

**ADHIYAMAAN COLLEGE OF ENGINEERING - HOSUR**  
**(An Autonomous institute affiliated to Anna University, Chennai)**

# **SYLLABUS**

## **SEMESTER-I & II**

122ENI01	<b>PROFESSIONAL ENGLISH – I (EMBEDDED)</b> (Common to all branches)	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>

**OBJECTIVES:**

**The Course prepares first semester Engineering and Technology students to:**

- Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialization.
- Present information in an appropriate oral form.
- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
- Foster their ability to write anything convincingly with grammatical accuracy.

**UNIT I–Listening****Theory**

Listening to news and understanding its perspectives - Listening to motivational speech to comprehend the purpose - Listening to technical talks to understand its significance - Listening to classroom lecture to equip content knowledge - Listening comprehension.

**English Laboratory**

Listening audios and answering MCQs - Watching video clips on famous speeches, motivational videos, documentaries and answering MCQs - TED talks.

**UNIT II–Speaking****Theory**

Everyday activities for day-to-day communication - Extempore/Impromptu to develop spontaneous thoughts -Self introduction to face interviews - Public speaking for persuading the audience - Movie reviews to promote critical thinking.

**English Laboratory**

Prepared talk - Story knitting - Picture talk - Brainstorming - Debate - Group discussion - Elevator speech - Mock HR interviews - Story narration - Miming - Short skits.

**UNIT III- Reading****Theory**

Newspaper reading to upgrade world knowledge –Reading Comprehension to analyse the text –Novels to improve creativity - Biography/Autobiography to synthesise experience - Technical articles for upgrading technical knowledge.

**English Laboratory**

Classification - Alphabet test - Logical sequence of words - Statement & conclusions - Statement & courses of action - Situation reaction test - Theme detection - Deriving conclusions from passages.

**UNIT IV- Writing****Theory**

Definitions –Instructions – Checklists – Recommendations-Essays-Invitation and quotation letters -Email etiquettes-Reports - Minutes of a meeting

**English Laboratory**

Resumewriting - Letter writing (Covering letter – Follow up letter - Letter of thanks giving - appreciation –Gratitude) - Paragraph writing – Jumbled paragraph – Error spotting.

**UNIT V- Language Development****Theory**

Technical vocabulary -Parts of speech-Articles - Tenses - Voices - Numerical adjectives – Question tags - Misspelled words –Singular and plural nouns - Modals – Conditionals.

**English Laboratory - Career Skills**

Vocabulary Test (GRE, TOEFL, TOEIC & CAT Exam words) - Confused Pair of words - Contronyms – Time management – Stress management– Decision making – Negotiation - Sentence correction.

**TOTAL:60 HOURS**

**Lab Requirements:**

1. Teacher console and systems for students.
2. English Language Lab Software
3. Career Lab Software

**OUTCOMES:**

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

**CO1:** Listen and comprehend the various strategies of listening and its significance in their area of specialisation successfully.

**CO2:** Speak appropriately and effectively in varied formal and informal contexts.

**CO3:** Read and comprehend texts effortlessly and understand the prevailing practices of testing in the recruitment process by the corporates and the institutional selection processes.

**CO4:** Communicate the corporate and social requirements in an impressive written mode.

**CO5:** Understand the basic grammatical structures and its applications and enhance their verbal skills in the screening tests competently both for recruitment and pursuing higher studies as well.

**TEXT BOOKS:**

1. Board of editors. **Fluency in English: A Course book for Engineering and Technology**. Orient Blackswan, Hyderabad: 2016.
2. Sudharshana. N. P and Saveetha. C. **English for Technical Communication**. Cambridge University Press: New Delhi, 2016.
3. Uttham Kumar. N. **Professional English - I** (with work book). Sahana Publications, Coimbatore, 2016.
4. Agarwal R. S. A Modern Approach to Verbal and Non-verbal Reasoning. Chand & Co., New Delhi, 2012.
5. Ashraf Rizvi M. Effective Technical Communication. TATA McGraw Hill, New Delhi, 2007.

**REFERENCES:**

1. Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice. Oxford University Press: New Delhi, 2014.
2. Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad, 2015.
3. Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.
4. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007
5. Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007.
6. Lingua: Essays for TOEFL/IELTS, Dreamtech Press, New Delhi, 2016.
7. Lily Mangalam, Global English Comprehension, Allied Publishers Pvt. Ltd., New Delhi, 2014.
8. Sharon Weiner Green and Ira K. Wolf, Barron's GRE, Glagotia Publications Pvt. Ltd., 18th Edition, New Delhi, 2011.
9. Mohamed Elias, R. Gupta's IELTS/TOEFL Essays, Ramesh Publishing House, 6th Edition, New Delhi, 2016.

CO-PO MAPPING														
SEMESTER : I		Course Name : 122ENI01 - PROFESSIONAL ENGLISH - I												
CO'S	Course Outcomes	Program Outcomes (PO)												
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	
CO 1	Listen and comprehend the various strategies of listening and its significance in their area of specialisation successfully.										1	1	1	1
CO 2	Speak appropriately and effectively in varied formal and informal contexts.				1						3	3	2	1
CO 3	Read and comprehend texts effortlessly and understand the prevailing practices of testing in the recruitment process by the corporates and the institutional selection processes.		2		2						2	2	1	1
CO 4	Communicate the corporate and social requirements in an impressive written mode.		1		2						3	3	2	1
CO 5	Understand the basic grammatical structures and its applications and enhance their verbal skills in the screening tests competently both for recruitment and pursuing higher studies as well.										1	3		1

'1' = Low; '2' = Medium; '3' = High

122MAT02	<b>MATRICES AND CALCULUS</b> (Common to all branches)	L	T	P	C
		3	1	0	4

### Course Objectives

- To understand the eigenvalue problems.
- To learn the derivatives of multivariable functions and applications.
- To solve differential equations of certain types, including systems of differential equations that they might encounter in engineering subjects.
- To understand double and triple integration concepts.
- To study vector calculus comprising of surface and volume integrals along with the classical theorems involving them.

### Prerequisite

Matrices-Introduction, Properties, Basic Differentiation and Integration concepts.

### UNIT I MATRICES 9+3

Eigenvalues and eigenvectors of a real symmetric matrix – Properties – Cayley - Hamilton theorem (Statement and applications only) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation.

### UNIT II FUNCTIONS OF SEVERAL VARIABLES 9+3

Partial derivatives – Euler’s theorem for homogenous functions – Total derivatives – Jacobians – Taylor’s expansion – Maxima and Minima – Method of Lagrangian multipliers.

### UNIT III ORDINARY DIFFERENTIAL EQUATIONS 9+3

Second 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 to Engineering Problems-Electric Circuits, Simple Harmonic Motions and Bending of beams.

### UNIT IV MULTIPLE INTEGRALS 9+3

Double integration – Cartesian and polar co-ordinates – Change of order of integration – Change of variables between Cartesian and polar coordinates – Triple integration in Cartesian co-ordinates – Area as double integral – Volume as triple integral.

### UNIT-V VECTOR CALCULUS 9+3

Gradient, Divergence and Curl – Directional derivative – Irrotational and Solenoidal, vector fields – Vector integration – Green’s theorem in a plane, Gauss divergence theorem and Stokes’ theorem (Statement and applications only) – Simple applications involving cubes and rectangular parallelepipeds.

**TOTAL: 45+15= 60 PERIODS**

**Course Outcomes:**

After completing this course, the student will be able to

- CO 1:** Apply the matrix algebra concepts for solving practical problems.
- CO 2:** Compute extremities of a function using multivariable derivatives.
- CO 3:** Determine the solutions of ordinary differential equations by various methods which have an application in their core subjects.
- CO 4:** Determine the area and volume in 2-dimension and 3-dimension respectively using multiple integrals.
- CO 5:** Expertise the concept of vector calculus and apply in core subjects.

**TEXT BOOKS**

1. Erwin Kreyszig, “Advanced Engineering Mathematics”, Wiley India, 10<sup>th</sup> edition New Delhi 2016.
2. Grewal. B.S, “Higher Engineering Mathematics”, 44<sup>th</sup> Edition, Khanna Publications, Delhi, 2017.

**REFERENCES**

1. T.Veerarajan, “Engineering Mathematics” ,Tata McGraw-Hill Publishing company, New Delhi, 2014.
2. Kandasamy.P, Thilagavathy,K., &Gunavathi.K., “Engineering Mathematics for first year ”., S.Chand & Company Ltd., New Delhi,2014.
3. Ramana B.V., “Higher Engineering Mathematics”, Tata McGraw Hill Co. Ltd., New Delhi, 11<sup>th</sup> Reprint, 2010.
4. Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 3rd Edition, 2007.
5. V.Prameelakaladharan and G.Balaji, “Engineering Mathematics - I”, 3rd Edition, Amrutha marketing, Chennai, 2017.

CO-PO MAPPING																
SEMESTER : I		Course Name : 122MAT02 - MATRICES AND CALCULUS														
CO'S	Course Outcomes	Program Outcomes (PO)												Program Specific Outcomes (PSO)		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	Apply the matrix algebra concepts for solving practical problems.	3	2	2									2	2	2	
CO 2	Compute extremities of a function using multivariable derivatives.	3	3	2									2	2	2	
CO 3	Determine the solutions of ordinary differential equations by various methods which have an application in their core subjects.	3	3	3									2	2	2	
CO 4	Determine the area and volume in 2-dimension and 3-dimension respectively using multiple integrals.	3	3	3									2	2	2	
CO 5	Expertise the concept of vector calculus and apply in core subjects.	3	3	3									2	2	2	

122PHT03	ENGINEERING PHYSICS (Common to all branches)	L	T	P	C
		2	0	0	2

## COURSE OBJECTIVES

At the end of the course the students would be exposed to fundamental knowledge in

- Different engineering subjects and applications.
- Acoustics in building and Non-destructive techniques.
- Application of lasers in engineering and technology.
- Basics of Quantum theory.
- Atomic and nuclear related theories.

### UNIT-1: ACOUSTICS AND ULTRASONICS 6

Sound – classification – characteristics of musical sound – loudness – Decibel – Intensity of sound – Weber-Fechner law – Reverberation and Reverberation time – Sabine's law – Absorption coefficient – Measurement of absorption coefficients – Factors affecting acoustics of buildings and their remedies.

Ultrasonics – production – Magnetostriction effect – Magnetostriction oscillator – Piezoelectric effect – Inverse piezoelectric effect – Piezoelectric oscillator-Detection of ultrasonic waves-properties-Cavitations.

### UNIT-2: OPTICAL PHYSICS 6

Lasers – Spontaneous and Stimulated emissions-Types of lasers-Nd-YAG, Helium-Neon,CO<sub>2</sub>-Semiconductor lasers(Homojunction and Hetrojunction (qualitative))- Interference-Airwedge and its applications.

### UNIT-3: QUANTUM PHYSICS 6

Blackbody radiation-Laws of blackbody radiation-Planck's quantum theory of blackbody radiation(derivation)- Compton effect (derivation)-Matter waves-De-broglie's concept-Schrodinger wave equation-Time independent and Time dependent equations (derivations)

### UNIT-4: PROPERTIES OF MATTER AND THERMAL PHYSICS 6

Elasticity-Hook's law-stress- strain diagram-factors affecting elasticity-Poisson's ratio-Bending moment-Cantilever-Heavy cantilever-Young's modulus-Uniform and Non-uniform bending (Theory and Experiment).

### UNIT-5: NUCLEAR AND ATOMIC PHYSICS 6

Nuclear fission-chain reaction-Nuclear reactor-condition for sustained chain reaction-Controlled chain reaction-Pressurized water reactor (PWR )-Boiling water reactor (BWR)- Nuclear power plant-Nuclear fusion.

**TOTAL : 45 HOURS**

**REFERENCES**

1. Dr. R.N. Jayaprakash, Engineering Physics, Dhanam Publications, 2007.
2. Rajendran V, Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi,2003.
3. Palanisamy P.K.,Engineering Physics I,Scitech Publications, Chennai,2011.
4. Avadhanulu M.N. and Kshirsagar P.G., A textbook of Engineering physics, S.Chand &Company Ltd, New Delhi,2005.

**COURSE OUTCOMES**

**After successful completion of this course, the students should be able to:**

CO1: Apply the Acoustics and modern engineering tools necessary for engineering practice.

CO2: Categorize and illustrate the Lasers and its application to engineering

CO3: Apply the quantum concepts in engineering field.

CO4: Examine the elastic properties in various materials.

CO5: Discuss the role of nuclear physics in energy production.

COs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	Apply the Acoustics and modern engineering tools necessary for engineering practice	3	3	3	3	3	3	3		2				3	2	
CO2	Categorize and illustrate the Lasers and its application to engineering	3	3	3	3	3	3	3		2				3	2	
CO3	Apply the quantum concepts in engineering field	3	3	3	3	3	3	3		2				3	2	

CO4	Examine the elastic properties in various materials	3	3	3	3	3	3	3		2				3	2	
CO5	Discuss the role of nuclear physics in energy production	3	3	3	3	3	3	3		2				3	2	

122CYT04	ENGINEERING CHEMISTRY (Common to all branches)	L	T	P	C
		2	0	0	2

**Course objectives:**

At the end of the course the students would be exposed to fundamental knowledge in

- To understand the chemistry behind water technology
- To understand the chemistry of Corrosion
- To acquaint the student with concepts of important photo physical and photochemical processes and spectroscopy
- To acquaint the students with the basics of fuels, and chemistry behind combustion process.
- To understand the basic concepts of phase equilibrium

**UNIT I WATER TECHNOLOGY****9**

Physical, Chemical & Biological characteristics -Hardness of water - estimation of hardness (EDTA method) - Dissolved oxygen –determination and significances, Alkalinity – determination and significances - disadvantages of using hard water in boilers- Internal conditioning - phosphate, calgon and carbonate conditioning methods – External treatment: Zeolite, ion exchange methods - desalination – reverse osmosis and electro dialysis - domestic water treatment.

**UNIT II CORROSION SCIENCE****9**

Basic concepts - mechanism of chemical, electrochemical corrosion - Pilling Bedworth rule – Types of Electrochemical corrosion - galvanic corrosion - differential aeration corrosion –Measurement of corrosion (wt. loss method only) - factors influencing corrosion. Corrosion control: Cathodic protection - sacrificial anodic method and impressive cathode current method. Electroplating (Copper plating) and Electrolessplating (Nickel plating).

**UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY****9**

Photochemistry: Laws of photochemistry - Grotthuss–Draper law, Stark–Einstein law and Lambert-Beer Law. Quantum efficiency –Photophysical Process-Fluorescence, Phosphorescence, Chemiluminescence and Photo-sensitization. Spectroscopy: Electromagnetic spectrum - Absorption of radiation – Electronic, Vibrational and rotational transitions. UV-visible and IR spectroscopy – principles, instrumentation – applications.

