DMI COLLEGE OF ENGINEERING

(An Autonomous Institution)

Palanchur, Nazarethpet P.O., Chennai – 600 123

Approved by AICTE – New Delhi, Accredited by NBA,

Affiliated to Anna University - Chennai

AGENDA

REGULATIONS 2024

CURRICULUM & SYLLABUS FOR I YEAR I B. E / B. TECH

CHOICE BASED CREDIT SYSTEM

[COMMON TO ECE]

DMI COLLEGE OF ENGINEERING

(An autonomous Institution) PALANCHUR, CHENNAI - 600123

REGULATIONS 2024 – I B. E / B. TECH

CHOICE BASED CREDIT SYSTEM

PROGRAM OUTCOMES (POs)

PO Graduate Attributes:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze 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 modeling 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. Lifelong 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.

CURRICULUM FOR FIRST YEAR – SEMESTER I – R 2024

Sl. No	Course Code	Course Name	Category	Periods per week			Total Contact Periods	Credits
				L	T	P		
Theory								
1	SH1101	Technical English	HS	3	0	0	3	3
2	MA1101	Matrices and Calculus	BS	3	1	0	4	4
3	PH1101	Engineering Physics	BS	3	0	0	3	3
4	GE1101	Design Thinking	ES	2	0	2	4	3
5	EM1101	Coding Techniques	ES	3	0	0	3	3
6	GE1102	Biology for Engineers	ES	3	0	0	3	3
Practical								
7	PH1102	Physics Laboratory	BS	0	0	3	3	1.5
8	EM1102	Coding Techniques Laboratory	ES	0	0	3	3	1.5
NON-CREDIT COURSE (MANDATORY)								
9	NC1101	Tamilar Pannpadum and Kalvimuraigalum	HS	1	-	-	1	-
Total				**18**	**1**	**8**	**27**	**22**

Course Definition

Course code	Definition
L	Lecture
T	Tutorial
P	Practical
C	Credits
BS	Basic Science Courses
ES	Engineering Science Courses
HS	Humanities and Social Sciences including Management Courses

CURRICULUM FOR FIRST YEAR – SEMESTER II – R 2024

Sl. No	Course Code	Course Name	Category	Periods per week			Total Contact Periods	Credits
				L	T	P		
Theory								
1	SH1151	Technical Communication Skill Development	HS	2	0	2	4	3
2	MA1151	Vector Calculus and Transform Techniques	BS	3	1	0	4	4
3	CY1151	Engineering Chemistry	BS	3	0	0	3	3
4	EC1151	Circuit Analysis	ES	2	1	2	5	4
5	EM1151	Programming in Practice	ES	3	0	0	3	3
6	GE1152	Engineering Graphics	ES	3	0	2	5	4
Practical								
7	CY1152	Chemistry Laboratory	BS	0	0	3	3	1.5
8	EM1152	Programming in Practice Laboratory	ES	0	0	3	3	1.5
NON-CREDIT COURSE (MANDATORY)								
9	NC1151	Holistic Life skills	HS	1	-	-	1	-
Total				**17**	**2**	**12**	**31**	**24**

CURRICULUM FOR FIRST YEAR

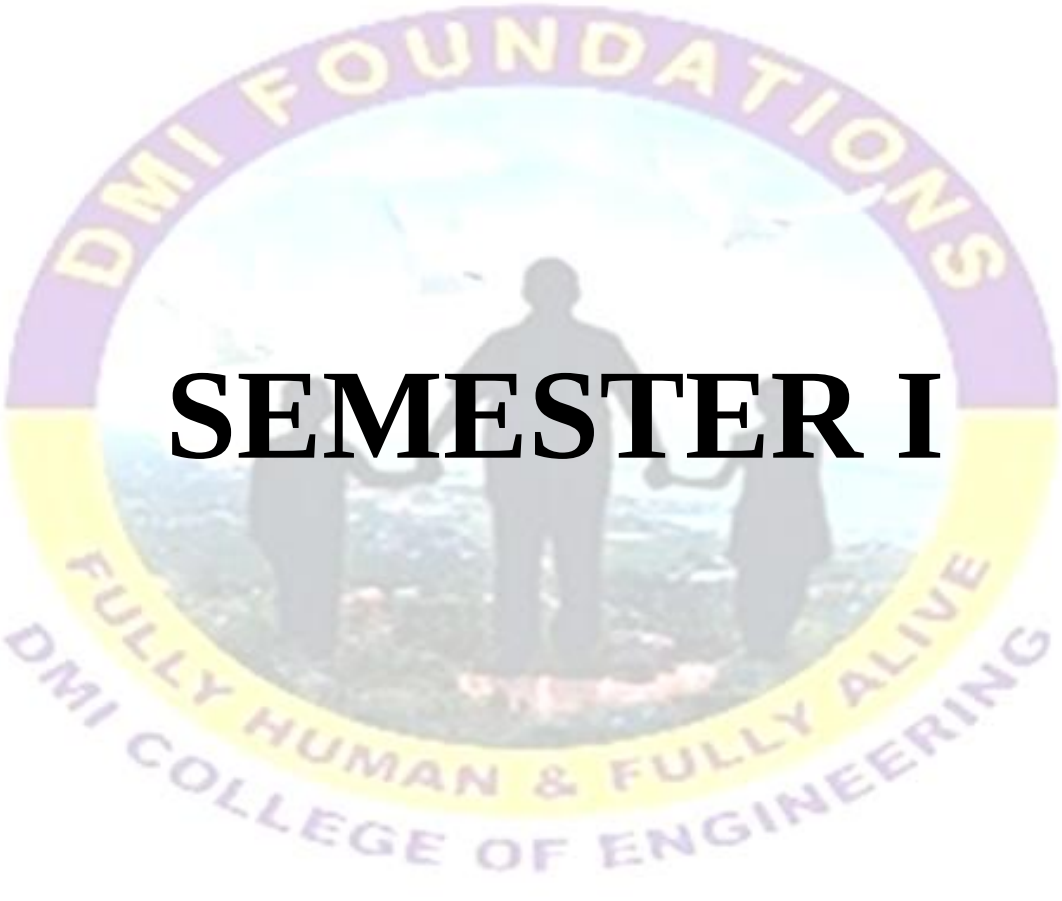
- The first-year curriculum should be common and cover the maximum foundation courses to meet the requirement of industries so that a student shall become eligible to get the Certificate from the University along with grade cards
- It is suggested to include as many open electives and value - added courses as per requirement and to offer open electives for the other departments as per their requirement
- It is also suggested to have course code with five characters, first two characters represent the Department Code and for foundational courses, the first two characters are to be decided as given in the table
- It is suggested that the two courses namely Tamilar Pannpadum and Kalvi muraigalum & Holistic Life skills introduced in the first year as Non-credit mandatory courses.
- Having specific names for the courses on Mathematics as stated in the curriculum as it is the current trend in many premier institutions in India as well as abroad and it conveys the expected outcomes clearly
- The course on Engineering Practices Laboratory shall be introduced in all branches of engineering during 2nd Semester in the Employability Enhancement course, to understand the mechanism of basic household engineering devices

CURRICULUM FOR FIRST YEAR – COURSE CODE PATTERN

Department Code	Description
EE	Electrical and Electronics Engineering
GE	General Engineering
SH	Science and Humanities
MA	Mathematics
PH	Physics
CY	Chemistry
EM	Employability Enhancement Courses

CURRICULUM FOR FIRST YEAR – COURSE CODE PATTERN

It is suggested to have the third character for Open Elective courses, online courses and professional elective courses as “7”, “8” and “9” respectively and for all other courses, the third character is the year number (1, 2, 3, and 4), the fourth character for odd semesters as “1” for even semesters as “5” and the last two characters are sequence numbers start with “01” to “49”.


DMI FOUNDATIONS
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DMI COLLEGE OF ENGINEERING

SEMESTER I

Course Code	Course Name	L	T	P	C
SH1101	Technical English	3	0	0	3

Category: Foundation Course

a. Course Objectives

This course will facilitate the learners to improve the communicative competence in Technical English. The aim is to focus not only on improving listening and speaking skill. But also, to enhance the leaner's reading and writing skill by imparting knowledge on appropriate usage of vocabulary and grammar.

b. Course Outcomes

After successful completion of the course, the students will be able to

CO.	Course Outcome
CO1	To listen and comprehend complex academic text.
CO2	To read and infer the denotative and connotative meanings of technical texts.
CO3	To write definitions, descriptions, narrations and essays on technology related topics.
CO4	To speak fluently and accurately in formal and informal communicative contexts.
CO5	To express their opinions effectively in both oral and written medium of communication.

c. Course Articulation Matrix

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	-

d. Course Syllabus **Total: 45 Hours**

UNIT – I INTRODUCING ONESELF **9**

Listening – Listening Comprehension: Conversation- Introduction to Classmates - Telephone Conversation - Listening to Voicemail and Messages - **Speaking** - Self Introduction - **Reading** - Reading Brochures - Telephone Messages / Social Media Messages relevant to Technical Contexts -**Writing** - Writing Emails – Letters; formal letter, informal letters - **Grammar** - Present Tense - Question Types: Why/ Yes or No-Tags -**Vocabulary** – Synonyms - One Word Substitution.

