VIVEKANANDHA
COLLEGE OF ENGINEERING FOR WOMEN

(An Autonomous Institution Affiliated to Anna University-Chennai
Approved by AICTE – Accredited by NAAC A++ and ISO 9001:2015 Certified)
Elayampalayam, Tiruchengode – 637205, Namakkal District, Tamilnadu.

DEPARTMENT OF CIVIL ENGINEERING

B.E.- CIVIL ENGINEERING

(CURRICULUM & SYLLABI -2023)

Applicable to the students admitted from the academic year 2024- 2025 onwards

(Regulation 2023)

INSTITUTE VISION

To impart value based education in engineering and technology to empower young women to meet the societal exigency with a global outlook.

INSTITUTE MISSION

- ✓ To provide holistic education through innovative teaching-learning practices.
- ✓ To instill self confidence among rural students by supplementing with co-curricular and extra-curricular activities.
- ✓ To inculcate the spirit of innovation through training, research and development.
- ✓ To provide Industrial exposure to meet the global challenges
- ✓ To create an Environment for Continual Progress through lifelong learning.

DEPARTMENT VISION

To evolve the department as a hub of eminence in assorted genres in Civil Engineering, and empower young women minds with imperative technical approach to face the global technical challenges.

DEPARTMENT MISSION

- ✓ To impart quality in education with concrete emphasis on societal ethics and commitment.
- ✓ To produce techno-capable professionals in the field of Civil Engineering.
- ✓ To enrich experts technically with techno-exchange progammes in diverse fields of the Engineering.

Programme Educational Objectives (PEOs)

Graduates of the programme B E Civil Engineering will

PEO1: To evaluate information and technological ideas relating to infrastructure development, design, sustainability, construction management, and any other civil engineering-related field.

PEO2: To fulfill their responsibilities in a way that is efficient, effective, and morally sound both individually and as a multidisciplinary team, thereby promoting the well-being of society.

PEO3: To embrace new, innovative technologies while maintaining a lifelong learning process that advances both their organization and themselves.

PROGRAM OUTCOMES (PO's)

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

PO2: Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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

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

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-Long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

On successful completion of the Civil Engineering Degree programme, the Graduates shall exhibit the following:

PSO1: Demonstrate in-depth knowledge of the civil engineering discipline, with an ability to evaluate, analyze, and synthesize existing and new knowledge.

PSO2: Analyze complex civil engineering problems, apply independent judgment for synthesizing information, and make innovative advances in a theoretical, practical, and policy context.

PSO3: Apply advanced and innovative techniques and methodologies in civil engineering practices.

Credit Distribution – R2023

Sl.No.	Category	Credit Per Semester								Total Credits
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
1.	HSMC	4	4	--	--	--	--	--	--	**08**
2.	BSC	8	8	4	4	--	--	--	--	**24**
3.	ESC	7	8	--	--	--	--	--	--	**15**
4.	PCC	--	--	17	17	13	10	9	--	**66**
5.	PEC	--	--	--	--	3	6	9	--	**18**
6.	OEC	--	--	--	--	3	3	--	--	**06**
7.	EEC	1	--	2	3	3	3	3	10	**25**
8.	MC	--	--	--	--	--	--	--	--	**0**
Total		**20**	**20**	**23**	**24**	**22**	**22**	**21**	**10**	**162**

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**I**

CURRICULUM

(Applicable to the students admitted from the academic year 2023 - 2024 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23MA101	Matrices and Calculus*	BSC	3	1	0	4	40	60	100
U23EN101	English For Communication*	HSMC	3	0	0	3	40	60	100
U23CH101	Engineering Chemistry$	BSC	3	0	0	3	40	60	100
U23CS101	Programming for Problem Solving*	ESC	3	0	0	3	40	60	100
U23TA101	தமிழர்மரபு / Heritage of Tamils*	HSMC	1	0	0	1	40	60	100
THEORY INTEGRATED WITH PRACTICAL									
U23GE101	Engineering Graphics*	ESC	2	0	3	3	50	50	100
PRACTICAL INTEGRATED WITH THEORY									
U23GE102	Design Thinking*	EEC	1	0	2	1	50	50	100
PRACTICAL									
U23PH102	Chemistry Laboratory$	BSC	0	0	3	1	60	40	100
U23CS102	Programming for Problem Solving Laboratory*	ESC	0	0	3	1	60	40	100
MANDATORY COURSES									
--	Induction Programme*	3 Weeks				0	--	--	--
U23MCFY2	Indian Constitution$	MC	2	0	0	0	100	--	100
					Total	**20**	**520**	**480**	**1000**

BSC - Basic Science Courses, ESC- Engineering Science Courses, MC- Mandatory Courses, HSMC-Humanities and Social Sciences including Management Courses, EEC – Employability Enhancement Courses, CA- Continuous Assessment, ESE - End Semester Examination.

*Common for All Branches

$ Common for ECE, EEE, BME, Civil & Agri

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Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**II**

CURRICULUM

(Applicable to the students admitted from the academic year 2023 - 2024 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23MA202	Complex Analysis and Ordinary Differential Equations*	BSC	3	1	0	4	40	60	100
U23PH201	Engineering Physics$	BSC	3	0	0	3	40	60	100
U23EE201	Basic Electrical and Electronic Engineering#	ESC	3	0	0	3	40	60	100
U23TA202	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology*	HSMC	1	0	0	1	40	60	100
THEORY INTEGRATED WITH PRACTICAL									
U23CS203	Python Programming@	ESC	3	0	2	4	50	50	100
U23EN202	Professional Communication*	HSMC	2	0	3	3	50	50	100
PRACTICAL									
U23PH202	Physics Laboratory$	BSC	0	0	2	1	60	40	100
U23GE204	Engineering Practices Laboratory*	ESC	0	0	3	1	60	40	100
MANDATORY COURSES									
U23MCFY1	Environmental Science and Engineering$	MC	2	0	0	0	100	--	100
					Total	**20**	**480**	**420**	**900**

BSC - Basic Science Courses, ESC- Engineering Science Courses, MC- Mandatory Courses, HSMC-Humanities and Social Sciences including Management Courses, EEC – Employability Enhancement Courses, CA- Continuous Assessment, ESE - End Semester Examination.

*Common for All Branches

#Common for BT, CSE, CST, CIVIL, IT & AI&DS

@ Common for ECE, EEE, BME, BT, CIVIL & AGRI

$ Common for ECE, EEE, BME, CIVIL & AGRI

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**III**

CURRICULUM

(Applicable to the students admitted from the academic year 2023 - 2024 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23MA303	Transforms and Partial Differential Equations	BSC	3	1	0	4	40	60	100
U23CE301	Rigid Body Statics and Dynamics	PCC	3	0	0	3	40	60	100
U23CE302	Mechanics of Fluids	PCC	3	0	0	3	40	60	100
U23CE303	Construction Materials and Technology	PCC	3	0	0	3	40	60	100
U23CTCP1	Verbal, Quantitative Aptitude and Reasoning - I	EEC	2	0	0	1	40	60	100
THEORY INTEGRATED WITH PRACTICAL									
U23CE304	Surveying -I	PCC	3	0	2	3	50	50	100
U23CE305	Water Supply and Wastewater Engineering	PCC	3	0	2	3	50	50	100
PRACTICAL									
U23CE306	Construction Materials Laboratory	PCC	0	0	2	1	60	40	100
U23CE307	Computer Aided Building Drawing Laboratory	PCC	0	0	2	1	60	40	100
U23CTCP2	Personality Development	EEC	1	0	2	1	60	40	100
					Total	**23**	**480**	**520**	**1000**

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**IV**

CURRICULUM

(Applicable to the students admitted from the academic year 2023 - 2024 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23MA401	Numerical Methods	BSC	3	1	0	4	40	60	100
U23CE401	Mechanics of Deformable Bodies	PCC	3	0	0	3	40	60	100
U23CE402	Concrete Technology	PCC	3	0	0	3	40	60	100
U23CE403	Soil Mechanics	PCC	3	0	0	3	40	60	100
U23ADL01	Additional Language	EEC	3	0	0	2	40	60	100
THEORY INTEGRATED WITH PRACTICAL									
U23CE404	Surveying – II	PCC	3	0	2	3	50	50	100
U23CE405	Applied Hydraulics Engineering	PCC	3	0	2	3	50	50	100
PRACTICAL									
U23CE406	Soil Mechanics Laboratory	PCC	0	0	2	1	60	40	100
U23CE407	Concrete Laboratory	PCC	0	0	2	1	60	40	100
CAREER TRACK COURSE									
	Career Track Course - I	EEC	2/0	0	0/2	1	40/60	60/40	100
					Total	**24**	**460/480**	**540/520**	**1000**

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**V**

CURRICULUM

(Applicable to the students admitted from the academic year 2023 – 2024 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23CE501	Structural Analysis – I	PCC	3	0	0	3	40	60	100
U23CE502	Design of Reinforced Concrete Elements	PCC	3	0	0	3	40	60	100
U23CE503	Foundation Engineering	PCC	3	0	0	3	40	60	100
U23CE504	Highway and Railway Engineering	PCC	3	0	0	3	40	60	100
	Professional Elective – I	PEC	3	0	0	3	40	60	100
	Open Elective – I	OEC	3	0	0	3	40	60	100
PRACTICAL									
U23CE505	Highway Engineering Laboratory	PCC	0	0	2	1	60	40	100
U23CE506	Survey Camp (2 Weeks)	EEC	0	0	0	1	100	--	100
U23CE507	Mini Project - I	EEC	0	0	2	1	100	--	100
CAREER TRACK COURSE									
	Career Track Course - II	EEC	2	0	0	1	40	60	100
					Total	**22**	**540**	**460**	**1000**

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**VI**

CURRICULUM

(Applicable to the students admitted from the academic year 2023 - 2024 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23CE601	Structural Analysis – II	PCC	3	0	0	3	40	60	100
U23CE602	Design of Steel Structural Elements	PCC	3	0	0	3	40	60	100
U23CE603	Transportation Engineering	PCC	3	0	0	3	40	60	100
U23CE604	Civil Comprehensive Exam	EEC	2	0	0	1	100	--	100
	Professional Elective – II	PEC	3	0	0	3	40	60	100
	Professional Elective – III	PEC	3	0	0	3	40	60	100
	Open Elective – II	OEC	3	0	0	3	40	60	100
PRACTICAL									
U23CE605	Computer Aided Structural Design Laboratory	PCC	0	0	2	1	60	40	100
U23CE606	Mini Project - II	EEC	0	0	2	1	100	--	100
MANDATORY COURSES									
	Career Track Course - III	EEC	2	0	0	1	40	60	100
					Total	**22**	**540**	**460**	**1000**

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**VII**

CURRICULUM

(Applicable to the students admitted from the academic year 2023 - 2024 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23CE701	Construction Management	PCC	3	0	0	3	40	60	100
U23CE702	Estimation and Quantity Surveying	PCC	3	0	0	3	40	60	100
U23CE703	Hydrology and Irrigation Engineering	PCC	3	0	0	3	40	60	100
	Professional Elective - IV	PEC	3	0	0	3	40	60	100
	Professional Elective - V	PEC	3	0	0	3	40	60	100
	Professional Elective - VI	PEC	3	0	0	3	40	60	100
PRACTICAL									
U23CE704	Internship and Project Work – Phase - I	EEC	0	0	6	3	60	40	100
					Total	**21**	**300**	**400**	**700**

Programme	**B.E.**	Programme Code	**103**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**VIII**

CURRICULUM

(Applicable to the students admitted from the academic year 2023 - 2024 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
PRACTICAL									
U23CE801	Project Work – Phase - II	EEC	0	0	20	10	60	40	100
					Total	**10**	**60**	**40**	**100**

Structure of B.E. Civil Engineering Programme

Sl.No.	Abbreviations	Category	Breakup of Credits
1.	HSMC	Humanities and Social Sciences including Management Courses	08
2.	BSC	Basic Science Courses	24
3.	ESC	Engineering Science Courses	15
4.	PCC	Professional Core Courses	66
5.	PEC	Professional Elective Courses	18
6.	OEC	Open Electives Courses	06
7.	EEC	Employability Enhancement Courses	25
8.	MC	Mandatory Non – Credit Courses – Audit Course	0
		Total	**162**

Semester - I

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Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**I**
Course Code	**U23MA101**	Periods per week		Credit	Maximum Marks
Course Name	**Matrices and Calculus**	L: 3	T: 1	P: 0	C: 4	CA: 40	ESE: 60	Total: 100

Objective

The main objective of the course is

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

Outcomes

At the end of the course the students will be able to	Knowledge Level
CO1: Use the matrix algebra methods for solving practical problems.	K1,K3
CO2: Apply differential calculus tools in solving various application problems.	K2,K4
CO3: Able to use differential calculus ideas on several variable functions.	K3,K5
CO4: Apply different methods of integration in solving practical problems.	K2,K5
CO5: Apply multiple integral ideas in solving areas, volumes and other practical problems.	K3,K5

Pre-Requisites: **Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	Programme Outcomes (POs)												PSOs		
CO1	3	2		1	1								2		
CO2	3	3	2		1								2		
CO3	3		2	1									2		
CO4	3	2	2	1	1								2		
CO5	3		1	1	1								2		

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignments
3. End-Semester Examinations

Indirect

1. Course - End Survey

Content of the Syllabus			
Unit - I	**MATRICES**	**Periods**	**12**
Characteristic equation – Eigen values and Eigenvectors of a real matrix– Properties of Eigen values and Eigenvectors – Cayley-Hamilton theorem (excluding proof) – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms. Simple application in encoding message using 2×2 matrix.			
Unit - II	**DIFFERENTIAL CALCULUS**	**Periods**	**12**
Limit, Continuity, Differentiability, Rules of differentiation, Differentiation of various functions, Rolle's theorem(excluding proof), Mean value theorem(excluding proof), Taylor's theorem(excluding proof), Maxima and Minima. Applications: Newton's law of cooling – Heat flow problems.			
Unit - III	**FUNCTIONS OF SEVERAL VARIABLES**	**Periods**	**12**
Partial differentiation – Homogeneous functions and Euler's theorem (excluding proof) – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables(excluding proof) – Maxima and minima of functions of two variables. Applications: Lagrange's method of undetermined multipliers.			
Unit - IV	**INTEGRAL CALCULUS**	**Periods**	**12**
Definite and Indefinite Integrals- Methods of integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions -Reduction formula on $\int_0^{\pi/2} \cos^n x\,dx$ n $\int_0^{\pi/2} \sin^n x\,dx$.			
Unit - V	**MUTIPLE INTEGRALS**	**Periods**	**12**
Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.			
		Total Periods	**60**

Text Books:	
1.	Stewart, J. Calculus: Early Transcendentals (8th Edition), Cengage Learning, 2015.
2.	Grewal B.S., ―Higher Engineering Mathematics‖, Khanna Publishers, New Delhi, 43rd Edition, 2014.
References:	
1.	Kreyszig E, Advanced Engineering Mathematics (10th Edition), John Wiley (2015).
2.	Bali. N., Goyal. M. and Watkins. C., ―Advanced Engineering Mathematics‖, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3.	Thomas. G. B., Hass. J, and Weir. M.D, "Thomas Calculus ", 14th Edition, Pearson India, 2018.
4.	Anton H, Calculus: Early Transcendentals, 10th Edition, Wiley (2016).
5.	B V Ramana, Higher Engineering Mathematics, Tata McGraw Hill Education Pvt Ltd., New Delhi (2016)
E-Resources.	
1.	https://freevideolectures.com/all courses/calculus/ucla
2.	www.learnerstv.com/Free-engineering-Video-lectures
3.	www.nptel.ac.in

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**I**
Course Code	**U23EN101**	Periods per week		Credit	Maximum Marks
Course Name	**English for Communication**	L	T	P	C	CA	ESE	Total
		3	0	0	3	40	60	100

Objective

The main objective of this course is to:

- Improve the communicative ability of learners.
- Make learners read widely in order to practice writing.
- Make learners develop vocabulary and strengthen grammatical understanding.
- Assist students in the development of intellectual flexibility, creativity, and cultural literacy so that they may engage in life-long learning.
- Identify and begin to apply the language features of academic and professional writing and speaking.