**UNIT IV FUELS AND COMBUSTION****9**

Fuel: Introduction- classification of fuels- calorific value- higher and lower calorific values- coal- analysis of coal (proximate and ultimate)- carbonization- manufacture of metallurgical coke (Otto Hoffmann method) – petroleum – Fractional distillation - manufacture of synthetic petrol (Bergius process)- knocking- octane number - diesel oil- cetane number - natural gas- compressed natural gas(CNG)- liquefied petroleum gases(LPG). Combustion of fuels – (simple problems) flue gas analysis (ORSAT Method).

## UNIT-V PHASE EQUILIBRIA

9

Gibbs phase rule-definition of terms involved- Thermal analysis-application of phase rule to one Component system-water system – Sulphur system. Reduced Phase rule-application of phase rule to two Component system- lead-silver system - KI-water system and Ferric Chloride water system

**Course Outcomes:**

*At the end of the course, the student will be able to*

CO1: Developing the knowledge of chemistry behind water technology

CO2: Understanding the chemistry of Corrosion

CO3: Applying the basic concepts of photon on matter

CO4: Understanding basics of fuels, and chemistry behind combustion process.

CO5: Understanding the basic concepts of phase equilibrium

**Text Books**

1. P.C. Jain and Monika Jain, Engineering Chemistry, DhanpatRai and Sons, NewDelhi 2004.16<sup>th</sup> Edition.
2. N. Krishnamurthy, P. Vallinayagam and D. Madhavan, Engineering Chemistry,2<sup>nd</sup>Edition.PHI Learning PVT., LTD, New Delhi, 2008. 3<sup>rd</sup> Edition.
3. K. Sivakumar, Applied Chemistry, Sahana Publishers, Coimbatore 2022.4<sup>th</sup> Edition.

**Reference Books**

1. S. S. Dara, A Textbook of Engineering Chemistry, S. Chand & Co., Ltd. NewDelhi. 2008. Reprint edition.
2. B. K. Sharma, Engineering Chemistry, 3rd edition Krishna Prakashan Media (P)Ltd., Meerut, 2001.
3. ArunBhal, B.S. Bhal, G. D. Tuli, Essentials of Physical Chemistry, S. Chand & Co., Ltd. New Delhi. 26<sup>th</sup> Edition.
4. P. W. Atkins & Julio de Paula, Atkins' Physical Chemistry, Oxford University Press York, 7thEdn, 2002.
5. ShashiChawla, A Text Book of Engineering Chemistry, 3rd Edition, DhanpatRai&New Delhi, 2007.
6. S. Vairam, P. Kalyani&Suba Ramesh, Engineering Chemistry, IstEdn, John Wiley &Sons, India, 2011.
7. Lee J.D., Concise Inorganic Chemistry, 7th Edn, Blackwel Science Publications Oxford, London, 2004.

		CO-PO MAPPING													
Course Name	CO'S	CO Attainment	CO Result	Program outcomes (Washington Accord Attributes)											
				PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Engineering Chemistry (122CYT04)	CO1			3	3	3				2					
	CO2			3	3	3				2					
	CO3			3	3	3	2								
	CO4			3	3	3				2					
	CO5			3	3	3	2								

122EGT05	ENGINEERING GRAPHICS (Common to all Non-Circuit branches)	L	T	P	C
		2	0	4	4

**OBJECTIVES:**

1. To gain knowledge on graphical skills for drawing the object.
2. To comprehend the principle of orthographic projection of points, lines and plane surfaces.
3. To study the principle of simple solids.
4. To comprehend the principle of section and development of solids.
5. To comprehend the principle of Isometric and Orthographic projections.

**Concepts and conventions (Not for Examination)****03**

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

**UNIT I PLANE AND SPECIAL CURVES****9**

Conics – Construction of Ellipse, Parabola and Hyperbola by Eccentricity method – Construction of cycloid – Construction of Involute of Square and Circle – Drawing of tangents and normal to the above curves.

**UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES****12**

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

**UNIT III PROJECTION OF SOLIDS****12**

Projection of simple solids like Prisms, Pyramids, Cylinders and Cones when the axis is inclined to one reference plane by change of position method.

**UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES****12**

Sectioning of simple solids like Prisms, Pyramids, Cylinders and Cones in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section.

Development of lateral surfaces of simple and truncated solids – Prisms, Pyramids, Cylinders and Cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

**UNIT V ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS****12**

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated Prisms, Pyramids, Cylinders and Cones.

Representation of Three-Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

**TOTAL:60 Hours**

**COURSE OUTCOMES:**

The student will be able to

- Recognize the conventions and apply dimensioning concepts while drafting simple objects.
- Draw the orthographic projection of points, line, and plane surfaces.
- Draw the orthographic projection of simple solids.
- Draw the section of solid drawings and development of surfaces of the given objects.
- Apply the concepts of Isometric and Orthographic projections in engineering practice.

**TEXT BOOKS:**

1. Ranganath G, “Engineering Graphics”, Second Edition, Sahana Publishers, Reprint, 2021.
2. Bhatt. N.D., “Engineering Drawing” Charotar Publishing House, 53<sup>rd</sup> Edition, 2014.

**REFERENCE BOOKS:**

1. Dhananjay A. Jolhe, “Engineering Drawing with an introduction to AutoCAD” Tata McGraw Hill Publishing Company Limited, 2017.
2. Gopalakrishnana. K. R, “Engineering Drawing” (Vol. I & II), Subhas Publications, 27<sup>th</sup> Edition, 2017.
3. Basant Agarwal and C.M.Agarwal, “Engineering Drawing”, Tata McGraw Hill, 2019.
4. Natrajan K. V, “A Text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2018.
5. M.B.Shaw and B.C.Rana, “Engineering Drawing”, Pearson Education India, 2011.

Course Outcome		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
Co1	Recognize the conventions and apply dimensioning concepts while drafting simple objects.		2		1								1	1		1
Co2	Draw the orthographic projection of points, line, and plane surfaces.	2	1		1								1		2	
Co3	Draw the orthographic projection of simple solids.	2	2		2								1		3	
Co4	Draw the section of solid drawings and development of surfaces of the given objects.		1		2								2			2
Co5	Apply the concepts of isometric and Orthographic projection in engineering practice.	1	1	1							2					1

122PPT05	PYTHON PROGRAMMING (Common to all Circuit Branches)	L	T	P	C
		3	0	0	3

**OBJECTIVE(S):**

- To know the basics of algorithmic problem solving
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures — lists, tuples, dictionaries.
- To do input/output with files in Python.

**Prerequisite:** Nil**UNIT I ALGORITHMIC PROBLEM SOLVING 9**

**Fundamentals of Computing**, Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, and guess an integer number in a range, Towers of Hanoi.

**UNIT II DATA EXPRESSIONS, STATEMENTS 9**

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

**UNIT III CONTROL STATEMENTS AND FUNCTIONS 9**

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search

**UNIT IV LISTS, TUPLES, DICTIONARIES 9**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: **Create- add- delete from a Dictionary- Operations associated with pairs of data**, and methods; advanced list processing - list comprehension; Illustrative programs: **To test if a variable is a list or tuple or a set**, selection sort, insertion sort, merge sort, histogram, **Retail Bill Preparation**.

**UNIT V FILES, MODULES, PACKAGES 9**

Files and exception: text files, reading and writing files, format operator; command line arguments, date and time, errors and exceptions, handling exceptions, debugging, modules, packages; Illustrative programs: word count, copy file. **Case Study: Python Libraries (Numpy, Pandas, Matplotlib, PyGame)**

**COURSE OUTCOMES:**

Upon completion of the course, students will be able to

**CO1:** Develop algorithmic solutions to simple computational problems

**CO2:** Develop and execute simple python programs

**CO3:** Structure simple Python programs for solving problems and decompose into functions.

**CO4:** Represent compound data using Python lists, tuples, and dictionaries.

**CO5:** Read and write data from/to files in Python Programs.

**TOTAL: 45**

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
C01	2	2	2	2											
C02	3		2	2								1	2		
C03	3		3	2										3	
C04	2	2								2		1			
C05		1	3		3										1

#### **TEXT BOOKS:**

1. Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson Education, 1st Edition, 2021.
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2<sup>nd</sup> Edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016 (<http://greenteapress.com/wp/think-python/>)

#### **REFERENCE BOOKS:**

1. Martin C. Brown, “Python: The Complete Reference”, 4th Edition, Mc-Graw Hill, 2018.
2. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data”, Third Edition, MIT Press, 2021

122EET06	<b>Basic Electrical Electronics and Instrumentation Engineering</b> (Common to CSE, IT, MECH, CHEM, AERO, BT, CIVIL)	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	0	0	3

**OBJECTIVES:**

- To learn the basics of electrical elements.
- To introduce the fundamental concepts of DC and AC circuits.
- To interpret the principle and characteristics of semiconductor devices.
- To analyze the various logic gates and switching theory.
- To understand the principles of measurement systems and transducers.

**UNIT – I INTRODUCTION TO BASIC ELECTRICAL ELEMENTS 9**

Electrical circuit: passive elements - Resistor, Inductor and Capacitor; active elements- Current, Voltage, Power and Energy – Ohm's Law and limitations - Kirchhoff's Laws – relationship between current, voltage and power – Resistors in series, parallel and series-parallel circuits

**UNIT – II FUNDAMENTALS OF DC AND AC CIRCUITS 9**

DC Circuits: Sources of Electrical Energy - Independent and Dependent Source, Source Conversion - Star –Delta conversion- Mesh and Nodal Analysis.

AC Circuits: Generation of sinusoidal - voltage, average - RMS value, form factor and peak factor- Phasor diagrams of R, L, C, combination of R-L, R-C and R-L-C circuits.

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

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Elementary Treatment of Small Signal Amplifier.

**UNIT - IV DIGITAL ELECTRONICS 9**

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts).

**UNIT – V MEASUREMENT SYSTEMS AND TRANSDUCERS 9**

Measurements-Significance of measurements-Methods of Measurement-Direct methods, indirect methods-Instrument and measurement systems-Mechanical, Electrical and Electronic instruments-Classification of instruments- characteristics of instruments and measurement systems-Errors-Type of Errors –Units and Standards. Moving coil and moving iron meters, Energy meter and watt meter. Transducers- RTD, Strain gauge, LVDT.

**TOTAL HOURS: 45**

**Course Outcomes:**

*Upon Completion of this course, students will be able to:*

CO1: Recognize the different combinations of circuit elements and solving the circuit by applying basic circuit laws.

CO2: Acquire a good understanding of DC and AC circuits.

CO3: Demonstrate the characteristics of semiconductor devices.

CO4: Design the various logic gates for switching applications.

CO5: Understand the principles of measurement systems and transducers.

**TEXT BOOKS:**

1. Muthusubramanian R, Salivahanan S, "Basic Electrical and Electronics Engineering", Tata McGraw Hill Education Private Limited, 2010.
2. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
3. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 9th Edition, Pearson Education / PHI, 2007.
4. A.K.Sawhney, "A course in Electrical and Electronic Measurements and Instrumentation" Dhanpat Rai & Co, 2016.

**REFERENCE:**

1. B.L.Theraja, A.K.Theraja, "A Text Book of Electrical Technology, Volume I", S.Chand and company Ltd., 2006.

COs	Programme Outcomes												Programme Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	2	2	3										2		
CO2	3	3	3										2	2	
CO3	2	2													
CO4	3	2													
CO5	3	3													

122CMT06	<b>BASIC CIVIL AND MECHANICAL ENGINEERING</b> (Common to ECE, BME & EEE)	<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:**

1. To gain the knowledge in surveying and construction materials.
2. To understand the building structures.
3. The student should familiar with foundry, welding and forging processes.
4. To know the working of IC engines and Boilers.
5. To gain the knowledge about sources of energy and refrigeration.

**A – CIVIL ENGINEERING****UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS****09**

Surveying: Objects, types, classification, principles, measurements of distances, angles, leveling, determination of areas, illustrative examples.

Civil Engineering Materials: Bricks, stones, sand, cement, concrete, steel sections.

**UNIT II BUILDING COMPONENTS AND STRUCTURES****10**

Foundations: Types, Bearing capacity, Requirement of good foundations.

Superstructure: Brick masonry, stone masonry, beams, columns, lintels, roofing, flooring, plastering, Mechanics, Internal and external forces, Stress, Strain, Elasticity, Types of Bridges and Dams, Basics of Interior Design and Landscaping.

**B – MECHANICAL ENGINEERING****UNIT III FOUNDRY WELDING AND FORGING****10**

Foundry: Introduction - Patterns –materials. Types of pattern and pattern allowances. Molding sand, types and properties, Molding procedure. Welding: Definition and Classification, Gas welding, Oxy Acetylene welding, Types of flames, advantages and disadvantages of gas welding. Resistance welding - Classification, Spot welding and Seam welding. Soldering, Definition and Classification. Brazing – Definition and Classification. Forging: Types of Forging, Differences between Hot working and Cold working processes.

**UNIT IV I C ENGINES & BOILERS****08**

Internal combustion engines, Working principle of Petrol and Diesel Engines, Four stroke and Two stroke cycles, Comparison of four stroke and two stroke engines, Boilers: Introduction of boilers, classification, Lancashire boiler, Babcock and Wilcox boiler, list of boiler mountings and accessories and applications (no sketches).

**UNIT V SOURCE OF ENERGY & REFRIGERATION****08**

Sources of energy: Introduction, conventional and non-conventional sources of energy, examples, solar energy, hydro power plant. Introduction to refrigeration and air-conditioning, COP, properties of refrigerants and types of refrigerants, working principle of vapour compression & vapour absorption refrigeration system, Layout of typical domestic refrigerator, Window and Split type room Air conditioner.

**TOTAL:45 Hours**

**COURSE OUTCOMES:**

The students will have an ability to

- Explain the usage of construction material and proper selection of construction materials.
- Design building structures.
- Gain knowledge on manufacturing processes like foundry, welding and forging.
- Demonstrate working principles of petrol and diesel engine and the components used in power plants.
- Explain the components of Refrigeration and Air conditioning cycle.

**TEXT BOOKS:**

1. Ranganath G, “Basic Engineering Civil & Mechanical”, S.S. Publishers, 2023.
2. Shanmugam G and Palanichamy M S, “Basic Civil and Mechanical Engineering”, Tata McGraw Hill Publishing Co., New Delhi, 3<sup>rd</sup> Edition, 2018.

**REFERENCE BOOKS:**

1. Shanmugasundaram. S and Mysamy. K, “Basics of Civil and Mechanical Engineering”, Cenage Learning India Pvt. Ltd, New Delhi, 2012.
2. Ramamrutham. S, “Basic Civil Engineering”, Dhanpat Rai Publishing Co. (P) Ltd, 3<sup>rd</sup> Edition reprint, 2013.
3. Gopalakrishna K R, “Elements of Mechanical Engineering”, Subhas Publications, Bangalore, 2015.
4. Khanna O.P, Foundry Technology, Dhanpat Rai Publishing Co. (P) Ltd, 2011.
5. Venugopal.K and Prabhu Raja.V, “Basic Mechanical Engineering”, Anuradha Publishers, Kumbakonam, 2016.
6. Shantha Kumar S R J, “Basic Mechanical Engineering”, Hi-Tech Publications, Mayiladuthurai, 2001.