UNIT – II NARRATION AND SUMMATION **9**

Listening - Listening to Podcast - Anecdotes - Event Narration - Documentaries and Biographies - **Speaking** - Reporting - Summarizing of Documentaries, Podcasts, and Interviews -**Reading** - Reading Biographies, Travelogues, Newspaper Reports, Travel, and Technical Blogs - **Writing** - Guided Writing - Paragraph Writing - Short Report on an Event -**Grammar** -Subject-Verb Agreement and Prepositions -**Vocabulary** - Word forms (prefixes& suffixes); Antonyms.

UNIT – III DESCRIPTION OF A PROCESS / PRODUCT **9**

Listening - Listen to the Descriptions of Products and Processes - Advertisements about a Product -**Speaking** - Picture Description - **Reading** – Reading Advertisements - Gadget Reviews - User Manuals -**Writing** - Writing Definitions (short & long) – Instructions – Product / Process Description -**Grammar** – Adjectives - Degrees of Comparison - Past Tenses -**Vocabulary** - Compound Nouns – Homonyms – Homophones -Discourse Markers.

UNIT – IV CLASSIFICATION AND RECOMMENDATIONS **9**

Listening - Listening to TED Talks - Scientific lectures - Educational Videos -**Speaking** - Making Recommendations -**Reading** -Newspaper Articles - Journal Reports -**Writing** - Note-Making / Note-Taking - Writing Recommendations - Transferring Information from Non-Verbal to Verbal Mode (charts and graphs) **Grammar** - Articles - Pronouns - Possessive &Relative pronouns -**Vocabulary** - Collocations - Fixed / Semi-fixed expressions

UNIT – V EXPRESSION **9**

Listening - Listening to Debates and Discussions - Different Viewpoints on an Issue - **Speaking** - Expressing Opinions through Simulations and Role-play - **Reading** - Reading Editorials and Opinion Blogs -**Writing** – Essay Writing (Descriptive or narrative) - **Grammar** – Future Tenses - Simple, Compound and Complex Sentences -**Vocabulary** - Cause and Effect Expressions – Content vs. Function Words.

e. Activities

- Narrating personal experiences
- Listening and filling a form
- Introducing a friend
- Presenting a product
- Small Talk
- Mini presentations
- Giving instruction to use the product.
- Debates
- Panel discussions

f. Text books

1. English for Engineers and Technologists Vol.1 & Vol.2", Orient BlackSwan Private Ltd., Department of English, Anna University, 2020.
2. Veena Selvam, Sujatha Priyadarshini, Deepa Mary Francis, K. N. Shoba, Lourdes Joevani, "English for Science & Technology", Cambridge University Press, Department of English, Anna University, 2021.

g. Reference books

1. Louis Puthery,"Technical English", SIA Publisher and Distributors Pvt. Ltd., 2020.
2. Meenakshi Raman, Sangeeta Sharma, "Technical Communication – Principles and Practices",4thEdition, Oxford University Press, 2022.
3. K. R. Lakshminarayanan, "A Course Book on Technical English" Scitech Publications (India) Pvt. Ltd., 2012.
4. AyshaViswamohan, "English for Technical Communication" Mcgraw Hill Education, 2018.
5. KulBhusan Kumar, R.S Salaria, "Effective Communication Skill," 1st Edition, Khanna Publishing House, 2018.
6. V. Chellammal, "Learning to Communicate" Allied Publishing House, New Delhi, 2003.

Course Code	Course Name	L	T	P	C
MA1101	Matrices & Calculus	3	1	0	4

Category: Foundation Course

a. Course Objectives

This course provides insights into the concepts of multivariable calculus, matrices, infinite series, differential equations, and highlights their applications in Design Engineering, Electric Circuit Theory and Security related courses in Computer Science.

b. Course Outcomes

Upon completion of the course, students will be able

CO	Course Outcome
CO1	To apply the techniques of matrix algebra for Solving practical applications.
CO2	To understand the concepts of differential calculus.
CO3	To compute partial and total derivatives, Jacobian and optimality of functions of several variables
CO4	To understand the concepts of integral calculus
CO5	To understand the concepts double and triple integral and To solve area and volume problems

c. Course Articulation Matrix

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	-	-	-	-	-	2	1
CO2	3	2	2	2	1	-	-	-	-	-	1	1
CO3	3	2	2	2	1	-	-	-	-	-	2	1
CO4	3	2	2	2	1	-	-	-	-	-	1	1
CO5	3	2	1	1	1	-	-	-	-	-	2	1

d. Course Syllabus **Total: 60 Hours**

UNIT I MATRICES 12

Eigen values and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigen values 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.

UNIT II DIFFERENTIAL CALCULUS 12

Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Maxima and Minima of functions of one variable

UNIT III FUNCTIONS OF SEVERAL VARIABLES 12

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 - Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV INTEGRAL CALCULUS 12

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.

UNIT V MULTIPLE INTEGRALS 12

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.

e. **Text books**

1. Dennis G. Zill, Michael R. Cullen “Advanced Engineering Mathematics”, 9th Edition-2017.
2. Ramana. B.V., " Higher Engineering Mathematics ", McGraw Hill Education Pvt.Ltd, New Delhi, 2006
3. J. Stewart, “Essential Calculus”, Cengage Learning”, 2nd edition, 2013.

f. Reference books

1. Erwin Kreyszig, “Advanced Engineering Mathematics”, 10th Edition, John Wiley, India, 2020.
2. Venkataraman. M. K. “Engineering Mathematics”, Volume I and II Revised Enlarged 4th Edition, The National Publishing Company, Chennai, 2004.
3. Glyn James, “Advanced Modern Engineering Mathematics”, 3rd Edition, Pearson Education Ltd, New Delhi, 2007.
4. Bali.N.P, Goyal.M., Watkins.C., “Advanced Engineering Mathematics”, 17th Edition Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 2017.

Course Code	Course Name	L	T	P	C
PH1101	Engineering Physics	3	0	0	3

Category: Foundation Course

a. Course Objectives

The course engineering physics offers foundation to the field of engineering. It makes students to gain knowledge to apply the basic principles of physics in the field of engineering.

b. Course Outcomes

Upon completion of the course, students will be able

CO.	Course Outcome
CO1	To understand the basic principles of semiconductor physics.
CO2	To comprehend the concepts of electromagnetic waves and their properties.
CO3	To understand the behavior of oscillations and applications of laser
CO4	To acquire knowledge on the concepts of thermal properties of materials and their applications
CO5	To study the concepts of quantum physics and analyze the energy levels in all dimensions

c. Course Articulation Matrix

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO12
CO1	3	2	-	-	2	2	1	-	-	-	-	-
CO2	3	2	-	2	2	2	2	-	-	-	-	-
CO3	3	2	-	2	2	-	-	-	-	-	-	-
CO4	3	2	-	2	-	-	-	-	-	-	-	-
CO5	3	2	-	2	2	-	-	-	-	-	-	-

d. Course Syllabus **Total: 45 Hours**

UNIT – I SEMICONDUCTOR PHYSICS **9**

Basics of Semiconductors – Energy Band Diagram – Direct and Indirect Band Gap Semiconductors – Intrinsic and Extrinsic Semiconductors - Carrier Concentration – Variation of Carrier Concentration and Fermi Level with Temperature - Impurity Concentration – Drift - Mobility and Diffusion – Hall Effect – Ohmic Contacts – Schottky Diode.

UNIT – II ELECTROMAGNETIC WAVES **9**

Maxwell's Equations - Wave Equation - Plane Electromagnetic Waves in Vacuum - Properties of Electromagnetic Waves: Speed – Amplitude – Phase - Orientation and Waves in Matter - Producing Electromagnetic Waves - Reflection and Transmission of Electromagnetic Waves from a Non-Conducting Medium - Vacuum Interface for Normal Incidence.

UNIT – III OSCILLATIONS, OPTICS AND LASERS **9**

Simple harmonic motion - resonance analogy between electrical and mechanical oscillating systems - Energy transfer of a wave - Sound waves - Doppler Effect - Reflection and refraction of light waves – Total internal reflection – Interference – Michelson interferometer – Theory of Air wedge and Experiment - Einstein theory of matter – Einstein coefficients – amplification of light – population inversion – Types of lasers: Nd-YAG, CO_2 and semiconductor laser (HOMO junction) – Applications of lasers in science, engineering and medicine

UNIT – IV THERMAL PHYSICS **9**

Transfer of Heat Energy – Thermal Expansion of Solids and Liquids – Expansion Joints – Bimetallic Strips – Thermal Conduction - Convection and Radiation – Heat Conduction in Solids – Thermal Conductivity – Forbe's and Lee's Disc Method: Theory and Experiment – Conduction through Compound Media – Thermal Insulation – Applications: Ovens and Solar Water Heaters.

UNIT – V QUANTUM MECHANICS **9**

Photons and Light Waves - Electrons and Matter Waves – Schrodinger Equation: Time dependent and Time independent forms - Meaning of Wave Function - Particle in an Infinite Potential Well: 1D, 2D and 3D Boxes - Applications of Quantum physics – Qbit, Quantum tunneling, Quantum entanglement – quantum computing - Quantum Structures: Quantum Wells, Wires and Dots - Density of States – Quantum Laser - Single Electron Phenomena: Coulomb Blockade - Single Electron Transistor.