Outcomes

The students who complete this course successfully are expected to:	Knowledge Level
CO1: Use appropriate vocabulary in a professional context	K1
CO2: Write appropriately based on the knowledge gained through reading of a variety of materials	K1
CO3: Use language through their grammatical acquisition	K2
CO4: Read and infer meanings of technical texts	K2
CO5: Comprehend and retain the contextual and syntax understanding from reading.	K3

Pre-Requisites: **Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1						2			3	3		3		2	
CO 2						2			3	3		3		2	
CO 3						2			3	3		3		2	
CO 4						2			3	3		3		2	
CO 5						2			3	3		3		2	

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus			
Unit - I		**Periods**	**9**
Listening-Introduction to Different Types of Listening, Listening to Casual Conversations, **Speaking-** Introduction to develop the Art of Speaking, Giving Self Introduction, **Reading–**Understanding the Basics of Reading Skills, Reading Instructions and Technical Manuals, **Writing-** Introduction to writing strategies, Writing Definitions, **Focus on Language** - -Technical terms (Jargon), Word Formation with Prefixes and Suffixes, Using Active Voice and Passive Voice, Basic sentence patterns, Tenses (present, past and future).			
Unit - II		**Periods**	**9**
Listening- Listening to lectures, listening to description of equipment, **Speaking-** Strategies for Developing Conversational Skills, Short Conversations through Role Play Activities, **Reading–** Reading Comprehension, Reading e-mails, Reading Headlines, Predicting the Content, **Writing-** Note making, Writing Descriptions, **Focus on Language**–Collocations, One word Substitution, Subject - verb agreement.			
Unit - III		**Periods**	**9**
Listening- Listening to different kinds of interviews (Face - to - face, radio, TV and telephone interviews), Speaking-Describing an Object, Asking Questions, participating in Discussions **Reading–** Intensive reading, Reading passages for gist. **Writing-** Writing short& lengthy e-mails with emphasis on Brevity, Clarity, Coherence and Cohesion), **Focus on Language–**Sequential Connectives, Impersonal Passive			
Unit - IV		**Periods**	**9**
Listening-Note Taking, Speaking- Improving Fluency through Narration. **Reading–**Reading passages for specific information- Phone messages, Reading and Transferring Information. **Writing-** Effective writing strategies, Informal writing, Writing a Memo, **Focus on Language–** Pronunciation Practice (Phonetic sounds - Vowels, Consonants and Diphthongs), Cause and Effect, Conditional Statements (if - clauses and types), Usage of Modal Verbs.			
Unit - V		**Periods**	**9**
Listening- Listening to understand Modulation, Listening to Welcome Speeches, **Speaking-** Delivering Welcome Address, Understanding Segmental and Suprasegmental Features-Practicing Stress, Pause and Intonation, **Reading–** Reading for a purpose, Reading Business Documents, Interpreting Charts and Graphs, **Writing-** Describing a Process. **Focus on Language** -Synonyms and Antonyms, Common Errors in English.			
		Total Periods	**45**

Text Books:	
1.	Sumant. s, Pereira Joyce, Shameem.M, Selvarajan.R-English Communication Skills, Vijay Nicole imprints Pvt. Ltd, 2015.
2.	Sokkaalingam, S.RM., The Art Of Speaking English,Versatile Publishing House,2018.
References:	
1.	Dr. Padma Ravindran, Poorvadevi, M. Y. Abdur Razack- English for life, English for work, students Book, Ebek language laboratory Pvt Ltd, 2011.
2.	Dutt Rajeevan, Prakash. A Course in Communication Skill (Anna University, Coimbatore edition): Cambridge University Press India Pvt.Ltd, 2007.
3.	S.P. Dhanavel, English and Communication Skills for Students of Science and Engineering, Orient Blackswan Pvt, Ltd, 2009.
4.	Technical English – I & II, Sonaversity, Sona College of Technology, Salem, First Edition, 2012.
5.	Meenakshmi Raman and Sangeeta Sharma- _Technical communication English Skills for Engineers; oxford University Press, 2008.
E-Resources.	
1.	http://www.sparknotes.com/lit/the-alchemist/summary.html
2.	https://www.stephencovey.com/7habits/7habits.php
3.	http://en.wikipedia.org/wiki/The_Seven_Habits_of_Highly_Effective_People

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**I**
Course Code	**U23PH101**	Periods per week		Credit	Maximum Marks
Course Name	**Engineering Physics**	L	T	P	C	CA	ESE	Total
		3	0	0	3	40	60	100

Objective

The student should be made to

- Understand the basic concepts of properties of matter.
- Gain knowledge about the conduction properties of metals.
- Identify the different types of crystal structures and crystal growth techniques. Study the production and applications of ultrasonic.
- Correlate better understanding the carrier concentration and its variations with temperature in a semiconductor. Study the properties of modern engineering materials and its uses.
- Categorize the types of laser and fiber optics.

Outcomes

At the end of the course, the student will be able to	Knowledge Level
CO 1: Understand the elastic properties of the materials	K2
CO 2: Gain knowledge about the conduction properties of metals	K3
CO 3: Determine packing factor for various unit cells and understand different types of crystal imperfections and learn the engineering, medical applications	K1
CO 4: Discuss the basic idea of semiconducting materials and realize the function of modern engineering materials	K1
CO 5: Learn the optical properties of materials and its uses	K3

Pre-Requisites: **Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	2	3	1	2									2	
CO 2	3	2	3	3	1										
CO 3	3	3		3	1									2	
CO 4	3		2	1	1								3	2	
CO 5	3			1	2	2								2	

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus			
Unit - I	**PROPERTIES OF MATTER**	**Periods**	**9**
Elasticity: Types of moduli of elasticity - Stress - Strain Diagram – uses. Young's modulus: Uniform bending (qualitative) Experimental determination by non-uniform bending - Twisting couple on a wire – Application: Torsional pendulum. **Viscosity:** Co-efficient of viscosity - Poiseuilles' formula - Experimental determination – uses.			
Unit - II	**ELECTRICAL PROPERTIES OF METALS**	**Periods**	**9**
Classical theory: Classical free electron theory of metals- Expressions for electrical conductivity and Thermal Conductivity of metals – Wiedemann-Franz law (Qualitative) - Success and failures. **Quantum theory:** de Broglie's hypothesis - Schrodinger's time independent and time dependent wave equations (Qualitative) - Particle in a one-dimensional box - Fermi – Dirac Statistics - Density of energy states (Qualitative).			
Unit - III	**CRYSTAL PHYSICS AND ULTRASONICS**	**Periods**	**9**
Crystallography - Unit cell - Crystal systems - Bravais lattices- Lattice planes - Miller indices - Inter-planar spacing in cubic lattice- Calculation of number of atoms per unit cell- Atomic radius – Coordination number- Packing Factor for HCP structures. **Ultrasonics:** Introduction - Properties and Generation of Ultrasonics – Magnetostriction and Piezoelectric Oscillator methods – Applications: Sound Navigation and Ranging (SONAR), Non – Destructive Testing (NDT) and Sonogram.			
Unit - IV	**SEMICONDUCTING & MODERN ENGINEERING MATERIALS**	**Periods**	**9**
Semiconductors: Elemental and Compound semiconductors - Intrinsic semiconductor: (Qualitative only) – Carrier concentration – Fermi level – Electrical conductivity - Band gap determination. Extrinsic semiconductors: Carrier concentration in n – type and p – type semiconductor (Qualitative) – Variation of Fermi level with temperature. Application; Construction and working of LED. **Metallic glasses:** preparation, properties and applications - Shape memory alloys (SMA): Characteristics and applications of NiTi alloy.			
Unit - V	**LASER AND FIBER OPTICS**	**Periods**	**9**
Laser: Interactions of Radiations with matters - Characteristics of laser – Derivation of Einstein's A and B coefficients. Types: CO2 laser - Semiconductor laser: Homo junction - Applications. **Optical fiber:** Principle of propagation of light through optical fiber - Numerical aperture and acceptance angle (Qualitative) -Types of optical fibers -Fiber optical communication system (block diagram) - Application: Temperature sensor.			
		Total Periods	**45**

Text Books:	
1.	R.K. Gaur and Gupta. S.L, Engineering Physics, Dhanpat Rai Publishers, 2017.
2.	S.O Pillai., Solid state physics, New Age International Private Limited.
3.	Dr.P.Mani, ―Engineering Physics‖, Shri Dhanam publisher, Chennai – 600 042
References:	
1.	B.K. Pandey, S. Chaturvedi. ―Engineering Physics‖, 1st Edition, Cengage Learning India Pvt Ltd, (2012).
2.	Fundamentals Of Physics Extended 8/Ed 8th Edition, David Halliday, Robert Resnick Jearl Walker, Wiley India Pvt Ltd, 2008.
3.	Lawrence H.Vanvlack, ―Elements of materials Science Engineering, 6th Edition, Pearson Publication.
4.	S.O.Pillai, ―Solid State Physics‖, New Age International Publishers.
5.	Dr.V.Rajendran, ―Engineering Physics‖, Tata McGraw Hill Education Private Limited, New Delhi.
E-Resources.	
1.	www.e-booksdirectory.com
2.	www.home.iitk.ac.in
3.	www.physics.cu.ac.bd

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**I**
Course Code	**U23CS101**	Periods per week		Credit	Maximum Marks
Course Name	**Programming for Problem Solving**	L: 3	T: 0	P: 0	C: 3	CA: 40	ESE: 60	Total: 100
Objective	The main objective of this course is to: • Learn the fundamentals of computers, languages, number systems and acquire problem solving skills in C Programming							

Outcomes	At the end of the course, the student should be able to	Knowledge Level
	CO 1: Examine number systems and to apply problem solving techniques.	K3
	CO 2: Learn the basics of C programming with branching and looping statements.	K2
	CO 3: Experiment the C programs using Arrays and Pointers for simple applications.	K3
	CO 4: Solve C programs with the functions and strings.	K3
	CO 5: Apply Structures, Union and File concepts to solve simple real world problems	K3
Pre-Requisites	**Nil**	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	Programme Outcomes (POs)												**CO/PSO Mapping** PSOs		
	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**	**PSO 3**
CO 1	3	2	1	1	2							2	3	3	2
CO 2	2	1	1		2							2	2	2	2
CO 3	3	2	1	1	2							2	3	3	2
CO 4	3	2	1	1	2							2	3	3	2
CO 5	3	2	1	1	2							2	3	3	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus			
Unit - I	**INTRODUCTION TO PROBLEM SOLVING**	**Periods**	**9**
Basic organization of Computer - Programming languages - Compilers – Interpreter - Flowchart – Pseudocode – Algorithm. **Number Systems** – Decimal, Binary, Octal and Hexadecimal conversions.			
Unit - II	**BASICS OF C PROGRAMMING**	**Periods**	**9**
Introduction to C – Features - Data Types – Constants – Variables - I/O Statement - Operators –Expressions - Decision Making and Branching – Looping Statements - Break, Go to, Continue.			
Unit - III	**ARRAYS AND POINTERS**	**Periods**	**9**
Arrays: Concepts – Need – one dimensional array – array declaration – features – array initialization - Two-Dimensional Arrays- Multidimensional Arrays. **Pointers:** Introduction, pointer declaration-accessing variable through pointer- Pointers and Arrays, Pointers and strings – Pointers structures - Pointer Arithmetic - Array of Pointers – dynamic memory allocation - malloc, realloc, free.			
Unit - IV	**FUNCTIONS AND STRINGS**	**Periods**	**9**
Functions: Introduction, function declaration, defining and accessing functions, User-defined Functions storage classes-function prototypes-parameter passing methods-recursion. **Strings:** Concepts – Strings manipulation - String Input / Output Functions- Strings standard functions - Arrays of Strings.			
Unit - V	**STRUCTURES, UNIONS AND FILE SYSTEMS**	**Periods**	**9**
Structures: Introduction- nested structures- Arrays of Structures - Structures and Functions - Pointers to Structures – Unions. **File:** opening, defining, closing, File Modes, File Types , Writing contents into a file, Reading file contents, Appending an existing file, File permissions and rights, Changing permissions and rights.			
		Total Periods	**45**

Text Books:	
1.	S.Kuppuswami, S.Malliga, C. S. Kanimozhi and K.Kousalya, ―Problem Solving and Programming‖, McGraw Hill, 2019.
2.	E. Balagurusamy, ―Programming in ANSI C‖, 8th Edition, Mc Graw Hill, 2019.
References:	
1.	Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition, 2017
2.	Kernighan BW and Ritchie DM, ―The C Programming Language‖, 2nd Edition, Prentice Hall of India, 2017.
3.	Dr.V.Rameshbabu, Dr.R.Samyutha, M.Muni Rathnan, ―Computer Programming‖, VRB Publishers Pvt.Ltd, 2016.
E-Resources.	
1.	https://www.geeksforgeeks.org/c-language-set-1-introduction/
2.	https://www.programiz.com/c-programming
3.	https://www.cprogramming.com/

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**I**

Course Code	**U23TA101**	Periods per week			Credit	Maximum Marks		
Course Name	**தமிழர்மரபு / Heritage of Tamils**	L	T	P	C	CA	ESE	Total
		1	0	0	1	40	60	100

Content of the Syllabus

அலகு- I	**மொழிமற்றும் இலக்கியம்**	**காலங்கள்**	**3**

இந்திய மொழிக் குடும்பங்கள் - திராவிடமொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை- சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைகருத்துக்கள் - தமிழ்க் காப்பியங்கள் தமிழகத்தில் சமணபௌத்தசமயங்களின் தாக்கம் – பக்தி இலக்கிய ம் , ஆழ்வார் கள் மற்றும் நாயன்மார்க ள் - சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கியவளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு .

அலகு- II	**மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை– சிற்பக் கலை**	**காலங்கள்**	**3**

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

அலகு- III	**நாட்டுப்புறக் கலைகள்மற்றும் வீரவிளையாட்டுகள்**	**காலங்கள்**	**3**

தெருக்கூத்து , கரகாட்டம் , வில்லுப்பாட்டு , கணியான் கூத்து , ஒயிலாட்டம் , தோல்பாவைக்கூத்து , சிலம்பாட்டம் , வளரி, புலியாட்டம் - தமிழர்களின் விளையாட்டுகள் .

அலகு- IV	**தமிழர்களின் திணைக்கோட்பாடுக ள்**	**காலங்கள்**	**3**

தமிழகத்தின் தாவரங்களும் விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக் கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும் கல்வியும் – சங்ககாலநகரங்களும் துறைமுகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்தநாடுகளில் சோழர்களின் வெற்றி .

அலகு- V	**இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்கு த் தமி ழர்களின் பங்களிப்பு**	**காலங்கள்**	**3**

இந்திய விடுதலை போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிற்பகுதிகளில் தமிழ்ப்பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுக்கள் , கையெழுயத்துப்படிகள் – தமிழ்ப் புத்தகங் களின் அச்சு வரலாறு.

	Total Periods	**15**

Text Books:	
1.	தமிழக வரலாறும் - மக்களும் பண்பாடும் – கே கே பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2.	கணினித்தமிழ் – முனைவர் இல சுந்தரம் (விகடன்பிரசுரம்).
3.	கீழடி – வைகைநதிக்கரையில் சங் க நகரநாகரிகம் (தொல்லியல் துறை வெளியீடு).
4.	பொருநை ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies
7.	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - „Sangam City Civilization on the banks of river Vaigai" (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: 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.

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(An Autonomous Institution Affiliated to Anna University, Chennai)

Elayampalayam, Tiruchengode – 637205.

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**I**
Course Code	**U23TA101**	Periods per week		Credit	Maximum Marks
Course Name	**தமிழர்மரபு / Heritage of Tamils**	L: 1	T: 0	P: 0	C: 1	CA: 40	ESE: 60	Total: 100

Content of the Syllabus

Unit - I	**LANGUAGE AND LITERATURE**	**Periods**	**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 TamilL and-Bakthi Literature Azhwarsand Nayanmars- Forms of minor Poetry- Development of
Modem literature in Tamil-Contribution of Bharathiyar and Bharathidhasan

Unit - II	**HERITAGE-ROCKARTPAINTINGSTOMODERNART– SCULPTURE**	**Periods**	**3**

Hero stone to modern sculpture –Bronze icons- Tribes and their hand crafts- Art of temple car making— Massive Terracotta sculptures Village deities, Thiruvalluvar Statue at Kanyakumari ,Making of musical instruments-Mridhangam ,Parai Veenai, Yazhand Nadhaswaram-Role of Temple sin Social and Economic Life of Tamils

Unit - III	**FOLK AND MARTIAL ARTS**	**Periods**	**3**

Therukoothu, Karagattam, VilluPattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tigerdance –Sportsand Games of Tamils.

Unit - IV	**THINAI CONCEPT OF TAMILS**	**Periods**	**3**

Flora and Fauna of Tamils & Ahamand 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**	**Periods**	**3**

Contribution of amils 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 Periods	**15**

Text Books:

1.	தமிழக வரலாறும் - மக்களும் பண்பாடும் - கே கே பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2.	கணினித்தமிழ் - முனைவர் இல சுந்தரம் (விகடன்பிரசுரம்).
3.	கீழடி - வைகைதிக்கரையில் சங்க நகரநாகரிகம் (தொல்லியல் துறை வெளியீடு).
4.	பொருநை ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies
7.	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - „Sangam City Civilization on the banks of river Vaigai" (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: 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.

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

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Programme	**B.E.**	Programme Code	**110**		Regulation	**2023**		
Department	**Civil Engineering**				Semester	**I**		
Course Code	**U23GE101**	Periods per week			Credit	Maximum Marks		
Course Name	**Engineering Graphics**	L	T	P	C	CA	ESE	Total
		2	0	3	3	50	50	100

Objective

The main objective of this course is to:

- Develop skills to enhance their ability to know the concept of engineering graphics and to draw the points kept in various positions, lines and planes.
- Project the drawing of various solids.
- Sketch sectioned views of solids.
- Draw the development of surfaces.
- Draw the isometric and orthographic projections for any given object to the required standard.

Outcomes

At the end of the course, the student should be able to	Knowledge Level
CO 1: Construct plane curves and develop projection of points, lines and plane surfaces.	K2
CO 2: Construct projection of solids with various conditions.	K4
CO 3: Design the section of solids and analyze the true shape of the section.	K3
CO 4: Design and develop the different solid surfaces.	K2
CO 5: Construct isometric and orthographic projection of different solids.	K1

Pre-Requisites: **Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	Programme Outcomes (POs)												**CO/PSO Mapping** PSOs		
	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**	**PSO 3**
CO 1	3	3	3	3	3								3	2	2
CO 2	3	3	2	2	2								2	2	2
CO 3	3	2	2	2	3								2	2	2
CO 4	3	2	3	3	2								3	3	3
CO 5	3	3	2	3	3								2	2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus			
Concepts & Conventions (Not for Examination)	Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.	**Periods**	**1**
Unit - I	**PROJECTION OF POINTS, LINES AND PLANE SURFACES**	**Periods**	**3+8**
Introduction to Plane curves, Orthographic projection – principles – projection of points, straight lines (only first angle projections) and plane surfaces (polygonal and circular).			
Unit - II	**PROJECTION OF SOLIDS**	**Periods**	**3+8**
Projections of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane.			
Unit - III	**SECTION OF SOLIDS**	**Periods**	**3+8**
Sectioning of solids - prisms, pyramids, cylinder and cone in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other - Obtaining true shape of section.			
Unit - IV	**DEVELOPMENT OF SURFACES**	**Periods**	**3+8**
Development of lateral surfaces of simple solids like prisms, pyramids, cylinders and cones – development of simple truncated solids involving prisms, pyramids, cylinders and cones.			
Unit - V	**ISOMETRIC PROJECTIONS, ORTHOGRAPHIC VIEWS FROM PICTORIAL VIEWS**	**Periods**	**5+10**
Isometric Projection and Introduction to AutoCAD / Solid Edge: Principles of isometric projection - Isometric scale -Isometric projections of simple solids like prisms, pyramids, cylinders and cones & orthographic views from pictorial views.			
Demonstration only: Computer Aided Drafting (Auto CAD / Solid Edge): Introduction to drafting packages and demonstration of their use.			
		Total Periods	**60**

Text Books:	
1.	Basant Agrawal and C.M Agrawal ,—Engineering Drawing ‖,Tata McGraw Hill ,Third Edition,2019.
2.	Jain and Gautam ,—Engineering Graphics & Design ‖,Khanna Publishing House, 2018.
References:	
1.	Dr.P.Kannan and Dr.J.Bensam Raj, —Engineering Graphics‖, JBR Tri Sea Publishers Pvt. Ltd, 2018.
2.	K.V Natarajan, "Engineering Drawing and Graphics", M/s. N.Dhanalakshmi, Chennai,2014.
3.	K.Venugopal and V. Prabhu Raja, —Engineering Graphics‖New Age International Publishers, 2011.
4.	N.S Parthasarathy and Velamurali, — Engineering Graphics‖, Oxford University, New Delhi,2015.
5.	Bhatt N.D and Panchal V.M, —Engineering Drawing‖, Charotar Publishing House,50th Edition,2010.
E-Resources.	
1.	http://nptel.ac.in/courses/105104148 , —Engineering Graphics‖ - Dr. Nihar Ranjan Patra , IIT Kanpur.
2.	http://cfd.annauniv.edu/webcontent.htm , —Engineering Graphics‖ - Dr.Velamurali.
3.	http://link.springer.com/ —Engineering Graphics‖-Springer Nature.

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(An Autonomous Institution Affiliated to Anna University, Chennai)

Elayampalayam, Tiruchengode – 637205.

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**I**
Course Code	**U23GE102**	Periods per week		Credit	Maximum Marks
Course Name	**Design Thinking**	L	T	P	C	CA	ESE	Total
		1	0	2	1	50	50	100

Objective

The student should be made to,

- Familiarize with design thinking concepts and principles
- Practice the methods, processes and tools of design thinking.
- Apply the design thinking approach and have ability to model real world situations.

Outcomes

At the end of the course, the student should be able to	Knowledge Level
CO1: Understand and apply the concept of team building activity.	K2
CO2: Understand Design Thinking and apply the design thinking approach to empathize situations in real world.	K3
CO3: Identify various methods of empathy and define the problem.	K3
CO4: Develop creative ideas through design thinking.	K4
CO5: Understand benefits of learning through observation, experience and application	K5

Pre-Requisites: **Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	2	3	3	3	3	2	2	3	3	3	2	2	3	3	3
CO 2	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2
CO 3	3	3	1	2	2	2	2	1	2	1			2	2	2
CO 4	3	3	3	3	3	2	2	2	2	2	2	1	2	2	2
CO 5	3	3	3	3	1	2	2	2	1	2	2	1	2	2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test through activities, assignment & Quiz
2. Models (Chart/paper/3D)
3. Prototype & Presentation

Indirect

1. Course - End Survey

Content of the Syllabus			
Unit - I	**SESSION - I**	**Periods**	**6**
Introduction – Team Building - Types – 4 C's of Team Building – Levels of Team Building – Benefits of Team Work – Team Building Activity.			
Unit - II	**SESSION - II**	**Periods**	**9**
Introduction to Design Thinking – Purpose of Design Thinking – Design Thinking Framework, Empathy and related case studies.			
Unit - III	**SESSION - III**	**Periods**	**6**
Define: Examine and Reflect on the problem.			
Unit - IV	**SESSION - IV**	**Periods**	**12**
Generating Ideas – Identifying ideas – Bundling the ideas and create concepts – Rapid Prototyping – Idea Refinement.			
Unit - V	**SESSION - V**	**Periods**	**12**
Importance & testing the design with people - Retest and redefine results.			
		Total Periods	**45**

Text Books:	
1.	Solving Problems with Design Thinking - Ten Stories of What Works by Jeanne Liedtka 2013.
2.	Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.
3.	Yousef Haik and Tamer M.Shahin, ―Engineering Design Process‖, Cengage Learning, 2nd edition, 2011.
4.	Design of Business: Why Design Thinking is the Next Competitive Advant age by Roger L. Martin 2009.
5.	Change by Design: How Design thinking transforms organizations and empires Innovation, 2009, Harper Business, Brown, Tim and Berry.
References:	
1.	Design thinking toolbox by Michael Lewick, Wily 2020.
2.	Design thinking playbook by Michael Lewrick , Wily 2019.
3.	Creative Confidence: Unleashing the Creative Potential Within Us All by by Tom 2014.
4.	The Design of Everyday Things: by Don Norman 2013.
E-Resources.	
1.	https://www.collectivecampus.io/blog/6-resources-to-help-you-learn-design-thinking
2.	https://thisisdesignthinking.net/on-design-thinking/design-thinking-resources/
3.	http://hs.griet.ac.in/pdf/studymaterialsgr20/Design%20Thinking%20Lab%202020-21.pdf
4.	https://www.mindtools.com/brainstm.html
5.	https://www.quicksprout.com/how-to-reverse-engineer-your-competit
6.	https://www.youtube.com/watch?v=2mjSDIBaUlM
7.	https://www.thevirtualinstructor.com/foreshortening.html
Activity Based Learning/Practical Based Learning	
1.	http://dschool.stanford.edu/dgift/
Online Course	
1.	https://onlinecourses.nptel.ac.in/noc19_mg60/preview
2.	https://www.ibm.com/design/thinking/page/badges/core-skills

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(An Autonomous Institution Affiliated to Anna University, Chennai)

Elayampalayam, Tiruchengode – 637205.

Programme	**B.E.**	Programme Code	**110**		Regulation	**2023**		
Department	**Civil Engineering**				Semester	**I**		
Course Code	**U23PH102**	Periods per week			Credit	Maximum Marks		
Course Name	**Physics Laboratory**	L	T	P	C	CA	ESE	Total
		0	0	2	1	60	40	100

Objective

- Understand elastic behavior of Materials
- Predict viscous force in liquids.
- Gain knowledge in measuring the lowest thickness materials
- To Identify wavelengths of prominent lines using polychromatic lamp
- Observe heat conduction in bad conductor
- Understand the principle of interferometer
- To learn about the characteristics of Lasers

Outcomes

At the end of the course, the student should be able to	Knowledge Level
CO1: Measure the Young"s Modulus of the materials, Rigidity Modulus – Torsion Pendulum	K3
CO2: Calculate Coefficient of viscosity of liquid and thickness of thin wire using Air wedge	K3
CO3: Observe and measure the different wavelengths of mercury Spectrum and dispersive power of a prism	K3
CO4: Illustrate the conductivity of bad conductors. To know how to determine the velocity of ultrasonic waves in liquid	K3
CO5: To understand the importance of laser beam compared to ordinary light	K2

Pre-Requisites: **Nil**

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	1											2		2
CO 2	3	3	1	2	2								2		2
CO 3	3	2			2								3		3
CO 4	3	3		1									1		1
CO 5	3	1	1		1								2		2

Course Assessment Methods

Direct

1. Prelab and post lab test
2. Execution of experiment and Viva-Voce
3. End-Semester examinations

Indirect

1. Course - End Survey

Content of the Syllabus

S.No.	Experiments	CO
1.	Determination of Young's modulus of the material - Uniform bending method	**CO1**
2.	Determination of Young's modulus of the material - Non uniform bending method	**CO1**
3.	Determination of Rigidity modulus – Torsion pendulum.	**CO1**
4.	Determination of Coefficient of viscosity of a liquid – Poiseuille's method.	**CO2**
5.	Determination of thickness of a thin material – Air wedge method.	**CO2**
6.	Determination of wavelength of mercury spectrum – spectrometer grating.	**CO3**
7.	Determination of Dispersive power of a prism – Spectrometer.	**CO3**
8.	Determination of thermal conductivity of metallic glass using Lee's Disc Method.	**CO4**
9.	Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.	**CO4**
10.	Determination of Wavelength and particle size using Laser.	**CO5**
	Total Periods	**30**

Lab Manual:

1.	R. Jayaraman, Engineering Physics Laboratory Manual, Pearson Pub, Edition-2021
2.	A.K. Katiyar & C.K. Pandey Engineering Physics: Theory and Practical, Wiley Pub,2 nd Edition.

