

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

**SEMESTER-I**

**B.E. (COMMON FOR MECH, CIVIL & AERO) & B.TECH. (CHEM& BT)**

S.No.	Course Code	Course Title	Category	L	T	P	C
-	122IP001	INDUCTION PROGRAMME	-	-	-	-	0
<b>THEORY</b>							
1	122ENI01	Professional English-I*	HS/EEC	2	0	2	3
2	122MAT02	Matrices and Calculus	BS	3	1	0	4
3	122PHT03	Engineering Physics	BS	2	0	0	2
4	122CYT04	Engineering Chemistry	BS	2	0	0	2
5	122EGT05	Engineering Graphics	ES	2	0	4	4
6	122EET06	Basic Electrical Electronics and Instrumentation Engineering	ES	3	0	0	3
7	112HST07	தமிழர் மரபு / Heritage of Tamils	HS	1	0	0	1
<b>PRACTICALS</b>							
7	122CYP07	Engineering Chemistry Laboratory	BS	0	0	2	1
8	122EPP08	Engineering Practice Laboratory	ES	0	0	2	1
TOTAL				15	1	10	20

**SEMESTER II**

**COMMON TO B.E (ME, CE & AE)**

S.No.	Course Code	Course Title	Category	L	T	P	C
<b>THEORY</b>							
1	222ENI01	Professional English-II*	HS/EEC	2	0	2	3
2	222MAT02	Probability and Statistics	BS	3	1	0	4
3	222EST03	Environmental Science and Engineering	BS	2	0	0	2
4	222PPT04	Python Programming	ES	3	0	0	3
5	222MST05	Material Science	BS	2	0	0	2
6	222EMT06	Engineering Mechanics	ES	3	0	0	3
7	222HST07	Tamils and Technology	HS	1	0	0	1
<b>PRACTICALS0</b>							
8	222PHP07	Engineering Physics Laboratory	BS	0	0	2	1
9	222PPP08	Python Programming Laboratory	ES	0	0	2	1
TOTAL				16	1	6	19

\*(Theory + Lab – Embedded / Integrated)

# Semester-I

# Syllabus

122ENT01	<b>PROFESSIONAL ENGLISH-I</b> (Common to all branches)	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>0</b>	<b>0</b>	<b>2</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****09**

Listening – News - Speaking – Everyday activities - Reading – Newspaper - Writing - Definitions – Instructions – Checklists – Recommendations - Vocabulary Development - Technical vocabulary - Language Development – Parts of speech – Articles – Word formation.

**UNIT II****09**

Listening – Motivational speech - Speaking – Extempore/Impromptu - Reading – Comprehension– Writing – Essay - Vocabulary Development - Vocabulary used in formal letters/emails and reports - Language Development – Tenses - Voices - Numerical adjectives – Question tags.

**UNIT III****09**

Listening – Technical talks - Speaking – Self introduction - Reading – Novels – Writing – Invitation and quotation letter - Vocabulary Development - Misspelled words – One-word substitution - Language Development - Singular and plural nouns - Compound nouns - Editing

**UNIT IV****09**

Listening – Classroom lecture - Speaking – Public speaking - Reading – Biography/Autobiography – Writing - Email etiquettes - Vocabulary Development – Synonyms and antonyms – Paraphrasing - Language Development – Modals – Conditionals.

**UNIT V****09**

Listening - Comprehension - Speaking – Movie reviews – Reading – Technical articles – Writing – Reports - Minutes of a meeting - Vocabulary Development - Verbal analogies - Phrasal verbs - Language Development - Concord - Reported speech.

**Total: 45 Hours****COURSE OUTCOMES:**

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

CO1: Listen and comprehend lectures and talks in their area of specialization successfully.

CO2: Speak appropriately and effectively in varied formal and informal contexts. CO3: Read and comprehend texts effortlessly.

CO4: Write any formal documents effectively.

CO5: Understand the basic grammatical structures and its applications. **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. Technical English (with work book). Sahana Publications, Coimbatore, 2016.

**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.

122MAT02	ENGINEERING MATHEMATICS-I (Common to all branches)	L	T	P	C
		3	1	0	4

**Objectives:**

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

- To understand the eigenvalue problems.
- To study sequences and series and tests of convergence.
- To understand the concepts of curvatures, evolutes and envelopes.
- To learn the total derivatives and apply the same to find maxima and minima.
- To solve differential equations of certain types, including systems of differential equations that they might encounter in engineering subjects.

**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 SEQUENCES AND SERIES****9+3**

Limits and Continuity - Sequences: Definition and examples – Series: Types and Convergence – Series of positive terms – Tests of convergence: Comparison test, Integral test and D’Alembert’s Ratio test, Raabe’s test and Cauchy’s Root test – Alternating series – Leibnitz’s test – Series of positive and negative terms: Taylor’s series, Binomial series, Exponential series, and Logarithmic series – Absolute and conditional convergence.

**UNIT III DIFFERENTIAL CALCULUS****9+3**

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes – Evolutes as envelope of normals.

**UNIT IV 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 V ORDINARY DIFFERENTIAL EQUATIONS****9+3**

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy’s and Legendre’s linear equations – Simultaneous first order linear equations with constant Coefficients-Applications to Engineering Problems- Electric Circuits, Simple Harmonic Motions and bending of beams.