Activities

- Demonstrate heat experiments using cardboard, mica and glass.
- Do experiment on Transfer of heat energy, heat conduction, convection and radiation.
- Carry out simple projects using semiconductor devices.
- Prepare power point presentation on dual nature of matter and Compton Effect.
- Seminars on quantum computing

e. Text books

1. A text book of Engineering Physics- M.N. Avadhanulu
2. D.K.Bhattacharya, PoonamTandon, "Engineering Physics", 1st Edition, Oxford University Press, 2017.
3. R.K. Gaur, S.L.Gupta, "Engineering Physics", Dhanpat Rai Publications, 2022.

f. Reference books

4. Paul A. Tipler, Mosca, G. — "Physics for Scientists and Engineers with Modern Physics".W.H.Freeman, 2008.
5. Edward M.Purcell, David J.Morin, "Electricity and Magnetism", 3rd Edition, Cambridge University Press, 2013.
6. N.Garcia, A.Damask, S. Schwarz, "Physics for Computer Science Students", Springer-Verlag, 2012.
7. Jasprit Singh, "Semiconductor Devices: Basic Principles", John Wiley & Sons Publishers, Second Reprint 2007.
8. Parag K. Lala, "Quantum Computing: A Beginner's Introduction", McGraw-Hill Education (Indian Edition), 2020.

Course Code	Course Name	L	T	P	C
GE1101	Design Thinking	3	0	0	3

Category: Engineering Science Course (General Engineering)

a. Course Objectives

This course enables the students to acquire intuition, logic, imagination, and reasoning through conceiving, conceptualizing, designing and demonstrating innovative ideas to solve real-time problems with expected outcomes. Students will be transformed as good designers with adequate creativity and problem-solving abilities.

b. Course Outcomes

After successful completion of the course, the students will be able:

CO.	Course Outcome
CO1	To develop creative thinking and to learn innovation cycle of design thinking process
CO2	To propose real-time innovative engineering product design with appropriate prototype development
CO3	To understand the design thinking principles and challenges.
CO4	To study the process of design thinking in education and healthcare sectors
CO5	To analyze customer experience through feedback, re-design and re-create
CO6	To demonstrate the final product

c. Course Articulation Matrix

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	2
CO2	3	3	3	-	-	-	-	-	-	-	-	2
CO3	3	2	1	-	-	-	-	-	-	-	-	2
CO4	3	3	-	-	-	-	-	-	-	-	-	2
CO5	3	3	2	-	-	-	-	-	-	-	-	2
CO6	2	2	-	-	-	-	-	-	-	2	-	2

d. Course Syllabus **Total:45 Periods**

UNIT – I - FOUNDATIONS OF DESIGN THINKING **9**

Design Thinking: Definition – Features – Innovation Strategies – Applications – Process Life Cycle – Solution-based Thinking – Scientific Method – Analysis – Synthesis – Divergent and Convergent Thinking.

UNIT – II - DESIGN THINKING ATTRIBUTES **9**

Design Thinking Principles: Rules – Human, Ambiguity, Re-design and Tangibility – Challenges – Design Methods: Empathize – Requirement Gathering – Define – Break the Problem into Pieces - Ideate – Brainstorming and Mind Maps - Prototype – Guidelines for Prototyping – Test Phase.

UNIT – III - DESIGN THINKING CONCEPTUALIZATION **9**

Team Formation – Visual Thinking – Drawing – Sketching – Innovating Thinking – Concept Generation Methodologies – Concept Selection and Testing – Product Design Process - Examples of Best Product Designs and Functions.

UNIT – IV - APPLICATIONS OF DESIGN THINKING **9**

Education Sector: Inquiry Learning Process – Institutional Improvement – Practitioner Inquiry – Learning Design – Healthcare: Data Sources – Study Selection – Data Abstraction – Study Extraction – Study Characteristics - Limitations

UNIT – V- CUSTOMER CENTRICITY AND FEEDBACK **9**

Customer Challenges: Examples – Enhancing Customer Experience – Parameters of Product Experience – Alignment of Customer Expectations with Product Design – Feedback Loop – Focus on User Experience – Ergonomic Challenges – Rapid Prototyping and Testing – Final Product and Presentation.

e. Activities

Activities to improve the basic understanding of Design Thinking:

- Explore the five steps involved in the Design Thinking Process
- Study the process of product design through group discussion and brainstorming sessions
- Perform empathy mapping
- Test your ideas with the customers / users

f. Text books

1. Gavin Ambrose, Paul Harris, “Design Thinking”, Bloomsbury Publishing, 2010.
2. Idris Mootee, “Design Thinking for Strategic Innovation”, Wiley Publishers, 2013.

g. Reference books

1. Michael Lewrick, Patrick Link, Larry Leifer, “The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems”, Wiley Publishers, 2018.
2. www.tutorialspoint.com/hi/design_thinking/design_thinking_tutorial.pdf
3. https://www.cdc.gov/pcd/issues/2018/18_0128.html

Course Code	Course Name	L	T	P	C
EM1101	Coding Techniques	3	0	0	3

Category: Employability Enhancement Courses (Programming Courses)

a. Course Objectives

This course facilitates the students to learn and develop simple algorithms and to understand the importance of coding to solve the real-time problems using computers. The art of coding enables the programming skills and logical thinking to instruct the computer for solving the problems. This course focuses on problem solving using structured programming language.

b. Course Outcomes

After successful completion of the course, the students will be able

CO.	Course Outcome
CO1	To understand the importance of writing pseudo-code, developing flow charts, algorithms and to apply the algorithmic skills to solve simple problems
CO2	To understand the basic concepts of C Programming and develop simple applications
CO3	To do insightful analysis of Arrays and Pointers
CO4	To develop skills on working with files and to understand collective data types
CO5	To understand the concept of Modular Programming and to develop user-defined packages

c. Course Articulation Matrix

Pos/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	2
CO2	3	2	2	-	-	-	-	-	-	-	-	2
CO3	3	3	2	-	-	-	-	-	-	-	-	2
CO4	3	2	2	-	-	-	-	-	-	-	-	2
CO5	3	2	2	-	-	-	-	-	-	-	-	2

d. Course Syllabus **Total:45 Hours**

Unit I PROBLEM SOLVING FUNDAMENTALS 9

Programs and Algorithms – Problem Definition – Flow Chart – Fundamental Algorithms (Exchange of values of two variables, Counting, Summation of a set of numbers, Factorial Computation, Sine Function Computation, Generation of Fibonacci Sequence, Reversing the Digits of an Integer, Base Conversion): Problem – Algorithm Development – Algorithm Description – Design Consideration – Applications.

Unit II C PROGRAMMING FUNDAMENTALS 9

Types and Values – Pre-processors – Declaration and Prototypes - Constants and Variables – Pre-defined Libraries - Storage Classes – Expressions – Operator Precedence and Associability - Input and Output Statements – Decision Making and Looping Constructs – Type Casting – Concept of Functions – Parameter Passing mechanism.

Unit III ARRAYS AND POINTERS 9

Representation of Single and Multidimensional Arrays – Array operations – Concept of Pointers – Pointer Arithmetic – Strings – Call by Reference – Dynamic Memory Allocation – Function Pointers.

Unit IV COLLECTIVE DATA TYPES AND FILE HANDLING 9

Structure and Union – Enumeration – Type Defining Structures – Structures and Pointers - Self Referential Structure - Sequential and Random-Access File Handling – Opening and Closing of a File - Input and Output Operations on a File – Handling of Binary files.

Unit V ADVANCED CONCEPTS AND APPLICATION DEVELOPMENT 9

Bit Fields – Type def – Macro Functions - User Defined Libraries – Variable Arguments – Command Line Arguments – Recursive Functions – Modular Programming – Package Development.

e. Text Book:

1. Dromey R.G, “How to Solve it by Computer”, Pearson Education, 2006.
2. Brian W. Kernighan, Dennis M. Ritchie, “The C Programming Language” Second Edition, Pearson Education, 2015

f. Reference Book

1. Paul Deitel, Harvey Deitel, “C How to Program”, Eighth Edition, Pearson Education, 2018.
2. Byron S. Gottfried, “Theory and Problems of Programming with C”, Schaum‟s Outlines, Second Edition, McGraw-Hill, 1996.
3. Yashavant Kanetkar, “Let Us C”, Sixteenth Edition, BPB Publications, 2018.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein. “Introduction to Algorithms”, Third Edition, The MIT Press, 2009

Course Code	Course Name	L	T	P	C
GE1102	Biology for Engineers	3	0	0	3

Category: Engineering Science Course

a) Course Objectives

This course facilitates the students to understand the biological concepts and their engineering applications. In addition, the course is expected to encourage engineering students to think about solving real-time problems with the use of biological mechanism.

b) Course Outcome:

After successful completion of this course, the students will be able

CO.	Course Outcome
CO1	To outline the classes of biological system
CO2	To illustrate the basic knowledge of the structural and functional properties of cells
CO3	To compare the different types of bio molecules based on their classifications and applications.
CO4	To articulate the concepts of genetics and genetic materials
CO5	To illustrate about central dogma of Molecular Biology
CO6	To make use of microbial concepts in human diseases and industrial applications

c) Course Articulation Matrix

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	2	2	3	-	2	2	-	2
CO2	2	2	-	-	2	2	3	-	2	2	-	2
CO3	2	2	-	-	2	2	3	-	2	2	-	2
CO4	2	2	-	-	2	2	3	-	2	2	-	2
CO5	2	2	-	-	2	2	3	-	2	2	-	2
CO6	2	2	2	2	2	2	2	-	2	2	-	2

d) Course Syllabus **Total: 45Hours**

UNIT – I - INTRODUCTION **9**

Science and Engineering - Evolution of Life forms –Application of Biology - Biological Classification: - Kingdom Fungi - Kingdom Plantae - Kingdom Animalia – Viruses.