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**I**
Course Code	**U23CS102**	Periods per week		Credit	Maximum Marks
Course Name	**Programming for Problem Solving Laboratory**	L	T	P	C	CA	ESE	Total
		0	0	2	1	60	40	100

Objective

The main objective of the course is to

- Develop simple C programs to illustrate the applications of User Defined and Derived Data Types such as Arrays, Pointers, Structures, and Functions.

Outcomes	At the end of the course, the student should be able to	Knowledge Level
	CO1: Develop C programs for computer based solution of simple real world problems using Conditional and Looping statements	K3
	CO2: Implement simple C Programs using Strings and Arrays	K3
	CO3: Implement C program for simple applications using Pointers	K3
	CO4: Write C programs that perform operations on File	K4
	CO5: Demonstrate C Programs using Structures	K3
Pre-Requisites	**Nil**	

CO / PO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	2	1	1	2							2	2	1	2
CO 2	3	2	1	1	2							2	2	1	2
CO 3	3	2	1	1	2							2	2	1	2
CO 4	3	2	1	1	2							2	2	1	2
CO 5	3	2	1	1	2							2	2	1	2

Course Assessment Methods

Direct
1. Pre lab and post lab test 2. End-Semester examination
Indirect
1. Course - End Survey

Content of the Syllabus		
S.No.	**Experiments**	**CO**
1.	Write a C program that accepts an employee's ID, total worked hours in a month and the amount he received per hour. Print the ID and salary (with two decimal places) of the employee for a particular month.	**CO1**
2.	Write a program in C to calculate the sum of three numbers with input on one line separated by a comma.	**CO1**
3.	Write a program in C to find the sum of the series [x - x^3 + x^5 + ...].	**CO1**
4.	Write a program in C to find the number and sum of all integers between 100 and 200 which are divisible by 9.	**CO1**
5.	Write a program in C to count the total number of duplicate elements in an array.	**CO2**
6.	You are given an input string 'S'. Your task is to find and return all possible permutations of the input string. **Note:** 1. The input string may contain the same characters, so there will also be the same permutations. 2. The order of permutation does not matter. **Sample Input** xyz sample Output xyz, xzy, yxz, yzx, zxy, zyx **Sample Output :** All the possible permutations for string "XYZ" will be "XYZ", "XZY", "YXZ", "YZX", "ZXY" and "ZYX".	**CO2**
7.	Find the Smallest and Largest Element in an Array **Method 1:** Traverse the array iteratively and keep track of the smallest and largest element until the end of the array. **Method 2:** Traverse the array recursively and keep track of the smallest and largest element until the end of the array. **Method 3:** Sort the array using STL and return the first element as the smallest element and the last element as the largest element. **For example, consider the array.** arr = {1, 2, 3, 4, 5} **Sample Output:** Smallest element: 1 Largest element: 5	**CO2**
8.	Write a C program to find the sum of all the multiples of 3 and 5 below 100 using pointers. We have to find the number of numbers which are multiples of both 3 and 5 in the first 100 natural numbers. Multiples of both 3 and 5 in the first 100 natural numbers are the multiples of LCM of 3 and 5. LCM of 3 and 5 =3×5=15 **Sample Output:** Multiples of 15 below 100 are 15, 30, 45, 60, 75 and 90.	**CO3**
9.	Write a C program to count number of characters, words and lines in a text file. Logic to count	**CO4**

	characters, words and lines in a file in C program. How to count total characters, words and lines in a text file in C programming. **Example Source file** I love programming. Working with files in C programming is fun. I am learning C programming at VCEW. **Sample Output** Total characters = 100 Total words = 18 Total lines = 3	
10.	Write a C program to implement Student database using Structure **Sample output:** **Enter details of student:** Name :abi RollNo:101 Percentage :89.7 **Entered details:** Name: abi RollNo: 101 Percentage: 89.70	**CO5**
	Total Periods	**45**

Tools Required	
1.	R. Jayaraman, Engineering Physics Laboratory Manual, Pearson Pub, Edition-2021

E-Resources	
1.	https://www.programiz.com/c-programming
2.	https://www.cprogramming.com/
3.	https://beginnersbook.com/2015/02/simple-c-programs/

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**I**
Course Code	**U23MCFY1**	Periods per week		Credit	Maximum Marks
Course Name	**Indian Constitution**	L: 2	T: 0	P: 0	C: 0 — CA: 100, ESE: NA, Total: 100

Objective	The main objective of this course is to: i) To know about the basic structure of Indian constitution. ii) To know about our Central Government Executive system of India iii) To know about our State Government Executive system of India iv) To learn the Election system, Amendments and Emergency Provisions given by the constitution. v) To know about the Special Constitutional Provisions in India

Outcomes	At the end of the course, the student should be able to	Knowledge Level
	CO1: Understand the functions of the Indian government.	K1
	CO2: Know about our Central Government, political structure & codes, procedures.	K1
	CO3: Understand our State Executive & Elections system of India.	K1
	CO4: Remember the Election system, Amendments and Emergency Provisions given by the constitution.	K2
	CO5: Understand our Special Constitutional Provisions in India.	K2

Pre-Requisites	**Nil**	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1						3		3	2						
CO 2						3		3	3						
CO 3						3		3	2						
CO 4						3		3	3						
CO 5						3		3	3						

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment
Indirect
1. Course - End Survey

Content of the Syllabus			
Unit - I	**INTRODUCTION**	**Periods**	**6**
Historical Background – Constituent Assembly of India – Fundamental Rights – Citizenship – Constitutional Remedies for citizens.			
Unit - II	**STRUCTURE AND FUNCTION OF CENTRAL**	**Periods**	**6**
Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India.			
Unit - III	**STRUCTURE AND FUCTION OF STATE**	**Periods**	**6**
State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.			
Unit - IV	**ELECTION PROVISIONS, EMERGENCY PROVISIONS, AMENDMENT OF THE CONSTITUTION**	**Periods**	**6**
Election Commission of India-composition, powers and functions and electoral process. Types of Emergency-grounds, procedure, duration and effects. Amendment of the constitution- meaning, Procedure and limitations.			
Unit - V	**SPECIAL CONSTITUTIONAL PROVISIONS**	**Periods**	**6**
Directive Principles of State Policy: Importance and its relevance. Special Constitutional Provisions for Schedule Castes, Schedule Tribes & Other Backward Classes, Women & Children.			
		Total Periods	**30**

Text Books:	
1.	Durga Das Basu, ―Introduction to the Constitution of India ―, Prentice Hall of India, New Delhi.
References:	
1.	R.C.Agarwal, (1997) ―Indian Political System‖, S.Chand and Company, New Delhi.
2.	Indian polity, M.Laksmikanth, Tata Mchraw Hill Publications.
E-Resources.	
1.	https://mhrd.gov.in/
2.	https://niti.gov.in/content/niti-aayog-library
3.	www.drishtiias.com/

Semester – II

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**II**
Course Code	**U23MA202**	Periods per week		Credit	Maximum Marks
Course Name	**Complex Analysis and Ordinary Differential Equation**	L	T / P	C	CA / ESE / Total
		3	1 / 0	4	40 / 60 / 100

Objective

The Main Objective of the course is to

- Understand the Analytic functions and bilinear transformations.
- Proficiently understand the Complex Integration.
- Demonstrate Vector Differentiation and Integration.
- To know about the Ordinary Differential Equations.
- Identify the Laplace Transform of Derivatives and Integrals.

Outcomes

At the end of the course the students will be able to	Knowledge Level
CO1: Analyze the construction of analytic functions.	K3,K4
CO2: Apply the concepts of cauchy's integral theorem and residue theorem in evaluation of complex integrals.	K2,K3
CO3: Apply Green's, Stoke's and Gauss Divergence theorems.	K1,K5
CO4: Understand the concepts of solving second order differential equations.	K2,K5
CO5: Apply the concepts of Laplace transform in solving ODE.	K3,K5

Pre-Requisites: **Nil**

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3		2	1	1								2	1	2
CO 2	3	2	1	1									2	1	2
CO 3	3	2		1									2	1	2
CO 4	3	2		1	1								2	1	2
CO 5	3	2	1	1									2	1	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignments
3. End-Semester Examinations

Indirect

1. Course - End Survey

Content of the Syllabus			
Unit - I	**ANALYTIC FUNCTIONS**	**Periods**	**12**
Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions c+z, cz,1/z and Bilinear transformation.			
Unit - II	**COMPLEX INTEGRATION**	**Periods**	**12**
Problem solving using Cauchy‘s integral theorem and integral formula- Taylor‘s and Laurent‘s expansions- Residues- Cauchy‘s residue theorem- Application: Contour integration over unit circle.			
Unit - III	**VECTOR DIFFERETIATION & INTEGRATION**	**Periods**	**12**
Vector Differentiation: Vector and Scalar Functions- Derivatives- Curves, Gradient of a Scalar Field- Directional Derivative -Divergence of a Vector Field - Curl of a Vector Field – Line, Surface and Volume integrals (concepts only), Green‘s theorem in a plane(excluding proof), Gauss Divergence theorem(excluding proof), Stoke‘s theorem (Excluding proof).			
Unit - IV	**ORDINARY DIFFERENTIAL EQUATIONS**	**Periods**	**12**
Second order Linear ordinary differential equations with constant coefficients, Cauchy‘s - Euler equations (excluding proof)- Legendre‘s Linear differential equations(excluding proof) - Method of variation of parameters.			
Unit - V	**LAPLACE TRANSFORMS**	**Periods**	**12**
Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems(excluding proof) -Transforms of derivatives and integrals – Initial and final value theorems(excluding proof) – Inverse transforms – Convolution theorem(excluding proof) – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.			
		Total Periods	**60**

Text Books:	
1.	Grewal B.S., ―Higher Engineering Mathematics‖, Khanna Publishers, New Delhi, 43rd Edition,2014.
2.	Ravish R Sing , Mukul Bhatt, ―Engineering Mathematics‖, Mc Graw Hill Education Pvt. Ltd-2018.
3.	Sivaramakrishna Das. P, Vijayakumari.C, ― Engineering Mathematics – II‖, Pearson India Education Pvt. Ltd-2022.
References:	
1.	Wylie, R.C. and Barrett, L.C., ―Advanced Engineering Mathematics‖ , Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.
2.	Kreyszig, E., Advanced Engineering Mathematics (10th Edition), John Wiley (2015).
3.	Alan Jefferis , Advanced Engineering Mathematics, Academic Press- New Delhi-2003
4.	Yunus A.Cengel, William J.Palm III,‖ Differential equations for Engineers & Scientists‖, Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.
5.	John Bird, Higher Engineering Mathematics, Anuradha Agencies (2004).
E-Resources.	
1.	https://en.wikipedia.org › wiki › Ordinary_differential_equation
2.	www.learnerstv.com/Free-engineering-Video-lectures
3.	www.nptel.ac.in

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**II**
Course Code	**U23CH201**	Periods per week		Credit	Maximum Marks
Course Name	**Engineering Chemistry**	L	T	P	C	CA	ESE	Total
		3	0	0	3	40	60	100

Objective

The main objective of this course is to:

- Recognize the basic technology requirements in water treatment
- Gain knowledge in basics and preparations, properties and applications of Polymers.
- Enrich the Knowledge of the students with the basics of Nano materials, their properties and applications.
- Familiarize about the Non renewable, renewable energy and different types of storage devices in the engineering application.
- Gain knowledge in destruction and protection of metals for engineering applications.

Outcomes

At the end of the course the students will be able to	Knowledge Level
CO1: Implement innovative solutions in wastewater treatment process.	K3
CO2: Familiarize with the applications of polymers in the field of engineering.	K3
CO3: Identify the synthesis methods of Nanoparticles and their industrial applications	K2
CO4: Recognize the renewable, non renewable energy and storage devices for domestic and industrial applications.	K3
CO5: Categorize the metal corrosion in different environment and find out appropriate control techniques to avoid corrosion.	K3

Pre-Requisites: **Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	3	3	2	1	2	2	2					1	1	1
CO 2	3	2	2	2		2	2	1					2	2	2
CO 3	3	2	2	3	2	1	2	1					2	1	1
CO 4	3	3	2	2	1	1	3	2					3	2	2
CO 5	3	3	3	2	1	2	2	1					2	1	1

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus			
Unit - I	**WATER TECHNOLOGY**	**Periods**	**9**
Introduction-Sources and impurities in Water, Soft and Hard water, Water quality parameters, Types of Hardness – Determination of Hardness by EDTA method, Domestic Water Treatment. Boiler Feed Water –Requisites, Problems due to hard water in boilers - Scale and Sludge formation in boilers-Caustic Embrittlement-Boiler corrosion, Treatment of boiler feed Water – Internal conditioning (Carbonate, Phosphate, and Calgon conditioning) External conditioning – Ion exchange process, Zeolite process, Brackish water –Water purification by Reverse osmosis.			
Unit - II	**POLYMER CHEMISTRY**	**Periods**	**9**
Introduction - Occurrence, definitions – Functionality - Degree of Polymerization, Classification of polymers – structure (Linear, Branched & network polymer structure) block, random & graft copolymers, Tacticity, Tg, molecular weight - number and weight average method. Types of polymerizations: Addition, condensation and copolymerization. Mechanism of polymerization (Free radical). Preparation, properties and applications of PE, PMMA, PC, Nylon 6, Nylon 6 6, Poly urethane, Poly isoprene and Vulcanization of rubber, Teflon, PET, and Bakelite.			
Unit - III	**NANO CHEMISTRY**	**Periods**	**9**
Basics- distinction between molecules, nanoparticles and bulk materials; Size dependent properties. Nanoparticles: nanocluster, nanorod, nanotube (CNT) and nanowires, Synthesis: Top down process- Laser ablation, Spray Pyrolysis, Chemical Vapour deposition, Electro deposition. Bottom up process- Precipitation, Sol-gel, Thermolysis - hydrothermal, solvothermal -Properties and applications of nano materials in medical and electronic devices.			
Unit - IV	**ENERGY RESOURCES AND STORAGE DEVICES**	**Periods**	**9**
Nonrenewable energy - Nuclear energy, nuclear reaction and its types, nuclear power plant and its working (Light water nuclear power plant & Breeder reactor). Renewable energy and its sources - Solar Energy - Photo voltaic cells, Importance of Solar cells - p-n junctions in Solar cells - Working of Photovoltaic cell, Recent advances in solar cell materials, Wind energy - Types of Wind Power Plants (WPPs), Components and working of WPPs. Batteries and fuel cells: Types of batteries -Alkaline battery, lead storage battery, Ni-Cd battery, lithium battery, Fuel cell - H2-O2 fuel cell-applications.			
Unit - V	**CORROSION AND ITS CONTROL**	**Periods**	**9**
Introduction, Types of corrosion - chemical and electrochemical corrosion, mechanism, Pilling -Bedworth rule, Types of electrochemical corrosion – Galvanic corrosion, pitting corrosion, Crevice corrosion, Corrosion on wire fence and Pipeline corrosion, Factors influencing rate of corrosion, corrosion control methods – Sacrificial anode and impressed cathodic current. Protective coatings – Paints: constituents and functions, Metallic coatings - steps involved in cleaning the surface for Electroplating, Electroplating (Au), Electro less plating (Ni).			
		Total Periods	**45**

