Curriculum and Syllabi

B.E CIVIL ENGINEERING

Semester I to IV

Regulations 2023

(2024 Batch onwards)

Programme: Civil Engineering
Curriculum and Syllabi: Semester I to IV
Recommended by Board of Studies on 12.06.2024
Approved by Academic Council on

Action	Responsibility	Signature of Authorized Signatory
Designed and Developed by	BoS Civil Engineering	
Compiled by	Office of the Controller of Examinations	
Approved by	Principal	

Dr. Mahalingam College of Engineering and Technology
Department of Civil Engineering

Vision

To develop Competent Civil Engineers to meet the infrastructure challenges of India and the world.

Mission

- To become one of the reputed departments offering Civil Engineering Program in the country.
- To produce excellent engineers to cope up with the changes through dynamic, innovative, and flexible curriculum.
- To provide a conducive environment for teaching & learning and to develop leaders with effective communication skills.
- To conduct quality research driven by industry & societal needs and provide affordable engineering solutions in an ethical way.

TL Coordinator   **Programme Coordinator**   **Head of the Department**

Head - TLC

Programme: B.E. – Civil Engineering

Programme Educational Objectives (PEOs) - Regulation 2023

B.E Civil Engineering graduates will:

PEO.1 Graduates who effectively demonstrate engineering knowledge, problem solving skill, design capabilities and entrepreneurial skills by providing practical solutions.

PEO.2 Graduates who effectively demonstrate professionalism in multi-disciplinary engineering environment, leadership quality, teamwork and engage in life-long learning.

PEO.3 Graduates who demonstrate an ethical commitment to the community and the profession through involvement with professional societies.

PEO.4 Graduates who make contributions to knowledge and establish best engineering practice through research and development.

Programme outcomes (Pos) – Regulations 2023

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

PO.2 **Problem Analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO.3 **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO.4 **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO.5 **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO.6 **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO.7 **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO.8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO.9 **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO.10 **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO.11 **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO.12 **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs) - Regulations 2023

PSO.1 **Problem Analysis:** Able to arrive solutions to real time problems related to various domains of civil engineering through problem solving skills.

PSO2. **Design and Management:** Able to design systems, components and processes considering safety, quality and cost consideration and able to prepare project documents, engineering drawings and construction schedules.
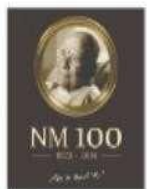
Dr. MAHALINGAM
COLLEGE OF ENGINEERING AND TECHNOLOGY
Udumalai Road, Pollachi, Coimbatore District - 642003
Established in 1998 ♦ Approved by AICTE ♦ Affiliated to Anna University
(A DIVISION OF NIA EDUCATIONAL INSTITUTIONS)

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

Programme: B.E. - CIVIL ENGINEERING

2023 Regulations

Curriculum for semester I & II (For 2024 Batch onwards)

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 L	T	P	Credits	Marks	Common to Programmes
AEC	23ENI101	Communication Skills I	2	0	2	3	100	All
Minor	23MAI101	Linear Algebra and Calculus	3	0	2	4	100	-
Minor	23PHT101	Physics for Civil Engineering	3	0	0	3	100	-
Minor	23CET102	Building Materials and Practices	3	0	0	3	100	-
Minor	23PHL101	Physics for Civil Engineering Laboratory	0	0	3	1.5	100	-
Minor	23CEL101	Engineering Drawing for Civil Engineering	1	0	3	2.5	100	-
VAC	23VAL102	Wellness for Students	0	0	2	1	100	All
VAC	23VAT101	தமிழ் மரபு / Heritage of Tamils	1	0	0	1	100	All
AEC	23SAL101	Studio Activities	0	0	2	-	-	All
		Total	**13**	**0**	**14**	**19**	**800**	

SEMESTER II

Type of Course	Course Code	Course Title	Hours/Week L	T	P	Credits	Marks	Common to Programmes
AEC	23ENI201/ 23FLT201/ 23FLT202	Communication Skills II/ Foreign Language-Japanese/ Foreign Language-German	2	0	2	3	100	All
Minor	23MAI201	Ordinary Differential Equations and Complex Variables	3	0	2	4	100	-
Minor	23CHI201	Chemistry for Civil Engineering	3	0	2	4	100	-
Minor	23CET201	Engineering Mechanics	3	0	0	3	100	-
Multi-disciplinary	23ADT001	C Programming	3	0	0	3	100	CE, EA, EC,EV
SEC	23ADL001	C Programming Laboratory	0	0	3	1.5	100	CE, EA, EC,EV
SEC	23MEL202	Engineering Practices Laboratory	0	0	3	1.5	100	AU, CE, ME
SEC	23ESL201	Professional Skills 1: 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
		Total	**16**	**0**	**16**	**22**	**1000**	

SEMESTER III

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Minor	23MAT301	Transforms and Partial Differential Equations	3	1	0	4	100	-
Major	23CET301	Strength of Materials	3	0	0	3	100	-
Major	23CET302	Surveying	3	0	0	3	100	-
Major	23CET304	Concrete Technology	3	0	0	3	100	-
Major	23CEL301	Surveying Practice Laboratory	0	0	3	1.5	100	-
Major	23CEL302	Materials Testing laboratory	0	0	3	1.5	100	-
Major	23CEL303	Computer Aided Building Drawing Laboratory	0	0	3	1.5	100	-
SEC	23ESL301	Professional Skills 2: Problem Solving Skills & Logical Thinking 2	0	0	2	1	100	-
VAC	23VAT301	Universal Human Values 2: Understanding Harmony	2	1	0	3	100	-
AEC	23SAL301	Studio Activities	0	0	2	-	-	All
		Total	**14**	**2**	**13**	**21.5**	**1000**	

SEMESTER IV

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Major	23CET401	Structural Analysis I	3	0	0	3	100	-
Major	23CET402	Highway Engineering	3	0	0	3	100	-
Major	23CET403	Water Supply Engineering	3	0	0	3	100	-
Major	23CET404	Remote Sensing and GIS	3	0	0	3	100	-
Major	23CET405	Fluid Mechanics & Hydraulics Engineering	3	1	0	4	100	-
Major	23CEL401	Concrete and Highway Engineering Laboratory	0	0	3	1.5	100	-
Major	23CEL402	Fluid Mechanics & Hydraulics Engineering Laboratory	0	0	3	1.5	100	-
SEC	23ESL401	Professional Skills 3	0	0	2	1	100	-
AEC	23SAL401	Studio Activities	0	0	2	-	-	All
Major	23CEC011	Survey Camp	1 Week			1	100	
		Total	**15**	**1**	**10**	**21**	**1000**	

Course Code	Course Title	Duration	Credits	Marks
23CES001	Internship-I/ Research Internship/Skill Development	2 Weeks	1	100

SEMESTER V

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Major	23CET501	Structural Analysis II	3	0	0	3	100	-
Major	23CET502	Design of Reinforced Concrete Elements	3	0	0	3	100	-
Major	23CET503	Geotechnical Engineering I	3	0	0	3	100	-
Major	23CET504	Waste Water Engineering	3	0	0	3	100	
Major	23CEXXXX	Professional Elective-I	3	0	0	3	100	-
Major	23CEXXXX	Professional Elective-II	3	0	0	3	100	-
SEC	23ESL501	Professional Skills 4	0	0	2	1	100	All
Major	23CEL501	Computer Aided Design and Drafting Laboratory 1	0	0	3	1.5	100	-
Major	23CEL502	Environmental Engineering Laboratory	0	0	3	1.5	100	-
AEC	23SAL501	Studio Activities	0	0	2	-	-	-
		Total	**18**	**0**	**10**	**22**	**900**	

SEMESTER VI

Type of Course	CourseCode	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Major	23CET601	Design of Steel Structures	3	0	0	3	100	-
Major	23CET602	Geotechnical Engineering II	3	0	0	3	100	-
Major	23CEEXXX	Professional Elective-III	3	0	0	3	100	-
Major	23CEEXXX	Professional Elective-IV	3	0	0	3	100	-
Major	23XXXXXX	Open Elective-I (Cyber Security)	3	0	0	3	100	-
SEC	23ESL601	Professional Skills 5	0	0	2	1	100	All
Major	23CEL601	Computer Aided Design and Drafting Laboratory 2	0	0	3	1.5	100	-
Major		Soil Mechanics Laboratory	0	0	3	1.5	100	--
Major	23CEL602	Innovative and Creative Project	0	0	6	3	100	-
AEC	23CEP601	Studio Activities	0	0	2	-	-	All
		Total	**15**	**0**	**16**	**22**	**900**	

Course Code	Course Title	Duration	Credits	Marks
23CES002	Internship-II/ Research Internship/ Skill Development	4 Weeks	1	100

SEMESTER VII

Type of Course	CourseCode	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Major	23CET701	Construction Project Management	3	0	0	3	100	-
Major	23CET702	Prefabricated Structures	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	-
Major	23CEL701	Estimation and Quantity Surveying	2	0	2	3	100	-
Major	23CEL702	Project Management Laboratory	0	0	3	1.5	100	-
Major	23CEP701	Project Phase - I	0	0	8	4	100	-
		Total	**17**	**0**	**13**	**23.5**	**700**	

SEMESTER VIII

Type of Course	CourseCode	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Major	23XXXXXX	Professional Elective - VII	3	0	0	3	100	-
Major	23XXXXXX	Professional Elective - VIII	3	0	0	3	100	-
Major	23CEP801	Project Phase - II	0	0	12	6	200	-
		Total	**6**	**0**	**12**	**12**	**400**	

Course Code	Course Title	Duration	Credits	Marks
23CES003	Internship-II/ Research Internship/ Skill Development	8 Weeks	4	100

Total Credits: 169

SEMESTER I

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

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. Familiarization 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	PO1	PO1	PO1	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 Intuitional Education, aliyar, "value educat harmonious life (Manavalakalai Yoga)", Vethathri Publications, Erode, 2010.
R3. Dr. R.Nagarathna, Dr.H.R. Nagendra, "Integrated approach of yoga therapy for positive Swami Vivekananada Yoga Prakashana Bangalore, 2008 Ed.

Web References:

1. https://youtube.com/playlist?list=PLYwzG2fd7hzc4HerTNkc3pS_IvcCfKznV.

2. https://www.youtube.com/watch?v=P4vjfEVk&list=PLWDeKF97v9SO0frdgmpaghDMjkom1.

3. https://fdp-si.aicte-india.org/download/AboutSIP/About%20SIP.pdf.

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

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.

Course Outcomes	Cognitive Level
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", 5th Edition, Cambridge University Press, South Asia Edition, 2022.
T2. Jack C. Richards, Jonathan Hull, and Susan Proctor, "Interchange - Student's Book 1", 5th Edition, Cambridge University Press, South Asia Edition, 2022.

Reference Book(s):

R1. David Bohlke, Jack C. Richards, "Four Corners", 2nd 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" 30th Edition, Cambridge University Press, 2022.

Web References:

1. https://speakandimprove.com/

2. https://writeandimprove.com/

3. https://www.cambridgeenglish.org/exams-and-tests/linguaskill/.