UNIT – II - CELLS AND THEIR FUNCTIONAL PROPERTIES **9**

Basic Properties of Cell–Structural organization of Cells - Prokaryotic and Cell Cycle-Cell Division-Immune Cells - Types of Immune Cells - Immune Organs – Metabolism - Photorespiration.

UNIT – III - GENETICS AND MOLECULAR BIOLOGY **9**

Mendelian Genetics - Chromosomal Theory of Inheritance – Linkage - Recombination – Replication of DNA - Transcription - Genetic Code – Translation - Regulation of Gene Expression.

UNIT - IV - BIOMOLECULES **9**

Chemical Composition of Living Forms –Overview of Bio molecules: Carbohydrates – Amino Acids and Proteins - Nucleic Acids and Lipids - Enzymes –Classification and Nomenclature– Co-Enzymes - Industrial applications of Enzymes.

UNIT – V - MICROBIOLOGY **9**

Microbes - Fermentation - Aerobic Respiration - Effect of Microbes on Human Health - Waterborne, Air- transmitted and Vector borne Diseases - Industrial applications of Microbiology: Antibodies– Bio fuels - Biopolymers – Biosensors.

e) Activities

1. Activities to improve the basic understanding of the biological concepts:
2. Explore the components of a cell and understand how they work together as a system
3. Study the relationships between DNA, Chromosomes and Genes
4. Explore the Aerobic Cellular Respiration process step by step
5. Study the importance of Bio fuels and Biosensors in industrial applications

f) Text books

1. Waite, G.N., Waite, L.R., “Applied Cell and Molecular Biology for Engineers”, McGraw-Hill Publishers, 1st Edition, 2016.
2. Arthur T. Johnson, “Biology for Engineers”, CRC Press, 2nd Edition, 2018.
3. David A.Vaccari, Peter F.Strom, James E.Alleman, “Environmental Biology for Engineers and Scientists”, Wiley Publishers, 2005.

g) Reference books

1. Alan H. Scragg, “Biotechnology for Engineers: Biological Systems in Technological Processes”, Ellis Horwood Publishers, 1988.
2. Jeremy M. Berg, John L, Tymoczko, Gregory J, Gattoand Lubert Stryer, “Biochemistry”,
3. W.H.Freeman Publishers, 8th Edition, 2015.
4. Robert F.Weaver, “Molecular Biology”, McGraw – Hill Publishers, 5th Edition, 2011.
5. S. ThyagaRajan, N. Selvamurugan, M. P. Rajesh, R. A. Nazeer, Richard W. Thilagaraj, S. Barathi, M. K. Jaganathan, “Biology for Engineers”, McGraw-Hill Publishers, 2013.
6. Wiley Editorial, “Biology for Engineers: As per latest AICTE Curriculum”, Wiley Publishers, 2018.

Course Code	Course Name	L	T	P	C
PH1102	Physics Laboratory	0	0	3	1.5

Category: Foundation Course

a. Course Objectives

The course Physics laboratory introduces students to experiments in the field of semiconductor physics, Thermal Physics, Properties of matter, Optics and Ultrasonic. It gives hands on training for the students individually.

b. Course Outcomes

Upon completion of the course students should be able to

CO	Course Outcome
CO1	Interpret elastic properties of materials
CO2	Compute the wavelength and size of the microscopic particle.
CO3	Measure the thickness of thin wire by interference
CO4	Estimate the sound properties and thermal properties of materials
CO5	Determine the compressibility of the given liquid and velocity of Ultrasonic Waves.
CO6	Assess the band gap of semiconductor materials

c. Course Articulation Matrix

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	2	2	-	-	-	-	-	-	2
CO2	2	3	2	2	2	-	-	-	-	-	-	2
CO3	2	3	2	2	2	-	-	-	-	-	-	2
CO4	2	3	2	2	2	-	-	-	-	-	-	2
CO5	2	3	2	2	2	-	-	-	-	-	-	2
CO6	2	3	2	2	2	-	-	-	-	-	-	2

d. Course Syllabus **Total: 45 Hours**

List of Experiments (Any Eight Experiments)

1. Torsional pendulum with symmetrical masses – Determination of rigidity modulus of wire and moment of inertia
2. Simple harmonic oscillations of cantilever - Determination of Young's modulus
3. Non-uniform bending – Determination of Young's modulus
4. Uniform bending – Determination of Young's modulus
5. Laser- Determination of the wave length of the laser using grating
6. Optical fiber - Determination of Numerical Aperture and acceptance angle
7. Air wedge – Determination of thickness of a thin sheet/wire
8. Determination of wavelength of mercury spectrum – Spectrometer & Grating
9. Melde's string apparatus– Determination of frequency of the electrical tuning fork
10. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
11. Ultrasonic Interferometer – determination of the velocity of sound and Compressibility of liquids
12. Determination of band gap of a semiconductor

e. Text books

1. R. A. Dunlap, "Experimental Physics", 1st Edition, Oxford University Press, 1988.
2. R. K. Shukla, AnchalSrivastava, "Practical Physics", 3rd Edition, New Age International (P) Ltd., 2017.
3. David Halliday, Robert Resnick, Jearl Walker. "Principles of Physics", Wiley (10th Indian Edition), 2015.
4. S.O. Kasap, "Principles of Electronic Materials and Devices", McGraw-Hill Education. Fourth Edition, 2020.

Course Code	Course Name	L	T	P	C
EM1102	Coding Techniques Laboratory	0	0	3	1.5

Category: Employability Enhancement Courses (Programming Courses)

a. Course Objectives

This laboratory course will facilitate the students to understand problem solving techniques and to write code in C programming language for simple applications in a modular way.

b. Course Outcomes

After successful completion of the course, the students will be able

CO.	Course Outcome
CO1	To understand problem solving techniques using flowcharts and algorithms
CO2	To develop C programs using conditional and iterative constructs with user-defined functions
CO3	To analyze the insights of arrays and pointers with string handling operations, parameter passing and function pointers
CO4	To comprehend macros and command-line arguments
CO5	To apply file handling concepts using collective data types
CO6	To develop modules and user-defined packages

c. Course Articulation Matrix

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	2
CO2	3	2	2	-	-	-	-	-	-	-	-	2
CO3	3	3	2	-	-	-	-	-	-	-	-	2
CO4	3	2	2	-	-	-	-	-	-	-	-	2
CO5	3	3	3	-	-	-	-	-	-	-	-	2
CO6	3	3	3	-	-	-	-	-	-	-	-	2

d. Course Syllabus **Total: 45 Hours**

PROBLEM SOLVING FUNDAMENTALS **9**

Draw flowcharts and develop algorithms for simple problems like:

i. To find the largest among 3 numbers.
ii. To do simple arithmetic calculations.
iii. To find simple interest.
iv. To find the roots of a quadratic equation.
v. To find the whether the given number is prime or composite.

CPROGRAMMING FUNDAMENTALS **9**

Write simple C programs:

i. To understand input – output statements using pre-defined functions.
ii. To find the factors of a given number.
iii. To check whether a given number is palindrome or not.
iv. To read two numbers x and n, and compute the sum of geometric progression $1 + x + x^2 + x^3 + x^4 + \ldots\ldots\ldots + x^n$.
v. To find the frequency of each digit in a given number.

ARRAYS AND POINTERS **9**

Write C programs:

i. To write a user-defined function to swap two numbers.
ii. To compute the sum and average of n numbers using arrays and pointers.
iii. To write functions to find the number of characters in a string, compare two strings, copying one string to another, concatenate two strings and reverse a string.
iv. To develop menu driven applications using function pointers.
v. To represent single and multi-dimensional arrays using pointers.

COLLECTIVE DATA TYPES AND FILE HANDLING **9**

Write C programs:

i. To store the information of a book using a structure.
ii. To count the number of lines in a file.
iii. To read the students' data (Reg.No., Name, Department, Semester and CGPA) and store them in a file sequentially.
iv. To copy the contents of one file to another file.
v. To merge two files.

