

**Dr. MAHALINGAM**  
COLLEGE OF ENGINEERING AND TECHNOLOGY

Udumalai Road, Pollachi, Coimbatore District - 642003

Established in 1998 • Approved by AICTE • Affiliated to Anna University

(A DIVISION OF NIA EDUCATIONAL INSTITUTIONS)



NAAC A++ GRADE  
Cycle 3 (2023-2030)  
The Highest Grade

# Curriculum and Syllabi

## Semesters I & II

## Regulations 2023

<b>Programme:</b>
<b>Curriculum and Syllabi: Semester I &amp; II</b>
<b>Recommended by Board of Studies on:</b>
<b>Approved by Academic Council on:</b>

<b>Action</b>	<b>Responsibility</b>	<b>Signature of Authorized Signatory</b>
Designed and Developed By		
Compiled By	Office of Controller of Examination	
Approved By	Principal	

**Dr. Mahalingam College of Engineering and Technology, Pollachi 642003.**  
**(An autonomous institution approved by AICTE and affiliated to Anna University)**

## **Department of Automobile Engineering**

### **Vision**

To offer cutting-edge technology in the broad area of automobile engineering and develop globally competitive engineers

### **Mission:**

- To develop automobile engineering graduates for a successful career in automotive industry around the globe through effective teaching-learning and training
- To develop the capability of graduates for creating innovative products / systems to enhance the quality of life
- To inculcate in them the ability to solve societal problems through engineering and professional skills

### **Programme Educational Objectives (PEOs)**

B.E. Automobile Engineering graduates will:

**PEO1. Technical expertise:** Actively apply technical and professional skills in engineering practices to face industrial challenges around the globe.

**PEO2. Higher studies and research:** Own their professional and personal development by continuous learning to create new knowledge.

**PEO3. Ethical knowledge:** Conduct themselves in a responsible, professional and ethical manner supporting sustainable economic development, which enhances the quality of life.

### **Programme Outcomes (POs) - Regulations 2023**

On successful completion of B.E. Automobile Engineering programme, graduating students/graduates will be able to:

**PO1. Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2. 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.

**PO3. 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.

**PO4. 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 for complex problems.

**PO5. 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.

**PO6. 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.

**PO7. 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.

**PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9. Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10. 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.

**PO11. 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

**PO12. 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.

### **Programme Specific Outcomes (PSOs)**

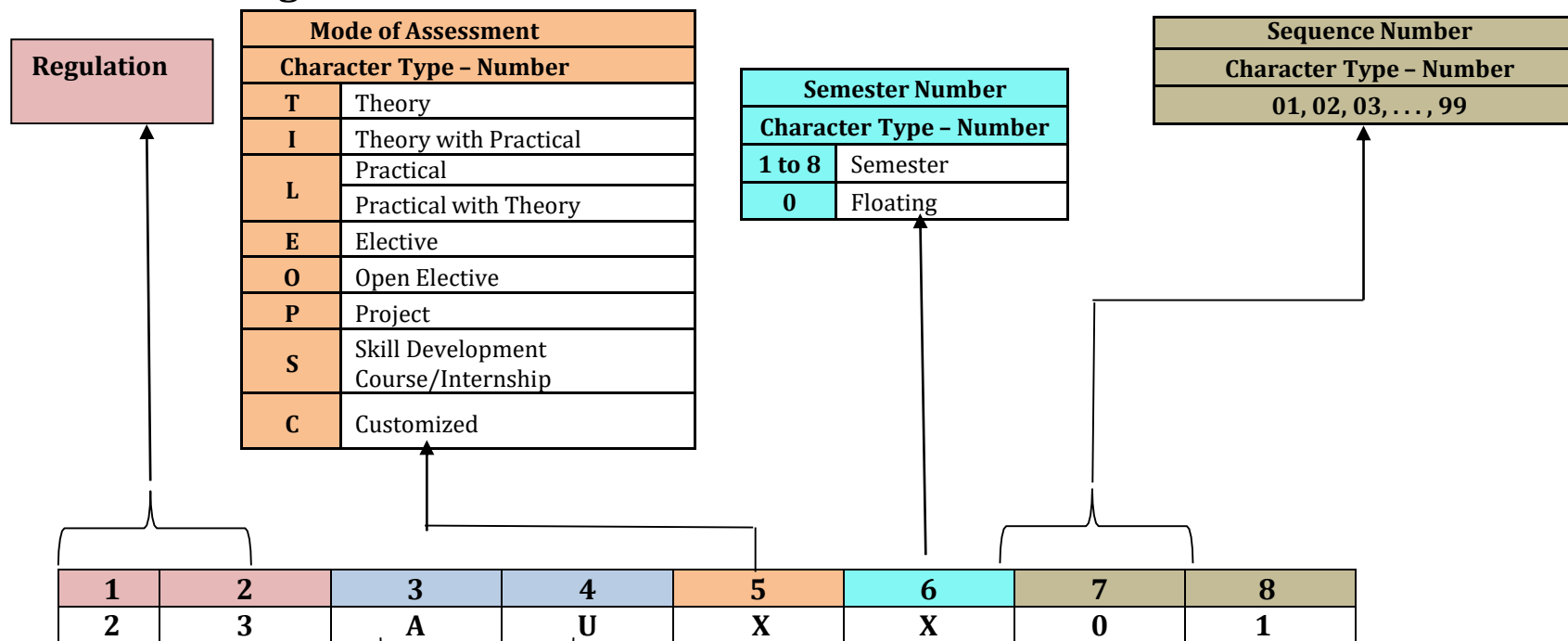
On successful completion of B.E. Automobile Engineering programme, graduating students/graduates will be able to:

**PSO1.**Analyze the systems behavior and optimize for the results using modeling, simulation and experiments.

**PSO2.**Design the automotive components with due considerations of environment and sustainability

## Dr. Mahalingam College of Technology, Pollachi

### 2023 Regulations - Course Code Generation Procedure for UG Courses



Mode of Assessment	
Character Type - Number	
T	Theory
I	Theory with Practical
L	Practical
L	Practical with Theory
E	Elective
O	Open Elective
P	Project
S	Skill Development Course/Internship
C	Customized

Semester Number	
Character Type - Number	
1 to 8	Semester
0	Floating

Sequence Number	
Character Type - Number	
01, 02, 03, ..., 99	

1	2	3	4	5	6	7	8
2	3	A	U	X	X	0	1

Board/Department/Programme/Course Type			
Character Type - Alphabet			
AD	Artificial Intelligence & Data Science	ME	Mechanical
AM	CSE (Artificial Intelligence & Machine Learning)	SC	CSE (Cyber Security)
AU	Automobile	PH	Physics
CE	Civil	CH	Chemistry
CS	Computer Science	EN	English
EA	Advanced Communication Technology	MA	Mathematics
EC	Electronics and Communication	ES	Employability Skills
EE	Electrical and Electronics	VA	Value Added Course
EV	VLSI Design & Technology	SA	Studio Activities
IT	Information Technology		

**Programme: B.E. Automobile Engineering  
2023 Regulations**

Type of Course	Course Code	Course Title	Duration	Credits	Marks
VAC	23VAL101	Induction Program	3 Weeks	-	100

**Semester I**

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
AEC	23ENI101	Communication Skills I	2	0	2	3	100	All
Minor	23MAI102	Matrices and Calculus	3	0	2	4	100	AU,EA,EC,EE,EV,ME
Minor	23PHT102	Physics for Mechanical Sciences	3	0	0	3	100	AU,ME
Multi-disciplinary	23ADT101	Python Programming for Mechanical Sciences	3	0	0	3	100	AU,ME
Major	23MEL001	Engineering Drawing	1	0	3	2.5	100	AD,AM,AU,CS,EA,EC,EE,EV,IT,ME,SC
Minor	23PHL102	Physics for Mechanical Sciences Laboratory	0	0	3	1.5	100	AU,ME
Multi-disciplinary	23ADL101	Python Programming Laboratory for Mechanical Sciences	0	0	3	1.5	100	AU,ME
VAC	23VAL102	Wellness for Students	0	0	2	1	100	All
VAC	23VAT101	தமிழர் மரபு/ Heritage of Tamils	1	0	0	1	100	All
AEC	23SAL101	Studio Activities	0	0	2	-	-	All
<b>Total</b>			<b>13</b>	<b>0</b>	<b>17</b>	<b>20.5</b>	<b>900</b>	

**Semester II**

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
AEC	23ENI201/ 23FLT201/ 23FLT202	Communication Skills II/ Foreign Language Japanese/ Foreign Language-German	2	0	2	3	100	All
Minor	23MAI202	Complex Variables and Transforms	3	0	2	4	100	AU,EC,EE,EV,ME
Minor	23CHT201	Chemistry for Mechanical Sciences	3	0	0	3	100	AU,ME
Major	23MEI201	Engineering Materials	3	0	2	4	100	AU,ME
Major	23MEL201	Computer Aided Drafting and Modelling Laboratory	1	0	3	2.5	100	AU,ME
Minor	23CHL201	Chemistry for Mechanical Sciences Laboratory	0	0	3	1.5	100	AU,ME
SEC	23MEL202	Engineering Practices Laboratory	0	0	3	1.5	100	AU,CE,ME
SEC	23ESL201	Employability Skills1: Aptitude	0	0	2	1	100	All
VAC	23VAT201	தமிழரும் தொழில்நுட்பமும்/ Tamils and Technology	1	0	0	1	100	All
Multi-disciplinary	23CHT202	Environmental Sciences	1	0	0	-	100	All
AEC	23SAL201	Studio Activities	0	0	2	-	-	All
<b>Total</b>			<b>14</b>	<b>0</b>	<b>19</b>	<b>21.5</b>	<b>1000</b>	

### Semester III

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Minor	23MAI301	Numerical Methods	3	0	2	4	100	AU,ME
Major	23MET301	Engineering Mechanics	2	1	0	3	100	AU,ME
Major	23AUI301	Engineering Thermodynamics and Heat Transfer	2	0	2	3	100	-
Major	23MET302	Fluid Mechanics and Machinery	2	1	0	3	100	AU,ME
Major	23MET303	Manufacturing Processes	3	0	0	3	100	AU,ME
Major	23MEL301	Manufacturing Processes Laboratory	0	0	3	1.5	100	AU,ME
Major	23MEL302	Fluid Mechanics and Machinery Laboratory	0	0	3	1.5	100	AU,ME
SEC	23ESL301	Professional Skills 2: Problem Solving Skills & Logical Thinking 2	0	0	2	1	100	All
VAC	23VAL003	Universal Human Values 2: Understanding Harmony	2	1	0	3	100	All
AEC	23SAL301	Studio Activities	0	0	2	-	-	All
SEC	23AUS301	Defensive Driving Skill Training	0	0	2	-	-	-
<b>Total</b>			<b>14</b>	<b>3</b>	<b>16</b>	<b>23</b>	<b>900</b>	

### Semester IV

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Minor	23MAI401	Probability and Statistics	3	0	2	4	100	AU,ME
Major	23MET401	Strength of Materials	3	0	0	3	100	AU,ME
Major	23MET402	Mechanics of Machinery	3	1	0	4	100	AU,ME
Major	23AUI401	Automotive Engines	3	0	2	4	100	-
Major	23AUT401	Automotive Chassis and Transmission	3	0	0	3	100	-
Major	23MEL401	Strength of Materials & Mechanics of Machinery Laboratory	0	0	3	1.5	100	AU,ME
Major	23AUL401	Fuels, Engine Performance and Emission Testing Laboratory	0	0	3	1.5	100	-
SEC	23XXXXXX	Employability Skills 3	0	0	2	1	100	All
AEC	23SAL401	Studio Activities	0	0	2	-	-	All
<b>Total</b>			<b>15</b>	<b>1</b>	<b>14</b>	<b>22</b>	<b>800</b>	

Type of Course	Course Code	Course Title	Duration	Credits	Marks
SEC	23XXXXXX	Internship I/ Research Internship/ Skill Development	2 Weeks	1	100