Course Code: 23MAI101	Course Title: LINEAR ALGEBRA AND CALCULUS		
Course Category: Minor	**Course Level: Introductory**		
L:T:P(Hours/Week) 3:0:2	**Credits: 4**	**Total Contact Hours:75**	**Max Marks:100**

Course Objectives:

The course is intended to impart knowledge to formulate and solve matrix based operations, sequences, series and gain proficiency in calculus computations through mathematical software tools.

Module I   **23 Hours**

Matrices

Eigen values and Eigen vectors-symmetric, skew symmetric and orthogonal matrices-Diagonalization of matrix through orthogonal transformation- Cayley-Hamilton theorem (without proof) - Reduction of quadratic forms to canonical form-rank, index, signature and nature of quadratic forms.

Sequences and Series

Sequences-definitions and examples- Series-Tests for convergence-comparison test, integral test, Alembert's ratio test- Alternating series –Leibnitz's test.

Differential Calculus I

Curvature-Cartesian and Polar coordinates- radius of curvature-center of curvature-

Module II   **22Hours**

Differential Calculus II

Circle of curvature.-Evolute and Involute of standard curves.

Multivariable Differentiation

Partial derivatives - Total derivatives- Differentiation of implicit functions- Taylor's series and Maclaurin's series – Jacobian – Maxima, Minima and saddle points - 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) - Triple integrals - Applications: Finding areas and volumes.

List of Experiments:

1. Introduction to MATLAB.
2. Rank of matrix and solution of system of linear algebraic equations.
3. Characteristic equation of a matrix and Verification of Cayley Hamilton theorem.
4. Finding Eigen values and Eigen vectors of a matrix.
5. Curve fitting and Interpolation.
6. Determining maxima and minima of a function of two variables.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Use orthogonal transformation to transform quadratic for to canonical form.	Apply
CO2: Apply different testing methods to check the nature of infinite series.	Apply
CO3: Calculate the Evolute and envelope of curves.	Apply
CO4: Apply partial derivatives to find extreme values of multivariate functions.	Apply
CO5: Determine the area between plane curves and volume of solids using multiple integrals.	Apply
CO6: Demonstrate the understanding of linear algebra and calculus 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	2	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	3	-	-	-	-	-	-	-	-	-

High-3; Medium-2;Low-1

Text Book(s):

T1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th edition, John Wiley & sons, 2010.
T2.T.Veerarajan.,Engineering Mathematics for first year, 3rd edition, Tata McGraw-Hill,2019.NewDelhi, 2008.

Reference Book(s):

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

Web References:

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

Course Code: 23PHT101	Course Title: PHYSICS FOR CIVIL ENGINEERING		
Course Category: Minor	Course Level: Introductory		
L:T:P(Hours/Week) 3: 0: 0	Credits: 3	Total Contact Hours: 45	Max Marks: 100

Course Objectives:

The course is intended to impart knowledge of the basic properties of Matter, Acoustics, Nano concepts and NDT.

Module I 22 Hours

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 – I-Shaped Girders – Twisting Couple of a wire – Determination of Rigidity Modulus of a thin wire using Torsional Pendulum.

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.

Nanotechnology: Introduction – Importance of Nanotechnology – Nanomaterials – Nanoparticles – Synthesis of Nanoparticles: High-energy ball milling (top-down approach) – Sol-gel process (bottom-up approach) – Application of Nanomaterials.

Module II   **23 Hours**

Nanomaterials: Carbon Nanomaterials – Fullerenes: Properties, synthesis and Applications – Carbon Nanotubes – Types – Synthesis of Carbon Nanotubes: Arc-Evaporation method – Properties of Carbon Nanotubes – Application of Carbon Nanotubes.

Architectural Acoustics: Introduction – Classification of Sound – Characteristics of musical sound (Intensity, Frequency and Quality) – Weber – Fechner law – Sound Intensity level – Decibel – Human Audiogram – Phon – Sound reflection – Reverberation Time – Sound Absorption – Sabine's formula for reverberation time (Growth and Decay of Sound Energy in a hall) – Absorption coefficient and its determination – Factors affecting acoustics of a building and their remedies – Acoustic design of a hall.

Non-Destructive Testing (NDT): Introduction – Advantages of NDT over conventional testing techniques – Methods of NDT. Liquid Penetrant Testing (LPT): Steps of LPT – Materials used in LPT – Advantages and Limitations of LPT. Ultrasonic Inspection: Pulse Echo method and through transmission method. Data presentation: A-Scan, B-Scan and C-Scan displays.

Sensors: Sensors for Structural Health Monitoring – Accelerometer – Vibrating wire sensors – Strain Gauges – Inclinometer – Acoustic emission sensor – Temperature sensors.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Apply the basic concepts of elasticity, heat and nanotechnology to solve the different physical parameters.	Apply
CO2: Perform as a member of team in analysing the concepts of elasticity, heat and nanotechnology involved in real-life applications related to civil engineering and make a presentation.	Apply
CO3: Interpret the concepts of nanomaterials, acoustics and non-destructive techniques and apply it for different engineering applications.	Apply
CO4: Perform as a member of team in articulating the modern technologies behind nanotechnology, architectural acoustics and testing of materials.	Apply

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Text Book(s):

T1.   M.N.Avadhanulu, P.G.Kshirsagar, "A Textbook of Engineering Physics", S.Chand & Co. New Delhi, Revised 8th Edition, 2014.

T2.   A. Marikani, "Engineering Physics", PHI Learning Private Limited, New Delhi, 2nd Edition, 2014.

Reference Book(s):

R1.   J. Walker, D.Halliday, R.Resnick,"Principles of Physics", Wiley Student Edition, New Delhi, 10th Edition, 2015.

R2.   D.S.Mathur, "Properties of Matter", S. Chand & Co., New Delhi, 4th Edition, 2012.

R3.   Balasubramaniam "Callister's Material Science and Engineering", John Wiley and Sons Inc., 2nd Edition, 2015.

Web References:

1. https://www.fprimec.com/sensors-for-structural-health-monitoring/
2. http://www.physicsclassroom.com/
3. http://nptel.ac.in/course.php?disciplineId=115

Course Code: 23CET303	Course Title: CONSTRUCTION MATERIALS AND PRACTICES		
Course Category: Major		**Course Level: Intermediate**	
L :T :P (Hours/Week) 3 : 0 :0	**Credits: 3**	**Total Contact Hours: 45**	**Max Marks:100**

Course Objectives:

The course is intended to impart knowledge on various building materials and their applications used in construction and to identify the scope for sustainable development.

Module I   **23 Hours**

BASIC CONSTRUCTION MATERIALS

Stones: Criteria for selection – Tests on Stones. Bricks: Classification – Manufacturing of Clay Bricks – Tests – Special Bricks. Cement Concrete Blocks – Compressed and Stabilized Earth Blocks. Lime: Types – Properties and Uses. Cement: Classification – Manufacturing Process – Properties and Uses. Aggregates: Classification – Properties. Mortar and Concrete: Classification – Preparation – Selection criteria

METALS, TIMBER AND OTHER MATERIALS

Steel: Types – Manufacturing process – Tests – Structural steel – Rebar – Alloy steels. Aluminium – Properties and Uses. Timber: Types – Characteristics – Seasoning – Defects. Glass: Characteristics – Selection criteria. PVC – UPVC – Properties and uses – Ceramics – Composite materials – Refractories – Geo-synthetics

SUSTAINABLE MATERIALS

Alternate Materials – Fly Ash – Industrial waste materials – Construction Debris – properties and applications – Construction products using waste materials

Module II   **22 Hours**

SUB STRUCTURE CONSTRUCTION PRACTICES

Components of Buildings – Sequence of activities – Details and Specifications – Site Clearance – Marking – Earthwork – Excavation – Dewatering – Back filling – Anti-termite treatment – Damp proofing – Sand filling – Shallow and Deep Foundations – Plinth beam

SUPER STRUCTURE CONSTRUCTION PRACTICES

Types of Masonry – Types of Formwork – Scaffolding – Shoring – Underpinning - Roofs and roof covering – Types of flooring – Construction Joints – Staircase: Types and Constructions – Lintel – Column – Plastering – Plastering methods – Pointing – Types – Painting: Preparation and Process – Defects. Fire Protection – Thermal Insulation – Water Proofing.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO.1 Justify the sustainability impacts of alternative materials compared to conventional materials in construction	Apply
CO.2 Suggest the suitability of various building materials and practices for sub structure and super structure construction	Apply
CO.3 Prepare a report based on the knowledge of various construction materials and sustainable practices	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Books:

T1.   Bindra and Arora, "Building Materials and Construction", Dhanpat Rai & Sons, New Delhi, 2020

T2.   Punmia B.C., Ashok Kumar Jain, Arun Kumar Jain, "Building Construction", Laxmi Publications Pvt. Ltd., 11th edition, 2016

T3.   Varghese. P.C, "Building Materials", PHI Learning Pvt. Ltd, New Delhi, 2nd Revised edition, 2015

Reference Books:

R.1   S.C. Rangwala, "Engineering Materials" Charotar Publishing House, Anand, India, 43rd edition, 2019

R.2   P.C. Varghese, "Building Construction", PHI Learning Private Limited, New Delhi, 2nd edition, 2017

Web References:

1.   www.understandconstruction.com
2.   www.engineeringcivil.com

Course Code: 23PHL101	Course Title: PHYSICS FOR CIVIL ENGINEERING LABORATORY		
Course Category: Minor		Course Level: Introductory	
L:T:P (Hours/Week) 0:0:3	Credits:1.5	Total Contact Hours: 45	Max Marks: 100

Course Objectives

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

List of Experiments (Any ten):

1. Determination of Young's Modulus of the material – Cantilever bending method.
2. Determination of Young's Modulus of the material – Uniform bending method.
3. Determination of Young's Modulus of the material – Non-Uniform bending method.
4. Determination of Rigidity modulus of the metallic wire – Torsion Pendulum method.
5. Determination of Viscosity of low viscous liquid – Poiseuille's method.
6. Determination of Viscosity of high viscous liquid –Stoke's method.
7. Lee's Disc method - Determination of thermal conductivity of the bad conductor.
8. Determination of specific heat capacity of given liquid – Newton's law of cooling method.
9. Ultrasonic interferometer – Determination of velocity of ultrasonics and compressibility of given liquid.
10. Measurement of sound intensity using sound level meter.
11. Measurement of strain using strain gauge.
12. Determination of Wavelength of laser using plane transmission grating and hence estimate particle size of lycopodium powder.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Elucidate the basic principles involved in the given experiments	Understand
CO2: 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://vlab.amrita.edu/index.php?sub=1&brch=280
2.   https://vlab.amrita.edu/index.php?sub=1&brch=189
3.   https://vlab.amrita.edu/index.php?sub=1&brch=194

Course Code: 23CEL101	Course Title: Engineering Drawing for Civil Engineering		
Course Category: Minor		Course Level: Introductory	
L:T:P(Hours/Week) 1: 0 : 3	Credits: 2.5	Total Contact Hours:60	Max Marks: 100

Course Objectives:

The course is intended to understand and develop the skill of drawing projection of points and lines, orthographic projection, isometric views of simple objects and buildings, perspective view of simple building. Also, to know the basic commands and applications of AutoCAD.

