	3										3		3
5.	3	3								3		3	2	

CS22203

**OBJECT ORIENTED PROGRAMMING**

**L T P C**

**3 0 0 3**

**OBJECTIVES**

- To understand object-oriented methodology, the approach to modular and reusable software systems
- To learn how to abstract a problem in an object oriented style
- To learn object oriented programming, basics to advanced level, using C++
- To understand file handling in C++
- To use the Standard Template Library (STL)

**UNIT I OBJECT-ORIENTED PROGRAMMING BASICS**

**9**

Object oriented programming - need - procedural languages - object oriented approach. Characteristics of object oriented languages - objects – classes – inheritance – reusability - polymorphism and overloading. Introduction to C++ – classes – access specifiers – function and data members – default arguments – function overloading – friend functions – const and volatile functions - static members – objects – pointers and objects – constant objects – nested classes.

**UNIT II COMPILE TIME POLYMORPHISM**

**9**

Constructors – default constructor – Parameterized constructors – Constructor with dynamic allocation – Copy constructor – destructors – operator overloading – overloading through friend functions – overloading the assignment operator – type conversion.

**UNIT III RUNTIME POLYMORPHISM**

**9**

Inheritance – public, private, and protected derivations – multiple inheritance - virtual base class – abstract class – Runtime polymorphism – virtual functions – pure virtual functions – RTTI.

**UNIT IV TEMPLATES AND EXCEPTION**

**9**

Function templates- class templates - linked list class using templates - storing user defined data types - UML and templates. Exceptions - simple exception - multiple exceptions - exceptions with the Distance Class - exceptions with arguments.

**UNIT V FILES AND STANDARD TEMPLATE LIBRARY**

**9**

Streams and formatted I/O – I/O manipulators - file handling – random access – object serialization. Introduction to the STL - algorithms - sequence containers - iterators - specialized iterators - associative containers - strong user-defined objects - function objects

**TOTAL (L:45): 45 PERIODS**

**TEXT BOOKS:**

1. B. Trivedi, "Programming with ANSI C++", Second Edition, Oxford University Press, 2012.

**REFERENCES:**

1. Ira Pohl, "Object oriented programming using C++", Second Edition, Pearson Education Asia, 2012.
2. Bjarne Stroustrup, "The C++ programming language", Fourth Edition, Addison Wesley, 2013.
3. Robert Lafore, "Object-Oriented programming in C++", Fourth Edition, SAMS, 2001.

**COURSE OUTCOMES:**

	Apply the concepts of data abstraction, encapsulation and inheritance for problem solutions. Critically analyze the problem and apply Object Oriented Concepts for practical problem solving.	L2
<b>CO1</b>		
<b>CO2</b>	Develop applications with function and operator overloading.	L3
<b>CO3</b>	Develop programs with reusability.	L3
<b>CO4</b>	Design and implement generic classes with C++ templates and handle exceptions.	L3
<b>CO5</b>	Handle large data set using file I/O and use STL.	L1

**COURSE ARTICULATION MATRIX**

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	3							2	3		3		3
2.	3	3	2						3			3	2	2
3.	3	3	2						2	3		3	2	
4.	3	3										3		3
5.	3	3								3		3	2	

<b>CS 22211</b>	<b>DIGITAL PRINCIPLES AND SYSTEM DESIGN</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>LABORATORY</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**OBJECTIVES**

- To be an adjunct to the “Digital System Design” Course through hands-on experience with design, construction, and implementation of digital circuits like combinational / sequential
- To provide the capability to understand and to simulate digital circuits through Xilinx

**LIST OF EXPERIMENTS**

1. Verification of logic gates
2. Verification of Boolean theorems
3. Combinational Circuits-Implementation of arbitrary functions and code converters.
4. Design and implementation of Binary adder/subtractor.
5. Design and implementation of Parity generator/checker.
6. Design and implementation of magnitude comparator.
7. Design and implementation of seven segment display
8. Design and implementation of applications using multiplexers.
9. Study and Implementation of Flip-Flops.
10. Design and implementation of shift registers.
11. Design and implementation of synchronous and asynchronous counters
12. Coding combinational circuits using hardware description language. (HDL s/w required)
13. Coding sequential circuits using HDL. (HDL s/w required)
14. Design and implementation of simple digital System(Mini Project)

**TOTAL: 45 PERIODS**

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

1. Digital Trainer Kits
2. Breadboard and components
3. PC s – with Xilinx for HDL
4. IC tester-1

**OUTCOMES:**

<b>CO1</b>	Students will be able to understand the working of various logic gates.	<b>L2</b>
<b>CO2</b>	Students will be able to understand the various combinational circuits and their applications.	<b>L2</b>
<b>CO3</b>	Students will be able to study, analyze and design sequential circuits	<b>L4</b>
<b>CO4</b>	Students will be mastering the HDL software.	<b>L3</b>

**CO5** Students will be able to understand the design of various building blocks of digital computers L2

**COURSE ARTICULATION MATRIX**

COs	POs													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	3								2		3		3
2.	3	3	2							3		3	2	2
3.	3	3	2							3	2	3	2	
4.	3	3								2		3		3
5.	3	3									3	3	2	



<b>CS22212</b>	<b>OBJECT ORIENTED PROGRAMMING LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

### **OBJECTIVES**

- To understand object-oriented methodology, the approach to modular and reusable software systems
- To learn how to abstract a problem in an object oriented style

### **LIST OF EXPERIMENTS**

1. Programs Using Functions
  - Functions with default arguments
  - Implementation of Call by Value, Call by Address and Call by Reference
2. Classes with objects, member functions and Constructors
  - Classes with primitive data members
  - Classes with arrays as data members
  - Classes with pointers as data members – String Class
  - Classes with constant data members
  - Classes with data members and member functions
3. Compile time Polymorphism
  - Operator Overloading including Unary and Binary Operators
  - Operator Overloading including friend functions
  - Function Overloading
4. Runtime Polymorphism
  - Inheritance
  - Virtual functions
  - Virtual Base Classes
5. Function Templates
6. Class Templates
7. Exception Handling
8. File Handling
  - Sequential access
  - Random access
9. RTTI
10. Standard Template Library

**TOTAL: 45 PERIODS**

### **LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

Standalone desktops with C++ compiler (or) Server with C++ compiler supporting 30 terminals or more.

## COURSE OUTCOMES:

<b>CO1</b>	Students will be able to understand the concepts of Classes & Objects, friend function, constructors & destructors in program design.	L2
<b>CO2</b>	Students will be able to design & implement various forms of inheritance, String class, calling base class constructors	L3
<b>CO3</b>	Students will be able to apply & analyze operator overloading, runtime polymorphism, generic Programming.	L3
<b>CO4</b>	Students will be able to do file operations, I/O operations and exception handling.	L3
<b>CO5</b>	Students will be able to develop applications using the standard template library.	L3

## COURSE ARTICULATION MATRIX

COs	POs													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	3								2		3		3
2.	3	3	2							3		3	2	2
3.	3	3	2							3	2	3	2	
4.	3	3								2		3		3
5.	3	3									3	3	2	