## Tentative Curriculum for Semesters V to VIII

### Semester V

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Multi - disciplinary	23XXXXXX	Cyber security	3	0	0	3	100	-
Major	23XXXXXX	Finite Element Analysis	2	1	0	3	100	-
Major	23XXXXXX	Design of Automotive Elements	3	1	0	4	100	-
Major	23XXXXXX	Professional Elective I	3	0	0	3	100	-
Major	23XXXXXX	Professional Elective II	3	0	0	3	100	-
Major	23XXXXXX	Vehicle Maintenance Laboratory	0	0	3	1.5	100	-
Major	23XXXXXX	Simulation and Analysis Laboratory	0	0	3	1.5	100	-
SEC	23XXXXXX	Employability Skills <sup>4</sup>	0	0	2	1	100	-
Project	23XXXXXX	Reverse Engineering Project	0	0	6	3	100	-
AEC	23SAL501	Studio Activities	0	0	2	-	-	All
<b>Total</b>			<b>14</b>	<b>2</b>	<b>16</b>	<b>24</b>	<b>900</b>	

### Semester VI

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Minor	23XXXXXX	Research Methodology	3	0	0	3	100	-
Major	23XXXXXX	Vehicle Dynamics	3	1	0	4	100	-
Major	23XXXXXX	Automotive Electrical, Electronics and Embedded Systems	2	0	2	3	100	-
Major	23XXXXXX	Professional Elective III	3	0	0	3	100	-
Major	23XXXXXX	Professional Elective IV	3	0	0	3	100	-
Minor	23XXXXXX	Open Elective I	3	0	0	3	100	-
Major	23XXXXXX	Automotive Embedded System Laboratory	0	0	3	1.5	100	-
SEC	23XXXXXX	Employability Skills <sup>5</sup>	0	0	2	1	100	-
AEC	23SAL601	Studio Activities	0	0	2	-	-	All
<b>Total</b>			<b>17</b>	<b>1</b>	<b>9</b>	<b>21.5</b>	<b>800</b>	

Type of Course	Course Code	Course Title	Duration	Credits	Marks
SEC	23XXXXXX	Internship II/ Research Internship/ Skill Development	4 Weeks	2	100

### Semester VII

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Minor	23XXXXXX	Project Management	3	0	0	3	100	-
Multi-disciplinary	23XXXXXX	Artificial Intelligence and Machine Learning	3	0	0	3	100	-
Major	23XXXXXX	Professional Elective V	3	0	0	3	100	-
Major	23XXXXXX	Professional Elective VI	3	0	0	3	100	-
Minor	23XXXXXX	Open Elective II	3	0	0	3	100	-
Project	23XXXXXX	Project Phase I	0	0	8	4	200	-
<b>Total</b>			<b>15</b>	<b>0</b>	<b>8</b>	<b>19</b>	<b>700</b>	

### Semester VIII

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Major	23XXXXXX	Professional ElectiveVII	3	0	0	3	100	-
Major	23XXXXXX	Professional ElectiveVIII	3	0	0	3	100	-
Project	23XXXXXX	Project Phase2	0	0	12	6	200	-
<b>Total</b>			<b>6</b>	<b>0</b>	<b>12</b>	<b>12</b>	<b>400</b>	

Type of Course	Course Code	Course Title	Duration	Credits	Marks
SEC	23XXXXXX	Internship III/ Research Internship/ Skill Development	12 Weeks	4	100

**Total Credits – 170.5**

# **SEMESTER 1**

<b>Course Code:23VAL101</b>		<b>Course Title: Induction Program (Common to all B.E/B.Tech Programmes)</b>
<b>Course Category: VAC</b>		<b>Course Level: Introductory</b>
<b>Duration: 3 weeks</b>	<b>Mandatory Non-Credit Course</b>	<b>Max Marks:100</b>

### **Pre-requisites**

- NIL

### **Course Objectives**

The course is intended to:

1. Explain various sources available to meet the needs of self, such as personal items and learning resources
2. Explain various career opportunities, opportunity for growth of self and avenues available in the campus
3. Explain the opportunity available for professional development
4. Build universal human values and bonding amongst all the inmates of the campus and the society.

### **List of Activities:**

1. History of Institution and Management: Overview on NIA Educational Institutions – Growth of MCET – Examination Process –OBE Practices –Code of Conduct – Centre of Excellence.
2. Lectures, interaction sessions and Motivational Talks by Eminent people, Alumni, Employer and Industry Experts
3. Familiarisation of Department / Branch:HoD's & Senior Interaction- Department Association
4. Universal Human Value Modules : Aspirations and concerns, Self Management, Relations Social and Natural Environment.
5. Orientation on Professional Skills Courses
6. Proficiency Modules : Mathematics, English, Physics and Chemistry
7. Introduction to various Chapters, Cells, Clubs and its events
8. Creative Arts : Painting, Music and Dance
9. Physical Activity :Games, Sports and Yoga
10. Group Visits: Visit to local area and Campus Tour

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1 : Explain various sources available to meet the needs of self, such as personal items and learning resources through visit to local areas and campus	Understand
CO2: Explain various career opportunities and avenues available in the campus through orientation sessions	Understand
CO3: Explain the opportunity available for professional development through professional skills, curricular, co-curricular and extracurricular activities	Understand
CO4: Build universal human values and bonding amongst all the inmates of the campus and society for having a better life	Apply

### Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	2	1	2	-	-	-	-
CO2	1	-	-	-	-	-	-	2	1	2	-	-	-	-
CO3	1	-	-	-	-	-	-	2	1	2	-	-	-	-
CO4	2	-	-	-	-	-	-	2	1	2	-	-	-	-

High : 3, Medium :2, Low: 1

### Text Book(s):

T1. Reading material, Workbook prepared by PS team of the college

### Reference Book(s):

R1. Sean Covey, "Seven habits of highly effective teenagers", Simon & Schuster Uk, 2004.

R2. Vethathiri Maharishi Institute For Spiritual and Intuition Education, aliyar, "value education for a harmonious life (Manavalakalai Yoga)", Vethathri Publications, Erode, 2010.

R3. Dr.R.Nagarathna, Dr.H.R. Nagendra, " Integrated approach of yoga therapy for positive living", Swami Vivekananda Yoga Prakashana Bangalore,2008 Ed.

### Web References:

- [https://youtube.com/playlist?list=PLYwzG2fd7hzc4HerTNkc3pS\\_lvcCfKznV](https://youtube.com/playlist?list=PLYwzG2fd7hzc4HerTNkc3pS_lvcCfKznV)
- <https://www.youtube.com/watch?v=P4vjfEVk&list=PLWDeKF97v9SO0frdgmpaghDMjkom1>
- <https://fdp-si.aicte-india.org/download/AboutSIP/About%20SIP.pdf>

<b>Course Code: 23ENI101</b>	<b>Course Title: Communication Skills I (Common to all B.E/B.Tech Programmes)</b>		
<b>Course Category: AEC</b>		<b>Course Level: Introductory</b>	
<b>L:T:P(Hours/Week) 2:0:2</b>	<b>Credits: 3</b>	<b>Total Contact Hours:60</b>	<b>Max Marks:100</b>

## Course Objectives

The course is intended to impart formal and informal language effectively and accurately in various real-life contexts on par with B1 level of CEFR Scale.

### Module I

**20 Hours**

**Grammar:** Synonyms & Antonyms -Tense forms - Modals - Passives – Reported Speech – Comparatives and Descriptive adjectives.

**Listening:** Listening for gist and specific information - Listening to past events, experiences and job preferences - Listening to descriptions of monuments - Listening for excuses - Listening to description: transportation systems and public places.

**Speaking:** Introducing oneself - Exchanging personal information – Effective Conversations: Role Play Situations (Describing personality traits - Describing landmarks, monuments and festivals - Making polite requests and excuses - Discussing facts - Asking for and giving information – Expressing wishes - Talking about lifestyle changes - Talking about transportation and its problems - Describing positive and negative features of things and places - Making comparisons)

**Reading:** Skimming and Scanning - Reading Comprehension - Reading and comprehending online posts and emails – Case Studies

**Writing:** Letter writing (Permission letters - Online cover letter for job applications) - Instructions - Recommendations - Write a blog (General) - Report Writing (Industrial Visit Report and Event Reports) - formal and informal emails.

### Module II

**20 Hours**

**Grammar:** Sequence adverbs - Phrasal verbs - Relative clauses – Imperatives - Infinitives - Conditionals.

**Listening:** Listening to review of food items - Listening to results of surveys- Listening to motivational talks & podcasts

**Speaking:** Expressing likes and dislikes - Describing a favourite snack - Giving advices and suggestions - Speculating about past and future Events – Group Discussion

**Reading:** Reading different expository texts - Reading to factual texts - Print and online media- Reading Comprehension

**Writing:** Process Descriptions – Email Writing (Requesting for information) - Reviewing Movie – Social media feeds/posts (Any Social Media)

**List of Experiments:****20 Hours**

1. Mini Presentation and Picture Prompt Discussion
2. Debate Tournament
3. Listening, Mind Mapping & Summarization
4. Listening to Stories and Providing the Innovative Climax
5. Reading Comprehension
6. Writing - Interpretation of Visuals

<b>Course Outcomes</b>	<b>Cognitive Level</b>
At the end of this course, students will be able to:	
CO 1 : Utilize the basic English grammar and vocabulary to acquire professional communication skills.	Apply
CO 2 : Develop listening and speaking skills through classroom activities based on listening comprehension, recapitulation, interpretation and debate on the same	Apply
CO 3 : Read and write social media posts and comments	Apply
CO 4 : Perform as a member of a team and engage in individual presentation	Apply

**Course Articulation Matrix**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	-	-	-

High-3; Medium-2;Low-1

**Textbooks:**

- T1. Jack C. Richards, Jonathan Hull, and Susan Proctor, "Interchange - Student's book 2", 5<sup>th</sup> Edition, Cambridge University Press, South Asia Edition, 2022.
- T2. Jack C. Richards, Jonathan Hull, and Susan Proctor, "Interchange - Student's Book 1", 5<sup>th</sup> Edition, Cambridge University Press, South Asia Edition, 2022.

**Reference Book(s):**

- R1. David Bohlke, Jack C. Richards, "Four Corners", 2<sup>nd</sup> Edition, Cambridge University Press, 2018.
- R2. Adrian Doff, Craig Thaine, Herbert Puchta, Jeff Stranks, Peter Lewis-Jones, Graham Burton, Empower B1 – Student's Book, Cambridge University Press, 2020.
- R3. Raymond Murphy, "Intermediate English Grammar" 30<sup>th</sup> Edition, Cambridge University Press, 2022.

**Web References:**

1. <https://speakandimprove.com/>
2. <https://writeandimprove.com/>
3. <https://www.cambridgeenglish.org/exams-and-tests/linguaskill/>

<b>Course Code: 23MA1102</b>		<b>Course Title: Matrices and Calculus (Common to AU, EA, EC, EE, EV &amp; ME)</b>	
<b>Course Category: Minor</b>		<b>Course Level: Introductory</b>	
<b>L:T:P(Hours/Week) 3:0 :2</b>	<b>Credits: 4</b>	<b>Total Contact Hours:75</b>	<b>Max Marks:100</b>

### **Course Objectives:**

The course is intended to impart knowledge on the use of matrix algebra techniques for practical applications, familiarize with differential calculus and acquire knowledge of mathematical tools to evaluate multiple integrals.

### **Module I**

**23 Hours**

#### **Matrices**

Definitions and examples of symmetric, skew symmetric and orthogonal matrices - Eigenvalues and Eigenvectors – Properties of Eigenvalues and Eigenvectors-Diagonalization of matrices through orthogonal transformation - Cayley-Hamilton Theorem (without proof) – verification problems and properties - Transformation of quadratic forms to canonical forms through orthogonal transformation.

#### **Differential and Integral Calculus**

Curvature – Radius of curvature –Centre of curvature- Circle of curvature - Evolutes and Involutives - Evaluation of definite and improper integrals - Beta and Gamma functions – Properties and applications.

#### **Multivariable Differentiation I**

Limit – continuity - Mean value theorems and partial derivatives - Taylor's series and Maclaurin's series – Jacobian of functions of several variables.