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

*After completing this course, the student will be able to*

CO 1: Develop the knowledge of linear algebraic concepts. CO 2:

Apply convergence or divergence concept in series.

CO 3: Use the differential calculus tools application to seek solutions for many problems in engineering subjects.

CO 4: Acquire the knowledge of partial differential concepts and apply to find maxima and minima of a function.

CO 5: Determine the solutions of ordinary differential equations by various methods which have an application in their core subjects.

### **TEXT BOOKS**

1. Erwin Kreyszig, “Advanced Engineering Mathematics”, Wiley India, 10 th edition New Delhi 2016.
2. Grewal. B.S, “Higher Engineering Mathematics”, 44 th 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.

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

**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.
- Identification of structure of engineering materials.
- Atomic and nuclear related theories.

**UNIT-1: ACOUSTICS AND ULTRASONICS****9**

Sound – classification – characteristics of musical sound – loudness – Decibel – Intensity of sound – Weber-Fechner law – Reverberation and Reverberation time – Sabine’s law – derivations – 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-Applications-NDT-pulse echo system- Determination of depth of sea.

**UNIT-2: OPTICAL PHYSICS****9**

Lasers – Spontaneous and Stimulated Emissions-Types of lasers-Nd-YAG, Helium-Neon, CO<sub>2</sub> - Semiconductor lasers [Homojunction and Heterojunction (qualitative)]-Interference- Air wedge and its applications- Michelson interferometer: construction, working, determination of wavelength and thickness.

**UNIT-3: QUANTUM PHYSICS****9**

Blackbody Radiation-Laws of blackbody Radiation-Planck’s quantum theory of blackbody radiation(derivation)-Photo Electric Effect-Compton effect(derivation)-Matter Waves-De- Broglie’s Concept-Schrodinger wave Equation-Time independent and Time dependent equations(derivations)- Physical significance of wave function-particle in a box (one dimensional case).

**UNIT-4: PROPERTIES OF MATTER AND THERMAL PHYSICS****9**

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). Modes of heat Transfer-Thermal Conductivity-Newton’s Law of Cooling-Lee’s disc Method-Radial Heat Flow-Cylindrical Shell Method-Thermal conductivity of Rubber-Heat conduction through a compound media.

**UNIT-5: NUCLEAR AND ATOMIC PHYSICS****9**

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- Differences between fission and fusion-Raman effect-applications-Raman spectroscopy.

**TOTAL: 45 HOURS**

**COURSE OUTCOMES:**

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

CO1: Apply the Acoustics and NDT techniques 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 and thermal properties in various materials. CO5: Discuss the role of nuclear physics in energy production.

**REFERENCES:**

1. Dr. R.N. Jayaprakash, Engineering Physics, Dhanam Publications, 2018.
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.



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

**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 impressed cathode current method. Electroplating (Copper plating) and Electroless plating (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, 7<sup>th</sup>Edn, 2002.
5. ShashiChawla, A Text Book of Engineering Chemistry, 3rd Edition, DhanpatRai&New Delhi, 2007.
6. S. Vairam, P. Kalyani&Suba Ramesh, Engineering Chemistry, 1stEdn, John Wiley &Sons, India, 2011.
7. Lee J.D., Concise Inorganic Chemistry, 7<sup>th</sup> Edn, Blackwel Science Publications Oxford, London, 2004.

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

**OBJECTIVES:**

- To gain knowledge on graphical skills for drawing the object.
- To comprehend the principle of orthographic projection of points, lines and plane surfaces.
- To study the principle of simple solids.
- To comprehend the principle of section and development of solids.
- 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****09**

Conics – Construction of ellipse, Parabola and hyperbola by Eccentricity method – Construction of cycloid – Construction of involutes 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 HOURS :60**

## **COURSE OUTCOMES**

*The student will be able to*

- CO1: Recognize the conventions and apply dimensioning concepts while drafting simple objects.
- CO2: Draw the orthographic projection of points, line, and plane surfaces. CO3: Draw the orthographic projection of simple solids.
- CO4: Draw the section of solid drawings and development of surfaces of the given objects.
- CO5: 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, 53th 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, 2014.
3. Basant Agarwal and C.M.Agarwal, "Engineering Drawing", Tata McGraw Hill, 2013.
4. Natrajan K. V, "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2012.
5. M.B.Shaw and B.C.Rana, "Engineering Drawing", Pearson Education India, 2011.

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>
		<b>3</b>	<b>0</b>	<b>3</b>	<b>3</b>

**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” DhanpatRai & Co, 2016.

**REFERENCE:**

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

<b>122PPT05</b>	<b>PROBLEM SOLVING AND PYTHON PROGRAMMING</b> (Common to all Circuit Branches)	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**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.

**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: selection sort, insertion sort, merge sort, histogram.

**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, SciPy, PyGame).

**TOTAL HOURS: 45**

**COURSE OUTCOMES:**

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

- CO1: Develop algorithmic solutions to simple computational problems CO2:  
Read, write, execute by hand 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.