Course Outcome		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>Co1</b>	Explain the usage of construction material and proper selection of construction materials.	3	3	3											2	
<b>Co2</b>	Design building structures.	3	3	3							1			1		
<b>Co3</b>	Gain knowledge on manufacturing processes like foundry, welding and forging.	3	3	3	1				1			1				1
<b>Co4</b>	Demonstrate working principles of petrol and diesel engine and the components used in power plants.	3	3	3											1	
<b>Co5</b>	Explain the components of Refrigeration and Air conditioning cycle.	3	3	3												3

122HST07	<b>HERITAGE OF TAMILS</b> (Common to all branches)	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		1	0	0	1

**UNIT I: LANGUAGE AND LITERATURE****3**

Language Families in India - Dravidian Languages – Tamil as a Classical Language – Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry – Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

**UNIT II : HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE 3**

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

**UNIT III: FOLK AND MARTIAL ARTS****3**

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

**UNIT IV : THINAI CONCEPT OF TAMILS****3**

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

**UNIT V: CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE****3**

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

**TOTAL: 15 PERIODS****REFERENCES:**

1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
2. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by:
3. International Institute of Tamil Studies.
4. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu)(Published by: International Institute of Tamil Studies).
5. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by:International Institute of Tamil Studies.)

6. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by:DepartmentofArchaeology& Tamil Nadu Text Book and Educational Services Corporation,Tamil Nadu)
7. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay)(Publishedby: The Author)

122CYP08	ENGINEERING CHEMISTRY LABORATORY (Common to all Non-Circuit Branches)	L	T	P	C
		0	0	2	1

**Objectives:**

Students will be conversant with the estimation of various compounds using volumetric and instrumental analysis.

**LIST OF EXPERIMENTS**

1. Estimation of Total hardness by EDTA
2. Determination of percentage of calcium in Lime Stone by EDTA
3. Estimation of chloride in water sample
4. Estimation of alkalinity of Water sample
5. Determination of DO in Water (Winkler's Method)
6. Determination of Rate of Corrosion of the given steel specimen by weight loss method (Without inhibitor)
7. Determination of Rate of Corrosion of the given steel specimen by weight loss method (With inhibitor)
8. Conduct metric titration (Simple acid base)
9. Conduct metric titration (Mixture of weak and strong acids)
10. Conduct metric titration using  $\text{BaCl}_2$  vs  $\text{Na}_2\text{SO}_4$
11. Potentiometric Titration ( $\text{Fe}^{2+}$  /  $\text{KMnO}_4$  or  $\text{K}_2\text{Cr}_2\text{O}_7$ )
12. PH titration (acid & base)
13. Determination of water of crystallization of a crystalline salt -Copper sulphate
14. Preparation of Bio-Diesel by Trans etherification method.

A minimum of TEN experiments shall be offered.

**Course Outcomes:**

CO1: Carry out the volumetric experiments and improve the analytical skills.

CO2: Understand the maintenance and usage of analytical instruments and thereby develop their skills in the field of engineering.

CO3: Understand the principle and handling of electrochemical instruments and Spectrophotometer.

CO4: Apply their knowledge for protection of different metals from corrosion by using different inhibitors

**Reference(s):**

1. Arthur I. Vogel's, "Quantitative Inorganic Analysis including Elementary Instrumental Analysis", ELBS, Group, 7th Edition, 2000.
2. Dr. K .Sivakumar, "Engineering Chemistry lab manual", S.S publishers, 2022.

		CO-PO MAPPING													
Course Name	CO'S	CO Attainment	CO Result	Program outcomes (Washington Accord Attributes)											
				PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Engineering Chemistry Laboratory (122CYP08)	C01			3	3	3				2					1
	C02			3	3	3				2					1
	C03			3	3	3	2								1
	C04			3	3	3				2					1
	C05			3	3	3	2								1

122PHP08	ENGINEERING PHYSICS LABORATORY (Common to all Circuit Branches)	L	T	P	C
		0	0	2	1

**Course Objectives:**

- To understand the practical concepts of interference and diffraction.
- To understand the concept of velocities of sound in different liquids.
- To get better knowledge of modulus of elasticity.
- To understand the concepts of thermal conductivity.
- To understand the concept of viscosity of liquids.

**LIST OF EXPERIMENTS**

1. (a) Determination of laser Parameters-Wavelength.  
(b) Particle size determination using diode laser.
1. Determination of Young's modulus of the material- uniform bending.
2. Determination of (i) the moment of inertia of the disc and (ii) the rigidity modulus of the material of a wire.
3. Determination of thickness of a thin Wire-Air wedge method.
4. Determination of velocity of sound and compressibility of liquid- Ultrasonic interferometer.
5. Determination of wavelength of mercury spectrum-spectrometer grating.
6. Determination of Young's modulus of the material-Non uniform bending.
7. Determination of viscosity of liquid-Poiseuille's method.
8. Determination of acceleration due to gravity 'g' – Compound pendulum.
9. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
10. Determination of wavelength of monochromatic light – Newton's ring method.

**Course Outcomes:**

*At the end of the course students will be able to:*

1. Understand the moduli of elasticity of various materials.
2. Understand the phenomenon of diffraction and interference of light using optical components.
3. Acquire knowledge of viscosity and compressibility of various liquids.
4. Understand the concept of heat transfer through conductors and bad conductors using Lee's disc.
5. Acquire knowledge about acceleration due to gravity.

**CO – PO MAPPING:**

<b><u>COURSE OUTCOMES</u></b>		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the phenomenon of diffraction and interference of light using optical components	3	3	3	3	3	3	3		2		3	
CO2	Understand the moduli of elasticity and thermal properties of various materials	3	3	3	3	3	3	3		2		3	
CO3	Understand the concept of moment of inertia and acceleration due to gravity	3	3	3	3	3	3	3		2		3	
CO4	Acquire knowledge of viscosity of various liquids.	3	3	3	3	3	3	3		2		3	
CO5	Understand the concept of velocities of sound and compressibility of various liquids.in different liquids.	3	3	3	3	3	3	3		2		3	

122EPP09	ENGINEERING PRACTICE LABORATORY (Common to all Non-Circuit Branches)	L	T	P	C
		0	0	2	1

### Part –A (Mechanical)

#### OBJECTIVES:

1. To get the knowledge on welding techniques and sheet metal operation..
2. To know the principle involved in plumbing work and in carpentry work.
3. To know about wiring various electrical joints in common household electrical and wire work.
4. To know about the working procedure of electrical appliances.
5. To get the knowledge about basics of electronics and to know the characteristics of switching devices.

#### LIST OF EXPERIMENTS

##### 1. WELDING:

Study of Electric Arc welding equipment's.

**Preparation of welding joints:**

**i) Butt joint    ii) Lap joint    iii) T - joint.**

##### 2. SHEET METAL WORK:

Study of sheet metal tools and operations

**Preparation of sheet metal models:    i) Rectangular Tray            ii) Funnel**

##### 3. PLUMBING WORKS:

Study of pipeline joints and house hold fittings.

**Preparation of plumbing models:    Basic pipe connections with PVC and GI pipe fittings.**

##### 4. CARPENTRY:

Study of wooden joints and tools used in roofs, doors, windows, furniture.

**Preparation of carpentry models:**

**i ) Lap joint    ii) Dovetail joint            iii) T-Joint**

### Part –B (Electrical and Electronics)

#### LIST OF EXPERIMENTS

1. Introduction to House Wiring.
2. Staircase Wiring.
3. Fluorescent lamp Wiring.
4. Measurement of single phase energy meter.
5. Measurement of Power, Power factor by using two- wattmeter Method.
6. Study of Electrical iron box and fan with regulator.
7. Characteristics of SCR and Diode
8. Introduction to color coding of resistor.

#### COURSE OUTCOMES:

The students will be able to

- Weld various joints in steel plates using arc welding work, make a tray out of metal sheet using sheet metal work.
- Draw pipe line plan, lay and connect various pipe fittings used in common household plumbing work, Sawing, Planning and make joints in wood materials used in common household wood work.
- Wire various electrical joints in common household electrical wire work.
- Know about the basic knowledge about electrical appliances.
- Know about the basic knowledge about electronics devices.

Course Outcome		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
Co1	Weld various joints in steel plates using arc welding work, make a tray out of metal sheet using sheet metal work.	1		2	2	1			1	1		1	1	1		2
Co2	Draw pipe line plan, lay and connect various pipe fittings used in common household plumbing work, Sawing, Planning and make joints in wood materials used in common household wood work.	2		2	2	1				1		1	1	1		2
Co3	Wire various electrical joints in common household electrical wire work.	1		1	2	1				1		1	1	1		2
Co4	Know about the basic knowledge about electrical appliances.	1		1	2	1				1		1	1	1		2
Co5	Know about the basic knowledge about electronics devices.	1		1	1	2				1		1	1	1		2

122PPP09	PYTHON PROGRAMMING LABORATORY (Common to all Circuit Branches)	L	T	P	C
		0	0	2	1

**OBJECTIVE(S):**

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, and dictionaries.
- Read and write data from/to files in Python.

**LIST OF PROGRAMS:**

1. To Implement python scripts using Variables and operators
2. To Demonstrate Operator precedence to evaluate an expression
3. Display grade of a student using elif statement
4. Implement Floyd triangle using for loop
5. Check the given number is prime or not using while loop
6. Compute the GCD of Numbers and **largest number in a list** using functions
7. Finding factorial of a given number using recursive function.
8. Take a list of words and return the length of longest one using strings
9. To perform linear and binary search using strings
10. To implement list as arrays (multiply 2 matrices)
11. To demonstrate use of list & related functions
12. To demonstrate use of tuple, set& related functions
13. To demonstrate use of Dictionary& related functions
14. Programs that take command line arguments (word count)
- 15. Implementing programs using written modules and Python Standard Libraries.**
- 16. Developing a game activity using Pygame like bouncing ball, car race etc.**

TOTAL: 45

**COURSE OUTCOMES:**

**Upon completion of the course, students will be able to:**

- CO1:** Develop and execute simple python programs
- CO2:** Implement Python programs with conditionals and loops.
- CO3:** Deploy functions to decompose a Python program.
- CO4:** Use Python lists, tuples, dictionaries for representing compound data.
- CO5:** Utilize Python packages in developing software applications

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
C01	3	2	2									2	2		
C02	2	3			1							1			
C03	2	3	2	3								1		3	
C04		2	3	2											
C05			3	3	2							2			2

### LIST OF EQUIPMENTS AND SOFTWARE FOR A BATCH OF 30 STUDENTS

#### Hardware:

LAN System with 30 Nodes (OR) Stand-alone PCs -30 No's.

Printer – 3 No's.

#### Software:

Operating System : Linux / Windows.

Open Source Software: Python.

Database : MySQL.

Open Source Platform: XAMPP, Eclipse IDE

## Regulation-2022 (CBCS)

### Semester-II -English –Syllabus

222ENI01	<b>PROFESSIONAL ENGLISH-II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	(Embedded Course - Common to all Programs)	<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>

#### OBJECTIVES:

**The Course prepares second semester Engineering and Technology students to:**

- Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialisation.
- Present information in an appropriate oral form.
- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
- Foster their ability to write anything convincingly with grammatical accuracy.
- Nurture the holistic perspective of industry readiness

#### UNIT I: Listening

##### Theory

Conversation - Telephonic conversation - Class memory quiz - Interviews of famous persons - Scene from a film - Podcast - Stories - Product description - Process description.

##### English Laboratory

Scientific lectures - Educational videos - Gap filling exercises - Presentations - Formal job interviews - Introduction to classmates - Debates - Panel discussion - INK talks

#### UNIT II: Speaking

##### Theory

Exchanging personal information- Greeting - Leave taking - Introducing friends - Reporting - Role play- Describing a person/place/thing - Small talk - Celebrity interview

##### English Laboratory

Narrating personal experiences - Presentation - Information gap - Simulations - Find the difference - Giving and asking for directions - News brief - Alibi - Untranslatable

#### UNIT III: Reading

##### Theory

Short stories: The Gift of the Magi, A Service of Love and The Last Leaf by O. Henry- Magazines- Jigsaw - Newspaper reports - Newspaper articles - Journals - Travelogues

##### English Laboratory

Brochures - Social media messages - Excerpts from literature - Editorials - Case studies - Critical reviews - Excerpts of interview with professionals - Technical texts - One word splash

#### UNIT IV: Writing

##### Theory

Developing hints-Note-making - Note-taking - Agenda -Advertisement - Transfer of information (Pie chart, Bar chart and Flow chart) - Précis writing and summarizing - Free writing - Short stories

##### English Laboratory

Letter writing - Essay writing - What if? - Poetry - Cubing - Defining technical terms - Character description -One minute paper - Feedback

#### UNIT V: Language Development

##### Theory

Consonants & vowels -Phonetic transcription - British and American English -Infinitive and gerund - Types of sentences - Information and emphasis - Cause and effect -Purpose and function - Phrasal verbs

### **English Laboratory - Career Skills**

Abbreviations and acronyms - Homonyms and homophones - Word formation - One word substitution - Compound nouns - Concord - Life etiquettes - Emotional intelligence - Notable Indian start-ups - Work ethic

**TOTAL: 60 HOURS**

### **Lab Requirements:**

1. Teacher console and systems for students.
2. English Language Lab Software
3. Career Lab Software

### **OUTCOMES:**

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

- CO1:** Listen and comprehend the various strategies of listening and its significance in their area of specialisation successfully.
- CO2:** Speak appropriately and effectively in varied formal and informal contexts.
- CO3:** Read and comprehend texts effortlessly and understand the prevailing practices of testing in the recruitment process by the corporates and the institutional selection processes.
- CO4:** Communicate the corporate and social requirements in an impressive written mode.
- CO5:** Understand the basic grammatical structures and its applications and enhance their verbal skills in the screening tests competently both for recruitment and pursuing higher studies as well.

### **TEXT BOOKS:**

1. Board of editors. **Fluency in English: A Course book for Engineering and Technology.** Orient Blackswan, Hyderabad: 2016.
2. Sudharshana. N. P and Saveetha. C. **English for Technical Communication.** Cambridge University Press: New Delhi, 2016.
3. Uttham Kumar. N. **Professional English - II** (with work book). Sahana Publications, Coimbatore, 2023.
4. Agarwal R. S. A Modern Approach to Verbal and Non-verbal Reasoning. Chand & Co., New Delhi, 2012.
5. Ashraf Rizvi M. Effective Technical Communication. TATA McGraw Hill, New Delhi, 2007.

### **REFERENCES:**

1. Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice. Oxford University Press: New Delhi, 2014.
2. Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad, 2015.
3. Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.
4. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007
5. Means, L. Thomas and Elaine Langlois, English & Communication for Colleges. Cengage Learning, USA: 2007.
6. Lingua: Essays for TOEFL/IELTS, Dreamtech Press, New Delhi, 2016.