### **Module II**

**22 Hours**

#### **Multivariable Differentiation II**

Maxima, Minima and saddle points of functions of several variables - Method of Lagrange's multipliers.

#### **Multiple Integral**

Multiple Integration: Double integrals - Change of order of integration in double integrals - Change of variables (Cartesian to polar, Cartesian to spherical and Cartesian to cylindrical) - Triple integrals - Applications: Finding areas and volumes.

#### **Ordinary Differential Equations Of Second and Higher Orders**

Second and higher order linear differential equations with constant coefficients – Second order linear differential equations with variable coefficients (Cauchy - Euler equation, Legendre's equation) – Method of variation of parameters – Solution of first order simultaneous linear ordinary differential equations



**List of Experiments:****30 Hours**

1. Introduction to MATLAB.
2. Rank of matrix and solution of system of linear algebraic equations.
3. Finding Eigen values and Eigen vectors of a matrix.
4. Solving ordinary differential equation.
5. Gram Schmidt Procedure.
6. Finding Maxima, Minima of a function.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
<b>CO1:</b> Determine the canonical form of a quadratic form using orthogonal transformation.	Apply
<b>CO2:</b> Identify the evolute of a curve and solve the improper integrals using beta gamma functions.	Apply
<b>CO3:</b> Examine the extreme value of multivariate functions.	Apply
<b>CO4:</b> Evaluate the area and volume using multiple integrals and solve the higher order differential equations.	Apply
<b>CO5:</b> Demonstrate the understanding of calculus concepts through modern tools.	Apply

**Course Articulation Matrix**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-	-	-

High-3; Medium-2;Low-1

**Text Book(s):**

- T1. Erwinkreyzig, Advanced Engineering Mathematics, 9<sup>th</sup> edition, John Wiley& Sons, 2006.  
 T2. Veerarajan T., Engineering Mathematics for first year, 3<sup>rd</sup> edition, Tata McGraw-Hill,

**Reference Book(s):**

- R1. G.B.Thomas and R.L Finney, Calculus and Analytic Geometry, 9<sup>th</sup> edition, Pearson, Reprint, 2002.  
 R2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 36<sup>th</sup> Edition, 2010.  
 R3. P. Sivaramakrishna Das , C. Vijayakumari , Engineering Mathematics, Pearson India, 2017.

**Web References:**

1. <https://nptel.ac.in/courses/111107112>
2. <https://nptel.ac.in/courses/111104031>

<b>Course Code: 23PHT102</b>		<b>Course Title: Physics for Mechanical Sciences (Common to AU &amp; ME)</b>	
<b>Course Category: Minor</b>		<b>Course Level: Introductory</b>	
<b>L:T:P(Hours/Week) 3: 0: 0</b>	<b>Credits: 3</b>	<b>Total Contact Hours: 45</b>	<b>Max Marks: 100</b>

**Course Objectives:**

The course is intended to develop capacity to predict the effect of force and motion in the design functions of engineering and to impart knowledge on the fundamental concepts of heat transfer and applications of laws of thermodynamics.

**Module I**

**22 Hours**

**Basics of Mechanics:** Classification of mechanics, Review of fundamental laws of mechanics – Physical quantities – scalars, vectors – Newton’s law of mechanics, Gravitational law. Particles and rigid body, Resolution of forces in to components, Rectangular components of forces,-Free body diagram-principle of transmissibility-Resultant force-equilibrium conditions-equilibrium of particles subjected to coplanar and non-coplanar force system – equilibrium of particles subjected to coplanar system of forces - Triangle law, Parallelogram law and Lami’s theorem.

**Kinematics and Kinetics of Particles:** Kinematic parameters – displacement, velocity, acceleration and time. Types of motion – uniform, non-uniform motion, motion of particles in a plane – Rectilinear and curvilinear motion of particles – motion of projectile. Kinetics of particles – Force and acceleration - D’Alembert’s principle – Work energy, and impulse momentum method.

**Elasticity:** Introduction – Concept of Load, Stress and Strain – Hooke’s law – Stress-Strain Diagram – Elastic and Plastic Materials – Factors affecting Elastic Properties – Three Moduli of Elasticity – Relation between Young’s, Rigidity and Bulk moduli (Qualitative – No derivation) – Bending Moment of a Beam – Determination of Young’s modulus using a Cantilever – Twisting Couple of a wire – Determination of Rigidity Modulus of a thin wire using Torsional Pendulum.

**Module II**

**23 Hours**

**Viscosity:** Coefficient of Viscosity – Experimental determination of coefficient of viscosity: Poiseuille’s method and Stoke’s method.

**Thermal Physics:** Introduction – Modes of Heat Transfer – Thermal Conductivity – Newton’s law of cooling – Specific Heat Capacity determination – Advantages and disadvantages of Newton’s law of cooling method – Verification of Newton’s law of cooling – Lee’s disc method for the determination of thermal conductivity of a bad

conductor – Conduction of Heat through a compound media : Bodies in both series and Parallel.

**Elements of Thermodynamics:** Concept of temperature – heat – thermodynamics – work – heat in thermodynamics – comparison of heat and work – internal energy – first law of thermodynamics – applications of the first law– limitations of first law, second law of thermodynamics-Statements of second law – the Carnot cycle – heat engine – heat pump – refrigerators – third law of thermodynamics.

<b>Course Outcomes</b>	<b>Cognitive Level</b>
At the end of the course students will able to	
CO1: <b>Apply</b> the basic concepts of mechanics and elastic properties of matter to solve the physical characteristics of an object using analytical problems.	Apply
CO2: Perform as a member of team in <b>analyzing</b> the recent advancements of mechanical engineering related to the concepts of basic mechanics, elasticity and make a presentation.	Apply
CO3: <b>Interpret</b> the concepts of viscosity, heat and thermodynamics and apply it for different real life applications.	Apply
CO4: Perform as a member of team in <b>articulating</b> the modern technologies behind the flow of fluids and different thermodynamic systems.	Apply

### Course Articulation Matrix

CO Vs PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3													
CO2	3								1	3				
CO3	3													
CO4	3								1	3				

High-3; Medium-2; Low-1

**Text Book(s):**

- T1. R. C. Hibbeler, "Engineering Mechanics: Combined Static and Dynamics", Prentice Hall, 2010.
- T2. M.N.Avadhanulu and P.G.Kshirsagar, "Text Book of Engineering Physics", S. Chand & Company Ltd., New Delhi, 2018.

**Reference Book(s):**

- R1. Balasubramaniam "Callister's Material Science and Engineering", John Wiley and Sons Inc., 2<sup>nd</sup> Edition, 2015.
- R2. Yunus A Sengel, Michel A Boles, Thermodynamics: An Engineering Approach, MCGraw Hill, 9<sup>th</sup> Edition, 2017.
- R3. P.K.Nag, Engineering Thermodynamics, MCGraw Hill, 6<sup>th</sup> Edition, 2017.

**Web References:**

1. <http://www.physicsclassroom.com/class/thermal>.
2. <https://nptel.ac.in/courses/112105123>
3. <https://nptel.ac.in/courses/112106286>

<b>Course Code: 23ADT101</b>		<b>Course Title: Python Programming for Mechanical Sciences</b> (Common to AU & ME)	
<b>Course Category: Multidisciplinary</b>		<b>Course Level: Introductory</b>	
<b>L:T:P(Hours/Week)</b> <b>3: 0: 0</b>	<b>Credits:3</b>	<b>Total Contact Hours:45</b>	<b>Max Marks:100</b>

**Course Objectives:**

The course is intended to provide the basic knowledge of Python. The course imparts the fundamentals concepts of python for writing the simple application.

**Module I**

**22 Hours**

**Computational Thinking and Problem Solving:** Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions) - notation (pseudo code, flow chart, programming language) - algorithmic problem solving - simple strategies for developing algorithms (iteration, recursion).

**Data Types, Expressions, Statements:** Python interpreter and interactive mode, debugging-values and data types –int, float, boolean, string and list – variables – expressions – statements – tuple assignment – precedence of operators – comments

**Control Flow :** Conditionals: Boolean values and operators – conditional (if) – alternative (if-else) – chained conditional (if-elif-else) – Iteration: state, while, for, break, continue, pass

**Module II**

**23 Hours**

**Functions and Strings:** 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

**Lists, Tuples, Dictionaries:** 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

**Files, Modules, Packages:** Files and exception: text files – reading and writing files – format operator – command line arguments – errors and exceptions – handling exceptions – modules – packages

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
<b>CO1:</b> Develop algorithmic solutions to simple computational problems including read, write and execute the simple python programs	Apply
<b>CO2:</b> Apply Python programming effectively, using variables, data types, functions, recursion, and file handling to solve practical problems and build functional applications	Apply
<b>CO3:</b> Decompose a python program into functions for reusability and easy debugging	Apply
<b>CO 4:</b> Represent compound data using python lists, tuples, dictionaries	Apply
<b>CO 5:</b> Manipulate the data from/to files in python programs.	Apply
<b>CO 6:</b> Utilize built-in packages for developing simple python application	Apply

### Course Articulation Matrix

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

High-3; Medium-2;Low-1

### Text Book(s):

- T1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
- T2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2<sup>nd</sup> edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016
- T3. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2", Network Theory Ltd., 2011.

### Reference Book(s):

- R1. John V Guttag, "Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press , 2013
- R2. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Interdisciplinary Approach", Pearson India Education Services Pvt. Ltd., 2016.

### Web References:

1. <https://www.w3schools.com/python/>
2. <https://realpython.com/>
3. <https://nptel.ac.in/courses/106106145>

<b>Course Code: 23MEL001</b>		<b>Course Title: Engineering Drawing</b> (Common to AD,AM,AU,CS,EA ,EC,EE,EV,IT,ME, SC)	
<b>Course Category: Major</b>		<b>Course Level: Introductory</b>	
<b>L:T:P(Hours/Week)</b> 1: 0: 3	<b>Credits:2.5</b>	<b>Total Contact Hours: 60</b>	<b>Max Marks:100</b>

**Course Objectives:**

The course is intended to

- To impart knowledge on basic dimensioning. 2D and 3 D drawings such as points, lines, planes and solids on first quadrant.

**Module I**

**8 Hours**

**Basics of Engineering Drawing:** Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning. Basic Geometrical constructions –Orthographic projection- Free hand Sketching.

**Projection of Points, Lines:** First angle projection-projection of points. 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 and traces by rotating object method.

**Projection of Solids:** 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. Practicing three dimensional modeling of simple objects by CAD Software (Not for examination).

**Module II**

**7 Hours**

**Sectioned Solids:** Sectioning of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by cutting planes inclined to one reference plane and perpendicular to the other – Orthographic views of sections of simple solids.

**Development of Surfaces:** Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders using straight line and radial line method.

**Isometric Projection:** Principles of isometric projection – Isometric scale –Isometric projections of simple solids and truncated solids. Practicing three dimensional modeling of isometric projection of simple objects by CAD Software (Not for examination).



## List of Experiments

45 Hours

1. Lettering & Dimensioning
2. Projection of Points & Lines
3. Orthographic projections
4. Projection of Simple Solids
5. Projection of Section of Simple Solids
6. Development of Surfaces
7. Isometric Projections

### Course Outcomes:

<b>CO 1:</b> Apply the concepts related to free hand sketching, orthographic and Isometric projection in first quadrant.	Understand
<b>CO2:</b> Apply the concepts and draw projections of points in four different quadrants and lines located first quadrant.	Apply
<b>CO3:</b> Apply the concepts and draw projections and sections of simple solids using rotatingobject method.	Apply
<b>CO4:</b> Apply the concepts and draw lateral surface of simple solids using straight line andradial line development methods.	Apply
<b>CO5:</b> Apply the concepts and draw isometric view of simple solids and truncated solids using principles of isometric projection.	Apply
<b>CO6:</b> Conduct experiments to demonstrate concepts, implement and analyze the drawing concepts using engineering tool : Using AutoCAD.	Analyze

### Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	3	-	-	3	-	-	-	1	1	-	1	-	-

High-3; Medium-2; Low-1

**Textbook:**

T1. Cencil Jensen, Jay D.Helsel and Dennis R. Short, “ Engineering Drawing and Design”, Tata McGraw Hill India, New Delhi, 3<sup>rd</sup> edition, 2019.