**TEXT BOOKS:**

1. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd Edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016.  
(<http://greenteapress.com/wp/think-python/>)
2. Guido van Rossum and Fred L. Drake Jr, -“An Introduction to Python” – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

**REFERENCE BOOKS:**

1. John V Guttag, -“Introduction to Computation and Programming Using Python”, Revised and expanded Edition, MIT Press, 2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, -“Introduction to Programming in Python: An Inter-Disciplinary Approach”, Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, -Exploring Python, Mc-Graw Hill Education (India) Private Ltd., 2015.
4. Kenneth A. Lambert, - “Fundamentals of Python: First Programs”, CENGAGE Learning, 2012.
5. Charles Dierbach, - “Introduction to Computer Science using Python: A Computational Problem”- Solving Focus, Wiley India Edition, 2013.
6. Paul Gries, Jennifer Campbell and Jason Montojo, - “Practical Programming: An Introduction to Computer Science using Python 3”, Second edition, Pragmatic Programmers, LLC, 2013.



<b>122CMT06</b>	<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:**

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

**PART-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.

**PART-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 IC 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 HOURS:45**

**COURSE OUTCOMES:**

*The students will have an ability to*

CO1: Explain the usage of construction material and proper selection of construction materials.

CO2: Design building structures.

CO3: Gain knowledge on manufacturing processes like foundry, welding and forging.

CO4: Demonstrate working principles of petrol and diesel engine and the components used in power plants.

CO5: Explain the components of Refrigeration and Air conditioning cycle.

**TEXT BOOKS:**

1. Ranganath G and Channankaiah, “Basic Engineering Civil & Mechanical”, S.S.Publishers, 2014.
2. Shanmugam G and Palanichamy M S, “Basic Civil and Mechanical Engineering”, Tata McGraw Hill Publishing Co., New Delhi, 3rd Edition, 2018.

**REFERENCE BOOKS:**

1. Shanmugasundaram. S and Mylsamy. 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, 3rd Edition reprint, 2013.
3. Gopalakrishna K R, “Elements of Mechanical Engineering”, Subhas Publications, Bangalore, 2008.
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, 2015.
6. Shantha Kumar S R J, “Basic Mechanical Engineering”, Hi-TechPublications, Mayiladuthurai, 2001.

122CYP07	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.

122PHP07	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.

122EPP08	ENGINEERING PRACTICE LABORATORY (Common to all Non-Circuit Branches)	L	T	P	C
		0	0	2	1

**OBJECTIVES:**

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

**PART –A (MECHANICAL)****LIST OF EXPERIMENTS****WELDING:**

Study of Electric Arc welding equipment's.

Preparation of welding joints:

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

**SHEET METAL WORK:**

Study of sheet metal tools and operations

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

**PLUMBING WORKS:**

Study of pipeline joints and house hold fittings.

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

**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*

CO1: Weld various joints in steel plates using arc welding work; Assemble simple mechanical assembly of common household equipment's; Make a tray out of metal sheet using sheet metal work.

CO2: Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work

CO3: Wire various electrical joints in common household electrical wire work. CO4: Basic knowledge about electrical appliances.

CO5: Basic knowledge about electronics devices.

122PPP08	<b>PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY</b> (Common to all Circuit Branches)	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**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. To import specific items from a library module.
16. Developing a game activity using Pygame like bouncing ball, car race etc.

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

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

- CO1: Write, test, and debug simple Python programs.  
 CO2: Implement Python programs with conditionals and loops.  
 CO3: Develop Python programs step-wise by defining functions and calling them. CO4: Use Python lists, tuples, dictionaries for representing compound data.  
 CO5: Read and write data from/to files in Python

**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

222ENI01	<b>PROFESSIONAL ENGLISH-II</b> (Embedded Course - 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 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 - A 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.

222MAT02	PROBABILITY AND STATISTICS (Common to all Branches)	L	T	P	C
		3	1	0	4

**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.

**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.

222EST03	ENVIRONMENTAL SCIENCES AND SUSTAINABILITY (Common to all Branches)	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 non renewable 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 (OHSAS). 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 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 Carbon Credit, 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 contribute to the sustainable measures to preserve them for future generations.
4. To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.
5. To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.

**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. Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2013.

222PPI04	PYTHON PROGRAMMING (Integrated Course) (Common to all Non Circuit Branches)	L	T	P	C
		3	0	2	4

**OBJECTIVE(S):**

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

**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)

**PYTHON PROGRAMMING LABORATORY****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 h**

**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

**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”, 2nd 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.

222MST05	MATERIAL SCIENCE (Common to ME, AE, CE and CH)	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 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 -relation between lattice parameter and density.

**UNIT II: CONDUCTING AND DIELECTRIC 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 – Band theory of solids.

Dielectric Materials: Electric force, electric field, electrical susceptibility, dielectric constant, polarization and polarizability - dielectric loss - dielectric breakdown.

**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: MAGNETIC MATERIALS****6**

Definition - Magnetic field, magnetic force, magnetic induction, Bohr magneton, permeability, magnetic susceptibility - Dia, para and ferro magnetism - Domain theory - Hysteresis loop - Antiferromagnetism -ferri magnetism - ferrites.

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

Shape memory alloys (SMA): Working principle of SMA - characteristics - Hysisteris, 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
3. Information Science, Academic Press, 2013.
4. V.V.Mitin, V.A. Kochelap and M.A.Stroscio, Introduction to Nanoelectronics, Cambridge 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.