7. Lily Mangalam, Global English Comprehension, Allied Publishers Pvt. Ltd., New Delhi, 2014.
8. Sharon Weiner Green and Ira K. Wolf, Barron's GRE, Glagotia Publications Pvt. Ltd., 18th Edition, New Delhi, 2011.
9. Mohamed Elias, R. Gupta's IELTS/TOEFL Essays, Ramesh Publishing House, 6th Edition, New Delhi, 2016.

<b>CO-PO MAPPING</b>														
<b>SEMESTER : II</b>		<b>Course Name : 222ENI01 - PROFESSIONAL ENGLISH - II</b>												
<b>CO'S</b>	<b>Course Outcomes</b>	<b>Program Outcomes (PO)</b>												
		<b>P O 1</b>	<b>P O 2</b>	<b>P O 3</b>	<b>P O 4</b>	<b>P O 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	
CO 1	Listen and comprehend the various strategies of listening and its significance in their area of specialisation successfully.										1	1	1	1
CO 2	Speak appropriately and effectively in varied formal and informal contexts.				1						3	3	2	1
CO 3	Read and comprehend texts effortlessly and understand the prevailing practices of testing in the recruitment process by the corporates and the institutional selection processes.		2		2						2	2	1	1
CO 4	Communicate the corporate and social requirements in an impressive written mode.		1		2						3	3	2	1
CO 5	Understand the basic grammatical structures and its applications and enhance their verbal skills in the screening tests competently both for recruitment and pursuing higher studies as well.										1	3		1

'1' = Low; '2' = Medium; '3' = High

## Regulation-2022 (CBCS)

### Semester-II -Mathematics - Syllabus

222MAT02	<b>PROBABILITY AND STATISTICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	(Common to all B.E. / B.Tech. Degree Programs)	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

#### Course Objectives

- To impart the knowledge of basic probabilistic theory.
- To learn one dimensional discrete and continuous probability distributions occurring in natural phenomena.
- To extend the probability theory to two-dimensional random variable and to study the statistical measures.
- To introduce the concept of sampling distributions and testing hypothesis techniques useful in decision making.
- To expose the statistical methods for analysis of variance and control limits.

**Prerequisite :** Basic Probability Concepts.

#### UNIT I PROBABILITY AND RANDOM VARIABLES 9 + 3

Axioms of probability - Conditional probability - Total probability – Baye’s theorem- Random variables - Probability mass function - Probability density function - Properties - Moments - Moment generating functions and their properties.

#### UNIT II PROBABILITY DISTRIBUTIONS 9 + 3

Binomial, Poisson, Geometric, Uniform, Exponential, and Normal distributions and their properties - applications.

#### UNIT III TWO-DIMENSIONAL RANDOM VARIABLES 9 + 3

Joint Probability Distributions – Marginal and Conditional distributions – Covariance – Correlation and Linear regression – Central limit theorem (Statement and applications only for independent and identically distributed random variables).

#### UNIT IV TESTING OF HYPOTHESIS 9 + 3

Sampling distributions - Tests for single mean, proportion, difference of means (large and small samples) – Tests for single variance and equality of variances – Chi-square test for Independence of attributes using contingency table and Goodness of fit.

#### UNIT V DESIGN OF EXPERIMENTS 9 + 3

Analysis of variance – Completely Randomized Design (CRD) (one way classification) – Randomized Block Design (RBD) (two-way classification) - Latin Square Design (LSD) - Control charts for measurements -  $\bar{x}$  chart, R-chart.

**TOTAL: 45 + 15 = 60 PERIODS**

*Note: Use of approved statistical table is permitted in the examination.*

#### Course outcomes

At the end of the course the student will be able to

**CO 1:** Apply probability concepts in real life problems.

**CO 2:** Identify and design probability distribution models and interpret.

**CO 3:** Use the concept of two dimensional random variables that helps to understand and analyze the statistical measures of probability functions.

**CO 4:** Draw inference & conclusion through hypothesis testing.

**CO 5:** Implement the knowledge of analysis of variance and control limits in real time applications.

**TEXT BOOKS**

1. Miller and Freund., “Probability and Statistics for Engineers”, Pearson Education, Asia, 7th edition, 2012.
2. Veerarajan.T., “Probability, Statistics and Random Processes”, Tata McGraw-Hill publishing company Limited, New Delhi, 2014.

**REFERENCES**

1. Spiegel, M.R, Schiller, J and Alu Srinivasan, R, “Schaum’s Outlines Probability and Statistics”, Tata McGraw-Hill Publishing Company Ltd. New Delhi , 2010.
2. Gupta.S.C., & Kapoor,V.K., “Fundamentals of mathematical statistics”, 11<sup>th</sup> edition, Sultan Chand & Sons publishers, New Delhi, 2013.
3. Ibe, O.C.,“Fundamentals of Applied Probability and Random Processes”, Elsevier, U.P., 1<sup>st</sup> Indian Reprint, 2007.
4. Kandasamy.P, Thilagavathy,K. & Gunavathi.K., “Probability, Statistics and Queueing Theory” -S.Chand & Company Ltd., New Delhi, 2014.
5. Hwei Hsu, “Schaum’s Outline of Theory and Problems of Probability, Random Variables and Random Processes”, Tata McGraw Hill edition, New Delhi, 2014.

CO-PO MAPPING																	
SEMESTER : II		Course Name : <b>222MAT02 - PROBABILITY AND STATISTICS</b>															
CO'S	Course Outcomes	Program Outcomes (PO)												Program Specific Outcomes (PSO)			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	
CO 1	Apply probability concepts in real life problems.	3	3	3	1	1								2	2	2	
CO 2	Identify and design probability distribution models and interpret.	3	3	3	1	1								2	2	2	
CO 3	Use the concept of two dimensional random variables that helps to understand and analyse the statistical measures of probability functions.	3	3	3	2	2								2	2	2	
CO 4	Draw inference & conclusion through hypothesis testing.	3	3	3	2	2								2	2	2	
CO 5	Implement the knowledge of analysis of variance and control limits in real time applications.	3	3	2	2	2								2	2	2	

## Regulation-2022 (CBCS)

### Semester-II - Chemistry - Syllabus

222EST03	ENVIRONMENTAL SCIENCE AND SUSTAINABILITY (Common to all Programs)	L	T	P	C
		2	0	0	2

#### OBJECTIVES:

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and nonrenewable resources, causes of their degradation and measures to preserve them.
- To familiarize the concept of sustainable development goals and appreciate the interdependence of economic and social aspects of sustainability, recognize and analyse climate changes, concept of carbon credit and the challenges of environmental management.
- To inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyze the role of sustainable urbanization.

#### **UNIT I ENVIRONMENT AND BIODIVERSITY 6**

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow – ecological succession. Types of biodiversity: genetic, species and ecosystem diversity – values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ.

#### **UNIT II ENVIRONMENTAL POLLUTION 6**

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, Hazardous and E-Waste management. Case studies on Occupational Health and Safety Management system (OHSMS). Environmental protection, Environmental protection acts.

#### **UNIT III RENEWABLE SOURCES OF ENERGY 6**

Energy management and conservation, New Energy Sources: Need of new sources. Different types of new energy sources. Applications of- Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.

#### **UNIT IV SUSTAINABILITY AND MANAGEMENT 6**

Development, GDP, Sustainability- concept, needs and challenges-economic, social and aspects of sustainability-from unsustainability to sustainability-millennium development goals, and protocols Sustainable Development Goals-targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-case

studies. Concept of CarbonCredit, Carbon Footprint. Environmental management in industry- A case study.

## **UNIT V SUSTAINABILITY PRACTICES**

6

Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Sustainable transports. Sustainable energy: Non-conventional Sources, Energy Cycles carbon cycle, emission and sequestration, Green Engineering: Sustainable urbanization- Socio-economical and technological change.

**TOTAL: 30 PERIODS**

### **OUTCOMES:**

1. To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.
2. To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.
3. To identify and apply the understanding of renewable and non-renewable resources and
4. contribute to the sustainable measures to preserve them for future generations.
5. To recognize the different goals of sustainable development and apply them for suitable
6. technological advancement and societal development.
7. To demonstrate the knowledge of sustainability practices and identify green materials,
8. energy cycles and the role of sustainable urbanization.
- 9.

### **TEXT BOOKS:**

1. Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers, 2018.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016.
3. Gilbert M. Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
4. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.
5. Bradley. A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning.
6. Environment Impact Assessment Guidelines, Notification of Government of India, 2006.
7. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998.

### **REFERENCES:**

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media. 38. Edition 2010.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, Third Edition, 2015.
5. ErachBharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2013.

		CO-PO MAPPING													
Course Name	CO'S	CO Attainment	CO Result	Program outcomes (Washington Accord Attributes)											
				PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Environmental Science and Sustainability (222EST03)	CO1			2	1	-	-	-	2	3	-	-	-	-	2
	CO2			3	2	-	-	-	3	3	-	-	-	-	2
	CO3			3	-	1	-	-	2	2	-	-	-	-	2
	CO4			3	2	1	1	-	2	2	-	-	-	-	2
	CO5			3	2	1	-	-	2	2	-	-	-	-	1

222EGT04	ENGINEERING GRAPHICS (Common to all Circuit branches)	L	T	P	C
		2	0	4	4

**OBJECTIVES:**

1. To gain knowledge on graphical skills for drawing the object.
2. To comprehend the principle of orthographic projection of points, lines and plane surfaces.
3. To study the principle of simple solids.
4. To comprehend the principle of section and development of solids.
5. To comprehend the principle of Isometric and Orthographic projections.

**Concepts and conventions (Not for Examination)****03**

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

**UNIT I PLANE AND SPECIAL CURVES****9**

Conics – Construction of Ellipse, Parabola and Hyperbola by Eccentricity method – Construction of cycloid – Construction of Involute of Square and Circle – Drawing of tangents and normal to the above curves.

**UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES****12**

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

**UNIT III PROJECTION OF SOLIDS****12**

Projection of simple solids like Prisms, Pyramids, Cylinders and Cones when the axis is inclined to one reference plane by change of position method.

**UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES****12**

Sectioning of simple solids like Prisms, Pyramids, Cylinders and Cones in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section.

Development of lateral surfaces of simple and truncated solids – Prisms, Pyramids, Cylinders and Cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

**UNIT V ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS****12**

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated Prisms, Pyramids, Cylinders and Cones.

Representation of Three-Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

**TOTAL:60 Hours**

**COURSE OUTCOMES:**

The student will be able to

- Recognize the conventions and apply dimensioning concepts while drafting simple objects.
- Draw the orthographic projection of points, line, and plane surfaces.
- Draw the orthographic projection of simple solids.
- Draw the section of solid drawings and development of surfaces of the given objects.
- Apply the concepts of Isometric and Orthographic projections in engineering practice.

**TEXT BOOKS:**

1. Ranganath G, “Engineering Graphics”, Second Edition, Sahana Publishers, Reprint, 2021.
2. Bhatt. N.D., “Engineering Drawing” Charotar Publishing House, 53<sup>rd</sup> Edition, 2014.

**REFERENCE BOOKS:**

1. Dhananjay A. Jolhe, “Engineering Drawing with an introduction to AutoCAD” Tata McGraw Hill Publishing Company Limited, 2017.
2. Gopalakrishnana. K. R, “Engineering Drawing” (Vol. I & II), Subhas Publications, 27<sup>th</sup> Edition, 2017.
3. Basant Agarwal and C.M.Agarwal, “Engineering Drawing”, Tata McGraw Hill, 2019.
4. Natrajan K. V, “A Text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2018.
5. M.B.Shaw and B.C.Rana, “Engineering Drawing”, Pearson Education India, 2011.

Course Outcome		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
Co1	Recognize the conventions and apply dimensioning concepts while drafting simple objects.		2		1								1	1		1
Co2	Draw the orthographic projection of points, line, and plane surfaces.	2	1		1								1		2	
Co3	Draw the orthographic projection of simple solids.	2	2		2								1		3	
Co4	Draw the section of solid drawings and development of surfaces of the given objects.		1		2								2			2
Co5	Apply the concepts of isometric and Orthographic projection in engineering practice.	1	1	1							2					1

222PPI04	PYTHON PROGRAMMING (Non-circuit Programs)	L	T	P	C
		3	0	2	3

**OBJECTIVE(S):**

- To know the basics of algorithmic problem solving
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures — lists, tuples, dictionaries.
- To do input/output with files in Python.

**Prerequisite:** Nil**UNIT I ALGORITHMIC PROBLEM SOLVING 9**

**Fundamentals of Computing**, Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

**UNIT II DATA EXPRESSIONS, STATEMENTS 9**

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

**UNIT III CONTROL STATEMENTS AND FUNCTIONS 9**

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search

**UNIT IV LISTS, TUPLES, DICTIONARIES 9**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: **Create- add- delete from a Dictionary- Operations associated with pairs of data**, and methods; advanced list processing - list comprehension; Illustrative programs: **To test if a variable is a list or tuple or a set**, selection sort, insertion sort, merge sort, histogram, **Retail Bill Preparation**.

**UNIT V FILES, MODULES, PACKAGES 9**

Files and exception: text files, reading and writing files, format operator; command line arguments, date and time, errors and exceptions, handling exceptions, debugging, modules, packages; Illustrative programs: word count, copy file. **Case Study: Python Libraries (Numpy,Pandas,Matplotlib,PyGame)**

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
C01	2	2	2	2											
C02	3		2	2								1	2		
C03	3		3	2										3	
C04	2	2								2		1			
C05		1	3		2										1

**COURSE OUTCOMES:**

**Upon completion of the course, students will be able to**

**CO1:** Develop algorithmic solutions to simple computational problems

**CO2:** Develop and execute simple python programs

**CO3:** Structure simple Python programs for solving problems and decompose into functions.

**CO4:** Represent compound data using Python lists, tuples, and dictionaries.

**CO5:** Read and write data from/to files and use python packages in developing simple applications..

**TOTAL: 45**

**TEXT BOOKS:**

1. Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson Education, 1st Edition, 2021.
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2<sup>nd</sup> Edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016  
(<http://greenteapress.com/wp/think-python/>)

**REFERENCE BOOKS:**

1. Martin C. Brown, “Python: The Complete Reference”, 4th Edition, Mc-Graw Hill, 2018.
2. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data”, Third Edition, MIT Press, 2021

## PYTHON PROGRAMMING LABORATORY

### OBJECTIVE(S):

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, and dictionaries.
- Read and write data from/to files in Python.