**Reference Book(s):**

- R1. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill India, New Delhi, 2<sup>nd</sup> edition, 2014.
- R2. Dhananjay A. Jolhe, “Engineering Drawing with an introduction to AutoCAD” Tata McGraw India, New Delhi, 3<sup>rd</sup> edition, 2010.
- R3. Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, Gujarat, 54<sup>rd</sup> edition, 2023.

**PUBLICATIONS OF BUREAU OF INDIAN STANDARDS**

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
2. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
3. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods. The mode of delivery is like practical.

**Web References:**

- 1 <http://nptel.ac.in/courses/112103019/>
- 2 <https://www.coursera.org/specializations/autodesk-cad-cam-cae-mechanical-engineering>

<b>Course Code: 23PHL102</b>		<b>Course Title: Physics for Mechanical Sciences Laboratory</b> <b>(Common to AU &amp; ME)</b>	
<b>Course Category: Minor</b>		<b>Course Level: Introductory</b>	
<b>L:T:P (Hours/Week)</b> <b>0:0:3</b>	<b>Credits: 1.5</b>	<b>Total Contact Hours: 45</b>	<b>Max Marks: 100</b>

### Course Objectives

The course is intended to expose the students to various experimental skills which is very essential for an Engineering student.

### List of Experiments (Any ten):

1. Verify Lami's theorem using triangle law of forces.
2. Verify the parallelogram law of forces.
3. Determination of Young's modulus of the Material – Cantilever bending method.
4. Determination of Young's modulus of the Material – Uniform bending method.
5. Determination of Young's Modulus of the material – Non-Uniform bending method.
6. Determination of Rigidity modulus of the metallic wire – Torsion Pendulum.
7. Determination of viscosity of low viscous liquid – Poiseuille's method.
8. Determination of viscosity of high viscous liquid – Stoke's method.
9. Determination of thermal conductivity of the bad conductor – Lee's Disc method.
10. Determination of specific heat capacity of the given liquid – Newton's law of cooling method.
11. Determination of velocity of ultrasonic waves and compressibility of the given liquid – Ultrasonic interferometer.
12. Determination of Wavelength of laser using plane transmission grating and hence estimate particle size of lycopodium powder.

<b>Course Outcomes</b>	<b>Cognitive Level</b>
At the end of this course, students will be able to:	
<b>CO1:</b> Elucidate the basic principles involved in the given experiments	Understand
<b>CO2:</b> Conduct, analyze and interpret the data and results from physics experiment	Evaluate

### Course Articulation Matrix

CO Vs PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	-	-

High-3; Medium-2; Low-1

**Reference Book(s):**

- R1. Physics Laboratory Manual Prepared by Faculty of Physics, Dr. Mahalingam College of Engineering and Technology
- R2. Engineering Physics Laboratory Manual, Dr. R. Jayaraman, V. Umadevi, S. Maruthamuthu, B. Saravanakumar, Pearson India Education Services Pvt. Ltd, 2022.
- R3. B.Sc., Practical Physics, C.L. Arora, S. Chand and Co, 2012.

**Web References:**

1. <https://archive.nptel.ac.in/courses/115/105/115105110/>
2. <https://vlab.amrita.edu/index.php?sub=1&brch=280>
3. <https://vlab.amrita.edu/index.php?sub=1&brch=194>

<b>Course Code:23ADL101</b>		<b>Course Title: Python Programming Laboratory for Mechanical Sciences (Common to AU &amp; ME)</b>	
<b>Course Category: Multi-disciplinary</b>		<b>Course Level: Introductory</b>	
<b>L:T:P (Hours/Week) 0:0:3</b>	<b>Credits:1.5</b>	<b>Total Contact Hours:45</b>	<b>Max Marks:100</b>

### Course Objectives

The course is intended to impart the programming knowledge. This will enable the students to develop simple applications in Python.

### List of Experiments:

1. Draw the flowchart and algorithm for finding the weight of a steel bar for the given cross section, length and density of the material
2. Implement programs using data types, operators and expressions
3. Implement programs using branching statements
4. Implement programs using looping statements to form a pyramid pattern
5. Develop programs with all the list/tuple operations for the given list/ tuples
6. Develop a dictionary consisting of auto components and apply the dictionary operations
7. Implement program to find the factorial of the given number using function
8. Implement program for string operations.
9. Develop the program to count the number of words and characters in the given TXT file using file handling methods.
10. Implement the program to plot the components of a given force for the different angle ranges.

<b>Course Outcomes</b>	<b>Cognitive Level</b>
At the end of this course, students will be able to:	
<b>CO1:</b> Construct the flowchart and algorithm for any given scenario	Apply
<b>CO2:</b> Develop programs using branching and looping statements for simple business logic	Apply
<b>CO3:</b> Apply advanced data structure techniques in Python, utilizing functions, methods, and operators to efficiently manipulate lists, tuples, sets, dictionaries, and strings for various computational tasks	Apply
<b>CO4:</b> Employ the Matplotlib library function for data visualization, enabling to present data and to get insights of visual impactful method on data	Apply

## Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	3	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	3	-	-	-
CO4	-	-	-	3	-	-	-	-	3	-	-	-

High-3; Medium-2;Low-1

### Text Book(s):

- T1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
- T2. Peter Wentworth, Jeffrey Elkner, Allen B. Downey, and Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python", 3rd Edition, O'Reilly, 2016.
- T3. Mark Lutz, "Powerful Object Oriented Programming Python", 4<sup>th</sup> Edition, O'Reilly, 2012.

### Reference Book(s):

- R1. Mark Lutz, "Learning Python, Powerful OOPs", 5th Edition, O'Reilly, 2013.
- R2. Zelle, John M, "Python Programming: An Introduction to Computer Science", Franklin Beedle & Associates, 2003.

### Web References

1. <https://docs.python.org/3/tutorial/>
2. <https://www.learnpython.org/>
3. <https://www.pyschools.com/>

<b>Course Code: 23VAL102</b>		<b>Course Title: Wellness for Students (Common to all B.E/B.Tech Programmes)</b>	
<b>Course Category: VAC</b>		<b>Course Level: Introductory</b>	
<b>L:T:P(Hours/Week)</b> <b>0: 0 :2</b>	<b>Credits:1</b>	<b>Total Contact Hours:30</b>	<b>Max Marks:100</b>

### Course Objectives:

The course is intended to impart knowledge on setting SMART goals for academic, career and life, applying time management techniques, articulating the importance of wellness for success in life and understanding the dimensions of wellbeing and relevant practices.

### Module I

**15 Hours**

**GOAL SETTING** Understanding Vision and mission statements - Writing personal mission statements – ‘Focus’ as a way of life of most successful people. Clarifying personal values, interests and orientations – Awareness of opportunities ahead – Personal SWOT analysis - Principles driving goal setting: Principle of response and stimuli, Circle of influence and circle of concern, What you see depends on the role you assume. Potential obstacles to setting and reaching your goals - Five steps to goals setting: SMART goals, Inclusive goals, Positive stretch, Pain vs gain, Gun-point commitment.

**TIME MANAGEMENT - TOOLS AND TECHNIQUES** Importance of planning and working to time. Pareto 80-20 principle of prioritization – Time quadrants as a way to prioritize weekly tasks – The glass jar principle - Handling time wasters – Assertiveness, the art of saying ‘NO’ – Managing procrastination.

**CONCEPT OF WELLNESS** – impact of absence of wellness - Wellness as important component to achieve success. Wellbeing as per WHO - Dimensions of Wellbeing: Physical, Mental, Social, Spiritual – indicators and assessment methods

### Module II

**15 Hours**

**Simplified Physical Exercises.** Fitness as a subset of Wellness – health related physical fitness - skill related physical fitness. Joint movements, Warm up exercises, simple asanas, WCSC simplified exercises.

### PRACTICES FOR MENTAL WELLNESS

**Meditation:** Mind and its functions - mind wave frequency – Simple basic meditation – WCSC meditation and introspection tables. Greatness of friendship and social welfare – individual, family and world peace – blessings and benefits.

**Food & sleep for wellness:** balanced diet - good food habits for better health (anatomic therapy) – hazards of junk food - food and the gunas.

### PUTTING INTO PRACTICE

Practicals: Using the weekly journal – Executing and achieving short term goals – Periodic reviews.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
<b>CO 1:</b> Set well-articulated goals for academics, career, and personal aspirations	Apply
<b>CO 2:</b> Apply time management techniques to complete planned tasks on time	Apply
<b>CO 3:</b> Explain the concept of wellness and its importance to be successful in career and life	Apply
<b>CO 4:</b> Explain the dimensions of wellness and practices that can promote wellness	Apply
<b>CO 5:</b> Demonstrate the practices that can promote wellness	Valuing

### Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	1	1	-	1
CO2	-	-	-	-	-	-	-	-	1	-	1	1
CO3	-	-	-	-	-	-	-	-	1	-	-	1
CO4	-	-	-	-	-	-	-	-	1	-	-	1
CO5	-	-	-	-	-	1	1	-	1	-	-	1

High-3; Medium-2; Low-1

### Text Book(s):

T1. Reading material, workbook and journal prepared by PS team of the college

### Reference Book(s):

- R1. Stephen R Covey, "First things first", Simon & Schuster UK, Aug 1997
- R2. Sean Covey, "Seven habits of highly effective teenagers", Simon & Schuster UK, 2004.
- R3. Vethathiri Maharishi Institute for Spiritual and Intuition Education, Aliyar, "Value education for harmonious life (Manavalakalai Yoga)", Vethathiri Publications, Erode, I Ed. (2010).
- R4. Dr. R. Nagarathna, Dr. H.R. Nagendra, "Integrated approach of yoga therapy for positive health", Swami Vivekananda Yoga Prakashana, Bangalore, 2008 Ed.
- R5. Tony Buzan, Harper Collins, "The Power of Physical Intelligence English"



<b>Course Code: 23VAT101</b>		<b>Course Title: HERITAGE OF TAMILS (Common to all B.E/B.Tech Programmes)</b>	
<b>Course Category: VAC</b>		<b>Course Level: Introductory</b>	
<b>L:T:P (Hours/Week) 1: 0 :0</b>	<b>Credit: 1</b>	<b>Total Contact Hours: 15</b>	<b>Max Marks:100</b>

### Pre-requisites

➤ NIL

### Course Objectives

மாணவர்கள் இப்பாடத்தை கற்றலின் மூலம்

**CO.1** மொழி மற்றும் இலக்கியம், பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை , நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் , திணைக் கோட்பாடுகள் மூலம் தமிழர் மரபை அறிந்து கொள்ள இயலும்.

**CO.2** இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பை அறிந்து கொள்ள இயலும்.

### தமிழர் மரபு

#### அலகு 1 - மொழி மற்றும் இலக்கியம்

3

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

#### அலகு 2 - மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை

3

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளூர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாத்தஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

#### அலகு 3 - நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்

3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

**அலகு 4 - தமிழர்களின் திணைக் கோட்பாடுகள்****3**

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக் கோட்பாடு - சங்க காலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறைமுகங்களும் - சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.

**அலகு 5 - இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு****3**

இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிற்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுய மரியாதை இயக்கம் - இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப் படிக்கல்- தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

**TOTAL : 15 PERIODS**

Course Outcomes		Cognitive Level
மாணவர்கள் இப்பாடத்தை கற்றபின்		
CO.1	மொழி மற்றும் இலக்கியம், பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை , நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் , திணைக் கோட்பாடுகள் மூலம் தமிழர் மரபை அறிந்து கொள்வார்கள்.	அறிதல் (Understand)
CO.2	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பை அறிந்து கொள்வார்கள்.	அறிதல் (Understand)

**Course Articulation Matrix**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

High-3; Medium-2; Low-1

## TEXT - CUM REFERENCE BOOKS

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே.பிள்ளை  
(வெளியீடு. தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)
3. கீழடி - வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருளை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL  
- (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by:  
International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D.  
Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by:  
International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published  
by:  
Department of Archaeology & Tamil Nadu Text Book and Educational Services  
Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay)  
(Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil  
Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) -  
Reference Book.