Text Books:	
1.	O.G.Palanna, —Engineering Chemistry —Tata Mc GrawHill PVT,Ltd. Second Edition -2017.
2.	Dr.S.Mageswari, Dr.K.Balachandran, M.S.Viswaksenan, Engineering Chemistry : First Edition, RK publication, Edition-2022.
References:	
1.	Engineering Chemistry: Jain & Jain, Dhanpat Rai Publishing Company Edition- 16- 2015.
2.	Arun Bahl, B.S. Bahl, G.D. Tuli, Essentials of Physical Chemistry, Published by S. Chand & Company Ltd, 2014.
3.	Engineering Chemistry: Sashi Chawla, Dhanpat Rai & Co (pvt.)Ltd. Edition- 5- 2013.
4.	Dr.S.Vairam ,Dr.Suba Ramesh, Engineering Chemistry: First Edition, Wiley publication,Reprint-2016.
E-Resources.	
1.	https://www.who.int/water_sanitation_health/dwq/arsenicun6.pdf
2.	https://www.schandpublishing.com/books/tech-professional/applied-science/a-textbook-polymerchemistry/9788121941129/#.XdZ214MzY2w
3.	https://www.elsevier.com/books/nanochemistry/klabunde/978-0-444-59397-9

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**II**
Course Code	**U23EE201**	Periods per week		Credit	Maximum Marks
Course Name	**Basic Electrical and Electronics Engineering**	L: 3	T: 0	P: 0	C: 3	CA: 40	ESE: 60	Total: 100

Objective

The students should have made to

- Introduce the basics of electric circuits and analysis.
- Impart knowledge in the basics of working principles and application of electrical machines.
- Learn the electrical wiring methods.
- Analyze the characteristics of Semiconductor devices.
- Educate on the fundamental concepts of digital electronics and introduce the functional elements and working of measuring instruments.

Outcomes

At the end of the course the students will be able to	Knowledge Level
CO1: Understand the basics of electric circuits and type of the connection.	K2
CO2: Understand the basics of electromagnetic laws and basic working principle of DC and AC machines.	K2
CO3: Understand the concepts of tariff, energy saving, illumination, electric lamps and safety measures.	K2
CO4: Understand the basic operating characteristics of semiconductor devices.	K2
CO5: Understand the fundamentals of digital logics and measuring Instruments.	K2

Pre-Requisites: Basic concepts and understanding of magnetic fields.

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	2	1					1				3	3	1	2
CO 2	3	2	1					1				3	3	1	2
CO 3	3	1	1					1				3	3	1	2
CO 4	3	2	1					1				3	3	1	2
CO 5	3	2	1					1				3	3	1	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus			
Unit - I	**INTRODUCTION OF ELECTRICAL CIRCUITS**	**Periods**	**9**
Definition of Voltage, Current, Power, Energy, Power factor, Circuit parameters, Ohm‘s law, Kirchhoff‘s law Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Real power, Reactive power and Apparent power, Power factor. Introduction to three phase systems - types of connections Concept of DC circuits.			
Unit - II	**ELECTRICAL MACHINES AND ITS APPLICATIONS**	**Periods**	**9**
Faraday ‘s laws of electromagnetic induction - Lens law - Fleming's left hand rule and Right hand rule. Working principle and construction of AC and DC machines - Construction, Working principle and Applications of single phase Transformer. Motor used for domestic applications.			
Unit - III	**WIRING AND ILLUMINATION**	**Periods**	**9**
Types of wiring-staircase and corridor wiring - wiring accessories. Different types of safety measures - Earthing. Electrical tariff -Energy conservation. Simple layout of power system-various energy resources, The Laws of Illumination- Different types of electrical lamps.			
Unit - IV	**SEMICONDUCTOR DEVICES**	**Periods**	**9**
PN junction diodes - Zener diodes - characteristics. Transistors: PNP and NPN transistors - Theory of operation - Transistor configurations -characteristics - comparison. Special semiconductor devices: FET - SCR - LED – V-I characteristics – Rectifier and Inverters -UPS – SMPS.			
Unit - V	**DIGITAL FUNDAMENTALS AND MEASUREMENTS**	**Periods**	**9**
Number systems - Boolean Theorems – DeMorgan's Theorem - Logic gates -Implementation of Boolean Expression using Gates - SOP and POS forms- Functional elements of an instrument, Standards and calibration, Operating Principle of Ammeters and Voltmeters.			
		Total Periods	**45**

Text Books:	
1.	S.K.Bhattacharya, ―Basic Electrical and Electronics Engineering‖,Pearson,2017.
2.	D.P. Kotharti and I.J Nagarath, ―Basic Electrical and Electronics Engineering‖, Mc Graw Hill, Third Edition, 2020.
References:	
1.	S.B. Lal Seksena and Kaustuv Dasgupta, ―Fundaments of Electrical Engineering, Cambridge, 2016.
2.	Mittle,Mittal, Basic Electrical Engineering, 2nd Edition, Tata McGraw-Hill Edition, 2016.
3.	T.K. Nagsarkar and M.S. Sukhija, ―Basic Electrical Engineering‖, Oxford, 2017.
4.	John Bird, ―Electrical and Electronic Principles and Technology‖, Fourth Edition, Elsevier, 2010.
5.	K MurugeshKumar, ―Elements of Electrical Engineering‖, Vikas Publishing House Pvt. Ltd.2011.
E-Resources.	
1.	https://nptel.ac.in/courses
2.	https://www.electrical4u.com/electrical-engineering-articles/illumination-engineering/
3.	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-andelectronics-spring-2007/lecture-notes
4.	https://www.google.co.in/books/edition/_/4nJROSC7iK8C?hl=en&gbpv=1

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**II**
Course Code	**U23TA202**	Periods per week		Credit	Maximum Marks
Course Name	**தமிழரும் தொழில்நுட்பமும் / Tamils and Technology**	L	T	P	C	CA	ESE	Total
		1	0	0	1	40	60	100

Content of the Syllabus

அலகு- I	**நெசவு மற்றும் பானைத்தொழில்நுட்பம்**	**காலங்கள்**	**3**

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

அலகு- II	**வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்ப ம்**	**காலங்கள்**	**3**

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமான ங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு – சங்க காலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடைஅமைப்பு பற்றிய விவரங்கள் - மாமல்லபுர ச் சிற்பங்களும் கோவில்களும் - சேலர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல் , மீனாட்சி அம்மன் ஆலையம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டி நாடு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ – சாரோசெனிக் கட்டிடக்கலை .

அலகு- III	**உற்பத்தி தொழில்நுட்பம்**	**காலங்கள்**	**3**

கப்பல் கட்டும் கலை உலோகவியல் இரும்புத் தொழிற்சாலை - இரும்பை உருகுதல் , எஃகு - வரலாற்றுச்சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல் மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் – எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்

அலகு- IV	**வேளாண்மைமற்றும் நீர்பாசனத் தொழில்நுட்பம்**	**காலங்கள்**	**3**

அணைரி , குளங்கள் , மதகு – சோழர்காலக் குமுழித் தூம் பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மைமற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டையஅறிவு – அறிவு சார் சமூகம் .

அலகு - V	**அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்**	**காலங்கள்**	**3**

அறிவியல் தமிழின் வளர்ச்சி – கணினித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின் பதிப்பு செய்தல் – தமிழ் மின் பொருட்கள் உருவாக்கம் – தமிழ் இணையக்கல்விக்கழகம் – தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம் .

	Total Periods	**15**

Text Books:

1.	தமிழக வரலாறும் - மக்களும் பண்பாடும் - கே கே பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2.	கணினித்தமிழ் - முனைவர் இல சுந்தரம் (விகடன்பிரசுரம்).

3.	கீழடி - வைகைதிக்கரையில் சங்க நகரநாகரிகம் (தொல்லியல் துறை வெளியீடு).
4.	பொருநை ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies
7.	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - „Sangam City Civilization on the banks of river Vaigai‟ (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: 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.

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(An Autonomous Institution Affiliated to Anna University, Chennai)

Elayampalayam, Tiruchengode – 637205.

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**II**
Course Code	**U23TA202**	Periods per week		Credit	Maximum Marks
Course Name	**Tamils and Technology**	L	T	P	C	CA	ESE	Total
		1	0	0	1	40	60	100

Content of the Syllabus

Unit - I	**WEAVING AND CERAMIC TECHNOLOGY**	**Periods**	**3**

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

Unit - II	**DESIGN AND CONSTRUCTION TECHNOLOGY**	**Periods**	**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**	**Periods**	**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**	**Periods**	**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**	**Periods**	**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 Periods	**15**

Text Books:

1.	தமிழக வரலாறும் - மக்களும் பண்பாடும் - கே கே பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2.	கணினித்தமிழ் - முனைவர் இல சுந்தரம் (விகடன்பிரசுரம்).
3.	கீழடி - வைகைநதிக்கரையில் சங்க நகரநாகரிகம் (தொல்லியல் துறை வெளியீடு).
4.	பொருநை ஆற்றங் கரைநாகரிகம் (தொல்லியல் துறை வெளியீடு).
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies
7.	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - „Sangam City Civilization on the banks of river Vaigai" (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: 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.

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**II**
Course Code	**U23CS203**	Periods per week		Credit	Maximum Marks
Course Name	**Python Programming**	L	T	P	C	CA	ESE	Total
		3	0	2	4	50	50	100

Objective

The student should be made to,

- Understand the fundamentals of Python programming
- Handle list, tuples, sets and Dictionaries data types
- Learn function prototypes and string functions.
- Use files and modules for data processing
- Understand packages in Python and data visualization

Outcomes

At the end of the course the students will be able to	Knowledge Level
CO1: Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.	K3
CO2: Perform operations on list, tuples, sets and Dictionaries using python.	K3
CO3: Implement function prototypes and string functions.	K3
CO4: Apply files and modules and perform operations on CSV files.	K3
CO5: Perform data visualization and apply Python packages for CSV files.	K3

Pre-Requisites: **Nil**

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	2	1		1							2	3	2	2
CO 2	3	3	1	1	2							2	3	2	2
CO 3	3	3	1	2	2							2	3	2	2
CO 4	3	3	1	2	2							2	3	2	2
CO 5	3	3	1	2	2							2	3	2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignments
3. End-Semester Examinations

Indirect

1. Course - End Survey

Content of the Syllabus			
Unit - I	**INTRODUCTION TO PYTHON**	**Periods**	**9**
Introduction to Python, features, installing Python, writing and executing Python program — native data types, comments, constants, variables, operators, expression, conditional statements, control statements, continue, pass, break.			
Unit - II	**LISTS, TUPLES, SETS AND DICTIONARIES**	**Periods**	**9**
Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Sets: methods and operators, Dictionaries: operations and methods.			
Unit - III	**FUNCTIONS AND STRINGS**	**Periods**	**9**
Functions definition, declaration, arguments, parameters – formal and local, parameter passing methods - function prototypes, recursion; Strings: string slices, immutability, string functions and methods, string module, regular expressions.			
Unit - IV	**FILES AND MODULES**	**Periods**	**9**
Files and exception: Text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, accessing CSV file.			
Unit - V	**PACKAGES AND DATA VISUALIZATION**	**Periods**	**9**
Text processing, Numerical processing: numpy package – mean, medium and mode, pandas package – vector, dataframe, data visualization: matplotlib, Time operations.			
		Total Periods	**45**

Suggested List of Experiments

Sl.No.	List of Experiments	COs
1.	Write a program to demonstrate different number data types in Python.	**CO1**
2.	Write a program to perform different Arithmetic Operations on numbers in Python.	**CO1**
3.	Write a program to create, append and remove lists and demonstrate the tuples in python.	**CO2**
4.	Write a program to demonstrate working with dictionaries in python.	**CO2**
5.	Write a program to create, concatenate and print a string and accessing sub-string from a given string.	**CO3**
6.	Write a Python function to calculate the factorial of a number (a non-negative integer). The function accepts the number as an argument.	**CO3**
7.	Write a program to compute the number of characters, words and lines in a file.	**CO4**
8.	To write a Python program to find the most frequent words in a text read from a file.	**CO4**
9.	Find mean, median, mode for the given set of numbers in a list.	**CO5**
10.	Draw a horizontal bar chart with Matplotlib.	**CO5**

Lecture 45: Practical 30;Total: 75

Text Books

1.	AnuragGupta,G.P BISWAS ," Python Programming – Problem solving, packages and Libraries, Edition 1, McGraw Hill, 2019.
2.	E Balagurusamy, "Problem Solving and Python Programming", Edition1, McGraw Hill, 2018.
3.	ReemaThareja, "Python Programming using Problem Solving Approach", OXFORD University Press, 2017.

References:

1.	Allen B. Downey, "Think Python: How to Think Like a Computer Scientist„„, 2ndedition, Updated for Python 3, Shroff/O„Reilly Publishers, 2016.
2.	John V Guttag, —Introduction to Computation and Programming Using Python„„, Revised and expanded Edition, MIT Press , 2021
3.	Guido van Rossum (Author), The Python Development Team (Author),An Introduction to Python Tutorial and What"s New ,2022,Shroff Publishers first edition.

E-Resources.