Module I   **8 Hours**

Importance of drawing in engineering applications - BIS conventions and specifications - Size, layout and folding of drawing sheets - Lettering and dimensioning - First angle projection - projection of points and lines - Determination of true lengths and true inclinations - Representation of Three-Dimensional objects - General principles of orthographic projection - Need for importance of multiple views and their placement - layout of views - Orthographic projection - Conversion of pictorial view to orthographic views - Projection of simple solids - Prism, pyramid, cylinder and cone - Isometric projection of simple solids- Prism, pyramid, cylinder & cone - Projection of simple residential building.

Module II   **7 Hours**

Perspective projection of simple solids like prism, pyramid, cylinder and cone by Visual Ray Method - Perspective projection of building by vanishing point method- AutoCAD- Applications, Advantages, System requirement, Elements of drawing window, Units, Limits, Drawing Tools - Draw, modify, annotation, layers and properties - Function keys - 3D tools - Orthographic projection of simple solids.

                                                                                                       45 Hours

List of Experiments:

1. Lettering & Dimensioning
2. Projection of points and lines
3. Orthographic projection of pictures
4. Orthographic projection of simple solids
5. Isometric projection of simple solids
6. Isometric projection of building
7. Perspective projection of simple solids
8. Perspective projection of building.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Draw orthographic, isometric and perspective projections of solids and buildings.	Apply
CO2: Draw projections of solids using software	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s):

T1.   K. V. Natrajan, A Text Book of Engineering Graphics, 48th Edition, Dhanalakshmi Publishers, Chennai, 2018.

T2.   Rangawala, "A text book of Civil Engineering Drawing", Charotar publishers, 3rd edition, 2017.

Reference Book(s):

R1.   K.L. Narayana and P. Kannaiah, "Engineering Drawing", Scitech Publications (India) Pvt. Ltd., 3rd Edition, 2021.

R2.   Anurag A. Kandya, "Elements of Civil Engineering" Charotar publishers, 3rd edition, 2017 (Reprint).

R3.   B.P. Verma, "Civil Engineering Drawing & House Planning", Khanna publishers, 12th edition, 2006.

Publications of Bureau of Indian Standards:

1. IS 10711 - 2001: Technical Product Documentation - Sizes and layout of drawing sheets.

2. IS 9609 (Part- 0 & 1) - 2001: Technical Product Documentation - Lettering.

3. IS 10714 (Part 20) - 2001: Technical Drawings- General Principles of Presentation- Basic Conventions for Lines.

4. IS 11669 - 1986: General Principles of Dimensioning on Technical Drawings.

5. IS 15021 (Part- 1 to 4) - 2001: Technical Drawings - Projection Methods.

6. SP 46 - 2003: Engineering Drawing Practice for Schools & Colleges.

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

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:	
CO 1: Set well-articulated goals for academics, career, and personal aspirations.	Apply
CO 2: Apply time management techniques to complete planned tasks on time.	Apply
CO 3: Explain the concept of wellness and its importance to be successful in career and life.	Apply
CO 4: Explain the dimensions of wellness and practices that can promote wellness.	Apply
CO 5: 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 Intuitional 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"

Course Code: 23VAT101	Course Title: HERITAGE OF TAMILS (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 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.

<div align="center">

தமிழர் மரபு

</div>

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 திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு 3 – நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்   3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், 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 பிறபகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுய மரியாதை இயக்கம் – இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெ முத்துப் படிகள்– 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. 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 C ivilization 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.

Course Code: 23VAT101	Course Title: HERITAGE OF TAMILS (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

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, Thinai 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

Course Outcomes	Cognitive Level
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

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 C ivilization 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.

SEMESTER II

Course Code: 23ENI201	Course Title: COMMUNICATION SKILLS II (Common to all B.E/B.Tech Programmes)		
Course Category: AEC	Course Level: Introductory		
L:T:P(Hours/Week) 2:0:2	Credits: 3	L:T:P(Hours/Week) 2:0:2	Credits: 3

Course Objectives

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

Module I   20 Hours

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.

Course Outcomes	Cognitive Level
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", 2nd Edition, South Asian, Cambridge University Press, 2020.
T2. Norman Whitby, "Business Benchmark pre-intermediate to Intermediate", 2nd Edition, South Asian, Cambridge University Press, 2014.

Reference Book(s):

R1. Hewings Martin - Advanced Grammar in use Upper-intermediate Proficiency, CUP,3rd 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/

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

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, migi, 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
4. www.learn-japanese.info/
5. www.learn.hiragana-katakana.com/typing-hiragana-characters/
6. www.kanjisite.com/

Course Code:23FLT202	Course Title: FOREIGN LANGUAGE - GERMAN
	(Common to all B.E/B.Tech Programmes)

Course Category: AEC		Course Level: Introductory	
L:T:P (Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours:45	Max. Marks:100

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 Hours

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 caf'e, Getränkekarte, Telefon-buch, Namen, Rechnungen) — Grammar (Frägesatze 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 bezhalen Telefonnummern und verstehen)– pronunciation (Wortakzent in Verben und in Zahlen) –

To learn (Grammatiktabelle ergänzen, mit einem Redemittelkasten arbeiten)

UNIT II   NUMBERS AND NOMINATIVE CASE   9 Hours

Theme and Text (Numbers – 1 to 12 (Eins bis Zwolf) – 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 Grammatiktabelle erarbeiten, Notizen machen).

UNIT III   **AKKUSATIVE CASE AND PREPOSITIONS**   **9 Hours**

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 bescreiben 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 + Datic)– 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 Hours**

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 Hours**

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 (Adjecktive 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 At the end of this course, students will be able to:	Cognitive Level
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	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(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

Course Code: 23MAI201	Course Title: ORDINARY DIFFERENTIAL EQUATION AND COMPLEX VARIABLES
Course Category: Minor	**Course Level: Introductory**

L:T:P(Hours/Week) 3:0 :2	Credits: 4	Total Contact Hours:75	Max Marks:100

Course Objectives:

The objective of this course is to familiarize the graduate engineers with techniques in vector calculus, complex variables and ordinary differential equations.

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).

Ordinary Differential Equations of Higher Orders

Second and higher order linear differential equations with constant coefficients – Second order linear differential equations with variable coefficients – Method of variation of parameters – Solution of first order simultaneous linear ordinary differential equations.

Laplace Transform

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

List of Experiments(Using Python): **30 Hours**

1. Find gradient of a given scalar function, divergence and curl of a vector function.
2. Verify Green's theorem in a plane.
3. Graphically plot time and frequency domain of standard functions and compute Laplace transform of In- built functions.
4. Compute second order ordinary differential equation.
5. Compute Inverse Laplace transform of In- built functions.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Apply the concepts of Vector Differentiation and Integration to solve problems in Science and Engineering.	Apply
CO2: Using the concept of complex variables to construct analytical functions.	Apply
CO3: Use the concept of complex integration to evaluate definite integrals.	Apply
CO4: Determine the solution of second and higher order ordinary differential equations.	Apply
CO5: Apply Laplace transform techniques to solve ordinary differential equations.	Apply
CO6: Develop programs using differential equations 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	2	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	3	-	-	-	-	-	-	-	-	-

High-3; Medium-2;Low-1

Text Book(s):

T1. Erwinkreyzig, Advanced Engineering Mathematics, 9th edition, John Wiley& Sons, 2006.

T2. Veerarajan T., Engineering Mathematics for first year, 3rd edition, Tata McGraw-Hill, New Delhi, 2019.

Reference Book(s):

R1. G.B.Thomas and R.L Finney, Calculus and Analytic Geometry, 9th edition, Pearson, Reprint,
    2002.

R2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th 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

Course Code:23CHI201	Course Title: CHEMISTRY FOR CIVIL ENGINEERING		
Course Category: Minor	Course Level: Introductory		
L:T:P (Hours/Week) 3: 0: 2	Credits:4	Total Contact Hours:75	Max Marks:100

Course Objectives

The course is intended to impart the knowledge of chemistry involved in Water technology, Corrosion and its control, Engineering materials, Spectroscopic techniques, and Building Materials.

Module: I   **22 Hours**

Water Technology: Water quality parameters - Types of water - Hardness of water - Types, expression, units, problems - Determination of hardness by EDTA method - Boiler feed water - Boiler troubles (Scale, Sludge, Priming, Foaming, Caustic embrittlement, Boiler Corrosion) - Water conditioning methods - Internal conditioning - Phosphate, Calgon, and Sodium aluminate conditioning. External conditioning - Demineralization, Desalination of brackish water -Reverse Osmosis process.

Corrosion and its Control: Corrosion – Causes – Consequences - Types- Chemical, electrochemical corrosion (galvanic, differential aeration - Pitting corrosion) - Factors influencing corrosion (Based on Metal and Environment) - Corrosion control - Cathodic protection methods and Metallic coating - Galvanizing and Tinning. Paints - Constituents and their functions.

Polymers, Plastics and Composites: Polymers – definition –Terminologies – Polymerization – Types - Addition and Condensation Polymerization - Classification. Plastics - Classification.

Module: II   **23 Hours**

Polymers, Plastics and Composites: Engineering Plastics (PVC, Teflon, Polycarbonates, Polyurethanes, PET) - Preparation, Properties and Uses. Compounding of Plastics - Moulding technique - Blow and Extrusion. Polymer composites - FRP and Ceramic matrix composites.

Analytical Techniques: Spectroscopy - Electromagnetic Spectrum, Absorption and Emission Spectroscopy - Beer-Lambert's law (Problems). UV-Visible Spectroscopy – Principle - Instrumentation (block diagram only) - Estimation of Iron by Spectrophotometry. Atomic Absorption Spectroscopy – Principle - Instrumentation (block diagram only) - Estimation of Nickel by AAS. Flame Photometry – Principle - Instrumentation (block diagram only) - Estimation of Sodium by Flame Photometry.

Chemistry of Building Materials: Chemistry of lime and gypsum. Cement - Chemical Composition, Classification, Manufacture by wet and dry process, Setting and Hardening of Cement, Chemical reactions during the Hydration of Cement, Waterproof and White Cement - Properties and Uses. Chemistry and applications of Admixtures.

LIST OF EXPERIMENTS: (Any 6 experiments)   **30 Hours**

1. Estimation of hardness of Water by EDTA method.

2. Determination of alkalinity in Water Sample by indicator method.

3. Determination of corrosion rate of mild steel by weight –loss method.

4. Determination of molecular weight of polymer by viscometric method.

5. Estimation of iron by spectrophotometry

6. Determination of percentage of calcium oxide in cement by titrimetric method.

7. Determination of strength of acid by pH metry.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Understand and explain the chemistry involved in Water treatment, Corrosion and its control, Engineering materials, Spectroscopic techniques, and Building materials.	Understand
CO2: Apply the acquired knowledge of chemistry to solve the Engineering problems.	Apply
CO3: Analyze Engineering problems through the concept of Water technology Corrosion, Engineering materials, Analytical techniques, and Building materials.	Apply
CO4: Investigate Engineering materials by volumetric and instrumental methods in chemistry 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	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	-

High-3; Medium-2; Low-1

Text Book(s):

T1. Jain and Jain, Engineering Chemistry, 17th Edition, Dhanpat Rai Publishing Company, New Delhi, 2018.