222EMT06	ENGINEERING MECHANICS (ME, AE, CE)	L	T	P	C
		3	0	0	3

**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.

PRE-REQUISITES: Knowledge of Engineering Physics

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

Introduction-Units and Dimensions-Laws of mechanics - Lamé'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 Coloumb friction - Simple contact friction - Rolling resistance - Belt friction - Ladder friction - wedge friction.

**TOTAL: 45 Hours**

**COURSE OUTCOMES:**

The students will be able to

1. Explain the differential principle applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
2. Find solution for problems related to equilibrium of particles.
3. Solve the Moment of inertia for different 2-D plane figures.
4. Analyse the forces in any structures.
5. 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.

222PHP01	ENGINEERING PHYSICS LABORATORY (Common to all Non 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.

222HST07	HERITAGE OF TAMILS	L	T	P	C
		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, Leather puppetry, 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:Department ofArchaeology & 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) (Published by: The Author)

S.No.	Course Code	Course Title	Category	L	T	P	C
<b>THEORY</b>							
1	322MAT01	Transforms and Partial Differential Equations	BS	3	1	0	4
2	322CET02	Mechanics of Solids	PC	3	1	0	4
3	322CET03	Mechanics of Fluids	PC	3	0	0	3
4	322CET04	Surveying – I*	PC	3	0	2	4
5	322CET05	Water supply and Waste water Engineering	PC	3	0	0	3
6	322CET06	Construction Materials, Techniques and Equipments	ES	2	0	0	2
7	322CEV01	Professional Development	EEC	1	0	0	1
<b>PRACTICALS</b>							
7	322CEP07	Water supply and Waste water Analysis Laboratory	PC	0	0	2	1
8	322CEP08	Computer Aided Design-I	PC	0	0	2	1
	<b>TOTAL</b>			18	2	6	22

(Common to branches of B.E. Aeronautical Engineering, B.E. Biomedical Engineering, B.E. Civil Engineering, B.E. Electrical and Electronics Engineering, B.E. Mechanical Engineering / B.Tech. Biotechnology & B.Tech. Chemical Engineering Degree Programmes)

### Course Objectives

- To learn various methods to solve the partial differential equations.
- To introduce Fourier series analysis which plays a vital role in many applications in engineering.
- To understand the boundary value problems and to obtain the solution using partial differential equations.
- To acquaint the Fourier transform techniques used in wide variety of situations.
- To develop z-transform techniques which analyze the discrete time signals.

### UNIT I PARTIAL DIFFERENTIAL EQUATIONS

9+3

Solutions of first order partial differential equations-Standard types-Singular solutions-Lagrange's Linear equation-Method of grouping and Method of multipliers-Solution of homogeneous and non-homogenous linear equations of second and higher order with constant coefficients.

### UNIT II FOURIER SERIES

9+3

Dirichlet's conditions – General Fourier series – Change of scale - Odd and even functions – Half-range Sine and Cosine series – Parseval's identity applications – Harmonic Analysis.

### UNIT III BOUNDARY VALUE PROBLEMS

9+3

Classification of Partial Differential Equations – Method of separation of Variables – Solutions of one dimensional wave equations and One-dimensional heat equations –Applications using Fourier series solutions in Cartesian coordinates - Steady state solution of two-dimensional heat equation.

### UNIT IV FOURIER TRANSFORMS

9+3

Fourier integral theorem – Fourier transform pair - Sine and Cosine transforms – Properties – Fourier Transform of simple functions – Convolution theorem (statement and applications only) – Parseval's identity (statement and applications only).

### UNIT V Z – TRANSFORMS

9+3

Z-Transform - Elementary properties and applications – Initial and final value theorems (statement and applications only) - Inverse Z-Transform – Partial fractions method, Residue theorem method and Convolution theorem (statement and applications only) - Solution of difference equations by applying Z-transforms.

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

### Course Outcomes

After completing this course, the student will be able to

- CO 1:** Know the methods to solve partial differential equations occurring in various physical and engineering problems.
- CO 2:** Describe an oscillating function which appears in a variety of physical problems by Fourier series which helps them to understand its basic nature deeply.
- CO 3:** Acquire the knowledge to construct partial differential equations with initial and boundary conditions for various physical and engineering real time problems and obtaining solution using Fourier series methods.
- CO 4:** Apply the Fourier transform techniques in engineering field.
- CO 5:** Gain the concept of analysis of linear discrete system using Z-transform approach.

### TEXT BOOK

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

### REFERENCES

1. Andrews L.C and Shivamoggi. B.K., "Integral Transforms for Engineers", SPIE Press Book, 1999
2. Wylie C R and Barrett L C, "Advanced Engineering Mathematics", 6<sup>th</sup> Edition, McGraw-Hill Co., New Delhi, 1995.
3. T.Veerarajan,"Engineering Mathematics-III", Tata McGraw-Hill Publishing company, New Delhi,2015.
4. P.Kandasamy, K.Thilagavathy, K.Gunavathy, " Engineering Mathematics-III", S.Chand Publishers,2015.
5. V.Prameelakaladharan and G.Balaji ,"Engineering Mathematics-III", Amrutha marketing, Chennai,2016.