1.	http://greenteapress.com/wp/think- python/
2.	https://www.python.org/about/gettingstarted/
3.	https://beginnersbook.com/2018/03/python-tutorial-learn-programming/
4.	https://www.tutorialspoint.com/python/index.htm
5.	https://www.learnpython.org/
6.	https://www.udemy.com/topic/python/free

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**II**
Course Code	**U23EN202**	Periods per week		Credit	Maximum Marks
Course Name	**Professional Communication**	L: 2	T: 0	P: 3	C: 3	CA: 50	ESE: 50	Total: 100

Objective

The main objective of this course is to:

- Provide suitable reading &writing tasks to develop communicative ability for academic and professional progress.
- Inculcate channelized reading to make learners proficient in the chosen professional writing contexts.
- Improve learners 'vocabulary and grammar to supplement their language use at professional contexts.
- Assist students in the development of intellectual flexibility, creativity, and cultural literacy so that they may engage in life-long learning.
- Identify and begin to apply the language features of academic and professional writing and speaking.

Outcomes

At the end of the course the students will be able to	Knowledge Level
CO1: Acquire sufficient command over language to speak at an academic or professional context.	K1
CO2: Write technically well at professional contexts through exposing them to similar readings.	K1
CO3: Use language at length at technical and professional situations through enrichment of vocabulary and strengthening of grammatical knowledge.	K2
CO4: Ethically gather, understand, evaluate and synthesize information from a variety of written and electronic sources.	K2
CO5: Be proficient in oral communication and writing.	K3

Pre-Requisites: **Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1						2			3	3		3	1	2	1
CO 2						2			3	3		3	1	2	1
CO 3						2			3	3		3	1	2	1
CO 4						2			3	3		3	1	2	1
CO 5						2			3	3		3	1	2	1

Course Assessment Methods

Direct

1. Continuous Assessment Test I & II
2. Continuous Assessment Test III in the Communication Skills Lab
3. Assignments
4. End-Semester examinations

Indirect

1. Course - End Survey

Content of the Syllabus			
Unit - I		**Periods**	**15**
Listening- Listening for Cultural Awareness, Listening to Professional Conversations, Talks, Interviews and Lectures **Speaking**- Developing Confidence to get rid of Fear on the Dias, Discussion at a Corporate Context. **Reading**– Inferential Reading, Reading Short Messages and Technical Articles, **Writing-** Introduction to Letter Writing, Writing Formal and Informal Letters, Thanking Letters, Letters Calling for Quotations, Letters Placing an Order, Seeking clarification, Letters of Complaint. **Focus on Language**–Adjectives and Degrees of Comparisons			
Unit - II		**Periods**	**15**
Listening- Listening to specific information relating to technical content, Listening for statistical information **Speaking**- Expressing opinions, Formal Discussions, Describing Role Play at Business Context and Consolidating Ideas**. Reading**–Reading Technical Articles in Journals and Comparing Articles. **Writing**- Letter seeking permission to undergo practical training and to undertake project work. **Focus on Language**– Simple, compound and complex sentences and Transformation of Sentences.			
Unit - III		**Periods**	**15**
Listening- Listening to understand the overall meaning, Listening to Interviews and Presentations. **Speaking**- Giving Instructions and Showing Directions and Rephrasing Instructions. **Reading**– Skimming and Scanning, Reading Job Advertisements. **Writing**- Applying for a Job, Writing a CV. **Group Discussion:** Introduction – Topic Analysis – Thematic Expressions-Objective and content of Discussion.			
Unit - IV		**Periods**	**15**
Listening- Listening and retrieving Information. **Speaking**- Developing fluency and Coherence, Accent Neutralization, Voice Modulation, and Intonation, Improving Voice Quality. **Reading**– Reading and understanding Advertisements. **Writing**- Letters to the Editor, Letter of Complaint, Various kinds of Reports, Permission to go for Industrial visits. **Presentation skills:** Making Self Introduction effectively-Elements of effective presentation – Structure of presentation - Presentation tools – Voice Modulation – Audience analysis - Body language – Accents analysis – Stylistics.			
Unit - V		**Periods**	**15**
Listening- Listening to Fragmented Texts and Filling in the Blanks. **Speaking-**Mind Mapping, Developing Coherence and Self-Expression, making presentations, Paralinguistic and Extra Linguistic Features (body language), **Reading–** Predicting content, Interpreting Reports. **Writing** Writing Proposals, Agenda, Minutes of the Meeting. **Soft Skills:** Introduction - Change in Today's Workplace: Soft Skills as a Competitive Weapon - Antiquity of Soft Skills - Classification of Soft skills - Ability to work as a team.			
		Total Periods	**75**

Text Books	
1.	Sumant.S,Pereira Joyce, English for Communication, Vijay Nicole Imprints Pvt.Ltd., 2014.
2.	Sokkaalingam, S.RM., The Art Of Speaking EnglishVersatile Publishing House,2018.
References:	
1.	Norman Whitby - Business Benchmark Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2008. , 1997.
2.	Dutt, Rajeevan, Prakash .A Course in Communication Skills (Anna University, Coimbatore edition) :. Cambridge University Press India Pvt.Ltd, 2007.
3.	Meenakshi Raman and Sangeeta Sharma-'Technical Communication English Skills for Engineers'; Oxford University Press, 2008.
4.	S.P. Dhanavel, English and Communication Skills for Students of Science and Engineering, Orient Blackswan Pvt, Ltd, 2009.
5.	Technical English – I & II, Sona versity, Sona College of Technology, Salem, First Edition, 2012.
E-Resources.	
1.	http://www.kalevleetaru.com/Publish/Book_Review_Who_Moved_My_Cheese.pdf
2.	http://www.bookbrowse.com/reviews/index.cfm/book_number/304/who-moved-mycheese
3.	http://www.imdb.com/title/tt0482629/plotsummary

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(An Autonomous Institution Affiliated to Anna University, Chennai)

Elayampalayam, Tiruchengode – 637205.

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**II**
Course Code	**U23CH202**	Periods per week		Credit	Maximum Marks
Course Name	**CHEMISTRY LABORATORY**	L	T	P	C	CA	ESE	Total
		0	0	2	1	60	40	100

Objective

The main objective of this course is to:

- Gather basic simple acid-base reactions and study the mechanism of acid mixture with base.
- Learn pH and potential of hydrogen in a sample solution.
- Study the redox reaction through potential difference.
- Infer iron forms complex with thiocyanate.
- Gather knowledge on hardness producing salts and removal of hardness through estimation.
- Collect data required for dissolved oxygen present in water sample.
- Understand alkalinity and available chlorine present in water sample.

Outcomes

At the end of the course, the student should be able to	Knowledge Level
CO1: Infer knowledge on neutralization reaction between acid, acid mixture with base and identify the concentrations.	K3
CO2: Identify the concentration of sample using pH.	K3
CO3: Spot the concentration of sample solution through redox reaction by potentiometric method	K4
CO4: Estimate Iron by complexation reaction spectrometric ally.	K4
CO5: Determine hardness and dissolved oxygen present in domestic water supply and Identify alkalinity and available chlorine present in the given sample.	K4

Pre-Requisites: **Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	3		2	2	1	1						2	2	2
CO 2	3	3		2	2	2	2						2	1	1
CO 3	3	3		2	2	1							1	2	2
CO 4	3	3	1	2	2	1							2	2	2
CO 5	2	3	1	2		2	3						2	2	2

Course Assessment Methods

Direct

1. Pre lab and Post lab Test
2. Execution of Experiment and Viva-voce
3. End semester examination

Indirect

1. Course - End Survey

Content of the Syllabus		
S.No.	**Experiments**	**CO**
1.	Estimation of HCl using NaOH by Conductometric titration.	**CO1**
2.	Estimation of Mixture of acid using NaOH by Conductometric titration.	**CO1**
3.	Estimation of Barium Chloride using Sodium Sulphate by Conductometric precipitation titration.	**CO1**
4.	Determination of HCl using NaOH by pH metry.	**CO2**
5.	Estimation of Ferrous iron by Potentiometric titration.	**CO3**
6.	Estimation of Ferric ion by Spectrophotometry.	**CO4**
7.	Determination of Total, Temporary and Permanent hardness of water by EDTA method.	**CO5**
8.	Estimation of Dissolved Oxygen content in water by Winkler's method.	**CO5**
9.	Estimation of Alkalinity in water sample.	**CO5**
10.	Estimation of available Chlorine in bleaching powder.	**CO5**
	Total Periods	**30**

Lab Manual:	
1.	Chemistry Laboratory I & II by Dr.A.Ravikrishnan, Sri Krishna Pub, Revised Edition-2017.
2.	Chemistry Laboratory Manual by Dr.Veeraiyan, Revised Edition-2017.

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**II**
Course Code	**U23GE204**	Periods per week		Credit	Maximum Marks
Course Name	**Engineering Practices Laboratory**	L: 0	T: 0	P: 3	C: 1	CA: 60	ESE: 40	Total: 100

Objective

The students should made to
1. Know the plumbing line assemblies.
2. Weld lap joint, butt joint and T-joint.
3. Learn the assembling and dismantling methodology of home appliances.
4. Learn the resistor value identification through colors coated on resistor.
5. Learn the basics of signal generation in CRO.
6. Learn the soldering techniques in PCB board for designing the projects.

Outcomes

At the end of the course, the student should be able to	Knowledge Level
CO1: Perform basic machining operations and finish the job to the requirements and quantify the accuracy.	K2
CO2: Make various joints such as cross lap joint and Tee lap joint in the carpentry.	K2
CO3: Understand the basics of house wiring techniques and the measurements of basic electrical quantities.	K2
CO4: Understand the resistor value identification through colors coated on resistor.	K2
CO5: Understand the soldering techniques in PCB board for designing the projects.	K2

Pre-Requisites: **Nil**

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	2	3	2	2				2				3	2	2
CO 2	3	2	3	2	2				2				3	2	2
CO 3	3	2	2	3	2	2			2				3	2	2
CO 4	3	2	2	3	2	2			2				3	2	2
CO 5	3	2	3	3	2	2			2				3	2	2

Course Assessment Methods

Direct

1.Pre lab and Post lab test
2. Record mark
3.End- Semester Examinations

Indirect

1. Course - End Survey

Content of the Syllabus		
S.No.	**Experiments**	**CO**
	GROUP A **(CIVIL & MECHANICAL ENGINEERING)**	
	CIVIL ENGINEERING	
1.	**Plumbing :** a) Single Tap G.I / PVC pipe connection involving the fitting like valves, taps & bends. b) Two Tap G.I / PVC pipe connection involving the fitting like valves, taps & bends.	**CO2**
2.	**Carpentry:** a) To make a Cross Lap Joint from the given work piece. b) Preparation of 'T' Lap Joint from the given work piece.	**CO2**
	MECHANICAL ENGINEERING	
3.	**Welding:** a) To join the metal plates by a Butt Joint in arc welding machine. b) To join the metal plates by a Lap Joint in arc welding machine.	**CO1**
4.	**Basic Machining:** a) To perform simple facing & turning operation. b) To perform of step turning operation.	**CO1**
5.	**Sheet Metal Work:** a) To make a rectangular tray from the given sheet metal. b) To make a basket from the given sheet metal.	**CO1**
6.	**Special Laboratory** a) Study of 3D Printing machine and its applications. b) Study of CO2 Laser engraving & cutting machine and its applications. c) Study of Wood routing machine and its applications.	**CO1**
	GROUP B **(ELECTRICAL & ELECTRONICS ENGINEERING)**	
	ELECTRICAL ENGINEERING PRACTICE	
1.	Residential house wiring and stair case wiring using switches, fuse, indicator & lamp.	**CO3**
2.	LED lamp assembly.	**CO3**
3.	Measurement of voltage, current, power & power factor using R-Load.	**CO3**
4.	Measurement of energy using single phase meter.	**CO3**
5.	Measurement of resistance to earth of electrical equipment.	**CO3**
6.	Measurement of illumination in different lamps.	**CO3**
7.	Study of batteries.	**CO3**
	ELECTRONICS ENGINEERING PRACTICE	
1.	Study of Electronic components and equipments –Resistor, color coding, Inductor, Capacitor and CRO.	**CO4**
2.	Logic gates AND, OR, NOR, NAND and NOT.	**CO4**
3.	Generation of Clock Signal.	**CO4**
4.	Soldering practice – Components Devices and Circuits – Using ge n e r a l purpose PCB.	**CO4**
	Total Periods	**45**

Reference Book :	
1.	Dr.P.Kannan, Mr.T.Satheeskumar & Mr.K.Rajasekar, ―Engineering Practices Laboratory‖ Manual. First Edition, 2017.
2.	Mr.T.Jeyapoovan, Mr.M.Saravana Pandian, ―Engineering Practices Lab‖ Manual, Vikas Publishing House Pvt Ltd, 2017.

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**II**
Course Code	**U23MCFY1**	Periods per week		Credit	Maximum Marks
Course Name	**Environmental Science and Engineering**	L: 2	T: 0	P: 0	C: 0	CA: 100	ESE: 0	Total: 100

Objective

The main objective of this course is to:

- Familiarize basics of ecosystem and creating environmental awareness.
- Congregate about environmental pollution.
- Contrast on solid waste and social issues.
- Acquire knowledge in environmental legislation and protection.
- Summarize population growth, human rights and Environment.