ADVANCED CONCEPTS AND APPLICATION DEVELOPMENT 9

Write C programs:

i. To find the sum of *n* numbers whose values are given as command line parameters?

ii. To find the value of n^{th} factorial using a recursive function.

iii. To develop simple arithmetic calculator in a modular way and make it as a package.

e. Laboratory Equipment Required

Standalone Desktops (Windows/Linux) with GCC complier and Raptor Tool – 30 Nos

NON-CREDIT COURSES (MANDATORY)

Course Code	Course Name / SEMESTER – I	L	T	P	C
NC1101	Tamilar Pannpadum and Kalvimuraigalum	1	0	0	0

Category: Non-credit Course (Mandatory)

a. Course Syllabus **Total: 15 Hours**

UNIT I LANGUAGE AND LITERATURE 3

Tamil as a Classical Language – Classical Literature in Tamil – Management Principles in Thirukural - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil.

UNIT II TAMIL ARTS AND EDUCATION SYSTEM 3

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils – Gurukulam and Thinnai Kalvi

UNIT III SCIENTIFIC TAMIL & TAMIL COMPUTING **3**

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

UNIT IV DESIGN AND CONSTRUCTION TECHNOLOGY 3

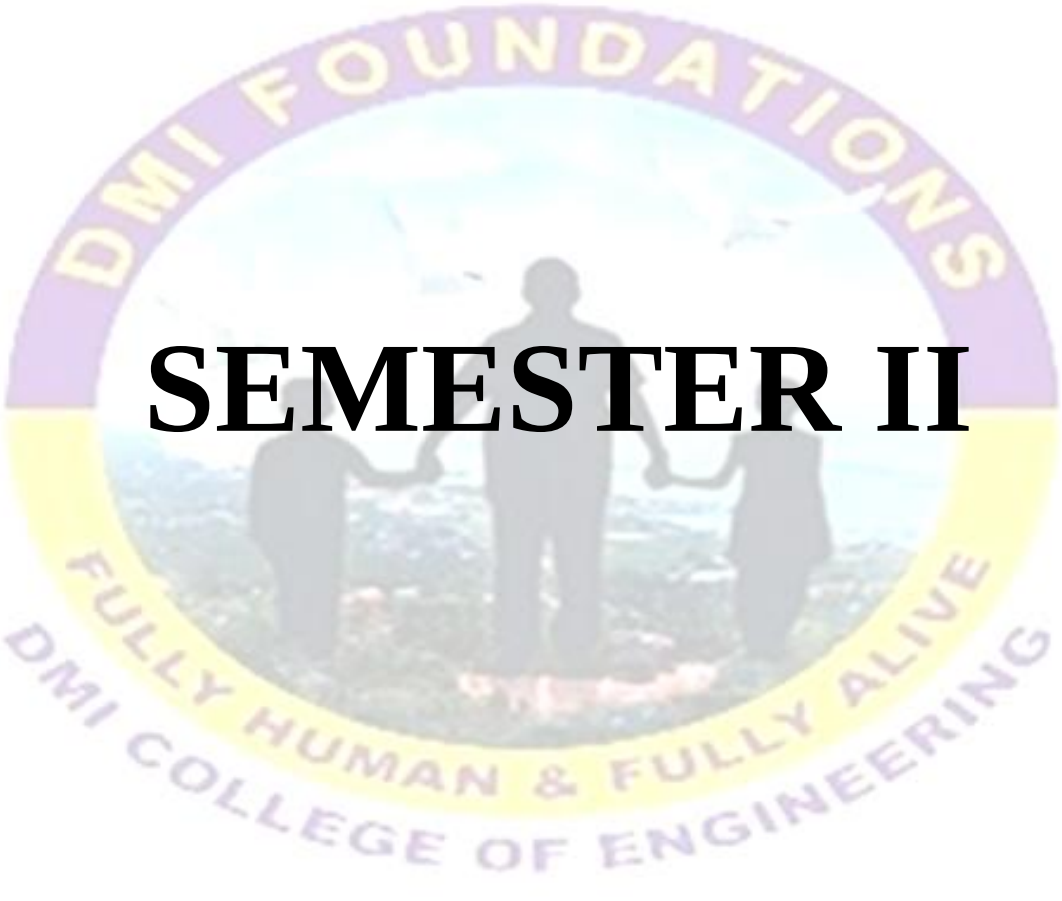
Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram

UNIT V LANGUAGE AND CULTURE TRAINING 3

Telling an interesting event experienced - Conduct contextual dialogues among students - Telling and writing the story, Film commentary - Usage of Tamil in daily life such as Morning duties, cooking, food, Health, Business, Transport, Travel and Conversation related to shop trade

b. Text books

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


DMI FOUNDATIONS
FULLY HUMAN & FULLY ALIVE
DMI COLLEGE OF ENGINEERING

SEMESTER II

Course Code	Course Name	L	T	P	C
SH1151	Technical Communication Skill Development	2	0	2	3

Category: Foundation Course

a. Course Objectives

1. To engage learners in meaningful language activities to improve their reading and writing skills
2. To learn various reading strategies and apply in comprehending documents in professional context.
3. To help learners understand the purpose, audience, contexts of different types of writing
4. To develop analytical thinking skills for problem solving in communicative contexts
5. To demonstrate an understanding of job applications and interviews for internship and placements

b. Course Outcomes

Upon successful completion of the course, the students will be able

CO.	Course Outcome
CO1	To compare and contrast products and ideas in technical texts.
CO2	To identify cause and effects in events, industrial processes through technical texts
CO3	To analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.
CO4	To report events and the processes of technical and industrial nature.
CO5	To present their opinions in a planned and logical manner.
CO6	To draft effective resumes in context of job search.

c. Course Articulation Matrix

COs	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-

d. Theory (30) cum Lab (15) **Total: 45 Hours**

UNIT- I MAKING COMPARISONS

Theory **6**

Writing – Professional emails, Email etiquette - Compare and Contrast Essay; Grammar – Mixed Tenses, Prepositional phrases. Vocabulary – Contextual meaning of words.

Practical **3**

Listening – Listening Advertisements and follow up exercise; Speaking Persuasive Speech Techniques: Marketing a product; Reading - user manuals and brochures and creating brochures.

UNIT – II EXPRESSING CASUAL RELATIONS IN SPEAKING AND WRITING

Theory **6**

Writing - Writing responses to complaints. Grammar – Active & Passive Voice transformations, Infinitive and Gerunds. Vocabulary– Word Formation (Noun-Verb-Adj-Adv), Adverbs

Practical **3**

Listening- Listening technical information from podcasts and follow up exercise; Speaking – Describing and discussing the reasons of accidents or disasters based on news reports and news Reading exercise. Reading - Reading longer technical texts– Cause and Effect Essays, and Letters / emails of complaint and follow up exercise

UNIT – III PROBLEM SOLVING

Theory **6**

Writing-Letter to the Editor, Movie Review - Problem solution essay/Argumentative Essay. Grammar - Error correction; If conditional sentences. Vocabulary- Compound Words, Sentence Completion

Practical **3**

Listening – Listening to / Watching movie scenes/ documentaries depicting a technical critical review. Speaking- Book Review and speaking activity, Reading- Case Studies and follow up exercise.

UNIT – IV REPORTING OF EVENTS AND RESEARCH

Theory **6**

Writing– Recommendations, Checklist, Project report, proposal writing, minutes of meeting - Grammar – Reported Speech Modals - Vocabulary– Conjunction. Abbreviations & Acronyms

Practical **3**

Listening– Listening Comprehension based on news reports and documentaries and follow up exercise- Precise writing, Summarising. Speaking–Interviewing- Mock interview, Reading– Newspaper articles- article write up

UNIT – V THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY

Theory **6**

Writing– Job / Internship application – Cover letter & Resume; Grammar – Numerical adjectives, Relative Clauses; Vocabulary– Idioms, Phrasal verbs.

Practical **3**

Listening – Listening to TED Talks- GD on selected topics, speaking– Participating in a Role play, Reading – Company profiles, Statement of Purpose, an excerpt of interview with professionals – creating company profile.

e. Text books

Text books:

1. Dr. Veena Selvam, Dr. Sujatha Priyadarshini Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, "English for Science & Technology" Cambridge University Press, Authored by, Anna University. 2021.
2. Meenakshi Raman, Sharma. Sangeeta, "Professional English." Oxford University press, New Delhi.2019
3. V.N. Arora, Laxmi Chandra, "Improve Your Writing." Oxford Univ. Press, New Delhi. 2001.

f. Reference:

1. V. Chellammal, "Learning to Communicate" Allied Publishers, New Delhi, 2003.
2. C. Sharma, Krishna Mohan, "Business Correspondence and Report Writing." Tata McGraw Hill & Co. Ltd, New Delhi, Sixth Edition, 2008.
3. Francis Soundararaj, "Basics of Communication in English," Laxmi Publication, 2011.