### LIST OF PROGRAMS:

1. To Implement python scripts using Variables and operators
2. To Demonstrate Operator precedence to evaluate an expression
3. Display grade of a student using elif statement
4. Implement Floyd triangle using for loop
5. Checks the given number is prime or not using while loop
6. Compute the GCD of Numbers and **largest number in a list** using functions
7. Finding factorial of a given number using recursive function.
8. Take a list of words and returns the length of longest one using strings
9. To perform linear and binary search using strings
10. To implement list as arrays (multiply 2 matrices)
11. To demonstrate use of list & related functions
12. To demonstrate use of tuple, set& related functions
13. To demonstrate use of Dictionary& related functions
14. Programs that take command line arguments (word count)
- 15. Implementing programs using written modules and Python Standard Libraries.**
- 16. Developing a game activity using Pygame like bouncing ball, car race etc.**

**TOTAL: 45**

### COURSE OUTCOMES:

#### Upon completion of the course, students will be able to:

- CO1:** Develop and execute simple python programs
- CO2:** Implement Python programs with conditionals and loops.
- CO3:** Deploy functions to decompose a Python program.
- CO4:** Use Python lists, tuples, dictionaries for representing compound data.
- CO5:** Utilize Python packages in developing software applications

## Regulation-2022 (CBCS)

### Semester-II - Physics - Syllabus

<b>222MST05</b>	<b>MATERIAL SCIENCE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	(Common to ME, AE, Civil and CH)	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

#### **COURSE OBJECTIVES:**

1. To make the students to understand the basics of crystallography and its importance in studying materials properties.
2. To understand the conducting and Dielectric properties of materials including Classical, Quantum and Band theories.
3. To instill knowledge on physics of semiconductors.
4. To establish a sound, grasp of knowledge on different magnetic properties of materials.
5. To inculcate an idea of significance of modern engineering materials like Shape memory alloys and nano materials with its applications.

#### **UNIT I: PHYSICS OF CRYSTALS 6**

Definitions: Crystal, poly-crystal, liquid crystal, lattice, basis, unit cell, primitive cell - Bravais lattices - Characteristics of SC, BCC, FCC and HCP Structures - Miller indices - d-spacing in Cubic structure.

#### **UNIT II: CONDUCTING 6**

Conducting Materials: Classical free electron theory - Expression for electrical and thermal conductivity - Wiedmann - Franz law - drawbacks - Quantum free electron theory - Fermi-Dirac statistics - Density of energy states.

#### **UNIT III: SEMICONDUCTING MATERIALS 6**

Energy band diagram - Types of Semiconductors: direct and indirect band gap, Elemental and Compound, Intrinsic and Extrinsic Semiconductors - carrier concentration in intrinsic semiconductors - Hall effect - applications of semiconducting materials.

#### **UNIT IV OPTICAL PROPERTIES OF MATERIALS 6**

Classification of optical materials - carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) - photocurrent in a P-N diode - solar cell - LED.

#### **UNIT V: MODERN ENGINEERING MATERIALS 6**

Shape memory alloys (SMA): Working principle of SMA - characteristics - Hysteresis, Pseudo elasticity and Super elasticity - applications. Nano materials: Properties - preparation - ball milling - Plasma arcing method - Electro deposition - applications.

**TOTAL HOURS: 30**

**COURSE OUTCOMES:**

At the end of the course, the students should be able to

1. Know basics of crystal physics and its importance for various material properties.
2. Gain knowledge on the conducting and dielectric properties of materials and their applications.
3. Understand about physics of semiconducting materials.
4. Understand the properties of various magnetic materials.
5. Gain knowledge about SMA and nano materials and its applications.

**TEXT BOOKS:**

1. R. N. Jayaprakash, Physics for information science, Sahana publication, 2022
2. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw Hill Education (Indian Edition), 2020.
3. Jasprit Singh, “Semiconductor Devices: Basic Principles”, Wiley (Indian Edition), 2007.
4. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw-Hill Education (Indian Edition), 2020.
5. Parag K. Lala, Quantum Computing: A Beginner& Introduction, McGraw-Hill Education (Indian Edition), 2020.

**REFERENCES:**

1. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
2. Y.B.Band and Y.Avishai, Quantum Mechanics with Applications to Nanotechnology and  
and
3. Information Science, Academic Press, 2013.
4. V.V.Mitin, V.A. Kochelap and M.A.Stroscio, Introduction to Nanoelectronics,  
Cambridge  
1. Univ.Press, 2008.
5. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson Education (Indian Edition)  
2009.
6. B.Rogers, J.Adams and S.Pennathur, Nanotechnology: Understanding Small Systems,  
CRC Press, 2014.

<b><u>COURSE OUTCOMES</u></b>		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Page 47 of 84		
														PSO 1	PSO 2	PSO 3
CO1	Know basics of crystal physics and its importance for various material properties.	3	3	3	3	3	3	3		2				3	2	
CO2	Gain knowledge on the conducting and dielectric properties of materials and their applications.	3	3	3	3	3	3	3		1				3	2	
CO3	Understand about physics of semiconducting materials.	3	3	3	3	3	3	3		2				3	2	
CO4	Understand the properties of various magnetic materials.	3	3	3	3	3	3	3		2				3	2	
CO5	Gain knowledge about SMA and nano materials and its applications.	3	3	3	3	3	3	3		3				3	2	

## Regulation-2022 (CBCS)

### Semester-II

222BTT05	<b>BIO MATERIALS</b> (Bio Technology)	L	T	P	C
		2	0	0	2

**Prerequisite** NIL

**Course** The course aims to

- Objectives**
- learn principles of biomaterial designing
  - understand design considerations for biomaterials and its applications
  - appreciate regulatory, ethical, and commercial considerations for tissue engineering
  - learn the major components of tissue engineered scaffolds, including polymeric constructs and cellular populations.
  - appreciate the application of biomaterial science to worldwide diseases

#### **UNIT I INTRODUCTION 9**

Biomaterials: Properties of biomaterials, Surface, bulk, mechanical and biological properties. Scaffolds & tissue engineering, Types of biomaterials, biological and synthetic materials, Biopolymers, Applications of biomaterials, Modifications of Biomaterials, Role of Nanotechnology. 3DPrinting, controlled bioactive factor release mechanisms.

#### **UNIT II BIOMATERIAL TYPES 9**

Introduction: Biomaterial types-Natural-Artificial biomaterial-Processing-Skin grafts-Organo-typic culture-Cell polymer bioreactor-Functional cell mammalian cell constructs.

#### **UNIT III NATURAL BIOPOLYMERS 9**

Natural biopolymers: Introduction: Collagen, Chitosan, Sodium alginate, Hyaluronic acid, Fibrinogen-Stabilization-Chemical modification-Copolymers-Scaffolds-Porous matrices-Tubules-Cell surface interaction.

#### **UNIT IV SYNTHETIC POLYMERS 9**

Synthetic polymers-Introduction: Aliphatic carbonate based polymers-Dioxepanone based polymers-Poly anhydrides-Poly amino acids-Hydrogels-Polymer scaffolds-Processing microencapsulation-Injectable polymers.

#### **UNIT V REGULATORY ISSUE AND STANDARDIZATION 9**

Regulatory issue and standardization-Safety consideration-Effectiveness consideration-Regulatory activities of FDA-Standardization through the ASTM-future prospects-Ethics and responsibility.

**Total hours 45**

**Course** At the end of the course the students will be able to

- Outcomes**
- CO1 Learn types of biomaterials.
  - CO2 Learn the major components of scaffolds, including polymeric constructs and cellular populations.
  - CO3 Understand design considerations of biomaterials and its applications.
  - CO4 Appreciate regulatory, ethical and commercial considerations for biomaterials construction.

CO5 Understand mechanisms by which biomaterial scaffolds can modify disease processes and its applications to diseases worldwide

### TextBooks

- 1 Biomaterials Science. Ratner, Hoffman, Schoen, Academic Press.3rd edition 2012
- 2 Clemens Van Blitterswijk, Tissue Engineering.Elseiver, 2nd edition, 2014.

### References

- 1 Anthony Atala, Robert P. Lanza (2001) *Methods of tissue engineering* .Academic press
- 2 R. Lanza, J. Gearhart etal (Eds), *Essential of Stem Cell Biology*, Elsevier Academicpress, 2006.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	Learn typesof biomaterials	1		2		2		2		1		1	2	1	3	2
CO2	Learn the major components of scaffolds, including polymeric constructs and cellular populations		1	3	1		2		1	2	2		1	3	2	3
CO3	Understand design considerations of biomaterials and its applications		1	2	1		1		1	3	2		2	3	2	2
CO4	Appreciate regulatory, ethical and commercial considerations for biomaterials construction	1	2	1		1		2	2	3		1		2	3	3
CO5	Understand mechanisms by which biomaterial scaffolds can modify disease processes and its applications to			1		2		1	2	2		1		2	3	3

diseases worldwide																	
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## Regulation-2022 (CBCS)

### Semester-II - Physics - Syllabus

222PET05	PHYSICS FOR ELECTRONICS ENGINEERING (Common to ECE & EEE)	L	T	P	C
		2	0	0	2

#### COURSE OBJECTIVES:

1. To make the students to understand the basics of crystallography and its importance in studying materials properties.
2. To understand the conducting properties of materials including Classical and Quantum theories.
3. To instill knowledge on physics of semiconductors.
4. To inculcate an idea of significance of modern engineering material like nano materials with its applications.
5. To insist the basic knowledge about Capacitors and Transistors.

#### UNIT I: PHYSICS OF CRYSTALS 6

Definitions: Crystal Structure – parameters - Bravais lattices – Calculations of no. of atoms per unit cell –atomic radius – Coordination number – packing factor of SC, BCC, FCC and HCP Structures – Millerindices - d-spacing in Cubic structure.

#### UNIT II: ELECTRICAL PROPERTIES OF MATERIALS 6

Conducting Materials: Classical free electron theory - Expression for electrical and thermal conductivity– Wiedmann - Franz law– drawbacks - Quantum free electron theory - Fermi-Dirac statistics - Density of energy states.

#### UNITIII: SEMICONDUCTING MATERIALS 6

Semiconductors – Properties - Energy band diagram – Types of semiconductors - direct and indirect band gap, Elemental and Compound semiconductors - carrier concentration in intrinsic semiconductors– Hall Effect.

#### UNIT IV: MODERN ENGINEERING MATERIAL 6

Nano materials: Introduction – different forms – Synthesis - ball milling - Plasma arcing method – Electrodeposition- Chemical vapour deposition – application of nano phase materials.

#### UNIT V: ELECTROSTATIC AND TRANSISTORS

**6**

Capacitor – Sharing of energy between two capacitors – Capacity of a spherical and Cylindricalcapacitors – Capacitors in series and parallel. Transistors – Working – Transistor current and parameters– input and output Characteristics of NPN transistor – Transistor as voltage amplifier and switch.

**TOTAL HOURS: 30.****TEXT BOOKS:**

1. R. N. Jayaprakash, Physics for information science, Sahana publication, 2022
2. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw Hill Education (IndianEdition), 2020.
3. Jasprit Singh, “Semiconductor Devices: Basic Principles”, Wiley (Indian Edition), 2007.
4. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw-Hill Education (IndianEdition), 2020.
5. Parag K. Lala, Quantum Computing: A Beginner& Introduction, McGraw-Hill Education (IndianEdition), 2020.

**REFERENCES:**

1. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
2. Y.B.Band and Y.Avishai, Quantum Mechanics with Applications to Nanotechnology andInformation Science, Academic Press, 2013.
3. V.V.Mitin, V.A. Kochelap and M.A.Stroscio, Introduction to Nanoelectronics, CambridgeUniv.Press, 2008.
4. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson Education (Indian Edition) 2009.
5. B.Rogers, J.Adams and S.Pennathur, Nanotechnology: Understanding Small Systems, CRC Press,2014.

**COURSE OUTCOMES:**

At the end of the course, the students should be able to

1. Know basics of crystal physics and its importance for various material properties.
2. Gain knowledge on the conducting properties of materials and their applications.
3. Understand about physics of semiconducting materials.
4. Gain knowledge about nano materials and its applications.
5. Get the basic knowledge about Capacitors and Transistors

<b><u>COURSE OUTCOMES</u></b>		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
<i>CO 1</i>	Know basics of crystal physics and its importance for various material properties.	3	3	3	2								2	3		
<i>CO 2</i>	Gain knowledge on the conducting properties of materials and their applications.	3	3	3	2								2	3		
<i>CO 3</i>	. Understand about physics of semiconducting materials.	3	3	3	2								2	3		
<i>CO 4</i>	Gain knowledge about nano materials and its applications.	3	3	3	2								2	3		
<i>CO 5</i>	Get the basic knowledge about Capacitors and Transistors.	3	3	3	2								2	3		

## Regulation-2022 (CBCS)

### Semester-II

222BMT05	MEDICAL PHYSICS (BME)	L	T	P	C
		2	0	0	2

#### COURSE OBJECTIVES:

- To study the principles of light, sound and ultrasound and its properties and about the non-ionizing radiation and their effects.
- To study various types of spontaneous radioactive emissions and various methods of producing radionuclides.
- To study various types of interaction of charged particles with matter and effects due to interaction of gamma radiation with matter.
- To study about the mechanical characteristics of lungs and cardiopulmonary system and application of Bernoulli's principle to cardiovascular system.
- To study the various types of acute and delayed effects of radiation and the various organs affected due to the radiation

#### UNIT I LIGHT, SOUND AND NON-IONIZING RADIATION 9

Electromagnetic spectrum and its medical application. **Vision-** Physics of light, Intensity of light, Threshold of vision, Visual acuity, Visual sensitivity, Colour vision. **Audition-**General properties of sound-Physical properties of sound, Sound intensity level, Reflection and transmission of sound at barriers ,Ultrasound fundamentals- Generation of ultrasound (Ultrasound Transducer). Non- ionizing radiation- Electromagnetic Radiation Tissue as a leaky dielectric – Relaxation Processes – Overview of non – ionizing radiation effects -Low Frequency Effect – Higher frequency effect.

#### UNIT II NUCLEAR PHYSICS 9

Radioactive Decay – Spontaneous Emission – Isometric Transition - Gamma ray emission, alpha, beta, positron decay, electron capture. Principles of Nuclear Physics – Natural radioactivity, Decay series, Half life period, type of radiation and their applications. Production of radio nuclides – Cyclotron produced Radionuclide - Reactor produced Radionuclide – fission and electron Capture reaction, Radionuclide Generator – Milking Process - Linear accelerator, Radionuclide used in Medicine and technology.

#### UNIT III INTERACTION OF RADIATION WITH MATTER 9

Interaction of charged particles with matter – Specific ionization , linear energy Transfer Range, Bremsstrahlung , Annihilation Interaction of Gamma radiations with matter – Photoelectric effect, Compton Scattering , pair Production, Attenuation of Gamma Radiation, Interaction of neutron with matter



COURSE OUTCOMES		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3	
CO1	Study the principles of light, sound and ultrasound and its properties and about the non-ionizing radiation and their effects	3			1		2				2					2	1
CO2	Understand the various types of spontaneous radioactive emissions and various methods of producing radionuclides.	3			1									2	1		
CO3	Understand the various types of interaction of charged particles with matter and the effects due to interaction of gamma radiation with matter and their characteristics	3		2	1								2	2	1	2	
CO4	Study about the mechanical characteristics of lungs and cardiopulmonary system and application of Bernoulli's principle to cardiovascular system	3			1									2	1	2	
CO5	Understand the various radiation effects on human body	3			1										2	1	

## Regulation-2022 (CBCS)

### Semester-II - Physics - Syllabus

222PIT05	PHYSICS FOR INFORMATION SCIENCE	L	T	P	C
	(Common to CSE, IT& AI&DS)	2	0	0	2

#### COURSE OBJECTIVES:

- To make the students to understand the basics of crystallography and its importance in studying materials properties.
- To make the students understand the importance in studying electrical properties of materials.
- To enable the students to gain knowledge in semiconductor physics.
- To establish a sound grasp of knowledge on different optical properties of materials.
- To inculcate an idea of significance of nano structures and quantum confinement.