<b>Course Code: 23VAT101</b>	<b>Course Title: HERITAGE OF TAMILS (Common to all B.E/B.Tech Programmes)</b>		
<b>Course Category: VAC</b>		<b>Course Level: Introductory</b>	
<b>L:T:P (Hours/Week) 1: 0 :0</b>	<b>Credit: 1</b>	<b>Total Contact Hours: 15</b>	<b>Max Marks:100</b>

### **Pre-requisites**

➤ NIL

### **Course Objectives**

The course is intended to:

1. Understand the Heritage of Tamils in terms of Language and Literature, Rock Art Paintings to Modern Art – Sculpture, Folk and Martial Arts, Thinaï Concept.
2. Understand the Contribution of Tamils to Indian National Movement and Indian Culture.

## **HERITAGE OF TAMILS**

### **UNIT I LANGUAGE AND LITERATURE**

**3**

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

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

**3**

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

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

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

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

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

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

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

**TOTAL : 15 PERIODS**

<b>Course Outcomes</b>	<b>Cognitive Level</b>
At the end of this course, students will be able to:	
CO.1 Understand the Heritage of Tamils in terms of Language and Literature, Rock Art Paintings to Modern Art – Sculpture, Folk and Martial Arts, Thinai Concept.	Understand
CO.2 Understand the Contribution of Tamils to Indian National Movement and Indian Culture.	Understand

**Course Articulation Matrix**

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	-	-	-	-	-	-	-	-	-	-	-	1	-	-
<b>CO2</b>	-	-	-	-	-	-	-	-	-	-	-	1	-	-

High-3; Medium-2; Low-1

## TEXT - CUM REFERENCE BOOKS

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே.பிள்ளை  
(வெளியீடு. தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)
3. கீழடி - வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
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- (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by:  
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Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
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9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published  
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10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay)  
(Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil  
Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) -  
Reference Book.

# **SEMESTER 2**

<b>Course Code: 23ENI201</b>		<b>Course Title: Communication Skills II (Common to all B.E/B.Tech Programmes)</b>	
<b>Course Category: AEC</b>		<b>Course Level: Introductory</b>	
<b>L:T:P(Hours/Week) 2:0:2</b>	<b>Credits: 3</b>	<b>Total ContactHours:60</b>	<b>Max Marks:100</b>

### Course Objectives

The course is intended to impart effective and accurate language in business correspondence on par with B2 level of CEFR Scale.

**20 Hours**

### Module I

**Grammar:** Linking Words - Collocations –Sentence Completion - Articles –Adverbs– Indefinite Pronoun

**Listening:** Listening to short conversations - Listening for gist and summarizing - Listening for detail - Responding to straightforward questions.

**Speaking:** Making statements of facts - Agreeing and disagreeing to opinions - Respond to queries - Group Discussion.

**Reading:** Read and select (phrasal verbs & relative clause)- Cloze Test - Gapped sentences - Multiple- choice gap-fill

**Writing:** Paragraph Writing: Descriptive, narrative, persuasive and argumentative - Emails: Giving information - Making enquiries - Responding to enquiries - Power Point Presentation

### Module II

**20 Hours**

**Grammar:** Expressions of cause and result – Concord - Error Spotting (Parts of Speech & Indian English) - Prepositions

**Listening:** Listening for identifying main points - Responding to a range of questions about different topics - Listening to identify relevant information

**Speaking:** Empathetic Enunciation – Situation handling – Visual Interpretation - - Short presentations

**Reading:** Intensive Reading: Comprehending business articles, reports and proposals and company websites-- Open gap-fill - Extended reading

**Writing:** – Report Writing - Memo – Complaint letter - Business Letters (Seeking permission & Providing Information)



**List of Experiments:****20 Hours**

1. Listening to Monologue and Extended Listening Activity I
2. Listening to Monologue and Extended Listening Activity II
3. Expressing Opinions and Situational based speaking
4. Mini Presentation and Visual Interpretation
5. Reading Comprehension
6. Writing letter, email and report

<b>Course Outcomes</b>	<b>Cognitive Level</b>
At the end of this course, students will be able to:	
CO1: Identify the common errors in written and spoken correspondence.	Apply
CO2: Develop listening, reading and speaking skills through task based activities in listening, reading comprehension, recapitulation, interpretation and discussion.	Apply
CO3: Read business correspondences like memo, Email, letter, proposals and write reports and website entries and product launches.	Apply
CO4: Perform as an individual and member of a team and engage effectively in group discussion and individual presentation.	Apply

**Course Articulation Matrix**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	-	-	-

High-3; Medium-2; Low-1

**Textbooks:**

- T1. Guy Brook- Hart, "Business Benchmark Upper Intermediate", 2<sup>nd</sup> Edition, South Asian, Cambridge University Press, 2020.
- T2. Norman Whitby, "Business Benchmark pre-intermediate to Intermediate", 2<sup>nd</sup> Edition, South Asian, Cambridge University Press, 2014.

**Reference Book(s):**

- R1. Hewings Martin - Advanced Grammar in use Upper-intermediate Proficiency, CUP, 3<sup>rd</sup> Edition, 2013.
- R2. Clark David – Essential BULATS (Business Language Testing Service), CUP, 2006.
- R3. Adrian Doff, Craig Thaine, Herbert Puchta, Jeff Stranks, Peter Lewis-Jones, Rachel Godfrey, Gareth Davies, Empower B1+ – Student's Book, Cambridge University Press, 2015.

**Web References:**

1. <https://speakandimprove.com/>
2. <https://writeandimprove.com/>
3. <https://www.cambridgeenglish.org/exams-and-tests/linguaskill/>

<b>Course Code:23FLT201</b>	<b>Course Title: FOREIGN LANGUAGE -JAPANESE</b> (Common to all B.E/B.Tech Programmes)		
<b>Course Category: AES</b>		<b>Course Level: Introductory</b>	
<b>L:T:P (Hours/Week) 3: 0: 0</b>	<b>Credits:3</b>	<b>Total Contact Hours:45</b>	<b>Max. Marks:100</b>

**Course Objectives:**

The course objectives intended to:

1. Express a basic exposure on Japanese language and culture
2. Express thoughts and communicate in the beginner level of Japanese with native Japanese speaker
3. Identify the kanji etymology as well as use it in basic vocabulary required for the JLPT/NAT 5 examination level
4. Read and write 100 kanji of the official JLPT N5
5. Choose the appropriate verb forms for learning and practicing the Japanese language

**UNIT I Introduction to Japan and greetings 9 Hours**

Japan : Land and culture - Introduction to Japanese language – Greetings – Seasons - Days of the week - Months of the year – Dates of the month - Self introduction – Numbers (Upto 99,999) – Expressing time – Conversation audio and video.

Listening: Listening to Greetings - Listening for Specific Information: Numbers, Time.  
Speaking: Self-Introduction

**UNIT II Building vocabulary 9 Hours**

Family relationships - Colours - Parts of body - Profession - Directions - Time expressions (today, tomorrow, yesterday, day before, day after) - Japanese housing and living style - Food and transport (vocabulary) - Stationery, fruits and vegetables

Listening: Listening for Specific Information: Directions, Family Members, Parts of body  
Speaking: Introducing one's family.

**UNIT III Writing systems 9 Hours**

Hiragana Chart 1 - vowels and consonants and related vocabulary – Hiragana Charts 2&3, double consonants, vowel elongation and related vocabulary – Introduction to Kanji – Basic Vocabulary – Basic Conversational Phrases.

Listening: Listening to Japanese Alphabet Pronunciation, Simple Conversation.  
Speaking: Pair Activity (Day to day situational conversation)

**UNIT IV Kanji and preposition 9 Hours**

Katakana script and related vocabulary – Basic kanjis: naka, ue, shita, kawa , yama , numbers (1- 10, 100, 1000, 10,000 and yen) , person, man, woman, child, tree , book ,

hidari, mihi, kuchi , 4 directions - Usage of particles wa, no, mo and ka and exercises - Usage of kore, sore, are, kono, sono, ano, arimasu and imasu - Particles – ni (location) and ga , donata and dare - Particles ni (time), kara, made , ne , koko, soko, asoko and doko - Directions : kochira, sochira, achira and dochira , associated vocabulary (mae, ushiro, ue, shita, tonari, soba, etc.)

Listening: Listening to conversation with related particles

## UNIT V

## Verb forms

9 Hours

Introduction to Verbs - Verbs –Past tense, negative - i-ending and na-ending adjectives introduction - ~masen ka, mashou - Usage of particles de, e , o, to, ga(but) and exercises - Adjectives (present/past – affirmative and negative) – Counters - ~te form

Listening: Listening to different counters, simple conversations with verbs and adjectives.

Speaking: Pair Activity (Explaining one’s daily routine by using appropriate particles and verbs)

Course Outcomes		Cognitive Level
At the end of this course, students will be able to:		
CO1:	Recognize and write Japanese alphabet	Understand
CO2:	Comprehend the conversation and give correct meaning	Understand
CO3:	Apply appropriate vocabulary needed for simple conversation in Japanese language	Apply
CO4:	Apply appropriate grammar to write and speak in Japanese language	Apply
CO5:	Speak using words of the Japanese language	Apply

### Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO5	-	-	-	-	-	-	-	-	2	3	-	1	--	-

High-3; Medium-2; Low-1

**Text Book:**

T1.Genki 1 Textbook: An Integrated Course in Elementary Japanese by Eri Banno, Yoko Ikeda, Yutaka Ohno, Yoko Sakane, Chikako Shinagawa, Kyoko Tokashiki published by The Japan Times

T2.Genki 1 Workbook: An Integrated Course in Elementary Japanese by Eri Banno published by The Japan Times

**Reference:**

1. *Japanese for Everyone: Elementary Main Textbook1-1*, Goyal Publishers and Distributors Pvt. Ltd., Delhi, 2007
2. *Japanese for Everyone: Elementary Main Textbook1-2*, Goyal Publishers and Distributors Pvt. Ltd., Delhi, 2007
3. [www.japaneselifestyle.com](http://www.japaneselifestyle.com)
4. [www.learn-japanese.info/](http://www.learn-japanese.info/)
5. [www.learn.hiragana-katakana.com/typing-hiragana-characters/](http://www.learn.hiragana-katakana.com/typing-hiragana-characters/)
6. [www.kanjisite.com/](http://www.kanjisite.com/)

<b>Course Code:23FLT202</b>	<b>Course Title: FOREIGN LANGUAGE - GERMAN</b> (Common to all B.E/B.Tech Programmes)		
<b>Course Category: AEC</b>		<b>Course Level: Introductory</b>	
<b>L:T:P (Hours/Week) 3: 0: 0</b>	<b>Credits:3</b>	<b>Total Contact Hours:45</b>	<b>Max. Marks:100</b>

### Course Objectives:

The course is intended to:

1. Listen and understand numbers, names and dialogues of a native speaker on par with A1 level.
2. Speak and introduce self in simple sentences to convey their opinion and ideas on par with A1 level.
3. Read simple passages and given text on par with A1 level.
4. Write letter and simple sentences on par with A1 level.