Course Code	Course Name	L	T	P	C
MA1151	Vector Calculus and Transform Techniques	3	1	0	4

Category: Foundation Course

a. Course Objectives

This course facilitates the students to understand the techniques in Vector Calculus and make them to familiarize the concepts and applications of differentiation, and integration of vector valued functions. Further, this course enhances their knowledge on the topics of Laplace and Inverse Laplace Transforms, Fourier Series and Fourier Transforms which are significantly used in engineering applications.

b. Course Outcomes

Upon successful completion of the course, the students will be able

CO.	Course Outcome
CO1	To compute the derivatives and integrals of vector valued functions.
CO2	To understand the relationship amongst Line, Surface and Volume using Green's, Stokes and Gauss Divergence theorems.
CO3	Understand the principles of Ordinary differential equation
CO4	Apply Laplace transforms on elementary and special functions and methods of finding Inverse Laplace Transforms.
CO5	Understand the principles, properties of Fourier Series
CO6	To acquaint the student with Fourier, transform techniques used in wide variety of situations in which the functions used are not periodic.

c. Course Articulation Matrix

Pos/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	2	-	-	-	2	3	-	2
CO2	3	2	-	2	3	3	--	-	-	-	-	3
CO3	3	2	-	2	3	3	--	-	-	-	-	3
CO4	3	2	-	2	3	2	--	-	-	-	-	3
CO5	3	2	-	1	3	3	--	-	-	-	-	3
CO6	3	2	-	1	3	3	--	-	-	-	-	3

d. Course Syllabus **Total: 60 Hours**

UNIT I VECTOR CALCULUS **12**

Gradient of a Scalar Field- - directional derivative - divergence and curl – Solenoidal and irrotational Vector Fields- Line integrals over a plane curve- Surface integrals- Area of Curved Surface- Volume integral - Green's theorem - Gauss divergence theorem - Stokes' theorem – Verification and Applications in evaluating line, surface and volume integrals.

UNIT II ORDINARY DIFFERENTIAL EQUATIONS **12**

Homogeneous linear Ordinary Differential Equations of Second order, Linearity Principles general Solutions – Operator Method – Solution by Variation of Parameter – Method of un determined Coefficients – homogenous equations of Euler – Cauchy and Legendre's

UNIT III LAPLACE TRANSFORMS **12**

Existence Theorem– Transforms of standard functions – Transforms of unit step function and Dirac delta function – Basic properties – Shifting Theorems – transforms of derivatives and integrals – Transforms of periodic functions – Initial and Final Value Theorem – Inverse Laplace – Convolution Theorem (without proof) – Solving Initial Value problems by using Laplace Transform techniques.

UNIT IV FOURIER SERIES **12**

Dirichlet's conditions – General Fourier Series – Odd and even functions – Half range Sine and Cosine Series – Complex form of Fourier series – Parseval's identity.

UNIT V FOURIER TRANSFORMS **12**

Fourier Integral Theorem (Statement only) – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transform of elementary functions – Convolution theorem (without proof) – Parseval's identity.

e. Text books

1. B. S. Grewal, Higher Engineering Mathematics by, Khanna Publishers, New Delhi, 44th Edition.
2. T. Veerarajan, “Engineering Mathematics -II McGraw Hill Education, 2018.
3. H. Anton, I. Biven S. Davis, “Calculus”, Wiley, 10thedition, 2015.
4. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008

f. Reference books

1. Jain R. K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, 5th Edition, New Delhi, 2017
2. Srimanta Pal, Subodh C. Bhunia, “Engineering Mathematics”, Oxford University Press, 2015
3. Dr. B. B. Singh, Integral Transforms and Their Engineering Applications by, Synergy. Knowledge ware, Mumbai.

Course Code	Course Name	L	T	P	C
CY1151	Engineering Chemistry	3	0	0	3

Category: Foundation Course

a. Preamble

- To inculcate sound understanding of water quality parameters and water treatment techniques
- To impart knowledge on the basic principles and preparatory methods of nanomaterials
- To introduce the basic concepts and applications of phase rule and composites
- 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

b. Course Outcomes

After successful completion of the course, the students will be able

CO.	Course Outcome
CO1	To infer the quality of water and propose suitable treatment methodologies to treat water.
CO2	To identify basic concepts of Nano science and nanotechnology in designing the synthesis of Nano materials for engineering and technology applications.
CO3	To develop on understanding basics concepts of phase rule and its applications.
CO4	To illustrate the synthesis and applications of composites.
CO5	To determine the quality if fuels from its characteristics.
CO6	To acquire the basis of non-conventional sources of energy and the principal, reaction mechanism of batteries.

c. Course Articulation Matrix

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	2	-	-	-	2	-	1	2
CO2	2	2	2	3	2	-	-	-	-	-	-	-
CO3	2	3	1	2	2	-	-	-	1	-	1	-
CO4	2	2	3	2	2	-	2	-	1	-	1	-
CO5	1	-	2	2	2	-	-	-	-	-	-	-
CO6	3	2	2	2	2	-	-	-	1	-	1	2

d. Course Syllabus **Total: 45 Hours**

UNIT – I WATER AND ITS TREATMENT **9**

Water Sources and impurities - Municipal water treatment - primary treatment and disinfection - Desalination of brackish water - Reverse Osmosis - Boiler troubles - Scale and sludge - Boiler corrosion - Caustic embrittlement – Priming and foaming - Treatment of boiler feed water - Internal treatment and External treatment – Ion exchange demineralization - zeolite process.

UNIT – II NANO CHEMISTRY **9**

Basics distinction between molecules - nano materials and bulk materials - Size-dependent properties - Types of nanomaterials - Definition, properties and uses of nanoparticle Nano cluster – nanorod - nanowire and nanotube - Preparation of nanomaterials - sol-gel – solvothermal - laser ablation -chemical vapour deposition - electrochemical deposition and electro spinning - Applications of nanomaterials

UNIT – III PHASERULE AND COMPOSITES **9**

Phase rule: Introduction - definition of terms with examples - One component system - water system - Reduced phase rule -Two component system - lead-silver system - Pattinson process – Composites – Introduction - Definition and Need for composites – Constitution - Matrix Materials-Polymer matrix metal matrix and ceramic matrix- Definition -properties and applications of Metal Matrix composites.

UNIT – IV FUELS AND COMBUSTION 9

Fuels introduction - Classification of fuels - Carbonization - Manufacture of metallurgical coke - Petroleum and Diesel - Manufacture of synthetic petrol - Knocking - octane number - diesel oil - cetane number-Power alcohol and biodiesel –Combustion of fuels – Introduction –Calorific value - higher and lower calorific values- Ignition temperature-spontaneous ignition temperature-Explosive Range-Flue gas analysis method

UNIT – V ENERGY SOURCES AND STORAGE DEVICES **9**

Stability of nucleus - mass defect - binding energy - nuclear energy - light water nuclear power plant - breeder reactor-Solar energy conversion – Principle -working and applications of solar cells – Batteries - Types of batteries - Primary battery - dry cell - Secondary battery - lead acid battery and lithium-ion-battery - Electric vehicles - Fuel cells - H2-O2 fuel cell.

e. Activities

- Removal of industrial effluents by adsorption methods.
- Green Synthesis of Nano particles using plant extract.
- Preparation of Artificial Rayon Fiber.
- Sublimation Process using fractional distillation.
- Renewable energy sources model using Cardboard.

f. Learning Resources

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 Materials Science, 2018.
2. P. C. Jain, Monica Jain, "Engineering Chemistry", 17th Edition, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2018.
3. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
4. S.S. Dara, "A Text book of Engineering Chemistry", S. Chand Publishing, 12th Edition
5. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
6. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
7. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
8. O.V. Roussak, H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer (Special priced edition from AneBooks, India) 2nd Edition, 2013.

Course Code	Course Name	L	T	P	C
EC1151	CIRCUIT ANALYSIS	2	1	2	4

Category: Foundation Courses (Engineering Science Course)

a. Course Objectives

1. To learn the basic concepts and behavior of DC and AC circuits.
2. To understand various methods of circuit/ network analysis using network theorems.
3. To understand the transient and steady state response of the circuits subjected to DC excitations and AC with sinusoidal excitations.
4. To learn the concept of coupling in circuits and topologies.

b. Course Outcome

After successful completion of the course, the students will be able to

CO.	Course Outcome
CO1	Apply the basic concepts of circuit analysis such as Kirchoff's laws, mesh current and node voltage method for analysis of DC and AC circuits.
CO2	Apply suitable network theorems and analyze AC and DC circuits
CO3	Analyze steady state response of any R, L and C circuits
CO4	Analyze the transient response for any RC, RL and RLC circuits and frequency response of parallel and series resonance circuits.
CO5	Analyze the coupled circuits and network topologies

c. Course Articulation Matrix

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	-	-	-	1	-	1	-	-
CO2	3	3	2	2	-	-	-	1	-	1	-	-
CO3	3	3	3	3	-	-	-	1	-	1	-	-
CO4	3	3	3	3	-	-	-	1	-	1	-	-
CO5	3	3	3	3	-	-	-	1	-	1	-	-
AVG	3	3	2.4	2.4	-	-	-	1	-	1	-	-

d. Course Syllabus **Total:45 Hours**

UNIT I DC CIRCUITS ANALYSIS **9**

Basic Components of electric Circuits, Charge, current, Voltage and Power, Voltage and Current Sources, Ohms Law, Kirchoff's current law, Kirchoff's voltage law, The single Node – Pair Circuit, series and Parallel Connected Independent Sources, Resistors in Series and Parallel, voltage and current division, Nodal analysis, Mesh analysis

UNIT II NETWORK THEOREM AND DUALITY **9**

Useful Circuit Analysis techniques - Linearity and superposition, Thevenin and Norton Equivalent Circuits, Maximum Power Transfer, Delta-Wye Conversion. Duals, Dual circuits. Analysis using dependent current sources and voltage sources

UNIT III SINUSOIDAL STEADY STATE ANALYSIS **9**

Sinusoidal Steady – State analysis, Characteristics of Sinusoids, The Complex Forcing Function, The Phasor, Phasor relationship for R, L, and C, impedance and Admittance, Nodal and Mesh Analysis, Phasor Diagrams, AC Circuit Power Analysis, Instantaneous Power, Average Power, apparent Power and Power Factor, Complex Power.

