CHENNAI INSTITUTE OF TECHNOLOGY
(AUTONOMOUS)
CHENNAI
REGULATION 2022
CHOICE BASED CREDIT SYSTEM

B. E./B.TECH COMMON TO ALL BRANCHES

PROGRAM OUTCOMES (POs)

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

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SYLLABI FOR SEMESTER – I

S.No	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	IP2100	Induction Programme	-	-	-	-	-	0
THEORY								
2.	HS2101	Communicative English - I	HSMC	3	0	0	3	3
3.	MA2102	Matrices and Calculus	BSC	3	1	0	4	4
4.	PH2103	Engineering Physics	BSC	3	0	0	3	3
5.	CH2104	Engineering Chemistry	BSC	3	0	0	3	3
6.	CS2105	Problem Solving using Python	ESC	3	0	0	3	3
7.	ES2106	Employability Enhancement Skills	EES	3	0	0	3	3
PRACTICALS								
8.	BS2107	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
9.	CS2108	Problem Solving using Python Laboratory	ESC	0	0	4	4	2
10.	HS2109	Communicative English Laboratory	EEC	0	0	2	2	1
			TOTAL	18	1	10	29	24

IP2100   **INDUCTION PROGRAMME**

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

 "Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

 "One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. "

Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Physical Activity
       This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc.

(ii) Creative Arts
       Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it everyday for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later.

(iii) Universal Human Values
       This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity
        Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules
        This would address some lacunas that students might have, for example, English, computer familiarity etc.

(vi) Lectures by Eminent People
       Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

(viii) Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(ix) Department Specific Activities

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering /Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

References:
Guide to Induction program from AICTE

HS2101   **COMMUNICATIVE ENGLISH - I**   **L T P C**
                                                                                   3 0 0 3

COURSE OBJECTIVES:
- To develop vocabulary competency.
- To learn to use basic grammatical structures in suitable contexts.
- To identify syntax errors in a written text.
- To make learners write instructions, recommendations, and product descriptions.
- To develop learners' ability to write summaries, articles, blogs, definitions and essays.

Unit I – Fundamentals of Communication   9
Vocabulary – Synonyms & Antonyms and One Word Substitutes. **Grammar** – Tenses and Question Types.
Writing – Introducing oneself and others, E-mail writing and Paragraph Writing

Unit II – Definitions and Instructions   9
Vocabulary – Abbreviation & Acronyms and Word Forms. **Grammar** – Prepositions and Imperatives. **Writing** –
Instructions and Definitions

Unit III – Description of a Process / Product   9
Vocabulary – Homonyms & Homophones, Phrasal Verbs and Compound Nouns. **Grammar** – Adjectives,
Degrees of Comparison and Articles. **Writing** – Product Description, Process Description and
Recommendations

Unit IV – Decoding Non-Verbal Data   9
Vocabulary – Fixed & Semi-fixed expressions, Discourse Markers and Collocation **Grammar** – Possessive &
Relative Pronouns and Punctuation. **Writing** – Decoding Pictorial Data

Unit V – Narration and Expression   9
Vocabulary – Cause & Effect Expressions, Content and Function Words. **Grammar**-Negation, Types of
Sentences & Error Spotting. **Writing** – Descriptive & Narrative Essays.

                                                    TOTAL: 45 PERIODS

COURSE OUTCOMES:
At the end of the course, learners will be able
- To use appropriate words in a professional context
- To gain an understanding of basic grammatical structures and use them in the right context.
- To communicate and write without syntax errors.
- To write recommendations, instructions, and product descriptions.
- To write summaries, articles, blogs, definitions, and essays.

Text Books:
1.English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna
University, (2020 edition)
2.English for Science & Technology Cambridge University Press, 2021.Authored by Dr. Veena Selvam, Dr.
Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of
English, Anna University.

References:
1.Technical Communication – Principles And Practices By Meenakshi Raman &Sangeeta Sharma, Oxford
Univ. Press, 2016, New Delhi.
2.A Course Book On Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.