### **UNIT I BASIC INTRODUCTION TO GERMAN SCRIPTS 9**

Theme and Text (Introduction to German - German script, Deutsche Namen, Daily Greetings and Expressions) – Grammar ('wh' questions, das Alphabet)– Speak Action (Buchstabieren, sich und andere vorstellen nach Namen und Herkunft fragen, internationale Wörter auf Deutsch verstehen, jemanden begrüßen)– pronunciation (Buchstabieren J,V,W,Y, - Long vowels A,E,I,O,U - Pronunciation of Ä,Ü,Ö) – To learn (internationale Wörter in Texten finden, Wörter sortieren)

Theme and Text (Gespräche im café, Getränkekarte, Telefon-buch, Namen, Rechnungen) – Grammar (Fragesätze mit wie, woher, wo, was Verben in präsens Singular und Plural, das Verb Sein, Personalpronomen und Verben)– Speak Action (eine Gespräch beginnen sich und andere vorstellen zählen, etwas bestellen und bezahlen Telefonnummern und verstehen)– pronunciation (Wortakzent in Verben und in Zahlen) – To learn (Grammatiktablette ergänzen, mit einem Redemittelkasten arbeiten)

### **UNIT II NUMBERS AND NOMINATIVE CASE 9**

Theme and Text (Numbers – 1 to 12 (Eins bis Zwölf) – 20, 30, 40, 90 (zwanzig-Neunzig) – All Numbers (1-10000) – German Currency (Euro) – Basic Mathematics (plus, Minus, Malen, Geteilt durch)) – Grammar (Introduction of verbs –Have Verb – To Come, To Speak, To Read, To Drive, To Fly, To write, To Eat, To sleep, To take etc.,)

Theme and Text (Communication in course) – Grammar (Singular and Plural, Artikel: der,das,die/ ein,eine, verneinung: kein, keine, Komposita: das Kursbuch) – Speak Action (Gegenständen fragen/ Gegenstände benennen im kurs:) – pronunciation (word accent Marking, Umlaute ö ä ü hören und sprechen) – To learn (Lernkarten schreiben, Memotipps, eine Regel selbst finden)

Theme and Text (City, Town, Language: Nachbar, Sprachen, Sehenswürdigkeiten in Europa) – Grammar (Past tense for Sein, W-Frage, Aussagesatz und Satzfrage) – Speak Action (about city and siteseeing) – pronunciation (Satzakzent in Frage- und Aussagesätzen) – To learn (eine Regel ergänzen, eine Grammatiktablette erarbeiten, Notizen machen)

### **UNIT III            AKKUSATIVE CASE AND PREPOSITIONS**

**9**

Theme and Text (Menschen und Hauser, Furniture catalogue, E-Mail, House information) – Grammar (possesivartikel im Nominativ, Artikel im Akkusativ, Adjektive im satz, Graduierung mit zu)– Speak Action (Whonung beschreiben about perons and things)– pronunciation (consonant - ch) – To learn (wortschatz systematisch)

Theme and Text (Termine - Appointment and punctuality in Germany) – Grammar (questions with wann?, Preposition (am, um, von... bis), verneinung mit nicht, trennbare verben, präteritum von haben) – Speak Action (Daily plan making, time commitment, excuse for late coming) – pronunciation (consonants- p,b,t,d / k,g) – To learn (Rollenkarten arbeiten)

Theme and Text (orientation in working area, go for work, floor plan city plan, office and computer) – Grammar (preposition: in,neben, unter, auf, vor, hinter, an, zwischen, bei und mit + Dativ)– Speak Action (work place, work, giving appointments)– pronunciation (consonants: f,w und v) – To learn (Making notice in calender)

### **UNIT IV            DATIV CASE AND PREPOSITIONS**

**9**

Theme and Text (Holiday and Party, holiday plan, party plan in Germany) – Grammar (regular and iregular verbs) – Speak Action (holiday speak, accident, Ich-Text schreiben) – pronunciation (lange und kurze vokale markieren) – To learn (Text Order)

Theme and Text (organising an Excursion to Berlin through city orientation, Bus plan, City plan, post card, Excursion programme) – Grammar (preposition: in, durch, über + Akkusativ: zu, an... vorbei + Dativ, Modalverb wollen) – Speak Action (Tourism, culture, postcard preparation, travel description) – pronunciation (r and l)– To learn (plaket making)Theme and Text (Beruf und all Tag, Visiten karten, wörterbuch) – Grammar –

Speak Action (profession, statistic speaking) – pronunciation (n,ng and nk)– To learn (wörterbuch , text information in tabel)

## UNIT V ADJECTIVES AND PRONUNCIATION

9

Theme and Text (Haushaltstipp, kochrezept, maße und gewichte, Mahlzeiten und Gerichte) – Grammar (jeden Tag, manchmal, nie, Question - welche, Comparison – viel, gut, gern) – Speak Action (about eat, drink question and answers) – pronunciation (e,en,el,er) – To learn (Text auswerten und zusammenfassen)

Theme and Text (Clothing , colour, weather) – Grammar (Adjekktive im Akkusativ, unbestimmer Artikel) – Speak Action (weather, dress and colour understanding) – pronunciation (e-o- ö and ie-u- ü) – To learn (wetter and Farben interkulturelle)

Theme and Text (in super market,purchase, House Maintainence, Emotion, Sports, Body parts) – Grammar (Modal Verb) – Speak Action (Body parts) – To learn (Rollenkarten arbeiten)

Course Outcomes		Cognitive Level
<b>At the end of this course, students will be able to:</b>		
CO1	Recognize and write German alphabet, numbers.	Understand
CO2	Comprehend the conversation and give correct meaning	Understand
CO3	Apply appropriate grammar and vocabulary to write and speak.	Apply
CO4	Apply appropriate cases and texts to listen, write and speak.	Apply
CO5	Speak and read using words of the German language	Apply

### Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO5	-	-	-	-	-	-	-	-	2	3	-	1	--	-

High-3; Medium-2;Low-1



**TEXT BOOK(s)**

T1. Netzwerk, "Deutsch als Fremdsprache" by Stefanie Dengler, Paul Rusch, Helen Schmitz published by Goyal Publishers & Distributors Pvt Ltd;

T2. Funk, Kuhn, Demme, "Studio D A1 Deutsch als Fremdsprache" published by Goyal Publishers & Distributors Pvt Ltd;

**REFERENCES(s)**

R1. Hueber, "Fit for Goethe- Zertifikat A1 (Start Deutsch 1)" by GOYAL PUBLISHERS AND DISTRIBUTORS; 2016

<b>Course Code: 23MAI202</b>		<b>Course Title: Complex Variables and Transforms (Common to AU, EC, EE, EV &amp; ME)</b>	
<b>Course Category: Minor</b>		<b>Course Level: Introductory</b>	
<b>L:T:P(Hours/Week) 3:0 :2</b>	<b>Credits: 4</b>	<b>Total Contact Hours:75</b>	<b>Max Marks:100</b>

### Course Objectives:

This course is intended to enable the student to acquire the knowledge on the calculus of functions of complex variables and continuous, discrete transforms.

### Module I

**23 Hours**

#### Vector Calculus

Gradient – Divergence – Curl – Line integrals – Surface integrals – Volume integrals – Theorems of Green, Gauss and Stokes (without proof) and their applications.

#### Complex Variables (Differentiation)

Cauchy-Riemann equations – Analytic functions – Properties – Harmonic functions – Finding harmonic conjugate – Conformal mapping ( $w=z+a$ ,  $w=az$ ,  $w=1/z$ ,) – Mobius transformation and their properties.

#### Complex Variables I (Integration)

Cauchy Integral formula – Cauchy Integral theorem – Taylor's series – Singularities of analytic functions – Laurent's series.

### Module II

**22 Hours**

#### Complex Variables II (Integration)

Residues – Cauchy Residue theorem – Contour integrals – Evaluation of real definite integrals around unit circle and semi-circle (Excluding poles on the real axis).

#### Laplace Transform

Laplace Transform – Properties of Laplace Transform – Laplace transform of derivatives and integrals – Laplace transform of periodic functions -Inverse Laplace transforms - Convolution theorem – Solution of ordinary differential equations by Laplace Transform method.

#### Fourier Series

Dirichlet's condition -Fourier series – Even and odd functions- Half range sine and cosine series - Parseval's identity--Harmonic Analysis.

<b>List of Experiments(Using Python):</b>	<b>30 Hours</b>
<ol style="list-style-type: none"> <li>1. Find gradient of a given scalar function, divergence and curl of a vector function.</li> <li>2. Verify Green's theorem in a plane.</li> <li>3. Graphically plot time and frequency domain of standard functions and compute Laplace transform of In- built functions.</li> <li>4. Find the Fourier series of a periodic function.</li> <li>5. Compute Inverse Laplace transform of In- built functions.</li> </ol>	

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
<b>CO1:</b> Explain the concepts of Vector Differentiation and Integration.	Apply
<b>CO2:</b> Using the concept of complex variables to construct analytical functions and evaluate definite integrals.	Apply
<b>CO3:</b> Apply Laplace transform techniques to solve ordinary differential equations.	Apply
<b>CO4:</b> Compute the Fourier series expansion for given periodic functions.	Apply
<b>CO5:</b> Develop programs using Complex Variables and Transforms concepts through modern tool.	Apply

### Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-	-	-

High-3; Medium-2; Low-1

### Text Book(s):

- T1. Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> edition, John Wiley & Sons, 2011.
- T2. Veerarajan T., Engineering Mathematics for first year, 3<sup>rd</sup> edition, Tata McGraw-Hill, New Delhi, 2019.

### Reference Book(s):

- R1. G.B. Thomas and R.L. Finney, Calculus and Analytic Geometry, 9<sup>th</sup> edition, Pearson, Reprint, 2002.
- R2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36<sup>th</sup> Edition, 2010.
- R3. P. Sivaramakrishna Das, C. Vijayakumari, Engineering Mathematics, Pearson India, 2017.

### Web References:

1. <https://nptel.ac.in/courses/111107112>
2. <https://nptel.ac.in/courses/111104031>

<b>Course Code : 23CHT201</b>		<b>Course Title: Chemistry for Mechanical Sciences (Common to ME &amp; AU)</b>	
<b>Type of Course: Minor</b>		<b>Course Level: Introductory</b>	
<b>L:T:P(Hours/Week):3:0:0</b>	<b>Credits: 3</b>	<b>Total Contact Hours :45</b>	<b>Max Marks:100</b>

### Course Objectives

The Course is intended to impart the knowledge of Chemistry involved in water technology, Electrochemical cells, Corrosion and its control, Engineering materials and fuels and lubricants.

### Module:I

**23 Hours**

**Water Technology:** Water quality parameters- Hardness (Definition, types, units)- Estimation of Hardness (EDTA method). Boiler feed water -formation of deposits in steam boilers and heat exchangers (scale, sludge and caustic embrittlement). Water softening- Demineralization (Ion exchange method)- Desalination- Reverse Osmosis method. Roles and responsibility of women and individual in conservation of water.

**Batteries and Fuel cells:** Electrochemistry- Basic Terminologies - Conductometric, Potentiometric and pH titrations- Batteries- types and Characteristics. Construction, working and applications of Alkaline, Lead acid, and Lithium-ion batteries. Fuels cells- H<sub>2</sub>O<sub>2</sub> fuel cell.

**Corrosion and control:** Corrosion- dry and wet corrosion, Galvanic series, Galvanic corrosion, differential aeration corrosion. Factors influencing corrosion.

### Module:II

**22 Hours**

**Corrosion and control:** Corrosion control method- material selection and design, cathodic protection techniques. Metallic coating- Galvanizing and Tinning, Electroplating- Nickel plating.

**Engineering materials:** Polymer-Classification, Functionality, degree of polymerization, number and weight average molecular weight (definition only). Thermo plastic and thermosets, Compounding of plastics. Polymer processing by injection and blow techniques. Polymer composites. Nano materials- Introduction – Difference between bulk and nanomaterials, size dependent properties. Applications of nanomaterials in electronics, energy science and medicine.

**Fuels and Lubricants:** Automotive fuels- Petrol, diesel, CNG, blended fuels – Composition, properties and uses. Petroleum- refining, knocking in petrol and diesel engine- octane and cetane rating of fuels. Calorific value- Gross and Net calorific value. Catalytic converters. Lubricants- Importance and classification, properties of liquid lubricants and their significance. Greases – common greases, types, and properties

<b>Course Outcomes</b>	<b>Cognitive Level</b>
<b>At the end of this course, students will be able to:</b>	
<b>CO1:</b> Interpret the concepts involved in water treatment, batteries and fuel cells, corrosion.	Apply
<b>CO2:</b> Apply the acquired knowledge of chemistry to solve the Engineering problems.	Apply
<b>CO3:</b> Analyze the Engineering problems through the concept of electro chemistry, water technology, Engineering materials and fuels.	Apply

### Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-	-	-

**High-3; Medium-2; Low-1**

#### Text Book(s):

- T1.** Jain&Jain, Engineering Chemistry (All India), 17<sup>th</sup> Edition, Dhanpat Rai Publishing Company Pvt Ltd, New Delhi, 2018.
- T2.** Wiley Engineering Chemistry, 2<sup>nd</sup> edition, Wiley India Pvt Ltd, New Delhi, 2011.