#### UNIT I CRYSTALLOGRAPHY 6

Crystal structures: Crystal lattice – basis - unit cell and lattice parameters – crystal systems and Bravais lattices – Structure and packing fractions of SC, BCC, FCC and HPC structures – Miller indices – distance between successive planes.

#### UNIT II ELECTRICAL PROPERTIES OF MATERIALS 6

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Success and failures - Fermi- Dirac statistics – Density of energy states.

#### UNIT III SEMICONDUCTOR PHYSICS 6

Intrinsic Semiconductors – Properties - Energy band diagram – Types of semiconductors - direct and indirect band gap, Elemental and Compound semiconductors - carrier concentration in intrinsic semiconductors– Hall Effect.

#### UNIT IV OPTICAL PROPERTIES OF MATERIALS 6

Classification of optical materials – carrier generation and recombination processes – Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) – photocurrent in a P-N diode – solar cell – LED.

#### UNIT V NANO MATERIALS AND QUANTUM COMPUTING 6

Introduction - quantum confinement – quantum structures: quantum wells, wires and dots – bandgap of nanomaterials - preparation - ball milling - Plasma arcing method - Electro deposition - applications.

**TOTAL: 30 PERIODS**

#### COURSE OUTCOMES:

At the end of the course, the students should be able to

1. Know basics of crystallography and its importance for varied materials properties.
2. Gain knowledge on classical and quantum electron theories, and energy band structures.
3. Acquire knowledge on basics of semiconductor physics and its applications in various devices.
4. Have the necessary understanding on the functioning of optical materials for optoelectronics
5. Understand the basics of quantum structures and their applications and basics of quantum computing

**TEXT BOOKS:**

1. R. N. Jayaprakash, Physics for information science, Sahana publication, 2022
2. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw Hill Education (Indian Edition), 2020.
3. Jasprit Singh, "Semiconductor Devices: Basic Principles", Wiley (Indian Edition), 2007.
4. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw-Hill Education (Indian Edition), 2020.
5. Parag K. Lala, Quantum Computing: A Beginner& Introduction, McGraw-Hill Education (Indian Edition), 2020.

**REFERENCES:**

1. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
2. Y.B.Band and Y.Avishai, Quantum Mechanics with Applications to Nanotechnology and Information Science, Academic Press, 2013.
3. V.V.Mitin, V.A. Kochelap and M.A.Stroscio, Introduction to Nanoelectronics, Cambridge Univ.Press, 2008.
4. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson Education (Indian Edition) 2009.
5. B.Rogers, J.Adams and S.Pennathur, Nanotechnology: Understanding Small Systems, CRC Press, 2014.

<b><u>COURSE OUTCOMES</u></b>		P	P	P	P	P	P	P	P	P	P	P	P	PS	PS	PS	
		O 1	O 2	O 3	O 4	O 5	O 6	O 7	O 8	O 9	O 10	O 11	O 12	O 1	O 2	O 3	
CO 1	Know basics of crystallography and its importance for varied materials properties.	3	3	3	2									2	3		
CO 2	Gain knowledge on classical and quantum electron theories, and energy band structures.	3	3	3	2									2	3		
CO 3	Acquire knowledge on basics of semiconductor physics and its applications in various devices.	3	3	3	2									2	3		
CO 4	Have the necessary understanding on the functioning of optical materials for optoelectronics.	3	3	3	2									2	3		
CO 5	Understand the basics of quantum structures and their applications and basics of quantum computing	3	3	3	2									2	3		

222EMT06	ENGINEERING MECHANICS (Common to MECH, CE & AE)	L	T	P	C
		3	0	0	3

**UNIT I BASICS AND STATICS OF PARTICLES****9**

Introduction-Units and Dimensions-Laws of mechanics - Lame's theorem, Parallelogram and Triangular law of forces, Polygon force, Resolution and Composition of forces, Equilibrium of a particle-Forces in space - Equilibrium of a particle in space-Equivalent systems of forces-Principle of transmissibility-Single equivalent force.

**UNIT II EQUILIBRIUM OF RIGID BODIES****9**

Free body diagram-Types of supports and their reactions-Requirements of stable equilibrium-Moments and Couples, Moment of a force about a point and about an axis-Vectorial representation of couples- Varignon's theorem-Equilibrium of Rigid bodies in two dimensions- Equilibrium of Rigid bodies in three dimensions – Examples.

**UNIT III PROPERTIES OF SURFACES AND SOLIDS****9**

Determination of Areas and Volumes-First moment of area and the centroid of sections - rectangle, circle, triangle from integration - T section, I section, Angle section, Hollow section by using standard formula, Second and product moments of plane area - Rectangle, triangle, circle from integration-T section, I section, Angle section, Hollow section by using standard formula, Parallel axis theorem and perpendicular axis theorem.

**UNIT IV DYNAMICS OF PARTICLES****9**

Displacement, Velocity and Acceleration, their relationship, Relative motion- Rectilinear motion- Curvilinear motion, Newton's law-Work Energy Equation of particles-Impulse and Momentum-Impact of elastic bodies.

**UNIT V FRICTION****9**

Frictional force - Laws of Coulomb friction - Simple contact friction - Rolling resistance - Belt friction - Ladder friction - wedge friction.

**TOTAL : 45 Hours****OBJECTIVES:**

1. To understand the vectorial and scalar representation of forces and moments.
2. To understand the static equilibrium of particles and rigid bodies in two dimensions.
3. To understand the concepts of centroids and moment of inertia of composite sections.
4. To understand the principle of work and energy.
5. To enable the students to comprehend the effect of friction on equilibrium.

**COURSE OUTCOMES:**

The students will be able to

- Explain the differential principle applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
- Find solution for problems related to equilibrium of particles.
- Solve the Moment of inertia for different 2-D plane figures.
- Analyse the forces in any structures.
- Solve rigid body subjected to frictional forces.

**TEXT BOOKS:**

1. Bhavikatti S S, “Engineering Mechanics”, New Age International Publisher, 6<sup>th</sup> Edition, 2018.
2. Dr. Gujral I S, “Engineering Mechanics”, Lakmi Publications, Second Edition, Reprint, 2016.

**REFERENCE BOOKS:**

1. Ferdinand Beer, Jr. Johnston, David F Mazurek, Philip J Cornwell and Sanjeev Sanghi, “Vector Mechanics for Engineers Static and Dynamics”, McGraw Hill Education Private Limited, 2019.
2. Khurmi R S, “Engineering Mechanics”, S Chand Publisher, 20<sup>th</sup> Edition, 2019.
3. Dr. Bansal R K and Sanjay Bansal, “Engineering Mechanics”, Lakshmi Publication, 8<sup>th</sup> Edition, 2015.
4. Rajput R K, “A Textbook of Applied Mechanics”, Laxmi Publications, 3<sup>rd</sup> Edition, Reprint, 2015.
5. Ramamrutham S, “Engineering Mechanics (S.I Units)”, Dhanpat Rai Publications, 10<sup>th</sup> Edition, Reprint 2015.

Course Outcome	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>Co1</b> Explain the differential principle applies to solve engineering problems dealing with force, displacement, velocity and acceleration.		2											1		1
<b>Co2</b> Find solution for problems related to equilibrium of particles.	1	1											2		
<b>Co3</b> Solve the Moment of inertia for different 2-D plane figures.	1	2			1							1	1		1
<b>Co4</b> Analyze the forces in any structures.	1	2	1	1	1							2	1		1
<b>Co5</b> Solve rigid body subjected to frictional forces.	1	2	1										1		1

## Regulation-2022 (CBCS)

### Semester-II

<b>222BCT06</b>	<b>BIO ORGANIC CHEMISTRY</b> (BioTech)	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	0	0	3

**Prerequisite:** Engineering Chemistry

**Course Objectives :** The course aims to

- Enable the students to understand the basics concepts of bonding and stereochemistry
- Students understand the kinetics and its reaction mechanism.
- Students learn mechanisms of substitution and addition reactions
- Understand catalysis mechanisms
- Understand bioorganic reactions

#### **UNIT I BONDING AND STEREOCHEMISTRY 9**

Atoms Electrons and orbitals - Covalent Bonds - Octet rule - Polar covalent Bonds – Electro negativity formalcharge - Resonance Acids and Bases - Arrhenius and Bronsted Lowry Theories - Acid Base equilibria - SP<sup>3</sup> hybridization - Conformations analysis ethane, butane and cyclohexane - Cis- trans isomerism. Stereochemical activity around the tetrahedral carbon – optical activity – Conformation of the peptide bond.

#### **UNIT II MECHANISMS OF SUBSTITUTION AND ADDITION REACTIONS 9**

SN<sub>1</sub> and SN<sub>2</sub> reactions on tetrahedral carbon- nucleophiles- mechanism steric effects – nucleophilic addition on Acetals and ketals -Aldehyde and ketone groups – reactions of carbonyl group with amines- acid catalyzed ester hydrolysis – Saponification of an ester- hydrolysis of amides. Ester enolates - claisen .condensation – Michael condensation.

#### **UNIT III KINETICS AND MECHANISM 9**

Kinetic method – Rate law and mechanism – Transition states- Intermediates – Trapping of intermediates – Microscopic reversibility – Kinetic and thermodynamic reversibility – Isotopes for detecting intermediates. Primary and secondary isotopes – the Arrhenius equation Eyring equation -  $\Delta G$ ,  $\Delta S$ ,  $\Delta H$ , Thermodynamics of coupled reactions.

#### **UNIT IV CATALYSIS 9**

Reactivity – Coenzymes – Proton transfer – metal ions – Intra molecular reactions – Covalent catalysis – Catalysis by organized aggregates and phases. Inclusion complexation

#### **UNIT V BIOORGANIC REACTIONS 9**

Timing of Bond formation and fission – Acyl group transfer – C-C bond formation and fission –Catalysis of proton transfer reactions – Transfer of hydride ion – Alkyl group. Transfer – Terpene biosynthesis – Merrifield state peptide synthesis – Sanger method for peptide and DNA sequencing

**TOTAL: 45 PERIODS**

**Course outcomes**

At the end of the course the students will be able to understand

CO1 Bonding and stereochemistry

CO2 Mechanisms of substitution and addition reactions

CO3 Thermodynamics, kinetics and mechanism

CO4 Catalysis reaction and mechanism

CO5 Bioorganic reactions & mechanisms

**Text Books**

- Carey, Francis A.” Organic Chemistry”. VIIth Edition, Tata MCGraw Hill, 2009.
- Page, M.I. and Andrew W illiams “Organic and Bio-organic Mechanisms”. Pearson, 2010.

**REFERENCES**

- Dugas, Hermann “Bioorganic Chemistry: A Chemical Approach to Enzyme Action” 3<sup>rd</sup> Edition, Springer, 2003.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	Bonding and stereochemistry	2		1		2		2		1		1	2	1	2	2
CO2	Mechanisms of substitution and addition reactions		1	3	1		1		1	2	2		1	2	2	1
CO3	Thermodynamics, kinetics and mechanism		1	2	2		1		1	3	2		1	2	3	3
CO4	Catalysis reaction and mechanism	2		1		2		2		1		1	3	2	3	3
CO5	Bioorganic reactions & mechanisms		1	3	1		1		1	2	2		1	2	2	2

## Regulation-2022 (CBCS)

### Semester-II - Chemistry - Syllabus

222OCT06	ORGANIC CHEMISTRY (CHEM)	L	T	P	C
		3	0	0	3

#### COURSE OBJECTIVE:

The course is aimed to

- Learn various reaction mechanisms, preparation of organic compounds and their properties. This will be a precursor for the study on Chemical Reaction Engineering

#### UNIT I      **Carbohydrates** 9

Introduction – various definitions and classifications of carbohydrates – Configurations of aldoses and ketoses upto six carbon atoms- D and L configurations – Anomerism- Epimerism- Preparation, Chemical properties, different structures (Fisher, Haworth, Pyranose and Furanose). Ascending in carbohydrate series – Descending in carbohydrate series – aldose to isomeric Ketose – Ketose to isomeric Aldose – Aldose to epimer.

#### UNIT II      **Heterocyclics** 9

Different preparative methods, Physical & Chemical properties (Oxidation, reduction, Electrophilic and nucleophilic) and Uses of Pyrrole, Furan, Furfural, Tetrahydro Furan, Thiophene, Indole, Pyridine, Quinoline and Isoquinoline.

#### UNIT III **Multistep Synthesis-I** 9

Preparations of Benzil from benzyl aldehydes - Vanillin from catechol through guaiacol, Salol from phenol, Alanine from Ethyl Chloride, - Uses, Preparation of Chloramphenicol - Uses Reaction and mechanism of acyloin condensation, Baeyer-Villiger reaction, Gabriel's synthesis of phthalimide, Wittig reaction, Mannich Reaction.

#### UNIT IV **Multistep Synthesis-I** 9

Preparation and Synthetic utilities of Grignard reagent, Ethyl acetoacetate and Malonic ester for obtaining possible higher alkanes, alkenes, alkynes, acids, esters, aldehydes, ketones, alcohols, higher normal dicarboxylic acids, diketones and cyclic compounds etc.

#### UNIT V **Dyes-Colour and Constitution** 9

Colour and Constitution - Classification of Dye - Synthesis of Phenolphthalein, Methyl Orange - Congo Red - Malachite Green - Fluorescein - Anthraquinone - Indigo Dyes - Classifications of dyes by methods of application.

#### OUTCOMES:

On the completion of the course students are expected to

- CO1: Understand the preparation and classifications of carbohydrates  
 CO2: Understand the physical and chemical properties of heterocyclic compounds  
 CO3: Understand the various methods for preparing synthetic intermediates  
 CO4: Understand the various synthesis mechanisms  
 CO5: Understand the procedure for synthesizing dyes

**TEXT BOOKS:**

1. R.T. Morrison and R.N. Boyd "Organic Chemistry" VI Edition Prentice Hall Inc (1996) USA.
2. K.S. Tiwari, N.K. Vishnoi and S.N. Malhotra "A text book of Organic Chemistry" Second Edition, Vikas Publishing House Pvt. Ltd. (1998) New Delhi.

**REFERENCES:**

1. Chemistry in Engineering and Technology, Vol.2, TMH Publishing Co Ltd., New Delhi, 1994.
2. I L Finar "Organic Chemistry" ELBS (1994).