MA2102   **MATRICES AND CALCULUS**   **L T P C**
                                                                              3 1 0 4
COURSE OBJECTIVE

- To develop the use of matrix algebra techniques that is needed by engineers for practicalapplications
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals andtheir applications

UNIT I   MATRICES   9 + 3

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications: Stretching of an elastic membrane.

UNIT II DIFFERENTIAL CALCULUS   9 + 3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications: Maxima and Minima of functions of one variable.

UNIT III   FUNCTIONS OF SEVERAL VARIABLES   9 + 3

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV INTEGRAL CALCULUS   9 + 3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications: Hydrostatic force and pressure, moments and centres of mass.

UNIT V   MULTIPLE INTEGRALS   9 + 3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves - Triple integrals - Volume of solids - Change of variables in double and triple integrals - Applications: Moments and centres of mass, moment of inertia.

                                                                    TOTAL: 60 PERIODS
COURSE OUTCOMES
     At the end of the course the students will be able to
- Use the matrix algebra methods for solving practical problems.
- Apply differential calculus tools in solving various application problems.
- Able to use differential calculus ideas on several variable functions.
- Apply different methods of integration in solving practical problems.
- Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXT BOOKS

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, NewDelhi, 2016.
2. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition ,2018.
3. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES

1. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016
2. Bali. N., Goyal. M. and Watkins. C.,"A d v a n c e d Engineering Mathematics ", FirewallMedia (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3. Jain . R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications,New Delhi, 5th Edition, 2016.
4. Narayanan. S.and Manicavachagam Pillai. T.K.,"Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Ramana. B.V., " Higher Engineering Mathematics ", McGraw Hill Education Pvt. Ltd,New Delhi,2016.
6. Srimantha Pal and Bhunia. S.C, " Engineering Mathematics " Oxford University Press, 2015.
7. Thomas. G. B., Hass. J, and Weir. M.D, " Thomas Calculus ", 14th Edition, Pearson India, 2018.

PH2103   **ENGINEERING PHYSICS**   **L T P C**
                                                                        3 0 0 3

COURSE OBJECTIVE
- To make the students effectively to achieve an understanding of mechanics.
- To enable the students to gain knowledge of Properties of matter and its applications.
- To introduce the basics of Fibre optics.
- To motivate the students towards the applications of Laser
- Equipping the students to be successfully understand the importance of quantum physics

UNIT I   MECHANICS   9
Multi-particle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM –kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia-theorems of M.I-moment of inertia of continuous bodies (Ring, Disc)-moment of inertia of diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum-rotational energy state of a rigid diatomic molecule-gyroscope -torsional pendulum-double pendulum -Introduction to nonlinear oscillations

UNIT II   PROPERTIES OF MATTER   9
Elasticity-Hooke'slaw-Relationship between three modulii of elasticity (quantitative)-stress-strain diagram-Poisson's ratio-Factors affecting elasticity-bending of beams- Bending moment-Depression of a cantilever: theory and experiment- Young's modulus by uniform bending and non uniform bending: theory and experiment-I-shapedgirders

UNIT III   FIBRE OPTICS   9
Reflection and refraction of light waves-interference-Michelson interferometer –Theory of air wedge and experiment-total internal reflection-Fiber optics: Principle, Numerical aperture and acceptance angle -types of optical fibers (material, refractive index, mode)- fibre optic communication- losses associated with optical fibers- fibre optic sensors: pressure and displacement- medical endoscope..

UNIT IV   LASER   9
Theory of laser - characteristics -Spontaneous and stimulated emission-Components of Laser-Pumping methods-Optical Resonator-Active medium and Active centre-Einstein's coefficients-population inversion-Types of laser-Nd-YAGlaser,CO_2laser,Semiconductor lasers: homojunction and heterijunction- Applications of lasers inindustry and military.