T2. Wiley Engineering Chemistry, 2nd Edition, Wiley India Pvt Ltd, New Delhi, 2011.

Reference Book(s):

R1. Dara S. S and Umare S. S., A textbook of Engineering Chemistry, 12th Edition, S.Chand & Co.Ltd, New Delhi , 2014.

R2. V. R. Gowariker, N. V. Viswanathan and Jayadev Sreedhar, Polymer Science,4th Edition, New Age International(P) Ltd, Chennai ,2021.

R3. Jeffery G. H., Bassett. J., Mendham J and Denny R. C., Vogel's Textbook of Quantitative chemical analysis, 5th Edition, Oxford, ELBS, London ,2012.

Web References:

1. http://nptel.ac.in/courses/122101001/downloads/lec.23.pdf

2. https://nptel.ac.in/courses/104106075/Week1/MODULE%201.pdf2.

Course Code: 23CET201		Course Title: ENGINEERING MECHANICS	
Course Category: Minor		Course Level: Introductory	
L:T:P(Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours:45	Max Marks:100

Course Objectives:

The course is intended to expose the students to the fundamental concepts of mechanics and enhance their problem-solving skills. It introduces students to the influence of applied force system and the geometrical properties of the rigid bodies while in stationary or in motion.

Module I   **23 Hours**

Statics of Particles

Introduction – Units and Dimensions – Laws of Mechanics – Lami's theorem, Parallelogram and triangular Law of forces –– Vectorial representation of forces – Vector operations of forces - additions, subtraction, dot product, cross product – Coplanar Forces – Non-Coplanar Forces - rectangular components – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility .

Equilibrium of Rigid Bodies

Free body diagram – Types of supports –Action and reaction forces –stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem– Single equivalent force -Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions.

Centroids of Surfaces And Solids

Centroids and centre of mass– Centroids of lines and areas - Rectangular, circular, triangular areas by integration – T section, I section, - Angle section, Hollow section by using standard formula - Theorems of Pappus.

Module II **22 Hours**

Properties of Surfaces And Solids

Area moments of inertia of plane areas – Rectangular, circular, triangular areas by integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem –Principal moments of inertia of plane areas – Principal axes of inertia-Mass moment of inertia –mass moment of inertia for prismatic, cylindrical and spherical solids from first principle – Relation to area moments of inertia.

Friction

The Laws of Dry Friction, Coefficients of Friction, Angles of Friction, Wedge friction, Wheel Friction, Rolling Resistance, Ladder friction.

Dynamics of Particles

Kinematics - Rectilinear Motion and Curvilinear Motion of Particles. Kinetics- Newton's Second Law of Motion -Equations of Motions, Dynamic Equilibrium, Energy and Momentum Methods - Work of a Force, Kinetic Energy of a Particle, Principle of Work and Energy, Principle of Impulse and Momentum, Impact of bodies.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Calculate resultant forces, moments and couples using principles of mechanics and draw free body diagrams for any system of forces	Apply
CO2: Calculate the centroids and properties of surfaces and solids using principles of mechanics	Apply
CO3: Calculate the motion of particles using principles of dynamics	Apply
CO4: Exhibit a static or a dynamic model of a system using principles of mechanics	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s):

T1.   Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, Sanjeev Sanghi, "Vector Mechanics for Engineers: Statics and Dynamics", McGraw Higher Education, 11th Edition, 2017.

T2.   Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.

Reference Book(s):

R1.   Boresi P and Schmidt J, Engineering Mechanics: Statics and Dynamics, 1/e, Cengagelearning, 2008.

R2.   Hibbeller, R.C., Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 13th edition, Prentice Hall, 2013.

R3.   Meriam J L and Kraige L G, Engineering Mechanics: Statics and Engineering Mechanics: Dynamics, 7th edition, Wiley student edition, 2013.

Web References:

1.   https://archive.nptel.ac.in/courses/112/106/112106286/

2.   https://www.selfstudys.com/mcq/gate/mechanical-engineering/online-test/chapter-7-engineering-mechanics.

Course Code: 23ADT001	Course Title: C PROGRAMMING (Common to CE,EA,EC,EE& EV)		
Course Category: Multi-disciplinary	**Course Level: Introductory**		
L:T:P(Hours/Week) 3: 0: 0	**Credits:3**	**Total Contact Hours:45**	**Max Marks:100**

Course Objectives:

The course helps to understand the structured and procedural programming skills. The major objective is to provide students with understanding of code organization and functional hierarchical decomposition using complex data types.

Module I   **22 Hours**

Basics Of Computer Organization: Generation and Classification of Computers – Basic Organization of a Computer – Software development life cycle – Problem Solving Techniques, Algorithm, Pseudo code and Flow Chart.

Introduction To C Programming: Introduction – Structure of a C program – Keywords – Identifiers – Constants – Variables – Data Types – Operators and Expressions – Formatted & Unformatted I/O functions – Decision statements – Loop control statements.

Arrays: Characteristics – Declaration- One-dimensional array, Two-dimensional arrays

Module II   **23 Hours**

Functions: Declaration & Definition of function – Built in function – User defined function -Typesof functions – Call by value & reference.

Strings and Pointers: Formatting strings – String handling functions. Pointers: Features and Types of pointers – Arithmetic operations with pointers–Pointers and Arrays- Array of Pointers- Pointers and Strings

Structures and Union: Structures: Features – Operations on Structures – Array of structures –

Pointers to Structures -Unions-Union of Structures.

Course Outcomes At the end of this course, students will be able to:	Cognitive Level
CO1: Correlate the fundamental concepts of computer organization such as architectures of the processors and project management for real time application	Apply
CO2: Infer the fundamental concepts of programming, such as variables, data types and control structures for real time problems	Analyze
CO3: Apply programs solving skills and knowledge of C programmingconstructs to solve the given one dimensional and two dimensional datasets	Apply
CO4: Build a modules to solve the given application using functions	Apply
CO5: Develop a program by accessing the address of the variable using pointers and manipulation of characters using string handling functions	Apply
CO6: Test the performance of the students by group assignments and projects on real time problems	Evaluate

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Text Book(s):

T1. Ashok N.Kamthane, Amit.N.Kamthane, "Programming in C", 3rd Edition, Pearson Education, 2015.

T2. Deitel H M and Deitel P J, "C How to Program", Prentice Hall, 2013.

Reference Book(s):

R1. Ajay Mittal, "Programming in C-A Practical Approach", 3rd Edition, Pearson Education,2010.

R2. Yashavant P.Kanetkar," Let Us C" , 16th Edition, BPB Publications, 2018.R3. Herbert Schildt, "C The Complete Reference", Tata McGraw Hill, 2010.

R4. S Gottfried Byron, "Programming With C", Tata McGraw Hill, 2011.

Web References:

1. NPTEL course content on Introduction To Programming In https://onlinecourses.nptel.ac.in/noc22_cs40.

2. Complete guide on Learn C programming: http://www.cprogramming.com/

3. Complete reference manual on C programming: http://www.c4learn.com/

Course Code:23ADL001	Course Title: C PROGRAMMING LABORATORY (Common to CE,EA,EC,EE &EV)		
Course Category: Multi-disciplinary		Course Level: Introductory	
L:T:P(Hours/Week) 0:0:3	Credits:1.5	Total Contact Hours:45	Max Marks:100

Course Objectives

The course introduces students to the practical knowledge of programming using C programming language as an implementation tool. It aims at providing students with understanding of programming essentials used within the framework of imperative and structural programming paradigms.

List of Experiments:

1. Implement basic C programs using data types

2. Implement programs using Operators and Expressions

3. Develop Programs using Branching statements

4. Implement Programs using Control Structures

5. Develop programs using Arrays

6. Implement programs using Functions

7. Implement programs using String Operations

8. Develop programs using Pointers

9. Implement programs using Structures

10. Develop programs using Union

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Write programs using appropriate programming constructs.	Apply
CO2:Apply programs solving skills and knowledge of C programming constructs to solve the given one dimensional and two dimensional dataset	Apply
CO3:Develop a program by accessing the address of the variable using pointers and manipulation of characters using string handling functions	Analyze
CO4:Evaluate modular programming techniques to break down complex programs into smaller and manageable modules	Evaluate

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Text Book(s):

T1. Ashok N.Kamthane, Amit.N.Kamthane, "Programming in C", 3rd Edition, Pearson education, 2015.

T2. Deitel H M and Deitel P J, "C How to Program", Prentice Hall, 2013.

Reference Book(s):

R1. Ajay Mittal, "Programming in C-A Practical Approach", 3rd Edition, Pearson Education, 2010.

R2. Yashavant P.Kanetkar, "Let Us C", 16th Edition, BPB Publications, 2018.

R3. Herbert Schildt, "C The Complete Reference", Tata McGraw Hill, 2010.

Web References:

1. C programming resources: https://electronicsforu.com/resources/15-free-c-programming-Ebooks.

2. C programming tutorials: https://www.fromdev.com/2013/10/c-programming-tutorials.html.

3. C Manual: https://books.goalkicker.com/CBook.

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

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.

Course Outcomes At the end of this course, students will be able to:	Cognitive Level
CO1: Apply engineering knowledge to conduct experiments and analyze the electrical and electronic connections as per the given circuit.	Analyze
CO2: Apply to make wooden 'T' joint, and pipeline connection individually using various workshop tools as per the given dimensions.	Apply
CO3: 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

Course Code: 23ESL201	Course Title: PROFESSIONAL SKILLS 1:PROBLEM SOLVING SKILLS & LOGICAL THINKING 1 (Common to all B.E/B.Tech Programmes)		
Course Category: SEC	Course Level: Introductory		
L:T:P(Hours/Week) 0: 0: 2	Credits: 1	Total Contact Hours:30	Max Marks:100

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.

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

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

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" 2nd Revised Edition, Prentice-Hall of India Pvt.Ltd, 2013

R2: Arun Sharma. "Quantitative Aptitude for Common Aptitude Test", McGraw Hill Publications, 5th Edition, 2020

R3: Arun Sharma. "Logical Reasoning for Common Aptitude Test", McGraw Hill Publications, 6th Edition, 2021.

Web References:

1   https://www.indiabix.com/aptitude/questions-and-answers/

2   https://www.geeksforgeeks.org/aptitude-questions-and-answers/

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 பானைத் 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 பானைத் தொழில்நுட்பம்   3

சங்க காலத்தில் நெசவுத் தொழில் – பானைத் 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 குமுழித் 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 பதிப்பு 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	
CO.1 நெசவு மற்றும் பானைத் தொழில்நுட்பம், வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம், உற்பத்தித் தொழில்நுட்பம், வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் ஆகியன குறித்து அறிந்து கொள்வார்கள்.	அறிதல் (Understand)
CO.2 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

Passed in 17th Board of Studies Meeting held on 29.12.2023
Approved in 18th Academic Council Meeting held on 23.03.2024   BOS Chairman

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 C ivilization 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.