UNIT IV TRANSIENTS AND RESONANCE IN RLC CIRCUITS **9**

Basic RL and RC Circuits, The Source- Free RL Circuit, The Source-Free RC Circuit, The Unit-Step Function, Driven RL Circuits, Driven RC Circuits, RLC Circuits, Frequency Response, Parallel Resonance, Series Resonance, Quality Factor.

UNIT V COUPLED CIRCUITS AND TOPOLOGY **9**

Magnetically Coupled Circuits, mutual Inductance, the Linear Transformer, the Ideal Transformer, An introduction to Network Topology, Trees and General Nodal analysis, Links and Loop analysis.

LIST OF EXPERIMENTS **Total:15 Hours**

1. Verifications of KVL & KCL

2. Verifications of Thevenin & Norton theorem.

3. Verification of Superposition Theorem.

4. Verification of maximum power transfer Theorem

5. Determination of Resonance Frequency of Series & Parallel RLC Circuits.

6. Transient analysis of RL and RC circuits

e. Text books

1. Hayt Jack Kemmerly, Steven Durbin, "Engineering Circuit Analysis",Mc Graw Hill education, 9th Edition, 2018.
2. Charles K. Alexander & Mathew N.O.Sadiku, "Fundamentals of Electric Circuits", Mc Graw- Hill, 2nd Edition, 2003.
3. Joseph Edminister and Mahmood Nahvi, ―Electric Circuits, Schaum‘s Outline Series, Tata McGraw Hill Publishing Company, New Delhi, Fifth Edition Reprint 2016.

f. Reference books

1. Robert.L. Boylestead, "Introductory Circuit Analysis", Pearson Education India, 12th Edition, 2014. David Bell, "Fundamentals of Electric Circuits", Oxford University press, 7thEdition, 2009.
2. John O Mallay, Schaum’s Outlines "Basic Circuit Analysis", The Mc Graw Hill companies, 2nd Edition, 2011
3. Allan H.Robbins, Wilhelm C.Miller, “Circuit Analysis Theory and Practice", Cengage Learning, Fifth Edition, 1st Indian Reprint 2013

Course Code	Course Name	L	T	P	C
EM1151	**Programming in Practice**	**3**	**0**	**0**	**3**

Category: Employability Enhancement Courses (Programming Courses)

a. Course Objectives

Nowadays, Python is very popular and widely being used in all industrial environments. This course focuses primarily to inspire the learners to think logically and arrive at a solution programmatically and enables the students to use the large collections of built-in and external Python libraries to develop Web applications connecting databases.

b. Course Outcomes

After successful completion of the course, the students will be able

CO.	Course Outcome
CO1	To understand the basic principles, and data constructs of Python Programming Language
CO2	To apply conditional and looping constructs, built-in functions and to develop user-defined functions
CO3	To analyze the object orientation concepts of Python
CO4	To understand the concept of modules and files handling with simple applications
CO5	To develop applications using built-in and external libraries and implement user-defined packages
CO6	To develop simple Web Applications connecting with relational databases

c. Course Articulation Matrix

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	2
CO2	3	2	2	-	-	-	-	-	-	-	-	2
CO3	3	3	2	-	-	-	-	-	-	-	-	2
CO4	3	2	2	-	-	-	-	-	-	-	-	2
CO5	3	3	3	-	1	-	-	-	-	-	-	2
CO6	3	3	3	-	1	-	-	-	-	-	-	2

d. Course Syllabus **Total: 45Hours**

PYTHON PROGRAMMING FUNDAMENTALS **9**

Introduction – Features of Python – References and Keywords - Literals - String – Numeric, Boolean and Special Literals - Operators – Membership and Identity Operators - Conditional and Control Constructs - List, Tuple, Set and Dictionary Data types.

PYTHON FUNCTIONS AND MODULES **9**

Concept of Functions – Built-in Functions - Lambda Function – Recursive Function - Global and Local Variables – Decorators - "args" and "kwargs" - Iterators – Concept of Shallow and Deep Copy – Basics of Built-in Modules – "sys" Module – Array Module – Math Module – "collections" and "iter tools" Modules.

PYTHON OBJECT ORIENTATION CONCEPTS **9**

Class and Object – Constructor – Destructor - Inheritance – Abstract Class – Data Hiding - "super" and "class" Methods – Dunder Method - Static and Instance Methods – "self" parameter – Developing and Deploying Packages.

PYTHON FILE HANDLING **6**

File Objects and Methods - Opening and Closing of a File - Input and Output Operations – Handling of Binary Files – Sequential and Random-Access Files – Reading CSV Files - Writing CSV Files.

PYTHON WEB APPLICATION FRAMEWORK **12**

Basics of MySQL – Database Creation – Tables – MySQL Commands – SELECT – Where Clause – DELETE – UPDATE - Connect Python to MySQL - Flask Introduction – Flask Setup – Flask App Routing– Developing simple Web Applications connecting My SQL.

e. Text Book

1. Richard L.Halterman, “Fundamentals of Python Programming”, dbooks.org - e-Book, 2018.
2. Miguel Grinberg, “Flask Web Development: Developing Web Applications With Python”, O’Reilly Publications, 2nd Edition, 2018.

f. Reference Book

1. Allen B. Downey, “Python for Software Design: How to think like a Computer Scientist”, Cambridge University Press, 2018.
2. Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson Education, 1st Edition, 2021.
3. Martin C. Brown, “Python: The Complete Reference”, 4th Edition, Mc-Graw Hill, 2018.
4. Paul Barry, “Head First Python”, 3rd Edition, O’Reilly, 2023
5. https://www.python.org/

Course Code	Course Name	L	T	P	C
GE1152	Engineering Graphics	3	0	2	4

a. Category: Engineering Science Course

b. Course Objectives

To develop in students, graphic skills for communication of concepts, ideas and design of engineering products, to visualize the job in three dimensions, have a clear conception and appreciation of the shape, size, proportion and design.

c. Course Outcomes

After successful completion of the course, the students will be able to

CO.	Course Outcome
CO1	Relate thoughts and ideas graphically in a neat fashion and ability to perform sketching of engineering curves used in engineering practices, multiple views of objects.
CO2	Understand the concepts of orthographic projections for basic geometrical constructions.
CO3	Acquire the knowledge of orthographic projection in three-dimensional object.
CO4	Develop knowledge about Sectioning and apply interior shapes of solids.
CO5	Analyze the concepts of design in developing various 3-dimensional projections.
CO6	Build a strong foundation to analyze the design in various dimensions.

c. Course Articulation Matrix

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	2	2	-	2
CO2	3	2	2	-	-	-	-	-	2	2	-	2
CO3	3	2	2	-	-	-	-	-	2	2	-	2
CO4	3	2	2	-	-	-	-	-	2	2	-	2
CO5	3	2	2	-	-	-	-	-	2	2	-	2
CO6	3	2	2	-	-	-	-	-	2	2	-	2

d. Course Syllabus **Total:75 Hours**

UNIT I PLANE CURVES AND FREEHAND SKETCHING 15

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid on Horizontal Surfaces – construction of involutes of circle for one complete revolution – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three-Dimensional objects – Layout of views- Freehand sketching of multiple views from pictorial views of objects.

UNIT II PROJECTION OF LINES AND PLANE SURFACE 15

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

UNIT III PROJECTION OF SOLIDS 15

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

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACE15

Sectioning of prisms, pyramids, cylinder and cone in simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and truncated solids in vertical position – Prisms, pyramids cylinder and cone.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 15

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinder, cone- Perspective projection of simple solids-Prisms, pyramids and cylinder by visual ray method.

e. Text books

1. Venugopal K., Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2018.
2. T. Jeyapoovan, "Engineering Graphics using AUTOCAD", Vikas Publishing House Pvt Ltd, 7th Edition.
3. Bhatt N.D., Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rdEdition, 2019.
4. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.

f. Reference books

1. Basant Agarwal, Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, Third Edition, 2019.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas\ Stores, Bangalore, 2007.
3. Luzzader, Warren.J., Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Pearson Education, 11th Edition, 2015.
4. N S Parthasarathy, Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
5. Shah M.B., Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009.