UNIT V   QUANTUM MECHANICS   9
Photons and light waves-Electrons and matter waves-Compton effect: theory and experimental verification-Concept of wave function and physical significance- The Schrodinger equation(Time dependent and time independent forms) - meaning of wave function - Normalization -Freeparticle - particle in a infinite potential well: 1D,2D and 3D Boxes-Barrier penetration and quantum tunneling(qualitative)-Tunneling microscope.

                                                        TOTAL: 45 PERIODS

    COURSE OUTCOMES
        After completion of this course, the students should be able to
- Understand the importance of mechanics.
- Express their knowledge in properties of matter
- Demonstrate a strong foundational knowledge in fibre optics.
- Comprehend and apply laser principles.
- Understand the importance of quantum physics.

TEXT BOOKS

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education(IndianEdition), 2017.
2. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics,McGraw-Hill (Indian Edition), 2017.
3. Gaur R.K. and Gupta S.L. Engineering Physics. Dhanpat Rai publishers, 2009

REFERENCES

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition),2009.
2. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications,(Indian Edition), 2019.
3. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
4. Searls and Zemansky. University Physics, 2009

CH2104   **ENGINEERING CHEMISTRY**   **L T P C**
                                                                            3 0 0 3

COURSE OBJECTIVES:
- To inculcate sound understanding of water quality parameters and water treatmenttechniques.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.
- The student should be conversant with the principles electrochemistry, electrochemical cells, emf and applications of emf measurements. Principles of corrosion control

UNIT I   WATER AND ITS TREATMENT   9
Water: Sources and impurities, Water quality parameters: Definition and significance of pH, hardness, alkalinity, TDS, COD and BOD. Desalination of brackish water: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming &foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment Ion exchange demineralisation and zeolite process.

UNIT II   NANOCHEMISTRY   9
Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: solvothermal, laser ablation, chemical vapour deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

UNIT III   FUELS AND COMBUSTION   9
Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil - cetane number; Power alcohol and biodiesel.
Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoreticalcalculation of calorific value; Flue gas analysis - ORSAT Method. CO_2 emission and carbon foot print.

UNIT IV   ENERGY SOURCES AND STORAGE DEVICES   9
Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applicationsof solar cells; recent developments in solar cell materials. Wind energy; Geothermal energy; Batteries: Types of batteries, Primary battery - dry cell, Secondary battery - lead acid batteryand lithium-ion-battery; Electric vehicles-working principles; Fuel cells: H_2-O_2 fuel cell, microbialfuel cell; Super capacitors: Storage principle, types and examples

UNIT V   ELECTRO CHEMISTRY AND CORROSION   9
Electrochemical cells - reversible and irreversible cells - EMF - measurement of emf - Single electrode potential - Nernst equation (problem) - reference electrodes -Standard Hydrogen electrode -Calomel electrode - Ion selective electrode - glass electrode and measurement of pH - electrochemical series - significance-Chemical corrosion - Pilling - Bedworth rule - electrochemical corrosion - different types - galvanic corrosion - differential aeration corrosion - factors influencing corrosion - corrosion control - sacrificial anode and impressed cathodic current methods.

                                                                  .TOTAL: 45 PERIODS

COURSE OUTCOMES:
At the end of the course, the students will be able:
- To infer the quality of water from quality parameter data and propose suitable treatmentmethodologies to treat water.
- To identify and apply basic concepts of nanoscience and nanotechnology in designing thesynthesis of nanomaterials for engineering and technology applications.
- To apply the knowledge of phase rule and composites for material selection requirements.
- To recommend suitable fuels for engineering processes and applications.
- To recognize different forms of energy resources and apply them for suitable applications inenergy sectors.

TEXT BOOKS:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, DhanpatRai PublishingCompany (P) Ltd, New Delhi, 2018.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, NewDelhi, 2008.
3. S.S. Dara, "A text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.