**TEXTBOOKS:**

1. Rajput.R.K. "Strength of Materials", S.Chand and Co, New Delhi,2015.
2. Punmia.B.C., Ashok Kumar Jain and Arun Kumar Jain, SMTS –I Strength of materials, Laxmi publications. New Delhi,2015

**REFERENCES:**

1. Timoshenko.S.B. and Gere.J.M, "Mechanics of Materials", Van NosReinbhold, New Delhi 1999.
2. Singh. D.K., "Strength of Materials", Ane Books Pvt. Ltd., New Delhi,2016
3. Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., New Delhi,2009.
4. Rattan . S. S, "Strength of Materials", Tata McGraw Hill Education Private Limited, New Delhi,2012
5. Bansal. R.K. "Strength of Materials", Laxmi Publications Pvt. Ltd., New Delhi,2010

**COURSE OBJECTIVES:**

- To introduce the students about properties and Behaviour of the fluids under static conditions.
- To impart basic knowledge of the dynamics of fluids through the control volume approach
- To expose to the applications of the conservation laws.
- To understand a) flow measurements b) flow through pipes (both laminar and turbulent) and c) forces on pipe bend.
- To know the significance of boundary layer theory and its applications.

**UNIT I FLUIDS PROPERTIES AND FLUID STATICS 12**

Scope of fluid mechanics – Definitions of a fluid – Methods of analysis – Continuum hypothesis – System and Control volume approach – Reynolds's transportation theorem – Fluid properties – Fluid statics – Manometer – Forces on plane and curved surfaces – Buoyancy and floatation – Stability of floating bodies.

**UNIT II BASIC CONCEPTS OF FLUID FLOW 12**

Kinematics: Classification of flows – Streamline, streak-line and path-lines – Stream function and velocity potentials – Flow nets;  
 Dynamics : Application of control volume to continuity, energy and momentum – Euler's equation of motion along a stream line – Bernoulli's equation – Applications to velocity and discharge measurements – Linear momentum equation – Application to Pipe bends – Moment of momentum equation.

**UNIT III DIMENSIONAL ANALYSIS AND MODEL STUDIES 12**

Fundamental dimensions – Dimensional homogeneity – Rayleigh's method and Buckingham Pi theorem – Dimensionless parameters – Similitude and model studies – Distorted and undistorted models.

**UNIT IV INCOMPRESSIBLE VISCOUS FLOW 12**

Reynolds experiment – Laminar flow in pipes and between parallel plates – Development of laminar and turbulent flows in pipes – Darcy-Weisbach equation – Moody diagram – Major and minor losses of flow in pipes – Total energy line – Hydraulic grade line – Siphon – Pipes in series and parallel – Equivalent pipes.

**UNIT V BOUNDARY LAYERS 12**

Definition of boundary layers – Laminar and turbulent boundary layers – Displacement, momentum and energy thickness – Momentum integral equation – Applications – Separation of boundary layer- Drag and Lift forces.

**TOTAL HOURS TO BE TAUGHT****60 HOURS****COURSE OUTCOMES:**

On completion of the course, the student is expected to

- CO1 Demonstrate the difference between solid and fluid, its properties and behaviour in static conditions.
- CO2 Apply the conservation laws applicable to fluids and its application through fluid kinematics and dynamics.
- CO3 Formulate the relationship among the parameters involved in the given fluid phenomenon

and to predict the performance of prototypes by model studies.

CO4 Estimate the losses in pipelines for both laminar and turbulent conditions and analysis of pipes connected in series and parallel.

CO5 Explain the concept of boundary layer and its application to find the drag force exerted by the fluid on the flat solid surface.

**TEXTBOOKS:**

1. Modi P.N and Seth Hydraulics and Fluid Mechanics including Hydraulic Machines Standard Book House New Delhi. 2015.
2. Streeter, V.L. Wylie, E. B. and Bedford K.W, Fluid Mechanics. (9<sup>th</sup> Ed.) Tata McGraw Hill, New Delhi, 1998.

**REFERENCES:**

1. S K Som; Gautam Biswas and S Chakraborty, Introduction to Fluid Mechanics and Fluid Machines, Tata McGraw Hill Education Pvt. Ltd., 2012.
2. Pani B S, Fluid Mechanics: A Concise Introduction, Prentice Hall of India Private Ltd, 2016.
3. Jain A. K. Fluid Mechanics including Hydraulic Machines, Khanna Publishers, New Delhi, 2014.
4. Narayana Pillai N. Principles of Fluid Mechanics and Fluid Machines, (3<sup>rd</sup> Ed.) University Press (India) Pvt. Ltd. 2009.

**COURSE OBJECTIVES:**

- To introduce the rudiments of plane surveying
- To learn the various methods of plane and geodetic surveying
- To solve the real world problems.
- To introduce the concepts of Control Surveying.
- To introduce the basics of Astronomical Surveying