Course Code	Course Name	L	T	P	C
CY1152	Chemistry Laboratory	0	0	2	1

a. Preamble

This practical course imparts practical skills in the estimation of water quality parameters, impurities in aqueous solutions and demonstrates their presence.

b. Course Outcomes

After successful completion of the course, the students will be able to

CO.	Course Outcome
CO1	To study the principles of precipitation titration
CO2	To study working principle of the devices and the properties of the chemicals used in estimating the water quality parameters.
CO3	To apply electro analytical techniques in the estimation of impurities in aqueous solutions
CO4	To measure pH values of acid / base solutions and their classification.
CO5	To estimate iron content of a sample using potentiometric titration.
CO6	To determine the amount of metal ions / alkali metal ions in aqueous sample.

c. Course Articulation Matrix

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	2	2	-	2
CO2	3	2	2	-	-	-	-	-	2	2	-	2
CO3	3	2	2	-	-	-	-	-	2	2	-	2
CO4	3	2	2	-	-	-	-	-	2	2	-	2
CO5	3	2	2	-	-	-	-	-	2	2	-	2
CO6	3	2	2	-	-	-	-	-	2	2	-	2

d. Course Syllabus **Total: 30Hours**

LIST OF EXPERIMENTS

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample.
2. Estimation of Alkalinity, Chloride content, Dissolved Oxygen, and Hardness of water.
3. Estimation of copper content of the given solution by Iodometry.
4. Estimation of TDS of a water sample by Gravimetric.
5. Determination of strength of given hydrochloric acid using pH meter.
6. Determination of strength of acids in a mixture using conductivity meter.
7. Conducto metric titration of barium chloride against sodium sulphate (precipitation titration)
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1,10-Phenanthroline / Thiocyanate method).
10. Estimation of sodium /potassium ions present in water using flame photometer.

e. Learning Resources

1. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, "Vogel's Textbook of Quantitative Chemical Analysis", Sixth Edition, Pearson Education, 2009.
2. V. K. Ahluwalia, Sunitha Dhingra and Adarsh Gulati, "College Practical Chemistry", Universities Press (India) Pvt. Ltd., 2018.

Course Code	Course Name	L	T	P	C
EM1152	Programming in Practice Laboratory	0	0	3	1.5

Category: Employability Enhancement Courses (Programming Courses)

a. Preamble

This practical course will enable the students to develop simple to Web enabled applications and their own packages using the fundamental to advanced concepts in Python.

b. Course Outcomes

After successful completion of the course, the students will be able

CO.	Course Outcome
CO1	To apply conditional and control constructs and to understand usage of variables, keywords, data types, and built-in functions
CO2	To understand the mechanism of arguments passing in user-defined functions with arbitrary arguments and keyword arguments
CO3	To apply object-oriented concepts and develop applications
CO4	To apply file handling concepts and to implement modules and user-defined packages
CO5	To understand the basics of relational database by creating tables, using structured query language and commands for retrieval of records
CO6	To develop simple Web Applications connecting relational databases with data retrieval

c. Course Articulation Matrix

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	2
CO2	3	2	2	-	-	-	-	-	-	-	-	2
CO3	3	3	3	-	1	-	-	-	-	-	-	2
CO4	3	3	3	-	-	-	-	-	-	-	-	2
CO5	3	2	2	-	-	-	-	-	-	-	-	2
CO6	3	3	3	-	1	-	-	-	-	-	-	2

d. Course Syllabus **Total: 45Hours**

PYTHON PROGRAMMING FUNDAMENTALS **9**

- Write Python programs to understand input – output statements / functions.
- Develop programs using conditional and control constructs to demonstrate the use and purpose of the literals – string – list – tuple – dictionary – set:
  a. Reverse a String; reverse a list; find number of characters in a string; create a list of tuples / dictionaries, swapping two numbers; conversion of one data type into another: How to convert tuple to list in Python.
  b. Write a program to estimate the age of an employee till today's date in terms of years, months, and days. Valid assumptions shall be applied.
  c. Write programs to generate Fibonacci series; prime numbers; perfect numbers; cyclic prime numbers.
  d. Write a Python program to estimate the frequency of occurrence of characters in a String.
  e. Write a Python program to sort the dictionary using key or value.
  f. Write a Python program to manipulate matrices.

PYTHON FUNCTIONS AND MODULES **9**

- Develop menu driven applications using user-defined functions in Python.
- Write a function to demonstrate the ways of using arguments (arbitrary arguments, keyword arguments, Docstring, passing list as argument.
- Write recursive functions to do the following:
  a. To find the number of characters in a String
  b. To find the nth term in the Fibonacci series
  c. To find N factorial
- Write Python programs to demonstrate
  a. Shallow and Deep copy
  b. Decorators and Iterators
  c. Use of built-in modules in simple applications

PYTHON OBJECT ORIENTATION CONCEPTS **9**

- Develop a Class in Python to demonstrate the concept of constructors, destructor, data hiding, super () method, class () method, and static and instance methods.
- Write Python code with the use of underscores in different ways to gain the knowledge about their importance in application development.
- Demonstrate the purpose of "self" parameter and "dunder" methods.
- Develop a user-defined package and deploy it locally and globally for use.

PYTHON FILE HANDLING **6**

- Write a Python program to read the contents of a file line by line and print the same on to the display.
- Write a menu driven program to add a line of data, or to delete a line of data in a file and demonstrate the use of Context Manager in handling files.
- Write a Python code to create a CSV file and port them into data frames using Pandas.
- Write a code to insert a record in the specified position in a file: use both sequential access and random-access modes.

PYTHON WEB APPLICATION FRAMEWORK **12**

a. Do experiment on setting up of Flask development environment.
b. Install MySQL and experiment with SQL commands
c. Write a Python application to select records either in ascending order or descending order using MySQL Order By clause and using Python MySQL Connector and print them in the required order.
d. Develop a simple Web application in Flask environment
e. Develop a Web application in Flask environment to connect to the MySQL Database.

e. Laboratory Equipment Required

Standalone Desktops (Windows/Linux) with Python 3interpreterand MySQL database – 30 Nos

NON-CREDIT COURSES (MANDATORY)

Course Code	Course Name / SEMESTER - II	L	T	P	C
NC1151	Holistic Life skill	1	0	0	0

Category: Non-Credit Course (Mandatory)

a. Course Syllabus **Total: 15 Hours**

UNIT I ETHICS AND VALUES 3

Importance of Ethics in Personal and Professional Life - Distinction between Ethics and Morality - Principles of Ethical Decision Making - Case Studies in Ethical Dilemmas - Professional Ethics and Codes of Conduct - Ethical Leadership and Corporate Social Responsibility (CSR) - Influence of Culture on Values and Ethics - Social Values and Community Responsibility

UNIT II POSITIVE PSYCHOLOGY 3

Difference between Traditional Psychology and Positive Psychology - The PERMA Model (Positive Emotions, Engagement, Relationships, Meaning, Achievement) - Character Strengths and Virtues - How to Identify and Use Strengths - Mindfulness in Daily Life - Building and Maintaining Healthy Relationships - Community and Social Connections - Science of Happiness.

UNIT III YOGA AND MEDITATION 3

Introduction: - Presentations on Introduction to Yoga and its History - Lab Exp: 1Perform warming up exercises to prepare the body from head to toe for Yoga. Micro project: Maintain a diary indicating date wise practice done by the student with a photograph of self in yogic posture

UNIT IV FOOD AND NUTRITION 3

Basic Nutrients: Carbohydrates, Proteins, Fats, Vitamins, Minerals, and Water - Principles of a Balanced Diet - Dietary Guidelines and Food Pyramids - Nutritional Needs at Different Stages of Life (Infants, Children, Adolescents, Adults, Elderly) - Basics of Food Safety and Hygiene - Common Food borne Illnesses and Prevention - Safe Food Handling Practices - Tips for Eating Healthy on a Budget

UNIT V RESEARCH AND METHODOLOGY 3

Definitions and Characteristics of Research, Motivation and Objectives - Concept of Applied and Basic Research Process, Criteria of Good Research - Defining and Formulating the Research Problem: Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem.

b. Activities:

- Survey of Character Strengths
- Case study: Real-life examples of resilience
- Create a balanced meal plan for a day
- Guest lecture: Nutritionist or dietician on special dietary needs

c. Books for study:

1. "Flourish: A Visionary New Understanding of Happiness and Well-being" by Martin Seligman
2. "Authentic Happiness: Using the New Positive Psychology to Realize Your Potential for Lasting Fulfilment" by Martin Seligman
3. "Justice: What's the Right Thing to Do?" by Michael J. Sandel
4. "The Elements of Moral Philosophy" by James Rachels and Stuart Rachels
5. Science of Yoga: Understand the Anatomy and Physiology to Perfect Your Practice, Ann Swanson, ISBN-13?: 978-1465479358
6. "Nutrition: Concepts and Controversies" by Frances Sizer and Ellie Whitney
7. "The China Study" by T. Colin Campbell and Thomas M. Campbell II
8. C.R. Kothari and Gaurav Garg, “Research Methodology: Methods and Techniques”, New Age International (P) Ltd., Publishers, Fourth Multi Colour Edition, 2020.

References:

1. Seligman, M. E. P. (2002). Positive psychology, positive prevention, and positive therapy. Handbook of Positive Psychology.
2. Csikszentmihalyi, M. (1990). Flow: The Psychology of Optimal Experience.
3. Singer, P. (1972). "Famine, Affluence, and Morality." Philosophy & Public Affairs
4. Sandel, M. (2009). "The Case against Perfection." The Atlantic”
5. Harvard T.H. Chan School of Public Health. "The Nutrition Source”
6. Academy of Nutrition and Dietetics. "Food & Nutrition Magazine."
7. https://onlinecourses.swayam2.ac.in/aic23_ge09/preview - Yoga for Creativity