REFERENCES:

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and MaterialsScience, 2018.
2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
5. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

CS2105   **PROBLEM SOLVING USING PYTHON**   **L T P C**
                                                                         3 0 0 3

COURSE OBJECTIVES:

- To understand the basics of algorithmic problem solving.
- To learn to solve problems using Python conditionals and loops.
- To define Python functions and use function calls to solve problems.
- To use Python data structures-lists, tuples, dictionaries to represent complex data.
- To do input/output with files in Python.

UNIT I   **COMPUTATIONALTHINKING AND PROBLEMSOLVING**   **9**
Identification of Computational Thinking -Algorithms, building blocks of algorithms (statements, state, control flow, functions), Algorithmic representation (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.

UNITII   **DATATYPES, EXPRESSIONS, STATEMENTS**   **9**
Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string and list; variables, expressions, statements, tuple assignment, Boolean values and operators, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNITIII   **CONTROLFLOW, FUNCTIONS, STRINGS**   **9**
Conditionals:conditional(if),alternative(if-else),chainedconditional (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; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNITIV   **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: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation,

UNITV   **FILES & MODULES**   **9**
Files and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, Modules(random, math, time, sys, date)Illustrative programs: word count, copy file, Voter's age validation, Marks range validation(0-100).

                                      TOTAL: 60 PERIODS

COURSE OUTCOMES:

On completion of the course, students will be able to:
- Develop algorithmic solutions to simple computational problems
- Develop and execute simple Python programs.
- Implement programs in Python using conditionals loopsand functions for solving problems..
- Process compound data using Python data structures.
- Utilize Python packages in developing software applications.

TEXTBOOKS:

1. Reema Thareja "Python Programming Using Problem Solving Approach" 2 nd Edition, Oxford University Press, 2017.
2. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
3. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving andProgramming",1st Edition, BCS Learning& Development Limited, 2017.

REFERENCES:

1. JohnVGuttag,"IntroductiontoComputationandProgrammingUsingPython:WithApplications to Computational Modeling and Understanding Data", Third Edition, MIT Press,2021
2. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition,2021.
3. GVenkateshandMadhavanMukund,"ComputationalThinking:APrimerforProgrammersand Data Scientists", 1st Edition, Notion Press, 2021.
4. EricMatthes,"PythonCrashCourse,AHands-onProjectBasedIntroductiontoProgramming",2nd Edition, NoStarch Press,2019.
5. https://www.python.org/
6. MartinC.Brown,"Python:TheCompleteReference",4thEdition,Mc-GrawHill,2018.

ES2106	**EMPLOYABILITY ENHANCEMENT SKILLS- I**	**L T P C**
		3 0 0 3

COURSE OBJECTIVES:
- To categorize, apply and use thought process to understand the concepts of Quantitative methods to enhance problem solving skills.
- To prepare and explain the fundamentals related to various possibilities with numeric ability and probabilities related to quantitative aptitude.
- To critically evaluate numerous possibilities related to puzzles.

UNIT I   **NUMBERS**   **9**
Introduction - Classification of numbers- Formation of Numbers (Small & Large) -Place Value - Face Value – Divisibility Rule – Prime, Composite Numbers - Prime Factorization- Number of factors – Number of factors (Odd & Even) -Sum of factors - Successors and Predecessors - Greatest Integer Value - Vedic Mathematics- Trailing Zeroes- Unit Digits-Remainder Theorem- Real Number - Rational Numbers: Integers, Fractions – Comparison of Numbers - Operations on fractions- Scientific Notation

UNIT II   **PROBLEMS ON LETTERS, NUMBERS AND SYMBOLS**   **9**
Factors and Multiples, LCM and HCF- Relationship between LCM and HCF - Factorial-Simplification- VBODMAS – Square , Square Root - Cube, Cube Root – Exponents & Powers (Surds and Indices) - Sequence & Series:Arithmetic Progression -Geometric Progression- Special Progression,Letter Series, Number Series, Alpha-Numeric Series, Continuous Pattern Series