<b>UNIT I</b>	<b>FUNDAMENTALS OF CONVENTIONAL SURVEYING</b>	<b>9</b>
	Definition – Classifications – Basic principles – Equipment and accessories for ranging and chaining – Methods of ranging – Well conditioned triangles – Chain traversing – Compass – Basic principles – Types – Bearing – System and conversions – Sources of errors and Local attraction – Magnetic declination – Dip – compass traversing – Error of closure-Bowditch’s rule.	
<b>UNIT II</b>	<b>LEVELLING</b>	<b>9</b>
	Level line – Horizontal line – Datum – Benchmarks – Levels and staves – Temporary and permanent adjustments – Methods of leveling – Fly leveling – Check leveling – Procedure in leveling – Field Book– Reduction – Curvature and refraction – Reciprocal leveling – Precise leveling - Contouring.	
<b>UNIT III</b>	<b>THEODOLITE SURVEYING</b>	<b>9</b>
	Horizontal and vertical angle measurements – Temporary and permanent adjustments – Heights and distances – Tachometric surveying – Stadia Tachometry – Tangential Tachometry – Trigonometric leveling – Single Plane method – Double Plane method.	
<b>UNIT IV</b>	<b>CONTROL SURVEYING AND ADJUSTMENT</b>	<b>9</b>
	Horizontal and vertical control – Methods – Triangulation – Traversing – Gale’s table – Trilateration – Concepts of measurements and errors – Error propagation and Linearization – Adjustment methods - Least square methods – Angles, lengths and leveling network.	
<b>UNIT V</b>	<b>MODERN SURVEYING</b>	<b>9</b>
	Total Station: Digital Theodolite, EDM, Electronic field book – Advantages – Parts and accessories – Working principle – Observables – Errors - COGO functions – Field procedure and applications. PS: Advantages – System components – Signal structure – Selective availability and anti spoofing receiver components and antenna – Planning and data acquisition – Data processing – Errors in GPS – Field procedure and applications – Drone Surveying- Basics and applications	
		<b>TOTAL 45 PERIODS</b>

**COURSE OUTCOMES:**

On completion of the course, the student is expected to

- CO1 Introduce the rudiments of various surveying and its principles.
- CO2 Imparts knowledge in computation of levels of terrain and ground features
- CO3 Imparts concepts of Theodolite Surveying for complex surveying operations
- CO4 Understand the procedure for establishing horizontal and vertical control
- CO5 Imparts the knowledge on modern surveying instruments

**TEXTBOOKS:**

1. Dr. B. C. Punmia, Ashok K. Jain and Arun K Jain, Surveying Vol. I & II, Lakshmi Publications Pvt Ltd, New Delhi, Sixteenth Edition, 2016.
2. T. P. Kanetkar and S. V. Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 2008.

**REFERENCES:**

1. R. Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
2. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, Mc Graw Hill 2001.
3. Bannister and S. Raymond, Surveying, Seventh Edition, Longman 2004.
4. S. K. Roy, Fundamentals of Surveying, Second Edition, Prentice Hall of India 2010.
5. K. R. Arora, Surveying Vol I & II, Standard Book house, Twelfth Edition 2013.
6. C. Venkatramaiah, Textbook of Surveying, Universities Press, Second Edition, 2011.

**SURVEYING LABORATORY**

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

**COURSE OBJECTIVE:**

- At the end of the course the student will possess knowledge about survey field techniques.
- To use leveling instrument for surveying operation.
- To use theodolite for various surveying operations.
- To carry out necessary surveys for social infrastructures.
- To prepare plan metric maps.

**LIST OF EXPERIMENTS:****Chain and Compass Survey**

1. Study of chains and its accessories, Aligning, Ranging, Chaining and Marking Perpendicular offset
2. Setting out works – Foundation marking using tapes single Room and Double Room
3. Compass Traversing – Measuring Bearings & arriving included angles

**Levelling** - Study of levels and levelling staff

4. Fly levelling using Dumpy level & Tilting level
5. Check levelling

**Theodolite** - Study of Theodolite

6. Measurements of horizontal angles by reiteration and repetition and vertical angles
7. Determination of elevation of an object using single plane method when base is Accessible/ inaccessible.

**Tacheometry** – Tangential system – Stadia system

8. Determination of Tachometric Constants
9. Heights and distances by stadia Tachometry
10. Heights and distances by Tangential Tachometry

TOTAL: 45 PERIODS

**COURSE OUTCOMES**

On completion of the course, the student is expected to

- CO1 Impart knowledge on the usage of basic surveying instruments like chain/tape, compass and levelling instruments
- CO2 Able to use levelling instrument for surveying operations
- CO3 Able to use theodolite for various surveying operations
- CO4 Able to carry out necessary surveys for social infrastructures
- CO5 Able to prepare planimetric maps

**REFERENCES:**

1. T. P. Kanetkar and S. V. Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 24<sup>th</sup> Reprint, 2015.
2. Dr. B. C. Punmia, Ashok K. Jain and Arun K Jain, Surveying Vol. I & II, Lakshmi Publications Pvt Ltd, New Delhi, 17<sup>th</sup> Edition, 2016.
3. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, McGraw Hill 2001
4. Bannister and S. Raymond, Surveying, Seventh Edition, Longman 2004 a. David Clark, Plane and Geodetic Surveying for Engineers, Volume I, Constable and Company Ltd, London, CBS, 6<sup>th</sup> Edition, 2004.
5. David Clark and James Clendinning, Plane and Geodetic Surveying for Engineers, Volume II, Constable and Company Ltd, London, CBS, 6<sup>th</sup> Edition, 2004.
6. S. K. Roy, Fundamentals of Surveying, Second Edition, Prentice 'Hall of India 2004
7. K. R. Arora, Surveying Vol. I & II, Standard Book house, Eleventh Edition, 2013.