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

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 Thoompu 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

Course Outcomes	Cognitive Level
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

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 C ivilization 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.

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

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.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO 1: Explain the use of natural resources for a sustainable life as an individual in prevention of pollution.	Understand
CO 2: Apply the environmental ethics and legislations for various environmental issues.	Apply
CO 3: 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, 3rd 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.

2. https://en.wikipedia.org/wiki/Environmental_science.

Course Code: 23MAT301	Course Title: TRANFORMS AND PARTIAL DIFFERENTIAL EQUATIONS		
Course Category: Minor	Course Level: Intermediate		
L:T:P(Hours/Week) : 3 : 1 : 0	Credits: 4	Total Contact Hours: 60	Max Marks: 100

Course Objectives:

The objective of the course is to equip the students to solve various partial differential equations (PDEs) of different orders, and solving the wave equation and heat conduction problems in one and two dimensions by Fourier series method.

Module I   **22+8 Hours**

Partial Differential Equations: Formation of partial differential equations — Solutions of standard types of first order partial differential equations — Lagrange's linear equation -- Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non- homogeneous types.

Fourier Series: Dirichlet's conditions — General Fourier series — Odd and even functions — Half range sine series — Half range cosine series — Parseval's identity — Complex form of Fourier series — Harmonic analysis.

Classification of second order linear partial differential equations: Method of separation of variables - Classification of second order linear partial differential equations.

Module II   **23+7 Hours**

Solutions of one-dimensional wave equation: Solutions of one-dimensional wave equation by Fourier series method.

Solution of One and Two-Dimensional Heat Flow Equation: One dimensional equation of heat conduction - Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded), Solution by Fourier series method.

Fourier Transforms: Fourier transform pair — Fourier sine and cosine transforms — Properties — Transforms of simple functions — Convolution theorem — Parseval's identity.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Demonstrate the concept of transform and partial differential equations to civil engineering.	Apply
CO2: Apply Fourier series techniques in solving heat flow and wave equations	Apply
CO3: Determine the solution of first and higher order partial differential equations.	Apply
CO4: Calculate the Fourier transformation for a periodic function.	Apply

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Text Book(s):

T1. Erwinkreyzig, Advanced Engineering Mathematics, 10th edition, John Wiley& Sons, 2015.

T2. Veerarajan T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.

T3. Ramana B.V., higher Engineering Mathematics, Tata McGraw-Hill, New Delhi, 11th Reprint, 2010.

Reference Book(s):

R1. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, PearsonEducation (2007).

R2. N. P. Bali and Manish Goyel, A text book of Engineering Mathematics, Laxmi Publication, Reprint, 2008.

R3. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010. 11th Reprint, 2010

Web References:

1. http://nptel.ac.in/courses/122107037/19 2

2. http://nptel.ac.in/video.php?subjectIId=108106075

3. https://nptel.ac.in/courses/111103021/

Course Code: 23CET301		Course Title: STRENGTH OF MATERIALS	
Course Category: Major		Course Level: Intermediate	
L:T:P(Hours/Week) 3:0:0	Credits: 3	Total Contact Hours: 45	Max Marks: 100

Course Objectives:

The course is intended to impart knowledge on the fundamental concepts of stress, mechanism of load transfer in beams, deformation in determinate beams, basic concepts in analysis of indeterminate beams, crippling load in columns and stresses in cylinders

Module I   **25 Hours**

Simple and compound stresses

Stresses in simple and compound bars – Thermal stresses – Elastic constants – Biaxial state of stress – Principal stresses and principal planes – Mohr's circle of stresses – Torsion on circular shafts

Bending of beams

Types of beams and transverse loadings– Shear force and bending moment for simply supported, cantilever and over - hanging beams – Theory of simple bending

Deflection of beams

Double Integration method – Macaulay's method – Area moment method – Conjugate beam method – Castigliano's theorem

Module II   **20 Hours**

Indeterminate beams

Propped Cantilever and Fixed Beams – Fixed end moments and reactions, slope and deflection for standard cases of loading – Continuous beams – support reactions and moments – Theorem of three moments – Shear Force and Bending Moment Diagrams

Columns

Middle third rule – Types of columns – Euler's theory – Rankine's formula

Cylinders

Types of cylinders – Thin cylinders – strain under internal pressure – Stresses in thin compound cylinder

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Apply suitable method to determine the stresses in compound bars, column and cylinders	Apply
CO2: Apply suitable method to calculate the bending and deflection of beams	Apply
CO3: Present pictorial representation of a structural element by applying reverse engineering practices	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s):

T1.R.K. Rajput, "Strength of Materials", S. Chand & Company Pvt. Ltd., New Delhi, Seventh Edition, 2018.

T2.R.K. Bansal, "A Text Book of Strength of Materials", Laxmi Publications (P) Ltd., New Delhi, Sixth Edition, 2018.

Reference Book(s):

R1.Timoshenko. S.P. and Young D.H., "Elements of Strength of Materials", Affiliated East-West Press Ltd., New Delhi, 5th edition (SI Units), Reprint 2014.

R2.Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, First Revised Edition, 2017

R3.Ferdinand P. Beer, E. Russell Johnston Jr., John T. De Wolf and David F. Mazurek "Mechanics of Materials", McGraw Hill Education, New York, Seventh Edition, 2015.

Web References:
1.http://nptel.ac.in/courses/105106116

2.http://web.mit.edu/emech/dontindex-build/

3.http://www.aboutcivil.org/solid-mechanics.html

Course Code: 23CET302		Course Title: SURVEYING	
Course Category: Major		Course Level: Intermediate	
L:T:P(Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours: 45	Max Marks: 100

Course Objectives:

The course is intended to expose the students to the fundamental concepts of surveying. It introduces students to the influence of various equipments and their applications in measuring distance, areas and volumes.

Module I   **23 Hours**

FUNDAMENTALS OF SURVEYING

Surveying: Classifications and basic principles – Types of surveying – Equipment and accessories for various types of surveying. **Levelling:** Methods of levelling – Booking – Reduction – Curvature and refraction correction – Contouring.

THEODOLITE SURVEYING AND COMPUTATIONS

Horizontal and vertical angle measurements by Theodolite and Tacheometric surveying – Heights and distances – Trigonometric levelling - Computation of cross sectional areas and volumes – Earthwork calculations – Mass haul diagrams.

CONTROL SURVEYING AND ADJUSTMENT

Horizontal and vertical control: Methods – Triangulation – Traversing – Gale's table – Trilateration – Concepts of measurements and errors – error propagation and linearization – adjustment methods – least square methods – angles, lengths and levelling network.

Module II   **22 Hours**

MODERN SURVEYING

Total Station: Digital Theodolite, EDM, Electronic field book – Advantages – Parts and accessories – working principle – Observables – Errors - COGO functions – Field procedure and applications.

GPS: Advantages – System components – Signal structure – Selective availability and antispoofing – receiver components and antenna – Planning and data acquisition – Data processing – Errors in GPS – Field procedure and applications.

MISCELLANY

Route Surveying – Reconnaissance – Route surveys for highways and railways– Simple curves – Compound and reverse curves – Transition curves – Setting out different methods of simple curve – Vertical curves. Introduction to Hydrographic and Astronomical surveying.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Analyse the principles and methodologies of traditional and modern surveying techniques to evaluate their suitability for different surveying tasks	Analyse
CO2: Apply surveying principles and computation techniques to execute and interpret practical surveying tasks	Apply
CO3: Produce a report justifying the chosen surveying method based on the field scenario	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s):

T1. Punmia B C, "Surveying" - vol. 1, vol. 2 and vol 3, Laxmi Publications (P) Ltd., New Delhi, Seventeenth Edition, 2016

T2. Agor. R, "A Text Book of Surveying and Levelling", Khanna Publishers, Twelfth Edition, 2015

T3. Duggal R K, "Surveying", Vol I & II, Tata McGraw Hill Publishing Company Ltd., New Delhi, Fourth Edition, 2017

Reference Book(s):

R1. Basak N N, "Surveying and Levelling", McGraw Hill Education India, Second Edition, Twelfth reprint, 2017

R2. R. Subramanian, "Surveying and Levelling", Oxford University Press, Second Edition, 2012.

R3. Chandra. A.M., "Surveying", New Age International Private Ltd Publishers, Second Edition, 2015.

Web References:

1. http://www.aboutcivil.org/surveying-levelling%20II.html

2. https://nptel.ac.in/courses/105107121

3. http://www.vssut.ac.in/lecture_notes/lecture1428642587.pdf

Course Code: 23CET304	Course Title: CONCRETE TECHNOLOGY		
Course Category: Major	Course Level: Intermediate		
L:T:P(Hours/Week) 3:0:0	Credits: 3	Total Contact Hours: 45	Max Marks: 100

Course Objectives:

The course is intended to impart knowledge on the concrete ingredients, application of admixtures in concrete, IS method of concrete mix design, mechanical & durability properties of concrete and introduction to special concrete.

Module I   **22 Hours**

Composition of cement - Hydration of cement - Structure of hydrated cement paste - Aggregates-grading requirements as per BIS - Quality of water.

Chemical admixtures - accelerators, retarders, plasticizers and water retarding admixtures - Mineral admixtures - fly ash, silica fume, ground granulated blast furnace slag and metakaolin - Effects on fresh and hardened properties.

Mix proportioning- basic considerations - quality control - methods of mix proportioning - IS method of mix design - correction for moisture content and bulking.

Module II   **23 Hours**

Fresh concrete properties: workability - segregation - bleeding - Hardened concrete properties: compressive, tensile and flexural strength-Creep &shrinkage- Stress-strain curve for concrete-Durability - tests on permeability - Rapid Chloride Permeability Test, Half-cell potentiometer - factors affecting durability - chemical attack on concrete- sulphate, chloride and acid attacks - carbonation - corrosion of steel rebars, corrosion preventive measures.

Properties and applications of light weight concrete - HSC - HPC - FRC - Ferrocement - Polymer Concrete - RMC - Shotcrete- SCC-smart concrete - self healing concrete - light transmitting concrete - porous concrete - aerated concrete - SIFCON - reactive powder concrete - concrete canvas.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO 1: Design a concrete mix as per IS codal provisions with the selection of suitable ingredients.	Apply
CO 2: Justify the selection of conventional and special concrete for various applications based on its fresh and hardened properties.	Apply
CO 3: Prepare and exhibit special concrete models using sustainable materials.	Apply

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Text Book(s):

T1. M.S. Shetty and A.K. Jain, "Concrete Technology: Theory and Practice", 8th Edition,

S Chand Publishing., New Delhi, 2018

T2. M.L. Gambhir, "Concrete Technology: Theory and Practice", 5th Edition, McGraw Hill (India) Private Limited, Noida, 2013.

Reference Book(s):

R1. A.R. Santhakumar, "Concrete Technology", 2nd Edition, Oxford University Press, New Delhi, 2018.

R2. Neville A.M "Properties of Concrete", Pearson Education Asia Pvt Ltd., New Delhi, 2012.