Outcomes

At the end of the course the students will be able to	Knowledge Level
CO1: Acquire knowledge about Eco-system, Natural resources and Bio-diversity.	K1
CO2: Be aware of Environmental Pollution and its control.	K3
CO3: Infer and express Solid waste management and Social issues.	K3
CO4: Acquire Knowledge about Environmental legislation and protection.	K3
CO5: Awareness about population growth, human rights and Environment.	K2

Pre-Requisites: **Nil**

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	1	2	2			2	3					2	2	2	2
CO 2	3	2	2		1	2	3				1	3	3	3	3
CO 3	3	2	2		1	3	3				1	2	3	3	3
CO 4	1	1	1			2	3				1	2	2	2	2
CO 5	1	2	1			2	2				1	3	1	1	1

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment

Indirect

1. Course - End Survey

Content of the Syllabus			
Unit - I	**INTRODUCTION TO ENVIRONMENTAL SCIENCE AND ENGINEERING**	**Periods**	**6**
Nature and scope of environmental education- Natural Resources – (Forest, Water, Food,& Land Resources) problems and remedial measures, Ecosystem and Biodiversity- Ecosystem-Structure, Characteristics and functions of ecosystem - Biodiversity – Definition – Conservation of Biodiversity (in-situ and Ex-situ)-Values and Threats of Biodiversity Environmental awareness and sustainable development.			
Unit - II	**ENVIRONMENTAL POLLUTION AND ITS CONTROL**	**Periods**	**6**
Water pollution-causes, effects and control measures of water pollution- Waste water treatment process (Secondary- BOD,COD) - Air Pollution – Types of Air pollutants-CO_2, SO_2, NO_2, PAN-Sources- control measures (Electro static precipitator, Bag house filter, Wet Scrubber and cyclone separator).			
Unit - III	**SOCIAL ISSUES AND SUSTAINABILITY**	**Periods**	**6**
Solid waste Management-Types (E-Waste, Hazardous waste, Bio-waste)-Disposal method. Sustainability-Definition-Sustainable development Goals-Environmental issues-global warming and Ozone depletion, Climate change, Acid rain, Carbon foot print-Possible solutions to Environmental issues			
Unit - IV	**SUSTAINABILITY PRACTICES AND ENVIRONMENTAL LEGISLATION**	**Periods**	**6**
Zero waste and R-Concept-Circular economy, Material life cycle assessment-EIA, Energy efficiency and management- Environmental Legislation-Air act, Water Act-Wildlife protection act-Environmental protection act.			
Unit - V	**HUMAN POPULATION AND THE ENVIRONMENT**	**Periods**	**6**
Population growth, Human rights, Value education, environment and Human health, Family welfare Program, Women and Child welfare, Role of information technology in environment – Satellite, Data base, Geographical Information System (GIA), Environmental impact Analysis (EIA) and Human health.			
		Total Periods	**30**

Text Books	
1.	Dr.S. Vairam - ―Environment Science and Engineering‖ Gems publication. Edition 2018.
2.	Gilbert.M.Masters-―Environmental Science‖-Pearson education. Edition-2-2013.
References:	
1.	Linda Williams- ―Environmental Science‖-Tata McGRAW – Hill Edition. Edition-I-2008.
2.	T.G.Miller Jr-―Environmental Science‖-Wadsworth publishing Co. Edition -10-2004.
3.	William P. Cunningham, Barbara Woodworth Saigo- Tata McGraw Hill.Edition-4-2011.
4.	NPTEL Course Notes.
5.	Cunnighum and cooper-―Environmental Science‖-Jaico Publ, House Edition-4-2007.
E-Resources.	
1.	https://libraries.ou.edu/
2.	https://libguides.reading.ac.uk/
3.	https://www.loc.gov/, https://rdl.lib.uconn.edu/

Semester – III

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**III**

Course Code	**U23MA303**	Periods per week			Credit	Maximum Marks		
Course Name	**Transforms and Partial Differential Equations**	L	T	P	C	CA	ESE	Total
		3	1	0	4	40	60	100

Objective

The main objective of this course is to:

- Introduce the basic concepts of PDE for solving standard partial differential equations.
- Solve boundary value problems by using Fourier series.
- Acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- A acquaint the student with Fourier transform techniques used in wide variety of situations.
- Introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

Outcomes

At the end of the course the students will be able to	Knowledge Level
CO1: Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.	K2, K4
CO2: Understand how to solve the given standard partial differential equations.	K3, K4
CO3: Appreciate the physical significance of Fourier series techniques in solving one- and two-dimensional heat flow problems and one-dimensional wave equations.	K3, K5
CO4: Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.	K2, K5
CO5: Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.	K1, K3

Pre-Requisites: **Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	3											2		
CO 2	3	3											2		
CO 3	3	3											2		
CO 4	3	3											2		
CO 5	3	3											2		

Course Assessment Methods

Direct
1.Continuous Assessment Test I, II & III 2.Assignment 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus			
Unit - I	**FOURIER SERIES**	**Periods**	**12**
Dirichlet‟s conditions – General Fourier series – Change of interval – Odd and even functions – Half range Sine series – Half range Cosine series – Harmonic analysis.			
Unit - II	**PARTIAL DIFFERENTIAL EQUATIONS**	**Periods**	**12**
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Singular integral - Solution of Standard types of first order partial differential equations -Lagrange‟s linear equation – Solution of homogeneous linear partial differential equations of higher order with constant coefficients.			
Unit - III	**APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS**	**Periods**	**12**
Classification of second order quasi linear partial differential equations – Solutions of one-dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (excluding insulated edges).			
Unit - IV	**FOURIER TRANSFORM**	**Periods**	**12**
Fourier Integral theorem (without proof) – Fourier transform pair – Properties (without proof) – Transforms of simple functions – Fourier Sine and Cosine transforms – Properties (without proof)– Convolution theorem and Parseval's identity (Statement and applications only).			
Unit - V	**Z –TRANSFORM**	**Periods**	**12**
Definition – Z-transform of some basic functions – Elementary properties – Inverse Z-transform: Partial fraction method – Residue method –Initial and Final value theorem- Convolution theorem – Applications of Z-transforms: Solution of difference equations.			
		Total Periods	**60**

Text Books	
1.	Grewal B.S., ―Higher Engineering Mathematics‖, 43rd Edition, Khanna Publishers, Delhi,2014.
2.	Churchill, R.V. and Brown, J. W., Fourier series and boundary value problems. (8th Edition), McGrawHill,2011.
References:	
1.	Veerarajan T, Engineering Mathematics, McGraw Hill Education, 2013.
2.	Kreyszig, E., Advanced Engineering Mathematics (10th Edition), John Wiley (2015).
3.	Ramana.B.V., ― Higher Engineering Mathematics‖, Tata Mc Graw Hill Publishing CompanyLimited, New Delhi, 2008.
4.	P.R.Vittal, ― Differential equations Fourier and Laplce Transforms‖, Margham Publishers,2nd Edition, 1999.
5.	Ray Wylie. C and Barrett.C, ― Advanced Engineering Mathematics ― Tata Mc Graw Hill Education Pvt Ltd, Sixth Edition, New Delhi 2012.
E-Resources.	
1.	https://learnengineering.in
2.	www.learnerstv.com/Free-engineering-Video-lectures
3.	www.nptel.ac.in

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**III**
Course Code	**U23CE301**	Periods per week		Credit	Maximum Marks
Course Name	**Rigid Body Statics and Dynamics**	L	T / P	C	CA / ESE / Total
		3	0 / 0	3	40 / 60 / 100

Objective

The main objective of this course is

- To provides introduction the basic concepts of forces, inertia, centroid and moments of area along with their effects on motion.
- To introduces the phenomenon of friction and its effects.
- To familiarizes students to cognitive learning in applied mechanics and develops problem-solving skills in both theoretical and engineering oriented problems.

Outcomes

At the end of the course the students will be able to	Knowledge Level
CO1: Illustrate the vectorial and scalar representation of forces and moments	K3
CO2: analyze the moment produced by various force systems and conclude the static equilibrium equations for rigid body system	K4
CO3: Compute the centroid, center of gravity and moment of inertia of geometrical shapes and solids respectively.	K4
CO4: Manipulate the effect of dry friction and its applications.	K3
CO5: Apply the different principles to study the motion of a body and analyze their constitutive equations.	K4

Pre-Requisites: **Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	3	1	1		1						3	3	2	3
CO 2	3	3	2	2		2						3	3	3	3
CO 3	3	3	2	2		2						3	3	3	3
CO 4	3	3	1	1		1						3	3	2	3
CO 5	3	3	2	2		2						3	3	3	3

Course Assessment Methods

Direct

1.Continuous Assessment Test I, II & III
2.Assignment
3. End-Semester Examinations

Indirect

1. Course - End Survey

Content of the Syllabus			
Unit - I	**STATICS OF PARTICLES**	**Periods**	**9**
Fundamental concepts and principles-system of units–Laws of Mechanics–Parallelogram and Triangular Law of forces-Principle of Transmissibility – Force system – Resolution of force –Free body diagram–Equilibrium of a particle in plane – Forces in space – Equilibrium of a particle in space.			
Unit - II	**STATICS OF RIGID BODIES**	**Periods**	**9**
Moments: Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar component of moments – Varignon's theorem– Equivalent systems of forces – Single equivalent force. Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions.			
Unit - III	**PROPERTIES OF SURFACES AND SOLIDS**	**Periods**	**9**
First moment of area and Centroid of sections Theorem of pappus - Guldinus– T section- I section- Angle section- Hollow section from primary simpler sections – Second moment of plane areas-Polar Moment of Inertia-Radius of Gyration – Parallel axis theorem and Perpendicular axis theorem – T section – I section- Angle section- Hollow section - Mass moment of inertia.			
Unit - IV	**FRICTION**	**Periods**	**9**
Laws of dry friction-Co-efficient of Friction – Angle of friction & Angle of repose – Sliding friction– Ladder friction – Wedge friction – Belt Friction-Rolling Resistance.			
Unit - V	**DYNAMICS OF PARTICLES**	**Periods**	**9**
Kinematics: Equation of Motion-Rectilinear Motion and Curve linear motion- Kinematics of Rigid body- Translation – Rotation about a fixed axis. Kinetics: Newton 's second law of motion-Principles of Work – Energy Equation-Impulse Momentum equations of particles – Impact of elastic bodies.			
		Total Periods	**45**

Text Books	
1.	Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, Sanjeev Sanghi - Vector Mechanics for Engineers: Statics and Dynamics - McGraw Higher Education., - Edition - 11- 2017.
2.	Dubey N.H., - Engineering Mechanics: Statics and Dynamics - McGraw Hill Education, New Delhi - Edition – 1 - 2016.
References:	
1.	Rajasekaran,S., Sankara Subramanian,G. - Fundamentals of Engineering Mechanics - Vikas Publishing House Pvt. Ltd.- 2015.
2.	Hibbeller, R.C. - Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics - Prentice Hall - Edition – 13 - 2013.
3.	Timoshenko S, Young D H, Rao J V and SukumarPati - Engineering Mechanics- McGraw Hill Higher Education- Edition – 5 - 2013.
4.	Boresi P and Schmidt J- Engineering Mechanics: Statics and Dynamics- Cengage Learning - Edition – 1- 2008.
5.	Irving H. Shames, Krishna Mohana Rao G - Engineering Mechanics – Statics and Dynamics- Pearson Education Asia Pvt. Ltd. Edition – 4 - 2005.
E-Resources.	
1.	https://archive.nptel.ac.in/courses/112/106/112106180/
2.	https://open.umn.edu/opentextbooks/textbooks/1283
3.	https://babel.hathitrust.org/cgi/pt?id=mdp.39015000984263&seq=13

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**III**

Course Code	**U23CE302**	Periods per week			Credit	Maximum Marks		
Course Name	**Mechanics of Fluids**	L	T	P	C	CA	ESE	Total
		3	0	0	3	40	60	100

Objective

The main objective of this course is:

- To introduce students to the fundamental properties and behaviors of fluids under static conditions.
- To build a strong knowledge in fluid dynamics through pressure measurement
- To explore the applications of conservation laws in fluid mechanics, including: a) flow measurement techniques b) flow through pipes (both laminar and turbulent) and c) forces acting on pipes.
- To emphasize the significance of boundary layer theory and its practical applications

Outcomes

At the end of the course the students will be able to	Knowledge Level
CO1: Demonstrate the differences between solids and fluids, including their properties and behavior under static conditions.	K3
CO2: Apply conservation laws to fluids and analyze their applications in fluid kinematics and dynamics.	K3
CO3: Estimate losses in pipelines under both laminar and turbulent conditions and analyze systems of pipes connected in series and parallel.	K4
CO4: Explain the concept of the boundary layer and apply it to determine the drag force exerted by a fluid on a flat solid surface	K3
CO5: Evaluate the relationships among parameters in fluid phenomena and predict prototype performance through model studies.	K4

Pre-Requisites: **Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	2	1	1		1							3	2	3
CO 2	3	2	1	1		1							3	2	3
CO 3	3	3	2	2		2							3	3	3
CO 4	3	2	1	1		1							3	2	3
CO 5	3	3	2	2		2							3	3	3

Course Assessment Methods

Direct
1.Continuous Assessment Test I, II & III 2.Assignment 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus			
Unit - I	**FLUIDS PROPERTIES AND FLUID STATICS**	**Periods**	**9**
Introduction– Types of Fluids – Fluid properties- Hydrostatic law- Pascal's law-Types and measurement of Pressure-Fluid statics – Pressure measurement by manometers- Hydrostatic pressure- Total pressure – center of pressure – Buoyancy –metacenter-Equilibrium Conditions.			
Unit - II	**FLUID KINEMATICS AND DYNAMICS**	**Periods**	**9**
Kinematics: Classification of flows –Streamline, streak-line and path-lines – continuity equation - Stream function and velocity potentials – Flow nets. Dynamics: Equation of Motion- Euler's equation- Bernoulli's equation and it's applications-momentum and energy equation.			
Unit - III	**FLOW THROUGH PIPES**	**Periods**	**9**
Flow through pipes-Darcy-Weisbach equation – Hagen-Poiseuille equation- Major and minor loss in pipes-pipes in series and parallel-Equivalent pipes–Moody diagram –Energy losses in Pipes.			
Unit - IV	**BOUNDARY LAYERS**	**Periods**	**9**
Boundary layer concept-Laminar and Turbulent boundary layer on a flat plate– Displacement, momentum and energy thickness – Momentum integral equation – Applications – Separation of boundary layer – Drag and Lift forces.			
Unit - V	**DIMENSIONAL AND MODEL ANALYSIS**	**Periods**	**9**
Fundamentals of Dimensional analysis - Dimensional homogeneity-Rayleigh's method and Buckingham Pi theorem-Dimensionless parameters –Model Analysis- Types of Similitude-Scale effect- Distorted and undistorted models.			
		Total Periods	**45**
Text Books			
1.	R.K. Bansal, "A Textbook of Fluid Mechanics and Hydraulic Machines & quot;, 10 th Edition, Laxmi Publications, New Delhi, 2019		
2.	Modi P.N and Seth Hydraulics and Fluid Mechanics including Hydraulic Machines Standard Book House New Delhi. 2017.		
References:			
1.	S K Som; Gautam Biswas and S Chakraborty, Introduction to Fluid Mechanics and Fluid Machines, Tata McGraw Hill Education Pvt. Ltd., 2018.		
2.	Pani B S, Fluid Mechanics: A Concise Introduction, Prentice Hall of India Private Ltd, 2016.		
3.	Jain A. K. Fluid Mechanics including Hydraulic Machines, Khanna Publishers, New Delhi, 2014.		
4.	Narayana Pillai N. Principles of Fluid Mechanics and Fluid Machines, (3rd Ed.) University Press (India) Pvt. Ltd. 2009.		
5.	Streeter, V.L. Wylie, E. B. and Bedford K.W, Fluid Mechanics. (9th Ed.) Tata McGraw Hill, New Delhi, 1998		
E-Resources.			
1.	https://books.google.co.in/books?id=0clZbfwgiyUC&lpg=PR4&pg=PR12#v=onepage&q&f=false		
2.	https://books.google.co.in/books?id=KqIbEAAAQBAJ&printsec=frontcover&source=gbs_atb#v=onepage&q&f=false		
3.	https://books.google.co.in/books/about/Fluid_Mechanics_Hydraulic_Machines.html?id=mLpf6YjHM5AC		

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(An Autonomous Institution Affiliated to Anna University, Chennai)

Elayampalayam, Tiruchengode – 637205.