**COURSE OBJECTIVES:**

- To introduce students to various components
- To design of water supply scheme
- To know the water treatment methods, water storage distribution system, sewage treatment and disposal
- To design the intake structures and sewerage system.
- To understand the concept of sludge disposal and treatment.

**UNIT I WATER SUPPLY 12**

Estimation of surface and subsurface water resources - Predicting demand for water- Impurities of water and their significance - Physical, chemical and bacteriological analysis - Waterborne diseases - Standards for potable water. Intake of water: Pumping and gravity schemes.

**UNIT II WATER TREATMENT 12**

Objectives - Unit operations and processes - Principles, functions, and design of water treatment plant units, aerators of flash mixers, Coagulation and flocculation — Clarifloccuator - Plate and tube settlers - Pulsator clarifier - sand filters - Disinfection - softening, removal of iron and manganese - Defluoridation - Softening - Desalination process - Residue Management - Construction, Operation and Maintenance aspects

**UNIT III WATER STORAGE AND DISTRIBUTION 12**

Storage and balancing reservoirs - types, location and capacity- Distribution system: layout, hydraulics of pipe lines, pipe fittings, valves including check and pressure reducing valves, meters, analysis of distribution systems, leak detection, maintenance of distribution systems, pumping stations and their operations - House service connections.

**UNIT IV PLANNING AND DESIGN OF SEWERAGE SYSTEM 12**

Characteristics and composition of sewage - Population equivalent - Sanitary sewage flow estimation - Sewer materials - Hydraulics of flow in sanitary sewers - Sewer design - Storm drainage-Storm runoff estimation - Sewer appurtenances - Corrosion in sewers - Prevention and control — Sewage pumping-drainage in buildings - Plumbing systems for drainage

**UNIT V SEWAGE TREATMENT AND DISPOSAL 12**

Objectives - Selection of Treatment Methods - Principles, Functions, - Activated Sludge Process and Extended aeration systems - Trickling filters - Sequencing Batch Reactor(SBR) - UASB - Waste Stabilization Ponds - Other treatment methods - Reclamation and Reuse of sewage - Recent Advances in Sewage Treatment - Construction, Operation and Maintenance aspects. - Discharge standards-sludge treatment -Disposal of sludge

**TOTAL: 60 PERIODS****COURSE OUTCOMES:**

On completion of the course, the student is expected to

CO1 Understand the various components of water supply scheme and design of intake structure and conveyance system for water transmission

CO2 Understand on the characteristics and composition of sewage, ability to estimate sewage generation and design sewer system including sewage pumping stations

CO3 Understand the process of conventional treatment and design of water and wastewater treatment system and gain knowledge of selection of treatment process and biological treatment process

CO4 Ability to design and evaluate water distribution system and water supply in buildings and understand the self-purification of streams and sludge and septage disposal methods.

CO5 Able to understand and design the various advanced treatment system and knowledge about the recent advances in water and wastewater treatment process and reuse of sewage

**TEXTBOOKS:**

1. Garg, S.K. Environmental Engineering, Vol.I , Vol.II, Khanna Publishers, New Delhi, 2010.
2. Duggal K.N., "Elements of Environmental Engineering" S. Chand and Co. Ltd., New Delhi, 2014.
3. Punmia, B.C., Jain, A.K., and Jain.A.K., Environmental Engineering, Vol.II, LaxmiPublications, 2010.

**REFERENCES:**

1. Punmia B.C, Ashok Jain and Arun Jain, Water Supply Engineering, Laxmi Publications (P) Ltd., New Delhi 2010.
2. Modi, P.N., Water Supply Engineering, Vol.I Standard Book House, New Delhi, 2016.
3. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.
4. Syed R. Qasim and Edward M. Motley Guang Zhu, Water Works Engineering Planning, Design of Urban Development and Operation, Prentice Hall of India Learning Private Limited, New Delhi, 2009.
5. Metcalf and Eddy – Waste water Engineering – Treatment and Reuse, Tata Mc. Graw – Hill Company, New Delhi, 2010.
6. Syed R.Qasim "Waste water Treatment Plants", CRC Press, Washington D.C., 2010
7. Gray N.F, "Water Technology", Elsevier India Pvt.Ltd. New Delhi, 2006.



**COURSE OBJECTIVES:**

- To introduce students to various construction materials and the techniques that are commonly used in civil engineering construction.
- To recognize the market forms of timber, steel, aluminum.
- To identify the best construction and service practices such as thermal insulations and air conditioning of the building.
- To select various equipment for construction works conditioning of building.
- To understand the construction planning and scheduling techniques.

**UNIT I STONES - BRICKS - CONCRETE BLOCKS - LIME 9**

Stone as building material – Criteria for selection – Tests on stones – Bricks – Classification – Manufacturing of clay bricks – Tests on bricks – Efflorescence – Lime – Preparation of lime mortar – Concrete hollow blocks – Lightweight concrete blocks- Porotherm bricks.

**UNIT II OTHER MATERIALS 9**

Timber – Market forms – Plywood – Veneer – False ceiling materials – Steel – Mechanical treatment – Aluminium – Uses – Market forms – Glass – Ceramics – Refractories – Composite Materials – Types and applications – FRP – Fibre textiles – Geo-fibres and fabrics, UPVC for Civil Engineering.