R3. Mehta, P.K., "Concrete: Microstructure, Properties and Materials " 4th edition, McGraw Hill (India) Private Limited, Noida, 2013.

Web References:

1.http://nptel.ac.in/courses/105102012/

2.http://freevideolectures.com/Course/3357/Concrete-Technology/1

Course Code: 23CEL301	Course Title: SURVEYING PRACTICE LABORATORY		
Course Category: Major		Course Level: Intermediate	
L:T:P(Hours/Week) 0: 0: 3	Credits: 1.5	Total Contact Hours: 45	Max Marks: 100

Course Objectives:

The course is intended to expose the students to various surveying techniques which are very essential for a Civil Engineering student.

List of Experiments:

1. Determination of Pace Value of Surveyor using Chaining and Ranging
2. Computation of Included Angle after adjustment of Local Attraction
3. Determination of various points RL by Fly and Check levelling using dumpy level.
4. Contour Mapping using Grid Levelling
5. Determine the Angle Observations by Repetition using Theodolite.
6. Establishment of Horizontal Control Points by Traversing.
7. Determination of horizontal distance and height difference between two points by Stadia method.
8. Preparation of Planimetric Map using Stadia Tacheometry.
9. Determination of horizontal distance and height difference between two points by Tangential Tacheometry
10. Setting out of foundation using centre line marking
11. Determination of locations and distances using hand held GPS and Distomat.
12. Determination of area and volume using Total-station.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1. Determine the distance, height, area and volume of boundaries given using a suitable surveying technique	Apply
CO2. Execute marking and prepare a report representing topographic and spatial data	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Reference Book(s):

R1. Punmia B C, "Surveying" - vol. 1, vol. 2 and vol 3, Laxmi Publications (P) Ltd., New Delhi, Seventeenth Edition, 2016

R2. Agor. R, "A Text Book of Surveying and Levelling", Khanna Publishers, Twelfth Edition 2015

R3. Surveying Laboratory manual, Department of Civil Engineering, Dr. Mahalingam College of Engineering and Technology, Pollachi.

Web References:

1. http://www.aboutcivil.org/surveying-levelling%20II.html
2. http://civil.engineering.webservices.utoronto.ca/Assets/Civil+Engineering+Digital+Assets/
3. http://www.nptel.ac.in/courses/105107122/programs/courses/Survey+Camp+Class+Notes.pdf?method=1

Course Code: 23CEL302	Course Title: MATERIALS TESTING LABORATORY		
Course Category: Major	Course Level: Intermediate		
L:T:P(Hours/Week) 0:0 :3	Credits: 1.5	Total Contact Hours: 45	Max Marks: 100

Course Objectives

The course is intended to provide an understanding of the basic properties of construction materials and testing requirements for these materials.

List of Experiments:

Determine the
1. Modulus of elasticity for a given metal specimen

2. Properties of bricks and blocks

3. Physical properties of cement

4. Properties of coarse aggregates and fine aggregate

5. Torsional strength and modulus of rigidity for a given metal specimen

6. Deflection of beam and Verify using Maxwell reciprocal theorem

7. Hardness and impact strength for a given specimen

8. Spring constant for a given spring specimen

9. Slope and deflection of a beam by moment area theorem

10. Flexural Rigidity (EI) for a given specimens

11. Shear strength of metals (Double Shear test)

12. Buckling load for a given end condition of a column

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO 1: Determine the various properties of materials used in construction	Apply
CO 2: Interpret the results and recommend suitable materials for various applications	Apply

Course Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	-	-	-	-	-	-	-	3	2	-	-	3	-
CO 2	3	-	-	-	-	-	-	-	3	2	-	-	3	-

High-3; Medium-2; Low-1

Reference Book(s):

R 1. Bansal, R.K., "A Text Book of Strength of Materials", Laxmi Publications (P) Ltd., New Delhi 2010.

R 2. Timoshenko. S.P. and Young D.H., "Elements of Strength of Materials", Affiliated East-West Press Ltd., New Delhi, 5th edition (SI Units), 2012.

R 3. 19CECN3302 - Materials Laboratory Manual.

Web References:

1. https://sm-nitk.vlabs.ac.in/
2. https://eerc01-iiith.vlabs.ac.in/
3. https://www.youtube.com/c/constructionmaterialtesting

Course Code: 23CEL303	Course Title: COMPUTER AIDED BUILDING DRAWING LABORATORY		
Course Category: Major	Course Level: Intermediate		
L:T:P(Hours/Week) 0:0 :3	Credits: 1.5	Total Contact Hours: 45	Max Marks: 100

Course Objectives:

The course is intended to impart knowledge on the principles of planning for various buildings by incorporating building bye laws and develop the skill sets required for the drawing of different components of buildings.

List of Exercises:

Preparation of

1. Plan, elevation and Section of different types of footing. (Sketch)

2. Plan, elevation and section of dog legged staircase and bifurcated staircase. (Sketch)

3. Plan, elevation & section of simple building. (Sketch)

4. Introduction to CAD commands and drawing of simple objects.

5. Plan, elevation and section of types of foundations. (Wall foundation, Column footing – Stepped, Combined and Trapezoidal).

6. Plan, elevation of dog legged staircase and bifurcated staircase.

7. Plan, elevation & section of simple buildings.

8. Plan, elevation & section of two BHK residential building with RCC flat roof – single storey – load bearing structure.

9. Plan, elevation & section of two BHK residential building with RCC flat roof – single storey – framed structure.

10. Plan, elevation & section of Commercial building.

11. Section of King post & Queen Post for wooden/steel truss.

12. New plan for a dream house with proper orientation, scale and norms.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Draw the various components of a building manually and by using software	Apply
CO2: Prepare a plan, elevation and section of a residential building using software	Apply

Course Articulation Matrix:

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

High-3; Medium-2;Low-1

Reference Book(s):

R1. Rangawala, "A text book of Civil Engineering Drawing (including computer aided building drawing), Charotar publishers, 3rd edition, 2017.

R2. N. Kumaraswamy & A. Kameswara Rao, "Building Planning and Drawing", Charotar publishers, 9th edition, 2023.

R3. B.P. Verma, "Civil Engineering Drawing & House Planning", Khanna publishers, 13th edition, 2023.

Course Code: 23ESL301	Course Title:Professional Skills 2: Problem solving skills & Logical Thinking 2 (Common to all B.E/B.Tech Programmes)		
Course Category: SEC	**Course Level: Intermediate**		
L:T:P(Hours/Week) 0: 0: 2	**Credits: 1**	**Total Contact Hours:30**	**Max Marks:100**

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   **20 Hours**

Quantitative Ability

Time and work –Pipes and cisterns- - Time Speed Distance-Problems on Trains-Boats and Streams- Permutation and Combination-Probability, Menstruation- Heights and distance- Logarithms- Clocks and Calendars – Data Sufficiency

Module II   **10 Hours**

Reasoning Ability

Number & Alpha series- Odd man out-Coding and Decoding-Syllogisms- -Problems on Cubes and Dices- Logical Venn diagram -Visual Reasoning- Element & logical series-Analogies

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Enhance their problem solving skills & Logical thinking Skills	**Apply**

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

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" 2nd Revised Edition, Prentice-Hall of India Pvt.Ltd, 2013

R2: Arun Sharma. "Quantitative Aptitude for Common Aptitude Test", McGraw Hill Publications, 5th Edition, 2020

R3: Arun Sharma. "Logical Reasoning for Common Aptitude Test", McGraw Hill Publications, 6th Edition, 2021.

Web References:

1   https://www.indiabix.com/aptitude/questions-and-answers/

2   https://www.geeksforgeeks.org/aptitude-questions-and-answers/

Course Code: 23VAT301	Course Title: Universal Human Values 2: Understanding Harmony		
Course Category: VAC		Course Level: Intermediate	
L:T:P (Hours/Week) 2:1: 0	Credits:3	Total Contact Hours:45	Max Marks:100

Pre-requisites

➢ Induction Program

Course Objectives

The course is intended to:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Strengthening of self-reflection
3. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
4. Development of commitment and courage to act
5. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.

Unit I   Introduction to Value Education   9 Hours

Need for the Value Education; Self -exploration as the process   for value education; Continuous Happiness and Prosperity: A look at basic Human Aspirations; Right understanding: Relationship and Physical Facilities; Happiness and Prosperity: current scenario; Method to fulfill the Basic human aspirations

Unit II   Harmony in Human Being   9 Hours

Human being as a co-existence of self ('I') and the material 'Body'; needs of Self ('I') and 'Body'; The Body as an instrument of 'I'; Harmony in the self ('I'); Harmony of the self ('I') with body; Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

Unit III   Harmony in the Family and Society   9 Hours

Harmony in the Family the basic unit of human interaction; Values in human to human relationship; Trust as the foundational values of relationship; Respect as the right evaluation ;Understanding harmony in the society (society being an extension of family); Vision for the universal human order.

Unit IV   Harmony in the Nature   9 Hours

Understanding the harmony in the Nature Interconnectedness, self-regulation and mutual fulfillment among the four orders of nature; Existence as Co-existence at all levels; Holistic perception of harmony in existence.

Unit V   Harmony on Professional Ethics   9 Hours

Natural acceptance of human values; Definitiveness of Ethical Human Conduct; Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order; Competence in professional ethics; Case study: holistic technologies, management models and production systems; Strategy for transition towards value-based life and profession

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO.1 Reflect on values, aspiration, relationships and hence identify strengths and weaknesses.	Responding
CO.2 Appraise physical, mental and social wellbeing of self and practice techniques to promote wellbeing.	Responding
CO.3 Value human relationships in family and society and maintain harmonious relationships.	Valuing
CO.4 Respect nature and its existence for survival and sustainable of all life forms and hence practice conservation of nature	Valuing
CO.5 Appreciate ethical behaviour as a result of value system in personal and professional situations	Receiving

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Text Book(s):

T1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.

Reference Book(s):

R1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

R2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

R3. The story of stuff, Annie Leonard, Free Press, New York 2010.

Web References:

1. https://aktu.ac.in/hvpe/ResourceVideo.aspx

2. http://hvpenotes.blogspot.com/

3. https://nptel.ac.in/courses/109/104/109104068/

Course Code: 23CET401	Course Title: STRUCTURAL ANALYSIS - I		
Course Category: Major	Course Level: Intermediate		
L:T:P(Hours/Week) 3:0:0	Credits:3	Total Contact Hours:45	Max Marks: 100

Course Objectives:

The course is indented to impart knowledge on the concepts of virtual work to determine the deflection of trusses, frames and beams and to determine the bending moment and shear force for the determinate and indeterminate structures.

Module I   **25 Hours**

Deflection of determinate structures - Principle of Virtual work – Deflection of determinate plane trusses, beams and rigid plane frames.

Slope deflection method: analysis of determinate and indeterminate structures (beam and frame) – Settlement of supports - sway.

Moment distribution method: analysis of determinate and indeterminate structures (beam and frame) - settlement of supports - sway.

Module II   **20 Hours**

Flexibility Matrix Method: flexibility coefficients - flexibility matrix - analysis of determinate and indeterminate structures (beam and frame) – Analysis of pin jointed plane frames (truss).