CO-PO MAPPING															
Course Name	CO'S	CO Attainment	CO Result	Program outcomes (Washington Accord Attributes)											
				PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Organic Chemistry (222OCT06)	CO1			3	1		2								2
	CO2			3	1		2								2
	CO3			3	1		2								2
	CO4			3	1		2								2
	CO5			3	1		2								2

222EEI06	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (BME)	L	T	P	C
		3	0	2	4

**COURSE OBJECTIVES:**

1. Analyse the electrical circuits using different theorems
2. Gain the knowledge on the principle and operation of Transformers, DC Machines and Special Machines
3. Understand the concept of Semiconductor Diodes and Regulated Power supplies
4. Gain the knowledge of different configurations of transistors and their characteristics
5. Obtain the knowledge on concept of special semiconductor diodes and display devices

**UNIT – I CIRCUIT ANALYSIS TECHNIQUES 12**

Ohm's Law, Kirchhoff's current and voltage laws – series and parallel connection of independent sources – R, L and C. Mesh & Nodal analysis, Network Theorems – Thevenin, Superposition, Norton, Maximum power transfer and duality – Star-delta conversion.

**UNIT - II ELECTRICAL MACHINES 12**

Principle - Theory of ideal transformer - Construction details of shell and core type transformers -Construction and working principle of D.C. Machines - Constructional features of stepper motor – Principle of operation – Variable reluctance motor – Hybrid motor – Switched reluctance motor – Brushless D.C motor -Permanent magnet synchronous motor - Repulsion type motor – Universal motor – Hysteresis motor.

**UNIT-III SEMICONDUCTOR DIODES AND REGULATED POWER SUPPLIES 12**

Review of intrinsic & extrinsic semiconductors: Theory of PN junction diode – Energy band structure – Diode Equation and I-V characteristics, Zener diode – characteristics, Reverse saturation current, Zener and avalanche breakdown.Voltage regulator: Block diagram of regulated power supply, Line and Load regulation, Zener diode as voltage regulator.

**UNIT-IV TRANSISTORS 12**

Principle of operation of PNP and NPN transistors – Study of CE, CB and CC configurations and comparison of their characteristics – Breakdown in transistors – operation and comparison of N- Channel and P-Channel JFET – drain current equation – MOSFET – Enhancement and depletion types – structure and operation –comparison of BJT with MOSFET .

**UNIT -V SPECIAL SEMICONDUCTOR DIODES AND DISPLAY DEVICES 12**

Special semiconductor diodes: Varactor diode, Tunnel diode, PIN diode, SCR characteristics. Display Devices : LED, LCD and solar cell, 7-segment display, CCD, Photodiode, Phototransistor, Photoconductive and Photovoltaic cells ,Optocouplers.

**LIST OF EXPERIMENTS:**

1. Study of Electronic Components, Equipment and colour coding of Resistors.
2. Verification of KVL and KCL
3. Verification of Thevenin and Norton Theorems.
4. Verification of superposition Theorem.
5. Verification of Maximum power transfer Theorem.

6. Characteristics of PN and Zener diode
7. Characteristics of CE configuration
8. Characteristics of CB configuration
9. Characteristics of SCR
10. Characteristics of JFET and MOSFET.

**TOTAL HOURS: 60 PERIODS**

**COURSE OUTCOMES:**

Upon Completion of this course, students will be able to:

**CO1:** Analyse the electrical circuits using different techniques

**CO2:** Extend the principle of Transformers, DC Machines and Special Machines on their operation

**CO3:** Illustrate the characteristics of semiconductor diodes and Power supplies

**CO4:** Identify the configuration and working of transistors.

**CO5:** Compute the characteristics of special semiconductor diodes and display devices

**TEXT BOOKS:**

1. Chakrabarti A, "Circuits Theory (Analysis and synthesis), Dhanpat Rai& Sons, New Delhi, 2020.
2. S. Salivahanan, N. Suresh kumar and A. Vallavaraj, "Electronic Devices and Circuits",4th Edition, 2012.
3. Nagrath.I.J. & Kothari.D.P, "Electrical Machines", Tata McGraw-Hill, New Delhi, 5th Edition, 2012

**REFERENCE BOOKS:**

1. Joseph A. Edminister, Mahmood Nahvi, "Electric circuits", Schaum's series, McGraw-Hill, First Edition, 2019.
2. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition,2008.
3. Robert T. Paynter, "Introducing Electronics Devices and Circuits", Pearson Education,7th Education, 2006.
4. William H. Hayt, J.V. Jack, E. Kemmebly and steven M. Durbin, "Engineering Circuit Analysis", TMH, 6th Edition, 2002.
5. J. Millman & Halkins, Satyabranta Jit, "Electronic Devices & Circuits", TMH, 2<sup>nd</sup> Education, 2008.
6. Theraja, B.L., "A Text book of Electrical Technology", Vol.II, S.C Chand and Co., New Delhi, 2007.

COURSE OUTCOMES		P	P	P	P	P	P	P	P	P	PO	PO	PO	P	P	P
		O	O	O	O	O	O	O	O	O	10	11	12	S	S	S
		1	2	3	4	5	6	7	8	9				1	2	3
CO1	Analyse the electrical circuits using different techniques	3	3	3	3	1				1			1	1	2	2

CO2	Extend the principle of Transformers, DC Machines and Special Machines on their operation	3	2	3	3							1	1	2	2
CO3	Illustrate the characteristics of semiconductor diodes and Power supplies	3	2	3	3	1				1		1	1	2	2
CO4	Identify the working of transistors	3	2	3	3	1				1		1	1	2	2
CO5	Categorize the special semiconductor diodes and display devices	3	2	3	3	1				1		1	1	2	2

222EDI06	ELECTRIC CIRCUITS AND ELECTRON DEVICES (ECE)	L	T	P	C
		3	0	2	4

**COURSE OBJECTIVES:**

- Analyze the two port networks using different techniques
- Analyze the transient response in RLC circuits
- Discuss the concept of intrinsic and extrinsic semiconductors and its characteristics
- Infer the concept of different configurations of transistor and their characteristics
- Study the various forms of semiconductors devices

**UNIT I                   CIRCUIT ANALYSIS TECHNIQUES****9**

Kirchhoff's current and voltage laws – series and parallel connection of independent sources – R, L and C– Network Theorems – Thevenin, Superposition, Norton, Maximum power transfer and duality – Star- delta conversion. (Include Topic: General Methods of Network Analysis (mesh & nodal analysis))

**UNIT II                   TRANSIENT RESONANCE IN RLC CIRCUITS****9**

Basic RL, RC and RLC circuits and their responses to pulse and sinusoidal inputs – frequency response –Parallel and series resonances – Q factor – single tuned and double tuned circuits.

**UNIT III                   SEMICONDUCTOR DIODES****9**

Review of intrinsic & extrinsic semiconductors – Theory of PN junction diode – Energy band structure – current equation – space charge and diffusion capacitances – effect of temperature and breakdown mechanism – Zener diode and its characteristics.

**UNIT IV TRANSISTORS 9**

Principle of operation of PNP and NPN transistors – study of CE, CB and CC configurations and comparison of their characteristics – Breakdown in transistors – operation and comparison of N-Channel and P-Channel JFET – drain current equation – MOSFET – Enhancement and depletion types – structure and operation – comparison of BJT with MOSFET – thermal effect on MOSFET.

**UNIT V SPECIAL SEMICONDUCTOR DEVICES 9**

Tunnel diodes – PIN diode, varactor diode – SCR characteristics and two transistors equivalent model – UJT – Diac and Triac, Schottky Diodes– Laser, CCD, Photodiode, Phototransistor, Photoconductive and Photovoltaic cells – LED, LCD.

**TOTAL HOURS: 45 PERIODS**

**LIST OF EXPERIMENTS:**

1. Study of Electronic Components, equipment and color coding of Resistors.
2. Verification of KVL and KCL
3. Verification of Thevenin and Norton Theorems.
4. Verification of superposition Theorem.
5. Verification of Maximum power transfer Theorem.
6. Frequency response of series and parallel resonance circuits.
7. Characteristics of PN and Zener diode
8. Characteristics of CE configuration
9. Characteristics of CB configuration
10. Characteristics of UJT and SCR
11. Characteristics of JFET and MOSFET.
12. Characteristics of Diac and Triac.
13. Characteristics of Photodiode and Phototransistor.

**PRACTICAL HOURS: 30 PERIODS**

**TOTAL HOURS: 75 PERIODS**

**COURSE OUTCOMES:**

**Upon Completion of this course, students will be able to:**

CO1: Analyze the two port networks using different techniques

CO2: Compute transient response in RLC circuits

CO3: Describe the concept of intrinsic and extrinsic semiconductors and its characteristics

CO4: Explain the concept of transistor configurations and their applications

CO5: Recognize the various forms of semiconductor devices and their characteristics

**TEXT BOOKS:**

1. Joseph A. Edminister, Mahmood, Nahri, “Electric Circuits” – Shaum series, TMH, 2001.
2. S. Salivahanan, N. Suresh kumar and A. Vallavaraj, “Electronic Devices and Circuits”, 2nd Edition, 2008.

**REFERENCES:**

1. David A. Bell, “Electronic Devices and Circuits”, Oxford University Press, 5th Edition, 2008.
2. Robert T. Paynter, “Introducing Electronics Devices and Circuits”, Pearson Education, 7th Edition, 2006.
3. William H. Hayt, J.V. Jack, E. Kemmely and Steven M. Durbin, “Engineering Circuit Analysis”, TMH, 6th Edition, 2002.
4. J. Millman & Halkins, Satyabranta Jit, “Electronic Devices & Circuits”, TMH, 2nd Edition, 2008.

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
Co1	3	3	3	3	-	1	-	-	-	-	-	1	2	1	1
Co2	3	2	2	3	-	2	-	-	-	-	-	1	2	1	1
Co3	3	3	3	2	-	2	-	-	-	-	-	1	2	1	1
Co4	3	3	2	3	-	2	-	-	-	-	-	1	2	1	1
Co5	3	2	3	2	-	1	-	-	-	-	-	1	2	1	1

<b>222CAI06</b>	<b>ELECTRIC CIRCUIT ANALYSIS (EEE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>2</b>	<b>4</b>

**Prerequisite :** NIL

**Course Objectives**

To learn the basic concepts and analysis of DC and AC circuits

To understand various methods of circuit/ network analysis using network theorems.

To learn the concept of coupling in circuits and topologies.

To understand the transient response of the circuits subjected to DC excitations and AC with sinusoidal excitations.

To learn the basic concepts and analysis of three phase circuits

**UNIT I BASIC CIRCUITS CONCEPTS AND ANALYSIS 9**

Circuit elements, ideal sources (independent and dependent), linear passive element R, L and C; V-I relationship of circuit elements; sinusoidal voltage and current- RMS value, Average value, form factor, power and power factor; Ohm's Law – Kirchhoff's Laws; analysis of series and parallel circuits: Network reduction; voltage and current division, source transformation, star/delta transformation.

**UNIT II MULTIDIMENSIONAL CIRCUIT ANALYSIS & NETWORK THEOREMS 9**

Node voltage analysis of multi node circuit with current sources and Mesh-current analysis of multi node circuits with voltage sources for DC and AC circuits. Network Theorems for DC and AC circuits: Thevenin's theorem-Norton's theorem – Superposition theorem – Maximum power transfer theorem – Reciprocity theorem-compensation theorem – substitution theorem-Millman's theorem-Tellegen's theorem.

**UNIT III RESONANCE AND COUPLED CIRCUITS 9**

Series and parallel resonance – their frequency response – Quality factor and Bandwidth. Magnetically coupled circuits- Self and mutual inductance –Coefficient of coupling-Dot conversion; Tuned circuits – Single tuned circuits.

**UNIT IV TRANSIENT RESPONSE FOR DC AND AC CIRCUITS 9**

Source free response of RL and RC circuits; forced (step) response of RL and RC circuits; source free response of RL series circuit; forced (step) response of RL series circuit; forced response of RL, RC and RL series circuit to sinusoidal excitation; time constant and natural frequency of oscillation of circuits. Laplace Transform application to the solution of RL, RC & RL circuits: Initial and final value theorems and applications.

**UNIT V ANALYSING THREE PHASE CIRCUITS 9**

Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & unbalanced – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES**

Upon successful completion of the course, the students should have the:

- CO1 Recognize the different combinations of circuit elements and solving the circuit by applying basic circuit laws irrespective of the type of steady state source given.
- CO2 Analyse electrical circuits by applying theorems.
- CO3 ability to predict resonance and coupled circuits
- CO4 Recall the basic concepts of laplace transform and thus analyse the transient behavior of electrical circuits
- CO5 Explain the way of generation of alternating voltage and the response of single phase circuits and three phase circuits employing balanced and unbalanced loads

### REFERENCE BOOKS

1. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", TMH publishers, 6th edition, New Delhi, 2010
2. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", Tata McGraw Hill, 2020.
3. Ravish R Singh, "Network Analysis and Synthesis", McGraw Hill, 2021.
4. Electric Circuit Analysis by B. Subramanyam, Dreamtech Press 2020

COs	Programme Outcomes												Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3				2	2					1	2	3	2
CO2	2						2					1			2
CO3	2	3			2	2	1					1	3		
CO4	2	3					1					1	3		
CO5	2			3	3	2	2					1	3	3	2

**222CAI06-  
ELECTRIC CIRCUITS LABORATORY**

**L T P C  
0 0 2 1**

**Prerequisite :** Nil

**Course Objectives**

To provide exposure to the students with hands on experience on various electrical circuit laws, theorems and experiments.

**LIST OF EXPERIMENTS:**

1. Verification of kirchoff's laws and ohms laws
2. Verification of Thevenin's Theorem
3. Verification of Norton's Theorem
4. Verification of Superposition Theorem.
5. Verification of Maximum Power Transfer theorem.
6. Verification of Reciprocity theorem
7. Verification of Mesh analysis.
8. Verification of Nodal analysis.
9. Transient response of RL and RC circuits for DC input.
10. Frequency response of series and parallel resonance circuit

**Total:45 Periods**

**COURSE OUTCOMES**

Upon successful completion of the course, the students should have the:

- CO1 Apply basic circuit laws to confirm the practical values of the current through and voltage across different elements of the circuit with that of the theoretical values.
- CO2 Apply theorems to simplify the electric circuits.
- CO3 Verify the Mesh and Nodal analysis in electric circuits.
- CO4 Illustrate the transient response of RLC circuits
- CO5 Illustrate the frequency response of series and parallel resonance circuit

COs	Programme Outcomes												Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3		3		2	2					1	2		2
CO2	2	3	3									1	3		
CO3		3		3		2	1						3		
CO4	2					2						1	3		
CO5	2	3	3		3		2					1		3	

222CPI06	PROGRAMMING IN C (CSE,IT, AI&DS)	L	T	P	C
		2	0	2	3

**OBJECTIVE(S):**

- To introduce students to the basic knowledge of programming fundamentals of C language.
- To develop C programs using arrays and strings
- To impart the concepts like functions, pointers and structure
- To develop applications in C using file processing

**UNIT-I BASICS OF C LANGUAGE 9**

Introduction to C Programming – Fundamentals – **Applications of C Language**-Structure of a C Program – Compilation and Linking Processes – Constants, Variables – Data Types –

**Precedence and Associativity**- Expressions Using Operators in C – Managing Input and Output Operations – Decision Making and Branching – Looping Statements – Solving Simple Scientific and Statistical Problems.