#### Reference Book(s):

- R1.** Dara S.S., and Umare S.S., A text book of Engineering Chemistry, S. Chand & Co Ltd, New Delhi , 2014.
- R2.** V.R.Gowariker, N.V.Viswanathan and Jayadev Sreedhar, Polymer Science, New Age International Pvt Ltd, Chennai , 2006.
- R3.** Renu Bapna and Renu Gupta, Engineering Chemistry, Macmillan India Publisher Ltd, 2010.

#### Web References:

1. <http://nptel.ac.in/courses/122101001/downloads/lec.23.pdf>
2. <https://nptel.ac.in/courses/104106075/Week1/MODULE%201.pdf>
3. <https://nptel.ac.in/courses/103102015/>

<b>Course Code:23MEI201</b>		<b>Course Title: ENGINEERING MATERIALS (Common to AU,ME)</b>	
<b>Course Category: Major</b>		<b>Course Level: Introductory</b>	
<b>L:T:P(Hours/Week)</b> <b>2: 0: 2</b>	<b>Credits: 3</b>	<b>Total Contact Hours:60</b>	<b>Max Marks:100</b>

**Course Objectives:**

The course is intended to

To impart knowledge on crystal structure, phase analysis and heat treatment of ferrous alloy.

**Module I**

**15 Hours**

**Crystal Physics:** Crystalline and Non crystalline materials. Single crystal, Polycrystalline materials  
Anisotropic crystal parameters: Atomic radius, Number of atoms per unit cell, Coordination number, atomic packing factor for SC , BCC , FCC and HCP- Crystal planes: Miller indices, Braggs law . Interplanar distance- Polymorphism and allotropy. Crystal imperfections: Point, line , surface and volume, grain boundary and its role in mechanical properties.

**Ferrous alloy:** Effect of alloying elements on properties of steel (Mn, Si, Cr, Mg, V and W). Properties and applications of stainless steel and Tool steel, Cast Iron-White, Malleable, Grey and Spheroidal Cast Iron-Properties and Applications

**Non-Ferrous:** Aluminium and its alloys, Copper and its alloys, Magnesium and its alloys, Titanium and its alloys, Nickel and its alloys- Composition, Properties and Applications. Industrial standards for alloys and other materials - alloying elements and inclusion of ceramics materials.

**Module II**

**15 Hours**

**Constitution of Alloys and Phase diagram:** Constitution of alloys- Solid solutions- Substitutional and Interstitial. Phase diagrams- Interpretation of Phase diagram, Lever rule, Gibbs phase rule. cooling curve for pure metal, binary solid solution and binary eutectic system. Iron – Iron Carbide equilibrium diagram. Micro constituents in Fe<sub>3</sub>C diagram (Austenite, Ferrite, Cementite, Pearlite, Martensite, Bainite), Pearlite transformation.

**Heat Treatment:** Heat treatment process-purpose of heat treatment – Process parameters. Bulk treatment: Annealing, Normalizing, Tempering, Quenching (Process parameter, application). Isothermal transformation Diagram (TTT Diagram). Cooling curves superimposed on TTT diagram. CCR - CCT. Hardenability- Jominy end quench test. Austempering, martempering — case hardening, carburizing, Nitriding, cyaniding, carbonitriding — Flame and Induction hardening.

**List of Experiments****30 Hours**

1. Conduct the annealing operation for given ferrous alloy and analyze the microstructure.
2. Conduct the normalizing operation for given ferrous alloy and analyze the microstructure.
3. Conduct the Quenching operation for given ferrous alloy and analyze the microstructure.
4. Analyze the microstructure on non-ferrous alloy.
5. Analyze the hardness of the given material (Brinell and Rockwell).
5. Determine the micro hardness for the given sample.

<b>Course Outcomes</b>	<b>Cognitive Level</b>
At the end of this course, students will be able to:	
<b>CO 1:</b> Choose the suitable alloying elements for Ferrous and Non Ferrous alloys for industrial standard and analyze the crystal structures.	Apply
<b>CO2:</b> Apply the knowledge of composition changes in phase diagram and analyze the microstructure.	Apply
<b>CO3:</b> Analyze the heat treatment process for given ferrous material to meet industrial standards.	Analyze
<b>CO4:</b> Conduct experiments to demonstrate concepts related to heat treatment process and analyze the variations of microstructure.	Analyze

**Course Articulation Matrix**

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	2	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>CO2</b>	3	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>CO3</b>	-	3	-	-	-	-	-	-	-	-	-	-	-	-
<b>CO4</b>	-	3	-	-	-	-	-	-	2	2	-	-	-	-

High-3; Medium-2; Low-1

**Textbook(s):**

T1. William D Callister “Material Science and Engineering”, John Wiley and Sons, 2014.

**Reference Book(s):**

- R1. Dieter G. E., "Mechanical Metallurgy", McGraw Hill Book Company, 2013.
- R2. Sidney H Avner "Introduction to Physical Metallurgy", Tata McGRAW-Hill, 2017.
- R3. Raghavan.V "Materials Science and Engineering", Prentice Hall of India Pvt., Ltd., 2015.

**Web References:**

- 1 <http://nptel.ac.in/courses/113106032/>
- 2 <https://www.coursera.org/specializations/physical-metallurgy>



<b>Course Code: 23MEL201</b>		<b>Course Title: COMPUTER AIDED MODELING AND DRAFTING LABORATORY</b> (Common to AU,ME)	
<b>Course Category: Major</b>		<b>Course Level: Practice</b>	
<b>L:T:P(Hours/Week)</b> <b>1: 0: 3</b>	<b>Credits:2.5</b>	<b>Total Contact Hours:45</b>	<b>Max Marks:100</b>

**Course Objectives:**

The course is intended to create a CAD model as per the given part/assembly drawing.

**List of Experiments**

1. Construction of 2D sketches using AutoCAD.
2. Construction of 2D sketches with dimensions using AutoCAD.
3. Construction of simple 3D models with basic features using CAD tool.
4. Construction of 3D models with advanced features such as holes, pattern, swept, and etc. using a CAD tool.
5. Develop the part drawing of 3D models using a CAD tool.
6. Develop the production drawing of given machine component using a CAD tool.
7. Develop the assembly drawing of given machine component using a CAD tool.

<b>Course Outcomes</b>	<b>Cognitive Level</b>
At the end of this course, students will be able to:	
CO1: Apply the methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.	Apply
CO2: Apply the concepts to conduct experiments for design, draft and detailing of 2D modelling	Apply
CO3: Apply the concepts to design 3D modelling and assembly using modern software tools.	Apply

### Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	2
CO2	2	-	2	2	-	-	-	-	-	-	-	-	-	2
CO3	-	-	2	-	2	-	-	-	-	-	-	-	-	2

### Textbooks:

- T1. Cencil Jensen, Jay D.Helsel and Dennis R. Short, " Engineering Drawing and Design", Tata McGraw Hill India, New Delhi, 7th Edition, 2017.
- T2. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, Gujarat, 53rd edition, 2015.
- T3. K. V. Natrajan, "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 48th edition, 2018.

### Reference Book(s):

- R1 Louis Gary Lamit, "PTC Creo Parametric 3.0", Global engineering, Cengage learning, USA. R2 John K.C., "Engineering Graphics", PHI Learning, Delhi, 1st edition, 2009. R3 Dhananjay A. Jolhe, "Engineering Drawing with an introduction to AutoCAD" TataMcGraw India, New Delhi, 3rd edition, 2008.

### Web References:

1. <https://nptel.ac.in/courses/112104031>
2. <https://www.coursera.org/specializations/autodesk-cad-cam-cae-mechanical-engineering>
3. <https://www.coursera.org/specializations/autodesk-cad-cam-cae-engineering-drawing>

### Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	2
CO2	2	-	2	2	-	-	-	-	-	-	-	-	-	2
CO3	-	-	2	-	2	-	-	-	-	-	-	-	-	2

### Textbooks:

- T1. Cencil Jensen, Jay D.Helsel and Dennis R. Short, " Engineering Drawing and Design", Tata McGraw Hill India, New Delhi, 7th Edition, 2017.
- T2. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, Gujarat, 53rd edition, 2015.
- T3. K. V. Natrajan, "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 48th edition, 2018.

### Reference Book(s):

- R1 Louis Gary Lamit, "PTC Creo Parametric 3.0", Global engineering, Cengage learning, USA. R2 John K.C., "Engineering Graphics", PHI Learning, Delhi, 1st edition, 2009.
- R3 Dhananjay A. Jolhe, "Engineering Drawing with an introduction to AutoCAD" TataMcGraw India, New Delhi, 3rd edition, 2008.

### Web References:

1. <https://nptel.ac.in/courses/112104031>
2. <https://www.coursera.org/specializations/autodesk-cad-cam-cae-mechanical-engineering>
3. <https://www.coursera.org/specializations/autodesk-cad-cam-cae-engineering-drawing>

<b>Course Code: 23CHL201</b>		<b>Course Title: Chemistry for Mechanical Sciences Laboratory (Common to ME &amp;AU)</b>	
<b>Course Category: Minor</b>		<b>Course Level: Introductory</b>	
<b>L:T:P(Hours/Week): 0:0:3</b>	<b>credits:1.5</b>	<b>Total Contact Hours :45</b>	<b>Max Marks:100</b>

### Course Objectives:

The Course is intended to analyze the Dissolved Oxygen, Hardness, Iron, Chloride content, and Corrosion rate, Molecular weight of polymer and Properties of various lubricants.

### List of experiments: (Any 10 experiments)

1. Determination of Total, Temporary and Permanent Hardness of water by EDTA method.
2. Determination of alkalinity in water sample.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of chloride content of the water sample by Argentometric method.
5. Estimation of iron content of the water sample using Spectrophotometer.
6. Conductometric titration of strong acid Vs strong base.
7. Estimation of  $Fe^{2+}$  by potentiometric titration.
8. Determination of strength of given hydrochloric acid using  $p^H$  metry.
9. Corrosion experiment - weight loss method.
10. Determination of molecular weight of Polyvinyl alcohol using Ostwald viscometer.
11. Green synthesis of silver nanoparticles by Neem leaf
12. Determination of Cloud and Pour Point.

<b>Course Outcomes</b>	<b>Cognitive Level</b>
<b>At the end of this course, students will able to:</b>	
<b>CO1:</b> Understand the concept of volumetric and instrumental methods through chemistry laboratory.	Understand
<b>CO2:</b> Apply the knowledge of chemistry to investigate engineering materials by volumetric and instrumental methods and analyze, interpret the data to assess and address the issues of Environmental Problems.	Evaluate

### Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	3	-	-	-	-	-	-	-	-	-	-

High-3; Medium-2; Low-1

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**Reference Book(s):**

- R1.** A Text book on Experiments and calculations in Engineering Chemistry by SS Dara, 9<sup>th</sup> Edition, S Chand publications, 2015.
- R2.** Instrumental methods of chemical analysis, Chatwal and Anand, 5<sup>th</sup> Himalaya Publications,2023.
- R3.** Lab manual of Chemistry for Mechanical Sciences Laboratory prepared by Chemistry faculty members.

**Web References:**

1. <https://archive.nptel.ac.in/courses/104/106/104106121/>
2. <https://academic.oup.com/book/42038/chapter-bstract/355779823?redirectedFrom=fulltext>

<b>Course Code: 23MEL202</b>		<b>Course Title: ENGINEERING PRACTICES LABORATORY</b> (Common to AU,CE,ME)	
<b>Course Category: SEC</b>		<b>Course Level: Practice</b>	
<b>L:T:P(Hours/Week)</b> <b>0: 0: 3</b>	<b>Credits:1.5</b>	<b>Total Contact Hours:45</b>	<b>Max Marks:100</b>

**Course Objectives:**

The course is intended to impart knowledge on basic electrical, mechanical and civil operations.