UNIT III   **VERBAL AND NON - VERBAL REASONING**   **9**
Verbal Reasoning - Analogy: Completing the Analogous pair, Direct Analogy, Choosing the Analogous pair, Double Analogy, Choosing a Similar Word, Detecting Analogies, Multiple word Analogy, Number Analogy, Alphabet Analogy – Classification: Odd Words and Numerals – Coding and Decoding: Letter, Number, Symbol, Matrix, Substitution, Deciphering Message Word, Number and Symbols Non - Verbal Reasoning Figure Series -Missing figure, Incorrect figure – Analogy: Similarity Related Pair, Similarity Related figures, unrelatedfigures, Group of figures.

UNIT IV   **RATIO AND PROPORTION**   **9**
Introduction - Ratio – Proportion: Direct and Indirect – Unitary Method- Problems on Ages – Chain Rule- Partnership - Mixture or Allegation-Time and Work: Individual, Group, Efficiency, Wages - Pipes and Cistern: Inlet, Outlet, and Leakage.

UNIT V   **PERCENTAGE**   **9**
Introduction – Percentages in real life – Profit and Loss – Discount - Simple Interest – Compound Interest – Relationship between Simple Interest and Compound Interest – Overhead Expenses and GST

TOTAL: 45 PERIODS

COURSE OUTCOMES:
The student will be able to
- Understand and improve the arithmetic ability and properties of numbers that we use in day to day life
- Understand the logic behind the formation of numbers, alphabets series.
- Can think logically to apply the reasoning methods and evaluate complex relationships between the variables and numbers
- Apply the concept of ratios and proportion in ages and partnership problems
- Can apply the short cuts of the mathematical tricks to reduce the time duration in problem solving

TEXT BOOKS:
1. "Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal – 2022"
2. "Teach Yourself Quantitative Aptitude" by Arun Sharma – 2017
3. "A modern approach verbal and non -verbal reasoning" by R.S. Aggarwal – 2017

REFERENCE BOOKS
1. "Shortcuts in Mathematics" by AkhileshKhare – 2016
2. "Vedic maths for competitive exams" by Ravi Shankar – 2016
3. "Quantitative Aptitude for Competitive Examination" by Abhijit Guha – 2017

BS2107   **PHYSICS AND CHEMISTRY LABORATORY**   **L T P C**
                                                                                0 0 4 2

PHYSICS LABORATORY : (Any Five Experiments)

COURSE OBJECTIVES:
• To learn the proper use of various kinds of physics laboratory equipment.
• To learn how data can be collected, presented and interpreted in a clear and concise manner.
• To learn problem solving skills related to physics principles and interpretation of experimental data.
• To determine error in experimental measurements and techniques used to minimize such error.
• To make the student as an active participant in each part of all lab exercises.

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Non-uniform bending - Determination of Young's modulus
3. Uniform bending – Determination of Young's modulus
4. Laser- Determination of the wave length of the laser using grating
5. Air wedge - Determination of thickness of a thin sheet/wire
6. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids

                                                                        TOTAL PERODS: 30

COURSE OUTCOMES:
Upon completion of the course, the students should be able to
•   Understand the functioning of various physics laboratory equipment.
•   Use graphical models to analyze laboratory data.
•   Use mathematical models as a medium for quantitative reasoning and describing physical reality.
•   Access, process and analyze scientific information.
•   Solve problems individually and collaboratively.