Stiffness Matrix Method: stiffness coefficients - stiffness matrix - analysis of determinate and indeterminate structures (beam and frame) – Analysis of pin jointed plane frames (truss).

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Calculate the bending moment, shear force and deflection of statically determinate and indeterminate structures by force methods	Apply
CO2: Calculate the bending moment and shear force of statically determinate and indeterminate structures by displacement methods	Apply
CO3: Prepare a comparative study report on various methods of analysis of a structure	Analyse

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s):

T1. Vaidyanathan R, Perumal P, "Structural Analysis - Vol. 1", Fourth Edition, Laxmi Publications (P) Ltd., New Delhi, 2019.

T2. Bhavikatti S S, "Structural Analysis", Fourth Edition, Vikas Publishing House (P) Ltd., New Delhi, 2021.

Reference Book(s):

R1.Timoshenko S P and Young D H, "Theory of Structures", Second edition, McGraw Hill Publishing Int Ltd., 1965.

R2. Punmia B C, Ashok Kumar Jain, Arun Kumar Jain, "Theory of Structures", Thirteenth Edition, Laxmi Publications (P) Ltd., New Delhi, 2017

R3. Hibbler R C, "Structural Analysis", Tenth Edition, Pearson Education, 2022.

Web References:

1.http:// nptel.ac.in/courses/105/105/105105166/

2.https://www.udemy.com/course/structural-analysis-i/?couponCode=NVDPRODIN35

3. https://courses.structure.education/courses/structural-analysis-i

Course Code: 23CET402	Course Title: HIGHWAY ENGINEERING		
Course Category: Major	Course Level: Intermediate		
L:T:P(Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours: 45	Max Marks: 100

Course Objectives:

The course aims to impart the knowledge on concept and design of highway geometrics, properties and testing of highway materials and design, evaluation and maintenance of highway pavement.

Module I   **22 Hours**

HIGHWAY ALIGNMENT

Modes of transportation - Highway development in India - Highway alignment: Factors controlling the alignment, horizontal and vertical profile - Engineering surveys for Highway alignment.

HIGHWAY ELEMENTS

Cross sectional elements of highway - Super elevation: Problems on super elevation - Sight distance: types, calculation of sight distance – Types of gradient – Types of curves, extra widening, problems on horizontal curves and vertical curves.

HIGHWAY CONSTRUCTION MATERIALS

Characteristics and properties of sub grade soil, aggregates and bitumen - Modern materials used in highway construction: Polymer modified bitumen, Geo-Textiles and Geo-Membrane.

Module II   **23 Hours**

TESTS ON HIGHWAY CONSTRUCTION MATERIALS

Testing of sub grade soil: CBR Test, specific gravity test, proctor compaction test - Testing of aggregates: impact test, abrasion test, crushing strength test, specific gravity and water absorption test - Testing of bitumen: penetration test, ductility test, softening point test, viscosity test, flash and fire point test.

HIGHWAY PAVEMENT DESIGN

Types of pavements – Elements of pavement - Factors for pavement design - Design of flexible pavement (as per IRC: 37- 2018) - Design of rigid pavement (as per IRC:58- 2015) - Construction practice of flexible and concrete pavement – Pavement failures.

HIGHWAY MAINTENANCE

Highway drainage - Evaluation of pavements – Highway maintenance - Special repairs for highway pavement - Detailed Project Report(DPR).

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Calculate the geometric design elements of a highway.	Apply
CO2: Design flexible and rigid pavement with suitable highway construction materials as per the IRC codes.	Apply
CO3: Prepare a case study report on pavement failure and suggest suitable mitigation measures.	Apply

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO3	3	-	-	-	-	-	-	-	3	2	-	-	3	-
23CET402 - HIGHWAY ENGINEERING	3	-	-	-	-	-	-	-	3	2	-	-	3	-

High-3; Medium-2;Low-1

Text Book(s):

T1. Khanna, S. K. and Justo, C.E.G., Highway Engineering, Nem Chand & Bros, 10th Edition 2017, Roorkee.

T2. Kadiyali, L.R., Highway Engineering, Khanna Publishers, 1st edition,2018, Delhi.

Reference Book(s):

R1. IRC:37 - 2018, Guidelines for the Design of Flexible Pavements, Indian Roads Congress, New Delhi.

R2. IRC:58 - 2015, Guidelines for the Design of Plain Jointed Rigid Pavements for Highways (Fourth Revision) , Indian Roads Congress, New Delhi.

Web References:

1. https://onlinecourses.nptel.ac.in/noc22_ce94

2. https://www.civil.iitb.ac.in/~vmtom/nptel/401_lnTse/web/web.html

Course Code: 23CET403	Course Title: Water Supply Engineering	
Course Category: Major	Course Level: Intermediate	
L:T:P(Hours/Week) : : 3:0:0	Credits: 3	Total Contact Hours: 45
		Max Marks:100

Course Objectives:

The course is intended to explain the sources of drinking water supply systems and its quality, describe the conveyance systems for the water supply, describe the primary methods for water treatment, outline the advanced methods invoked in the treatment of water, design the water distribution networks for buildings.

Module I   **23 Hours**

PLANNING FOR WATER SUPPLY SYSTEM

Public water supply system: Planning – Objectives – Design period – Population forecasting – water demand – Sources of water and their characteristics – Surface and ground water – impounding reservoir – well hydraulics – Development and selection of source – Water quality – characterization and standards – Impact of climate change

CONVEYANCE SYSTEM

Water supply – Intake structures – functions and drawings – Pipes and conduits for water – pipe materials – Hydraulics of flow in pipes – Transmission main design – Laying, jointing and testing of pipes – Types and capacity of pumps – Selection of pumps and pipe materials

WATER TREATMENT

Objectives – Unit operations and processes – Principles, functions, design and drawing of chemical feeding, flash mixers, flocculators, sedimentation tanks and sand filters – Disinfection – Residue management – Construction, operation and maintenance aspects of water treatment plants

Module II   **22 Hours**

ADVANCED WATER TREATMENT

Principles and functions of aeration – Iron and manganese removal, defluoridation and mineralization – Water softening – Desalination – Membrane systems – Recent advancements

WATER DISTRIBUTION AND SUPPLY TO BUILDINGS

Requirements of water distribution – Components- Service reservoirs – Functions and drawings - Network design – Economics – Analysis of distribution networks – Appurtenances – Operation and maintenance – Leakage detection – Methods, principles of design of water supply in buildings – House service connection – Fixtures and fittings – Systems of plumbing

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO 1: Design and draw conveyance systems and treatment processes for the water supply	Apply
CO 2: Suggest suitable water distribution network as per the requirements of the community	Apply
CO 3: Prepare a comparative study report on various water treatment methods	Apply

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Text Book(s):

T1. S.K. Garg, "Environmental engineering" volume 1, Kanna publishers, New Delhi, 2005.
T2. P.N. Modi, "Water supply engineering" volume 1, Standard book house, New Delhi, 2005.

Reference Book(s):

R1. B.C. Punmia, A.K. Jain, A.K. Jain, "Water supply engineering", Lakshmi publications Pvt Limited, New Delhi, 2005.
R2. Government of India manual on "Water supply and treatment", CPHEEO, Ministry of Urban Development, New Delhi, 2003.
R3. R.Q. Syed, E.M. Motley, G. Zhu, "Water works engineering - planning design and operation", Prentice Hall of India Private limited, New Delhi, 2006.

Web References:

1. http://nptel.ac.in/courses/105104102/

Course Code: 23CET404	Course Title: REMOTE SENSING AND GIS		
Course Category: Major	Course Level: Intermediate		
L:T:P(Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours: 45	Max Marks: 100

Course Objectives:

The course is intended to expose the students to the fundamental concepts of Remote Sensing and GIS. It introduces students to the influence of various sensors and their data applications in various fields of engineering.

Module I   **23 Hours**

PHYSICS OF REMOTE SENSING

Introduction of Remote Sensing – Electro Magnetic Spectrum, Physics of Remote Sensing – Effects of Atmosphere Scattering – Different types – Absorption – Atmospheric window – Energy interaction with surface features – Spectral reflectance of vegetation, soil ,and water – atmospheric influence on spectral response patterns.

BASICS OF SENSORS AND PLATFORM CONCEPTS

Passive and Active sensors – Across track and along track scanners – Multi spectral scanners and thermal scanners - Types of platforms – PSLV and GSLV – Resolution – Spatial, Spectral, Radiometric and temporal resolutions – Pay load description of LANDSAT, SPOT, IRS, INSAT, IKONOS, QUICKBIRD, CHANDRAYAAN, MANGALYAAN.

IMAGE PROCESSING

Data Products – image interpretation types – basic elements of image interpretation – visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.

Module II   **22 Hours**

INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEM

Introduction – Maps – Map projections – types of map projections – GIS definition – components of GIS – standard GIS software's – Data type – Spatial and non-spatial data – measurement scales – Input and Output devices – Analysis Tools.

DATA ENTRY, STORAGE AND ANALYSIS

Data models – vector and raster data – data compression – data input by digital and analog methods – attribute data analysis – integrated data analysis – Modeling in GIS – Different case studies in Remote Sensing and GIS applications

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Apply the principles of remote sensing to interpret the spectral reflectance characteristics of various surface features, sensors and	Apply

platforms	
CO2: Apply image processing techniques to interpret the remote sensing data using GIS	Apply
CO3: Produce a report integrating remote sensing and GIS tools to analyse and map surface features	Analyse

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	3	-	-	3	2	2	-	-	2	-	-	2	-

High-3; Medium-2;Low-1

Text Book(s):

T1.   Thomas Lillesand, Ralph W. Kiefer, Jonathan Chipman, "Remote Sensing and Image Interpretation", John Willey and Sons (Asia) Pvt. Ltd., New Delhi, Seventh Edition, 2015.

T2.   Anjireddy. M., "Remote Sensing and Geographical Information Systems: An Introduction, BS Publications", Fourth Edition, 2014.

T3.   Basudeb Bhatta, Remote Sensing and GIS, Oxford University Press, New Delhi, Third Edition, 2020

Reference Book(s):

R1.   Victor Mesev, "Integration of GIS and Remote Sensing", John Wiley and Sons Ltd., First Edition, 2008.

R2.   Dr. S. Kumar, "Basics of Remote Sensing and GIS", Laxmi Publications, First Edition, 2006.

R3.   Chandra. A. M, Ghosh. S. K., "Remote sensing and geographical information system", Alpha Science Publications, Second Edition, 2015

Web References:

1.   http://www.wamis.org/agm/pubs/agm8/Paper-1.pdf

2.   http://ags.geography.du.ac.in/Study%20Materials_files/Punyatoya%20Patra_AM.pdf

3.   http://hydrologie.org/hsj/410/hysj_41_04_0593.pdf

4.   http://www.wiley.com/legacy/wileychi/gis/Volume1/BB1v1_ch14.pdf

5.   http://gis-lab.info/docs/books/aerial-mapping/cr1557_15.pdf

Course Code: 23CET405	Course Title: FLUID MECHANICS AND HYDRAULICS ENGINEERING		
Course Category: Major	**Course Level: Intermediate**		
L:T:P(Hours/Week) : : 3:1:0	**Credits: 4**	**Total Contact Hours: 60**	**Max Marks:100**

Course Objectives:
The course is intended to introduce the concepts of static pressure, buoyant force and metacentric height; Know the flow properties through velocity potential function and stream function; Apply the Bernoulli's theorem for pipe flow; Understand the major and minor losses in pipe flow; Study the principles of most economical channel section; Impart knowledge on dimensional and model analysis.