**UNIT III CONSTRUCTION PRACTICES & SERVICE REQUIREMENTS 9**

Types of Foundations – Shallow and Deep Foundations – Stone Masonry – Brick Masonry – Plastering and Pointing – Cavity Walls – Diaphragm Walls – Formwork – Centring and Shuttering – Scaffolding – Underpinning – Roofing – Flooring – Joints in concrete – Fire Protection – Thermal Insulation – Ventilation and Air conditioning – Acoustics and Sound Insulation – Damp Proofing and anti-termite measures.

**UNIT IV CONSTRUCTION EQUIPMENTS 9**

Selection of equipment for earthwork excavation, concreting, material handling and erection of structures – Dewatering and pumping equipment- Tunnel boring

**UNIT V CONSTRUCTION PLANNING 9**

Introduction to construction planning – Scheduling for activities – Critical path method (CPM) PERT and GERT – Case illustrations.

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

Students will be able to

CO1 Identify the good quality brick, stone and blocks for construction.

CO2 Recognize the market forms of timber, steel, aluminum and applications of various composite materials.

CO3 Identify the best construction and service practices such as thermal insulations and air conditioning of the building.

CO4 Select various equipments for construction works conditioning of building

CO5 Understand the construction planning and scheduling techniques

**TEXTBOOKS**

1. Varghese.P.C, Building Materials, Second Edition PHI Learning Ltd., 2015.
2. Arora S.P and Bindra S.P Building construction, Dhanpat Rai and sons, 2013.

**REFERENCES:**

1. SP 62 (1997) : Handbook on Building construction practices.
2. Varghese.P.C, Building Construction, Second Edition PHI Learning ltd., 2016.
3. Punmia ,B.C Building construction , Laxmi publication (p)ltd.,2008.
4. Peurifoy R.L., Schexnayder,C.J., Shapira A., Schmitt.R., Construction Planning Equipment and Methods, Tata McGraw-hill, 2011.
5. Srinath L.S.,PERT and CPM -Principles and applications, Affiliated East West Press 2001

**COURSE OBJECTIVE:**

This subject includes the list of experiments to be conducted for characterization of water and municipal sewage. At the end of the course, the student is expected to be aware of the procedure for quantifying quality parameters for water and sewage.

- To know the calibration and standardization of the equipment.
- To understand the proper procedure for the collection of samples,
- To be aware of the sample preservation methods.
- To perform field oriented testing of water, wastewater.
- To perform coliform analysis.

**LIST OF EXPERIMENTS: ANALYSIS OF WATER SAMPLE**

1. Sampling and preservation methods for water and wastewater (Demonstration only)
2. Measurement of Electrical conductivity and turbidity
3. Determination of fluoride in water by spectrophotometric method /ISE
4. Determination of iron in water (Demo)
5. Determination of Sulphate in water
6. Determination of Optimum Coagulant Dosage by Jar test apparatus
7. Determination of available Chlorine in Bleaching powder and residual chlorine in water

**ANALYSIS OF WASTEWATER SAMPLE**

8. Estimation of suspended, volatile and fixed solids
9. Determination of Sludge Volume Index in waste water
10. Determination of Dissolved Oxygen
11. Estimation of B.O.D.
12. Estimation of C.O.D.

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

On completion of the course, the student is expected to

CO1 Calibrate and standardize the equipment

CO2 Collect proper sample for analysis

CO3 know the sample preservation methods

CO4 Able to perform field oriented testing of water

CO5 Able to perform waste water analysis

**REFERENCES:**

1. APHA, "Standard Methods for the Examination of Water and Waste water", 22<sup>nd</sup> Ed. Washington, 2012.
2. Laboratory Manual for the Examination of water, wastewater soil Rump", H.H. and Krist,H. – Second Edition, VCH, Germany, 3rd Edition, 1999.
3. "Methods of air sampling & analysis", James Pledge Jr (Editor) 3rd Edition, Lewis publishers,Inc,USA,1989.

**OBJECTIVES**

- To draft on computer building drawings (Plan, elevation and sectional views) of a load bearing walls
- To draft on computer building drawings (Plan, elevation and sectional views) of a details of doors and windows
- To draft on computer of one and two storey RCC Framed structures
- To draft on computer of a different types of trusses
- To learn the principle to draw perspectives views of one and two storey buildings

**LIST OF EXPERIMENTS :**

1. Drawing of buildings with load bearing walls (Drawing of Flat and pitched roof) – including details of doors and windows
2. RCC framed structures – One and Two storey building(Plan, Section and Elevation)
3. Industrial buildings – North light roof structures – Trusses
4. Perspective view of one and two storey buildings

**COURSE OUTCOMES:**

**After undergoing the course, the students will have ability to**

- CO.1 Draw the load bearing walls
- CO.2 Draw the details of doors and windows
- CO.3 Draw the different types of roofs trusses
- CO.4 Draw the plan sectional elevation of a structure
- CO.5 Draw the different views of a structure

**REFERENCE:**

1. Building drawing – Shah, Tata McGraw-Hill
2. Building planning & Drawing – Dr. N. Kumaraswamy, A. KameswaraRao, Charotar Publishing
3. Shah, Kale and Patki, Building Drawing, Tata McGraw-Hill.