**UNIT-II ARRAYS AND STRINGS 9**

Arrays – Initialization – Declaration - One Dimensional and Two Dimensional Arrays - Strings- String Operations – String Arrays. Simple Programs - Sorting- Searching - Matrix Operations-Preprocessor Directives.

**UNIT-III FUNCTIONS,STRUCTURES &UNIONS 9**

Functions:Definition of function – Declaration of function – Pass by value - Pass by reference – Recursion - **Binary Search using recursive functions**.Structures and Unions: Introduction -Need for structure data type - Structure definition – Structure declaration - Structure within a structure - Union - Programs using Structures and Unions.

**UNIT-IV POINTERS 9**

Definition – Initialization – Pointer Operators -Pointers Arithmetic – Pointers and one dimensional array -Pointers and Multi-Dimensional array: Array of Pointers - Pointer to Pointer, Pointer to an array -void Pointer -Pointer to function - Dynamic memory allocation -- **typedef**-Command Line Arguments.

**UNIT-V STORAGE CLASSES AND FILES 9**

Storage classes:auto, static, extern, and register-**Visibility** - scope rules-Files: Introduction – Using files in C - Operations on files-Types of file processing: Sequential access, Random access - Sequential access file working with text files- File Handling Functions - Error handling

**TOTAL: 45****COURSE OUTCOMES:**

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

**CO1:**Demonstrate the use of Operators & Expressions, Decision Making and Looping statements.

**CO2:** Design and implement applications using arrays and strings

**CO3:** Write programs in C using functions and structures.

**CO4:** Develop applications in C using pointers.

**CO5:**Use storage class and files using sequential and random access processing.

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
C01		3	3	3								3	3		3
C02		2	3	2	2							2	3	3	3
C03		2	3	2								2	3	3	3
C04		2	3	2	3							2	3		3
C05		1	3	3	2							3		2	

#### **TEXT BOOKS:**

- 1.ReemaThareja “Programming in C”.Oxford University Press,Second Edition 2016
2. Kernighan B. W., Ritchie D.M. "The C Programming Language", Pearson., New Delhi, 2015 , Second Edition

#### **REFERENCES:**

1. PradipDey, ManasGhoush, -“Programming in C”, Oxford University New Delhi, 2018
2. Byron Gottfried, - “Programming with C”,2<sup>nd</sup> Edition, (Indian Adapted Edition), TMH Publications, 2018.
3. YashwantKanetkar "Let us C", BPB Publications., New Delhi, 2017 , Sixteenth Edition
4. Ashok.N.Kamthane,- “Computer Programming” , Pearson Education,Second edition(India), 2012

#### **LIST OF EXPERIMENTS:**

1. Programs using I/O statements, Operators and expressions.
2. Programs using decision-making and looping statements
3. Programs using 1-D and 2-D array.
4. Write a program for scientific and statistical problem.
5. Solving problems using string functions
6. Programs using user defined functions.

7. Program using call by value and call by reference
8. Program using recursive function and **passing arrays to function**
9. Sort the list of numbers using pass by reference.
10. Program using pointers and structures.
11. Program using structures and functions.
12. Program using Union
13. Program using i) Sequential access file.  
ii) Random access file.

### **LIST OF EQUIPMENTS AND SOFTWARE FOR A BATCH OF 30 STUDENTS**

#### **Hardware:**

LAN System with 30 Nodes (OR) Stand\_alone PCs -30 No's.

Printer – 3 No's.

#### **Software:**

OS: Windows / Linux.

Turbo C.

## Regulation 2022 (CBCS)

### Semester-II - Tamil - Syllabus

222HST07	TAMILS AND TECHNOLOGY (Common to ALL)	L	T	P	C
		1	0	0	1

#### UNIT 1 WEAVING AND CERAMIC TECHNOLOGY 3

Weaving Industry during Sangam Age-Ceramic technology-Black and Red Ware Potteries- Graffiti on potteries.

#### UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age –Building materials and Hero stone of Sangam Age- Details of stage constructions in Silappathikaram-Sculptures and temples of Mamallapuram-Great Temples of Cholas and other worship places –Temples of Nayaka period –Type study (Madurai Meenakshi Temple)-Thirumalai Nayakar Mahal-Chetti Nadu Houses, Indo-Saracenic architecture at Madras during British period.

#### UNIT III MANUFACTURING TECHNOLOGY 3

Art of ship Building- Metallurgical studies-Iron industry-Iron smelting steel-Copper and gold-Coins as source of history –Minting of coins-Beads making industries Stone beads-Glass beads-Terracotta beads-Shell beads/ bone beads-Archeological evidences-Gem stone types described in Silappathikaram.

#### UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

Dam , Tank, Ponds, Sluice, Significance of kumizhi Thooppu of Chola period, Animal Husbandry- Wells designed for cattle use –Agriculture and Agro Processing- Knowledge of sea – Fisheries-Pearl-Conche diving-Ancient Knowledge of Ocean-Knowledge specific Society.

#### UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING 3

Development of Scientific Tamil- Tamil computing –Digitalization of Tamil Books- Development of Tamil Software-Tamil virtual Academy-Tamil Digital Library-Online Tamil Dictionaries-Sorkuvai project.

**TOTAL: 15 PERIODS**

#### REFERENCES:

1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
2. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by:
3. International Institute of Tamil Studies.
4. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu)(Published by: International Institute of Tamil Studies).
5. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

6. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by:DepartmentofArchaeology& Tamil Nadu Text Book and Educational Services Corporation,Tamil Nadu)
7. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay)(Publishedby: The Author)

## Regulation-2022 (CBCS)

### Physics - Semester-II- Practical- Syllabus

<b>222PHP08</b>	<b>ENGINEERING PHYSICS LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Common to all Circuit Branches)</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

#### Course Objectives:

- To understand the practical concepts of interference and diffraction.
- To understand the concept of velocities of sound in different liquids.
- To get better knowledge of modulus of elasticity.
- To understand the concepts of thermal conductivity.
- To understand the concept of viscosity of liquids.

#### LIST OF EXPERIMENTS

1. (a) Determination of laser Parameters-Wavelength.  
(b) Particle size determination using diode laser.
2. Determination of (i) the moment of inertia of the disc and (ii) the rigidity modulus of the material of a wire.
3. Determination of thickness of a thin Wire-Air wedge method.
4. Determination of velocity of sound and compressibility of liquid- Ultrasonic interferometer.
5. Determination of wavelength of mercury spectrum-spectrometer grating.
6. Determination of Young's modulus of the material-Non uniform bending.
7. Determination of viscosity of liquid-Poiseuille's method.
8. Determination of acceleration due to gravity 'g' – Compound pendulum.
9. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
10. Determination of wavelength of monochromatic light – Newton's ring method.

#### Course Outcomes:

*At the end of the course students will be able to:*

1. Understand the moduli of elasticity of various materials.
2. Understand the phenomenon of diffraction and interference of light using optical components.
3. Acquire knowledge of viscosity and compressibility of various liquids.
4. Understand the concept of heat transfer through conductors and bad conductors using Lee's disc.
5. Acquire knowledge about acceleration due to gravity.

**CO – PO MAPPING:**

<b><u>COURSE OUTCOMES</u></b>		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the phenomenon of diffraction and interference of light using optical components	3	3	3	3	3	3	3		2		3	
CO2	Understand the moduli of elasticity and thermal properties of various materials	3	3	3	3	3	3	3		2		3	
CO3	Understand the concept of moment of inertia and acceleration due to gravity	3	3	3	3	3	3	3		2		3	
CO4	Acquire knowledge of viscosity of various liquids.	3	3	3	3	3	3	3		2		3	
CO5	Understand the concept of velocities of sound and compressibility of various liquids.in different liquids.	3	3	3	3	3	3	3		2		3	

**Regulation-2022 (CBCS)**  
**Chemistry - Semester-II - Practical - Syllabus**

222CYP08	ENGINEERING CHEMISTRY LABORATORY (Common to all Circuit Branches)	L	T	P	C
		0	0	2	1

**Objectives:**

Students will be conversant with the estimation of various compounds using volumetric and instrumental analysis.

**LIST OF EXPERIMENTS**

1. Estimation of Total hardness by EDTA
2. Determination of percentage of calcium in Lime Stone by EDTA
3. Estimation of chloride in water sample
4. Estimation of alkalinity of Water sample
5. Determination of DO in Water (Winkler's Method)
6. Determination of Rate of Corrosion of the given steel specimen by weight loss method (Without inhibitor)
7. Determination of Rate of Corrosion of the given steel specimen by weight loss method (With inhibitor)
8. Conduct metric titration (Simple acid base)
9. Conduct metric titration (Mixture of weak and strong acids)
10. Conduct metric titration using  $\text{BaCl}_2$  vs  $\text{Na}_2\text{SO}_4$
11. Potentiometric Titration ( $\text{Fe}^{2+}$  /  $\text{KMnO}_4$  or  $\text{K}_2\text{Cr}_2\text{O}_7$ )
12. PH titration (acid & base)
13. Determination of water of crystallization of a crystalline salt -Copper sulphate
14. Preparation of Bio-Diesel by Trans etherification method.

A minimum of TEN experiments shall be offered.

**Course Outcomes:**

- CO1: Carry out the volumetric experiments and improve the analytical skills.  
 CO2: Understand the maintenance and usage of analytical instruments and thereby develop their skills in the field of engineering.  
 CO3: Understand the principle and handling of electrochemical instruments and Spectrophotometer.  
 CO4: Apply their knowledge for protection of different metals from corrosion by using different inhibitors

**Reference(s):**

1. Arthur I. Vogel's, "Quantitative Inorganic Analysis including Elementary Instrumental Analysis", ELBS, Group, 7th Edition, 2000.
2. Dr. K .Sivakumar, "Engineering Chemistry lab manual", S.S publishers, 2022.

		CO-PO MAPPING														
Course Name	CO'S	CO Attainment	CO Result	Program outcomes (Washington Accord Attributes)												
				P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	
Engineering Chemistry Laboratory (222CYP08)	C01			3	3	3					2					1
	C02			3	3	3					2					1
	C03			3	3	3	2									1
	C04			3	3	3					2					1
	C05			3	3	3	2									1

222EPP09	ENGINEERING PRACTICE LABORATORY (Common to all Circuit Branches)	L	T	P	C
		0	0	2	1

### Part –A (Mechanical)

#### OBJECTIVES:

1. To get the knowledge on welding techniques and sheet metal operation..
2. To know the principle involved in plumbing work and in carpentry work.
3. To know about wiring various electrical joints in common household electrical and wire work.
4. To know about the working procedure of electrical appliances.
5. To get the knowledge about basics of electronics and to know the characteristics of switching devices.

#### LIST OF EXPERIMENTS

##### 1. WELDING:

Study of Electric Arc welding equipment's.

**Preparation of welding joints:**

i) Butt joint ii) Lap joint iii) T - joint.

##### 2. SHEET METAL WORK:

Study of sheet metal tools and operations

**Preparation of sheet metal models:** i) Rectangular Tray ii) Funnel

##### 3. PLUMBING WORKS:

Study of pipeline joints and house hold fittings.

**Preparation of plumbing models:** Basic pipe connections with PVC and GI pipe fittings.

##### 4. CARPENTRY:

Study of wooden joints and tools used in roofs, doors, windows, furniture.

**Preparation of carpentry models:**

i) Lap joint ii) Dovetail joint iii) T-Joint

### Part –B (Electrical and Electronics)

#### LIST OF EXPERIMENTS

9. Introduction to House Wiring.
10. Staircase Wiring.
11. Fluorescent lamp Wiring.
12. Measurement of single phase energy meter.
13. Measurement of Power, Power factor by using two- wattmeter Method.
14. Study of Electrical iron box and fan with regulator.
15. Characteristics of SCR and Diode
16. Introduction to color coding of resistor.

#### COURSE OUTCOMES:

The students will be able to

- Weld various joints in steel plates using arc welding work, make a tray out of metal sheet using sheet metal work.
- Draw pipe line plan, lay and connect various pipe fittings used in common household plumbing work, Sawing, Planning and make joints in wood materials used in common household wood work.
- Wire various electrical joints in common household electrical wire work.
- Know about the basic knowledge about electrical appliances.
- Know about the basic knowledge about electronics devices.

Course Outcome		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
Co1	Weld various joints in steel plates using arc welding work, make a tray out of metal sheet using sheet metal work.	1		2	2	1			1	1		1	1	1		2
Co2	Draw pipe line plan, lay and connect various pipe fittings used in common household plumbing work, Sawing, Planning and make joints in wood materials used in common household wood work.	2		2	2	1				1		1	1	1		2
Co3	Wire various electrical joints in common household electrical wire work.	1		1	2	1				1		1	1	1		2
Co4	Know about the basic knowledge about electrical appliances.	1		1	2	1				1		1	1	1		2
Co5	Know about the basic knowledge about electronics devices.	1		1	1	2				1		1	1	1		2

222BCP10	BIOORGANIC CHEMISTRY LABORATORY	L	T	P	C
		0	0	2	1

**Prerequisite:** Nil

**Course Objectives:**

The course aims to

- understand the mechanism of synthesis of different chemical moieties
- Make students understand the kinetics and its reaction mechanism.
- Make the students learn mechanisms of substitution and addition reactions
- Understand catalysis mechanisms
- Familiarize the students with the isolation of biomolecules from natural sources

**LIST OF EXPERIMENTS**

1. Synthesis of aspirin
2. Hydrolysis of sucrose
3. Preparation of pyruvic acid from tartaric acid
4. Preparation of oleic acid from tartaric acid
5. Preparation of alpha D- glucopyranosepentaacetate
6. Preparation of 1,2,5,6 dicyclohexylnoine alpha d glucofuranose
7. Isolation of lycopene from tomato paste
8. Preparation of L-proline
9. Preparation of L-cysteine from hair
10. Preparation of S-ethylhydroxybutonate from methylacetoacetate using yeast

**Course Outcomes**

At the end of the course the students will be able to understand

- CO1 Comprehend the mechanism of reactions  
 CO2 Mechanisms of substitution and addition reactions  
 CO3 To synthesize various Bioorganic compounds  
 CO4 To work independently for the experimentation.  
 CO5 Bioorganic reactions & mechanisms

**References**

- 1 Organic Chemistry, Francis A.Carey, VII Edition, Tata MCGraw Hill, Fourth reprint 2009.
- 2 Organic and Bio-organic Mechanisms, M.I. Page and Andrew Williams. Pearson, First Impression, 2010.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	Comprehend the mechanism of reactions		1	2	1		1		1	2	2		1	3	2	2
CO2	Mechanisms of substitution and addition reactions		1	2	1		1		1	2	2		1	3	2	2
CO3	To synthesize various Bioorganic compounds	2		1		2		2		1		1	2	3	2	3
CO4	To work independently for the experimentation	2		1		2		2	3	1		1	2	3	2	2
CO5	Bioorganic reactions & mechanisms	2		1		2		2		1		1	2	3	2	2