CHEMISTRY LABORATORY: (Any Five experiments to be conducted)

COURSE OBJECTIVES:
•   To inculcate experimental skills to test basic understanding of water quality parameters, suchas, acidity, alkalinity, hardness, DO, chloride and copper.
•   To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
•   To demonstrate the analysis of metals and alloys.
•   To demonstrate the synthesis of nanoparticles

 1. Determination of types and amount of alkalinity in water sample.
 2. Determination of total, temporary & permanent hardness of water by EDTA method.
 3. Determination of chloride content of water sample by Argentometric method.
 4. Determination of strength of given hydrochloric acid using pH meter.
 5. Determination of HCl acid using conductivity meter.
 6. Conductmetric titration of barium chloride against sodium sulphate (precipitation titration)
 7. Estimation of iron content of the given solution using potentiometer.
                                                                        TOTAL : 30 PERIODS

COURSE OUTCOMES:
•   To analyse the quality of water samples with respect to their acidity, alkalinity, hardness.
•   To learn the amount of chloride present in the water sample by quantitative analysis.
•   To quantitatively analyse the impurities in solution by electroanalytical techniques.

TEXT BOOK:
    J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, Vogel's Textbook ofQuantitative Chemical Analysis (2009).

CS2108   **PROBLEM SOLVING USING PYTHON LABORATORY**   **L T P C**
                                                                            0 0 4 2

COURSE OBJECTIVES:
- To understand the problem solving approaches.
- To learn the basic programming constructs in Python.
- To practice various computing strategies for Python-based solutions to real world problems.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

EXPERIMENTS:
- Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
- Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same.
- Scientific problems using Conditionals and Iterative loops.
- Implementing real-time/technical applications using Lists, Tuples.
- Implementing real-time/technical applications using Sets, Dictionaries.
- Implementing programs using Functions.
- Implementing programs using Strings.
- Implementing programs using written modules and Python Standard Libraries (pandas, numpy. Matplotlib, scipy)
- Implementing real-time/technical applications using File handling.
- Implementing real-time/technical applications using Exception handling
- Exploring Pygame tool.
- Developing a game activity using Pygame like bouncing ball, car race .

                                                                    TOTAL: 60 PERIODS
COURSE OUTCOMES:
 On completion of the course, students will be able to:
- Develop algorithmic solutions to simple computational problems
- Develop and execute simple Python programs.
- Implement programs in Python using conditionals loopsand functions for solving problems..
- Process compound data using Python data structures.
- Utilize Python packages in developing software applications.

TEXT BOOKS:
1. Reema Thareja "Python Programming Using Problem Solving Approach" 2 nd Edition, Oxford University Press, 2017.
2. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition,O'ReillyPublishers, 2016.
3. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving andProgramming",1st Edition, BCS Learning& Development Limited, 2017.

4. **REFERENCES:**
5. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
6. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
7. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press , 2021
8. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
9. https://www.python.org/
10. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

HS2109   **COMMUNICATIVE ENGLISH LABORATORY I**   **L T P C**
                                                                          0 0 2 1

COURSE OBJECTIVES:
- To improve the communicative competence of learners
- To learn to use basic grammatic structures in everyday communication.
- To listen and comprehend meaning in reference to the context.
- To acquire lexical competence and understand their meaning in a text
- To develop learners' ability to read complex texts, summaries, articles, blogs,definitions, essays, and user manuals.

Module I – Speaking   20
Self-Introduction, Introducing Others, Product Description and Sales, Narrating Personal Experience, Panel Discussion, Just a Minute, and Movie Review

Module II – Listening   5
Best of TED Talks, Podcasts, Celebrity Interviews, Speech by Native Speakers,andShort Films

Module III – Reading   5
Brochure, User Manual, Biography, Autobiography, Novel, Short Story, News Paper, Gadget Review, and Blogs

Course Outcome:
At the end of the course, learners will be able
- To introduce oneself and others.
- To narrate and discuss ideas
- To describe and communicate persuasively.
- To understand a conversation and reply accordingly.
- To read and infer the denotative and connotative meanings of technical and non-technical texts.

TEXT BOOKS:
1. Effective Communication Skill, Kulbhusan Kumar,RSSalaria, Khanna Publishing House.

REFERENCES:
1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)
2. Learning to Communicate–Dr.V.Chellammal, Allied Publishing House, New Delhi