Module I   **30 Hours**

FLUID PROPERTIES AND FLUID STATICS
Fluid: Definition, distinction between solid and fluid – Units and dimensions – Properties of fluid.
Fluid statics: Concepts of fluid static pressure, absolute and gauge pressure – Pressure measurements using manometers and pressure gauges – Forces on planes: centre of pressure – Buoyancy – Metacentric height – Floatation

FLUID KINEMATICS AND DYNAMICS
Fluid kinematics: Flow visualisation – Lines of flow – Types of flow – Velocity field and acceleration – Continuity (one dimensional and three dimensional form) – stream function – velocity potential function
Fluid dynamics: Euler's equation along a streamline – Bernoulli's equation – Applications – Venturimeter, Orificemeter

FLOW THROUGH PIPES
Flow through pipes: Darcy Weisbach equation – Friction factor – Moody's diagram – Major and minor losses of flow in pipes – Pipes in series and in parallel – Boundary layer concept: Types of boundary layer thickness

Module II   **30 Hours**

FLOW THROUGH OPEN CHANNELS
Types of open channels – Types of Flow – Fundamental equations – Chezy equation, Manning equation – Velocity distribution in open channel — Most economical channel section for uniform flow (Rectangular and Trapezoidal) – Specific energy and specific force – Hydraulic jump

DIMENSIONAL ANALYSIS AND MODEL STUDIES
Fundamental dimensions – Dimensional homogeneity – Rayleigh's method and Buckingham pi-theorem – Dimensionless parameters – Similitude and model studies – Distorted models

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Calculate the characteristics of fluid at rest and in motion	Apply
CO2: Calculate the characteristics of flow through pipes and channels	Apply
CO3: Determine the relationship between various fluid paramters by dimensional and model analysis	Apply

CO4: Demonstrate a model showing the various characteristics of fluid flow	Analyse

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Text Book(s):

T1. R.K. Bansal, "Fluid mechanics and hydraulic machines", Laxmi Publications Ltd, New Delhi, 2010.
T2. R.K. Rajput, "A text book of fluid mechanics", S. Chand Publishing, 2019.
T3. K. Subramanya, "Flow in open channels", Tata McGraw Hill Publishing Company Ltd, New Delhi, 2015.

Reference Book(s):

R1. Ven Te Chow, "Open Channel hydraulics", Tata McGraw Hill Book company Ltd, New Delhi, 2009.
R2. P.N. Modi, S.M. Seth, "Hydraulics and Fluid Mechanics", Standard book house, New Delhi, 2019.
R3. R. Srivastava, "Flow through open channels", Oxford University Press, New Delhi, 2007.

Web References:

1. http://nptel.ac.in/courses/105103095
2. http://www.vidhyarthiplus.com/vp/Thread-ME2204-Fluid-Mechanics-and-Machinery-Lecture-Noes-2013-Edition#.VxG4X_1971U
3. http://www.et.byu.edu/~2014/che374/lectureNotes/lectureNotes.html

Course Code: 23CEL401	Course Title: CONCRETE AND HIGHWAY ENGINEERING LABORATORY		
Course Category: Core	Course Level: Intermediate		
L:T:P(Hours/Week) 0:0:3	Credits: 1.5	Total Contact Hours: 45	Max Marks: 100

Course Objectives:
The course is intended to impart knowledge on preparing concrete mix design; testing the fresh and hardened properties of concrete; workability and flowability tests on SCC; finding the properties of bitumen and binder content of asphalt mix.

List of Experiments:

1. Preparation of concrete mix using IS method.
2. Preparation of concrete mix using ACI method.
3. Determination of workability of concrete.
4. Determination of compressive, split tensile and flexural strength of hardened concrete.
5. Determination of modulus of elasticity of concrete.
6. Determination of strength & quality of concrete using NDT.
7. Determination of workability of self-compacting concrete.
8. Determination of specific gravity of bitumen.
9. Determination of softening point of bitumen.
10. Determination of ductility of bitumen.
11. Determination of flash and fire point of bitumen.
12. Determination of binder content of asphalt mix using binder recovery extraction test.

Course Outcomes At the end of this course, students will be able to:	Cognitive Level
CO1: Design a concrete mix as per IS standards and determine the fresh and hardened properties of concrete.	Apply
CO2: Determine the properties of bitumen and optimal content of bitumen for a bituminous mix.	Apply

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Reference Book(s):

R1. M.S. Shetty and A.K. Jain, "Concrete Technology: Theory and Practice", 8th Edition, S Chand Publishing., New Delhi, 2018.

R2. S.K. Khanna, C.E.G Justo and A. Veeraragavan, "Highway Engineering", Revised 10th Edition, Nem Chand & Bros, Uttarakhand, 2017.

R3. 23CEL401 - Concrete and Highway Engineering Laboratory Manual.

Course Code: 23CEL402	Course Title: FLUID MECHANICS AND HYDRAULICS ENGINEERING LABORATORY		
Course Category: Major	Course Level: Intermediate		
L:T:P(Hours/Week) : : 0:0:3	Credits:1.5	Total Contact Hours:45	Max Marks:100

Course Objectives:
The course is intended to provide hands-on experience of the application of flow measuring devices and performance characteristics of pumps and turbines.

List of Experiments:

1. Determination of metacentric height of a floating body

2. Classification of flow based on Reynolds number

3. Verification of Bernoulli's theorem

4. Measurement of flow using venturi meter and orifice meter

5. Measurement of flow through orifice

6. Determination of friction factor of various pipe materials

7. Determination of losses of different pipe fittings

8. Measurement of flow through notches

9. Measure the performance of centrifugal pump

10. Measure the performance of reciprocating pump

11. Measure the performance of Kaplan turbine

12. Measure the performance of Pelton Wheel turbine

Demonstration on:

1. Multistage centrifugal pump

2. Francis turbine

3. Submersible pump

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO 1: Investigate the flow characteristics of fluids	Apply
CO 2: Determine the efficiency of hydraulic machines and draw characteristic curves	Apply

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

R 1. R.K. Rajput., "A textbook of hydraulic machines", S. Chand Publishing, New Delhi, 2019.
R 2. R.K. Bansal, "Fluid mechanics and hydraulic machines", Laxmi Publications Ltd, New Delhi, 2010.
R 3. 23CEL402 – Fluid Mechanics and Hydraulics Engineering Laboratory Manual, Dr. MCET.

Web References:

1. https://me.iitp.ac.in/Virtual-Fluid-Laboratory/

2. https://fm-nitk.vlabs.ac.in/

Course Code: 23ESL401	Course Title Professional Skills 3 : Professional Development and Etiquette (Common to all B.E/B.Tech Programmes)		
Course Category: SEC	Course Level: Intermediate		
L:T:P(Hours/Week) 0: 0: 2	Credits: 1	Total Contact Hours:30	Max Marks:100

Course Objectives:

The course is intended to cultivate students' appropriate etiquette across various personal and professional contexts, fostering professionalism and effective communication.

Module I   **15 Hours**

Emotional Intelligence
Intrapersonal Skill: Goal Setting- Self-management- Emotional Intelligence: Understanding & Developing EI for Effective Communication and Relationships – Enhancing Social Skills

Professional Development
Introduction to Professional Development - Career State Assessment - Set Career Goals- Stay on Industry Trends - Self & Lifelong learning – Creativity - Problem Solving Skills - Strong Fundamentals – Using/ Creating Opportunities – Work & Life Balancing - Revisiting Goals

Teamness and Interpersonal skills
Paraphrasing: Techniques for Active Listening -Paraphrasing as a Tool for Effective Understanding and Communication – Collaboration and Team Building: Building Trust and Rapport - Self-paced learning.

Module II   **15 Hours**

Effective Communication
Effective Verbal Communication - Assertive Communication - Elements of Effective Communication - Barriers to Effective Communication - Persuasion Skills - Effective Presentation: Oral and visual presentation – Drafting formal reports.

Professional Etiquette
Introduction - Types of professional Etiquette- Personal Grooming: Importance of Personal Grooming in Professional Settings- Dress Codes and Professional Appearance Guidelines- Body language - Social – Email – Telephonic – Dining – Classroom - Business.

Activities:
- Emotional Intelligence: Scenario based role play, Debate
- Paraphrasing: Listening, Reading
- Effective Presentation:
    o Oral Presentation: Self-Introduction, JAM , Extempore speech
    o Visual presentation: Email Writing, Power Point Presentation, Vlog
- Professional Etiquette: Demonstrate required Professional Etiquette in all the above activities.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Communicate effectively and exhibit Professional etiquettes in various social forums.	**Apply**

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Textbook(s):

T1. Sabina Pillai, Agna Fernandez, "Soft Skills & Employability Skills", Cambridge University Press 2018

T2. Peggy Post &Peter Post, "The Etiquette Advantage in Business: Personal Skills for Professional Success", 2nd edition (May 3, 2005), William Morrow.

Reference Book(s):

R1. Ashraf Rizvi, "Effective Technical Communication" 2nd Edition, McGraw-Hill India, 2018

R2. Maithry Shinde, Jyotsna Sreenath, "Life Skills & Personality Development", Cambridge University Press 2022

Web References:

1. https://www.indeed.com/career-advice/career-development/etiquette-at-work
2. https://www.skillsyouneed.com/interpersonal-skills.html

Course Code: 23CEC011	Course Title: SURVEY CAMP		
Course Category: Major	Course Level: Intermediate		
L:T:P (Hours/Week) 0:0:0	Credits: 1	Total Contact Hours: 1 week	Max Marks: 100

Course Objectives:

The course is intended to provide practical knowledge for implementation of different survey works using modern surveying instruments.

List of Experiments:

1. **Preparation of Topographic Map**
   a. Reconnaissance Survey for selection of Control Framework, Observation Stations
   b. Establishment of Horizontal Control Network (Traversing and Triangulation methods)
   c. Establishment of Vertical Control Network using Level Net
   d. Adjustment of Weighted Observations
   e. Measurement of Coordinates (X,Y and Z) of Features
   f. Preparation of Topographic Map using CAD software

2. **Setting out work and Computation work.**
   a. Setting out simple Road curve by linear method (Degree of Curve: 1 - 20°)
   b. Setting out simple Railway curve by Instrument method (Degree of Curve: 1 - 5°)
   c. Spread Footing Foundation marking for residential building.
   d. Column Footing Foundation marking for commercial / industrial building.
   e. Cut and fill volume calculation using profile levelling and Cross sectioning.

Course Outcomes At the end of this course, students will be able to:	Cognitive Level
CO1. Execute topographic survey techniques to observe and process field data for map creation.	Apply
CO2. Prepare a comprehensive topographic map using software.	Create

Course Articulation Matrix

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