**List of Experiments**

**Electrical & Electronics**

- 1) Symbols of electrical and electronic components and study of electrical drawing.
- 2) Insulation Testing using Megger.
- 3) Soldering practice of simple circuit and testing.
- 4) Fluorescent tube, staircase and house wiring.
- 5) Verification of Kirchhoff's current and voltage law.

**Civil & Mechanical**

1. Make a wooden Tee joint to the required dimension.
2. Make a "V" filling to the required dimension using fitting tools.
3. Make a tray in sheet metal to the required dimension.
4. Assemble the pipeline connections with different joining components for the given layout.
5. Demonstrate a butt joint using welding process to the required dimension.

<b>Course Outcomes</b>	<b>Cognitive Level</b>
At the end of this course, students will be able to:	
<b>CO1:</b> Apply engineering knowledge to conduct experiments and analyze the electrical and electronic connections as per the given circuit.	Analyze
<b>CO2:</b> Apply to make wooden 'T' joint, and pipeline connection individually using various workshop tools as per the given dimensions.	Apply
<b>CO3:</b> Apply to make metal 'V' joint with various joining components and a permanent joint as per the given dimensions using modern workshop tools and engineering principles.	Apply

## Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	2	-	-	-	-	2	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	2	-	-	-	-	-	-	-	-	-

High-3; Medium-2; Low-1

### Reference Book(s):

R1. Jeyachandran.K, Natarajan.S & Balasubramanian.S, "A Primer on Engineering Practices Laboratory", Anuradha Publications, TamilNadu (India), 2016.

R2. 19EPL21 - Engineering practices laboratory Manual.

### Web References:

1. <http://nptel.ac.in/courses/112103019/>
2. <https://www.aaaenggcoll.ac.in/engineering-practices-lab/>
3. <https://www.coursera.org/courses?query=engineering>

<b>Course Code: 23ESL201</b>		<b>Course Title: Professional Skills 1: Problem solving skills &amp; Logical Thinking 1 (Common to all B.E/B.Tech Programmes)</b>			
<b>Course Category: SEC</b>			<b>Course Level: Introductory</b>		
<b>L:T:P(Hours/Week)</b> <b>0: 0: 2</b>	<b>Credits: 1</b>	<b>Total Contact Hours:30</b>	<b>Max Marks:100</b>		

**Course Objectives:**

The course is intended to enhance the students' numerical, analytical and logical reasoning ability. Also course focus to make learners prepare for various public and private sector exams and placement drives.

**Module I Quantitative Ability 20 Hours**

Number System and LCM & HCF- Percentage- Ratio and Proportion - Average- Progressions- Ages- Partnership- Mixture & Allegation - Profit and loss- Interest calculation- Data interpretation.

**Module II Reasoning Ability 10 Hours**

Seating Arrangement- Linear, circular and Complex – Direction Problems- Blood Relation- Puzzles- Crypt arithmetic- Venn diagrams- Statement and conclusion- Statement and argument- Causes and effects- Self-Learning.

<b>Course Outcomes</b>	<b>Cognitive Level</b>
At the end of this course, students will be able to:	
<b>CO1:</b> Build the competence in numerical, analytical and logical reasoning ability	<b>Apply</b>

**Textbook(s):**

**T1:** Dr. R. S. Aggarwal. “Quantitative Aptitude for Competitive Examinations” Sultan Chand & Sons Pvt. Ltd, New Delhi, 2018.

**T2:** Dr. R. S. Aggarwal. “A Modern Approach to Logical Reasoning”, Sultan Chand & Sons Pvt. Ltd, New Delhi, 2018

**Reference Book(s):**

**R1:** R. V. Praveen. “Quantitative Aptitude and Reasoning” 2<sup>nd</sup> Revised Edition, Prentice-Hall of India Pvt.Ltd, 2013

**R2:** Arun Sharma. “Quantitative Aptitude for Common Aptitude Test”, McGraw Hill Publications, 5<sup>th</sup> Edition, 2020

**R3:** Arun Sharma. “Logical Reasoning for Common Aptitude Test”, McGraw Hill Publications, 6<sup>th</sup> Edition, 2021.

**Web References:**

- <https://www.indiabix.com/aptitude/questions-and-answers/>
- <https://www.geeksforgeeks.org/aptitude-questions-and-answers/>

**Course Articulation Matrix**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	3	-	-

High-3; Medium-2; Low-1



Course Code: 23VAT201	Course Title: TAMILS AND TECHNOLOGY (Common to all B.E/B.Tech Programmes)		
Course Category: VAC		Course Level: Introductory	
L:T:P (Hours/Week) 1: 0 :0	Credit: 1	Total Contact Hours: 15	Max Marks:100

### Pre-requisites

➤ NIL

### Course Objectives

மாணவர்கள் இப்பாடத்தை கற்றலின் மூலம்

- CO.1 நெசவு மற்றும் பாணைத் தொழில்நுட்பம், வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம், உற்பத்தித் தொழில்நுட்பம், வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் ஆகியன குறித்து அறிந்து கொள்ள இயலும்.
- CO.2 அறிவியல் தமிழ் மற்றும் கணினித் தமிழ் குறித்து அறிந்து கொள்ள இயலும்.

### தமிழரும் தொழில்நுட்பமும்

#### அலகு 1 - நெசவு மற்றும் பாணைத் தொழில்நுட்பம்

3

சங்க காலத்தில் நெசவுத் தொழில் - பாணைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்

#### அலகு 2 - வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்

3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் ஷ சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள், பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக் கலை.

#### அலகு 3 - உற்பத்தித் தொழில்நுட்பம்

3

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத் துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

**அலகு 4 வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம்****3**

அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குழுவித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன் வளம் - முத்து மற்றும் முத்துக் குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.

**அலகு 5 - அறிவியல் தமிழ் மற்றும் கணினித் தமிழ்****3**

அறிவியல் தமிழின் வளர்ச்சி - கணினித் தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின் புதிப்பு செய்தல் - தமிழ் மென் பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக் கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.

**TOTAL : 15 PERIODS**

Course Outcomes	Cognitive Level
மாணவர்கள் இப்பாடத்தை கற்றபின்	
<b>CO.1</b> நெசவு மற்றும் பாணைத் தொழில்நுட்பம், வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம், உற்பத்தித் தொழில்நுட்பம், வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் ஆகியன குறித்து அறிந்து கொள்வார்கள்.	அறிதல் (Understand)
<b>CO.2</b> அறிவியல் தமிழ் மற்றும் கணினித் தமிழ் குறித்து அறிந்து கொள்வார்கள்.	அறிதல் (Understand)

**Course Articulation Matrix**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

High-3; Medium-2; Low-1

## TEXT - CUM REFERENCE BOOKS

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே.பிள்ளை  
(வெளியீடு. தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)
3. கீழடி - வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL –  
(in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by:  
International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu)  
(Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by:  
International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by:  
Department of Archaeology & Tamil Nadu Text Book and Educational Services  
Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay)  
(Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu  
Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) –  
Reference Book.

<b>Course Code: 23VAT201</b>	<b>Course Title: TAMILS AND TECHNOLOGY (Common to all B.E/B.Tech Programmes)</b>		
<b>Course Category: VAC</b>		<b>Course Level: Introductory</b>	
<b>L:T:P (Hours/Week) 1: 0 :0</b>	<b>Credit: 1</b>	<b>Total Contact Hours: 15</b>	<b>Max Marks:100</b>

### Pre-requisites

➤ NIL

### Course Objectives

The course is intended to:

1. Understand Weaving and Ceramic Technology, Design and Construction Technology, Manufacturing Technology, Agriculture and Irrigation Technology.
2. Understand the Scientific Tamil & Tamil Computing.

## TAMILS AND TECHNOLOGY

### **UNIT I WEAVING AND CERAMIC TECHNOLOGY 3**

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

### **UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY 3**

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

### **UNIT III MANUFACTURING TECHNOLOGY 3**

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

**UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY****3**

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoombu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

**UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING****3**

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

**TOTAL : 15 PERIODS**

<b>Course Outcomes</b>	<b>Cognitive Level</b>
At the end of this course, students will be able to:	
CO.1 Understand Weaving and Ceramic Technology, Design and Construction Technology, Manufacturing Technology, Agriculture and Irrigation Technology.	Understand
CO.2 Understand the Scientific Tamil & Tamil Computing.	Understand

**Course Articulation Matrix**

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	-	-	-	-	-	-	-	-	-	-	-	1	-	-
<b>CO2</b>	-	-	-	-	-	-	-	-	-	-	-	1	-	-

High-3; Medium-2; Low-1

## TEXT - CUM REFERENCE BOOKS

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே.பிள்ளை  
(வெளியீடு. தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)
3. கீழடி - வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருதை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL  
- (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by:  
International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D.  
Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by:  
International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published  
by: Department of Archaeology & Tamil Nadu Text Book and Educational Services  
Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay)  
(Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil  
Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) -  
Reference Book.

<b>Course Code: 23CHT202</b>		<b>Course Title: Environmental Sciences (Common to all B.E/B.Tech Programmes)</b>	
<b>Course Category: Multidisciplinary</b>		<b>Course Level: Introductory</b>	
<b>L:T:P(Hours/Week) 1: 0: 0</b>	<b>Mandatory NonCredit Course</b>	<b>Total Contact Hours: 15</b>	<b>Max Marks:100</b>

**Course Objectives:**

The course is intended to impart knowledge on sustainable utilization of natural resources, prevention of pollution, disaster management and environmental issues & public awareness on ecosystem.

**Module I**

**8 Hours**

**Natural Resources**

Role of individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

**Environmental Pollution and Disaster Management**

Role of an individual in prevention of pollution; Disaster management : floods, earthquake, cyclone and landslides.

**Environmental Ethics and Legislations**

Environmental ethics : Environment Protection Act; Air Act; Water Act ; Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation.

**Module II**

**7 Hours**

**Environmental Issues and Public Awareness**

Public awareness - Environment and human health.

**Environmental Activities**

**(a) Awareness Activities:**

- i. Small group meetings about water management, promotion of recycle use, generation of less waste, avoiding electricity waste.
- ii. Slogan making event.
- iii. Poster making event.

**(b) Actual Activities:**

- i. Plantation.
- ii. Cleanliness drive.
- iii. Drive for segregation of waste.
- iv. To know about the different varieties of plants.
- v. Shutting down the fans and ACs of the campus for an hour or so.

<b>Course Outcomes</b>	<b>Cognitive Level</b>
At the end of this course, students will be able to:	
<b>CO 1:</b> Explain the use of natural resources for a sustainable life as an individual in prevention of pollution.	Understand
<b>CO 2:</b> Apply the environmental ethics and legislations for various environmental issues.	Apply
<b>CO 3:</b> Create the public awareness on environment and human health as an individual or team through various activity based learning.	Apply

### Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	3	3	-	-	-	-
CO3	3	-	-	-	-	3	3	-	3	3	-	-

High-3; Medium-2;Low-1

### Text Book(s):

- T1. Benny Joseph, "Environmental Studies", Tata McGraw Hill, New Delhi, 2006.
- T2. Mackenzie Davis and Susan Masten, "Principles of environmental engineering and science", Mc-Graw Hill, 3<sup>rd</sup> Edition, 2014.

### Reference Book(s):

- R1. Trivedi R.K. "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol.I and II, Enviro Media.
- R2. Cunningham, W.P.Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publishing House, Mumbai, 2001.

### Web References:

1. [https://onlinecourses.nptel.ac.in/noc23\\_hs155/preview](https://onlinecourses.nptel.ac.in/noc23_hs155/preview).
2. [https://en.wikipedia.org/wiki/Environmental\\_science](https://en.wikipedia.org/wiki/Environmental_science).