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**III**
Course Code	**U23CE303**	Periods per week		Credit	Maximum Marks
Course Name	**Construction Materials and Technology**	L	T	P	C	CA	ESE	Total
		3	0	0	3	40	60	100

Objective	The main objective of this course is: • To introduce students to various construction materials and the techniques that are commonly used in civil engineering construction.	
Outcomes	At the end of the course the students will be able to	Knowledge Level
	CO1: Describe the types and properties of basic building construction materials	K2
	CO2: Summarize the market forms and properties of other construction materials	K2
	CO3: Construct the best construction practice and service requirements of a structure	K3
	CO4: Illustrate the various equipment's used for civil construction works	K3
	CO5: Understand the construction planning and scheduling techniques	K2
Pre-Requisites	**Nil**	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	2	1											2	1	2
CO 2	2	1											2	1	2
CO 3	3	2	1	1		1							3	2	3
CO 4	3	2	1	1		1							3	2	3
CO 5	2	1											2	1	2

Course Assessment Methods

Direct
1.Continuous Assessment Test I, II & III 2.Assignment 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus			
Unit - I	**BUILDING CONSTRUCTION MATERIALS**	**Periods**	**9**
Stone: Stone as building material – Criteria for selection of Stones – Tests on stones – Quality of Good Stones – Advantages – Disadvantages – Applications of Stones. **Brick:** Introduction - Classification of Bricks – Manufacturing of Clay Bricks – Tests on Bricks - Quality of Good Bricks – Advantages – Disadvantages – Uses of Bricks. **Lime:** Introduction – Properties of Lime – Preparation of Lime Mortar – Merits & Demerits – Uses of Lime. **Concrete Blocks:** Concrete Hollow Blocks – Lightweight Concrete Blocks - Advantages – Disadvantages – Uses of Concrete blocks.			
Unit - II	**OTHER CONSTRUCTION MATERIALS**	**Periods**	**9**
Timber: Characteristics of Timber – Seasoning of Timber – Properties and Uses – Common forms of Timber - Plywood – Veneer – False Ceiling Materials **Steel:** Steel Sections- Steel as a Reinforcing Material - Types of Reinforcing Steels. **Aluminum** – Market Forms - Uses - **Glass** - Properties – Uses - **Ceramics** – Types and Properties – Uses - **Refractories** – Properties - Uses – **Composite Materials:** Types and Applications – FRP – Fiber Textiles – Geomembranes and Geotextiles for Earth Reinforcement.			
Unit - III	**CONSTRUCTION PRACTICES & SERVICE REQUIREMENTS**	**Periods**	**9**
Substructure: Objectives of Foundation – Bearing Capacity of Soil – Loads on Foundation – Requirements & Types of Foundation – Uses – **Superstructure:** Stone Masonry – Brick Masonry – Plastering and Pointing – Cavity Walls – Diaphragm Walls – Formwork – Centering and Shuttering – Shoring – Scaffolding – Underpinning – Roofing – Flooring - Joints in Concrete – Contraction/Construction/Expansion Joints – Fire Protection – Thermal Insulation – Ventilation and Air Conditioning – Acoustics and Sound Insulation – Damp Proofing.			
Unit - IV	**CONSTRUCTION EQUIPMENT'S**	**Periods**	**9**
Selection of Equipment for Earthwork Excavation - Advantages – Disadvantages – Applications - Equipment for Concreting - Merits and Demerits – Uses - Equipment for Material Handling - Advantages – Disadvantages – Applications - Equipment for Erection of Structures - Merits and Demerits – Uses – Equipment for Dewatering and pumping equipment - Advantages – Disadvantages – Applications.			
Unit - V	**CONSTRUCTION PLANNING**	**Periods**	**9**
Introduction to Construction Planning – Scheduling for Activities – Critical Path Method (CPM) and PERT Network Modelling and Time Analysis – Case Illustrations.			
		Total Periods	**45**

Text Books	
1.	Varghese.P.C, "Building Materials", Second Edition PHI Learning Ltd., 2019.
2.	Arora S.P and Bindra S.P "Building Construction, Planning Techniques and Method of Construction", Dhanpat Rai and sons, 2022.
References:	
1.	Varghese.P.C, Building Construction, Second Edition PHI Learning ltd., 2016.
2.	Punmia ,B.C Building Construction, Laxmi publication (p) Ltd.,2008.
3.	Peurifoy R.L., Schexnayder,C.J., Shapira A., Schmitt.R., Construction Planning Equipment and Methods, Tata McGraw-hill, 2011.
4.	Srinath L.S.,PERT and CPM -Principles and applications, Affliated East West Press 2001
5.	Duggal S.K., "Building Materials", 5th Edition, New Age Publishers, 2021.
E-Resources.	
1.	http://www.theconstructor.org
2.	http://nptel.ac.in/syllabus/syllabus.php?subjectId=105102088
3.	https://study.madeeasy.in/subjects/what-is-construction-material/

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Elayampalayam, Tiruchengode – 637205.

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**III**
Course Code	**U23CTCP1**	Periods per week		Credit	Maximum Marks
Course Name	**Verbal, Quantitative Aptitude and Reasoning - I**	L: 2	T: 0	P: 0	C: 1	CA: 40	ESE: 60	Total: 100

Objective

The student should be made to

- Identify and begin to apply the language features.
- Understand the mathematical techniques for solving the real-life problems.
- Use number theory arguments to justify relationships involving divisors, multiples and factoring.
- Help in preparation of competitive exams.

Outcomes

At the end of the course the students will be able to	Knowledge Level
CO1: Use language through acquisition of grammar rules.	K2
CO2: Demonstrate the use of mathematical reasoning by justifying the patterns and relationships.	K2
CO3: Face external competitive exams	K3
CO4: Solve a question in a fraction of minute using shortcut methods.	K3
CO5: Enhance their problem-solving skills and logical Skills	K4

Pre-Requisites: **Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1		2		3	2					3		3	1	1	
CO 2	3	3		2	2					3		3	2	2	
CO 3	3	3		3	2					3		3	3	1	
CO 4	3	3		2	3					2		2	3	1	
CO 5		2		2	2					2		2	3	3	

Course Assessment Methods

Direct
1.Continuous Assessment Test I, II & III 2.Assignment 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus			
Unit - I	**VERBAL ABILITY (ERROR SPOTTING)**	**Periods**	**5**
CONJUNCTIONS: Error on coordinative conjunction: The seven coordinating conjunctions are (fan boys): for, and, nor, but, or, yet, so, Errors on Subordinate Conjunction After, although, as soon as, because, before, by the time, in case, now that, since, unless, when, whether or not, while, yet…., Errors on correlative conjunction (Either……or, neither……nor, not only but also, as….as, both….and, whether…. or, so…as, such that, the) **CONDITIONAL CLAUSES:** Errors on Zero condition, Errors on first condition of If clauses, Errors on second condition of If clauses, Errors on third condition of If clauses **ADVERBS:** Errors on conjunctive adverb, Errors on adverbs of frequency, Errors on adverbs of time, Errors on adverbs of manner, Errors on adverbs of place, Errors on adverbs of degree **ADJECTIVES:** Errors on descriptive adjectives, Errors on demonstration adjectives, Errors on distributive adjectives, Errors on interrogative adjectives, Errors on numeral, Errors on quantitative adjectives, Errors on proper adjectives, Errors on possessive adjectives **DETERMINERS:** Definite Article, Indefinite Article, Quantifying Article – few, many, Possessive Article, (my, your, his, her, its, our, your, their….) **NOUNS:** Pronoun, Common Noun, Collective Noun, Abstract Noun, Material Noun **SUBJECT – VERB AGREEMENT:** Singular Subjects and Singular Verbs, Errors on plural subjects with plural verbs, Errors on indefinite pronouns, Errors on compound subjects, Errors on collective noun, Errors on singular or plural verb		
Unit - II	**NUMBER SYSTEMS**	**Periods**	**6**
NUMBER SYSTEMS (Divisibility Rule, Unit Digit, Remainder Theorem (1 Or -1, Cancellation, Wilson, Fermets), Progressions (Arithmetic, Geometric, Harmonic), Log, Surds and Indices, Simplification)			
Unit - III	**AVERAGE AND LCM & HCF PROBLEMS**	**Periods**	**8**
AVERAGE (Basic Model, Partial Average, 3. Overall Average, Inclusion/Exclusion of A Value in a Group, Increased or Included or Added or More and Replaced, Substituted, Cricket Based Model, Misread Model, Allegation and Mixture, Mean, Median and Mode, Miscellaneous) **LCM and HCF** (Find The LCM, HCF and Its fractions, Product of Two Numbers Model, LCM, HCF with Remainders Model, Smallest/Largest Based Model, Tolling Together Model, HCF Related Questions (Keyword: Distinct, Divided, Equal Number of Rows (Distributed Equally)), Mensuration Related Questions, No. of Pairs Model, LCM, HCF With Ratios Model, Algebraic Expressions Model, Reduce to Lowest Terms.			
Unit - IV	**RATIO AND PROPORTION**	**Periods**	**5**
RATIO (Zig Zag Model, Finding the Individual Component, Coins & Values Based Ratios, Number Based Ratios, Increment/Decrement Based Ratios, Miscellaneous) **PROPORTION** (Continuous, Third, Fourth, Mean)			
Unit - V	**LOGICAL REASONING**	**Periods**	**6**
CODING-DECODING- Types of Coding and Decoding (Letter Coding, Conditional Coding, Crypt arithmetic –Addition, Crypt arithmetic – Subtraction) **BLOOD RELATION** (Type 1: Pointing or Introducing, Type 2: Family Tree or Relational Puzzle, Type 3: Coded Relation) **NUMBER SERIES** (Pattern 1: Perfect Square Series, Pattern 2: Perfect Cube Series, Pattern 3: Geometric Series, Pattern 4: Ratio series, Pattern 5: Multi Stage Series) **SYLLOGISM** (Type 1: BASIC SYLLOGISM, Type 2: Either or Neither nor, Type 3: Only – Only a few)			
		Total Periods	**30**

Text Books	
1.	Rajeev Varma, ―Fast Track Objective Arithmetic's, Arihant Publications, 2024.
2.	R.S. Aggarwal, ―Modern Approach to Logical Reasoning‖, S Chand Publishing, 2022.
3.	SP Bakshi, ―Objective General English‖, Arihant Publications, 2024.
References:	
1.	R.S. Aggarwal, ―Quantitative Aptitude for Competitive Examinations‖, S Chand Publishing,2013.
2.	DineshKhattar, ―The Pearson guide to Quantitative Aptitude for Competitive Examinations‖, 3rd edition, 2016.
3.	Arun Sharma, ―How to Prepare for Logical reasoning for CAT‖, McGraw Hill Education;2014.
4.	Jaikishan and Premkishan, ―How to Crack Test of Reasoning‖, Arihant Publications,2016
5.	R.S. Agarwal, ―A modern Approach to verbal and non-verbal reasoning, S Chand Publishing, 2018.
E-Resources.	
1.	Aptitude: https://www.indiabix.com
2.	Reasoning: https://placement.freshersworld.com
3.	Verbal: https://testbook.com

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Programme	**B.E.**	Programme Code	**110**		Regulation	**2023**		
Department	**Civil Engineering**				Semester	**III**		
Course Code	**U23CE304**	Periods per week			Credit	Maximum Marks		
Course Name	**Surveying - I**	L	T	P	C	CA	ESE	Total
		3	0	0	3	50	50	100

Objective

To impart knowledge on

- Basics of linear and angular measurements using chain and compass.
- Principles of levelling and its applications.
- Usage of theodolite in linear and angular measurements.
- Utility of tachometric surveying by various methods.
- Importance of different kinds of engineering surveys and their significance.

Outcomes

At the end of the course the students will be able to	Knowledge Level
CO1: Illustrate the fundamental methods and procedures basic surveying.	K3
CO2: Acquire Knowledge to perform differential and profile levelling and their engineering relevance.	K3
CO3: Hands-on skills in operating a theodolite for traversing and layout works.	K3
CO4: Understand stadia and tangential methods, and their practical application in rapid surveys.	K2
CO5: Perform different kinds of engineering Surveys in real time applications.	K3

Pre-Requisites: **Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	Programme Outcomes (POs)												**CO/PSO Mapping** PSOs		
	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**	**PSO 3**
CO 1	3	2	1	1		1			2	2		2	3	2	3
CO 2	3	2	1	1		1			2	2		2	3	2	3
CO 3	3	2	1	1		1			2	2		2	3	2	3
CO 4	3	1							1	1		1	2	1	2
CO 5	3	2	1	1		1			2	2		2	3	2	3

Course Assessment Methods

Direct

1.Continuous Assessment Test I, II & III
2.Assignment
3. End-Semester Examinations

Indirect

1. Course - End Survey

Content of the Syllabus			
Unit - I	**FUNDAMENTALS OF CONVENTIONAL SURVEYING**	**Periods**	**7**
Introduction - Principles - Classification - Equipment and Accessories - Chain surveying - Ranging and chaining – Methods of ranging - Errors and their adjustment- Compass - Types – Bearings - Local attraction and its elimination – Plane table and its accessories- Radiation method and Intersection method.			
Unit - II	**LEVELLING AND ITS APPLICATIONS**	**Periods**	**7**
Levelling - Principles - Accessories - Temporary and permanent adjustments - Bench marks - Types of levelling - Plotting LS and CS - AI assisted Laser Level - Calculation of areas and volumes - Curvature and refraction corrections - Contour - Types - Applications.			
Unit - III	**THEODOLITE SURVEYING**	**Periods**	**7**
Components of theodolite and its Functions - Temporary and permanent adjustments - Horizontal and vertical angles - Heights and distances - Traversing - Closing error and distribution - Gale's table – Omitted measurements.			
Unit - IV	**TACHEOMETRIC SURVEYING**	**Periods**	**7**
Tacheometry - Principle - Stadia and Tangential methods - Horizontal and inclined sights - Staff- vertical and normal - Fixed and movable hairs - Stadia constants - Digital Field Data Logger with AI.			
Unit - V	**ENGINEERING SURVEYS**	**Periods**	**7**
Reconnaissance, Preliminary and location surveys for Engineering projects – Roads, Railways, Irrigation, Water supply project-Hydrographic surveys - Tides - MSL- Sounding - methods- Ground Penetrating Radar (GPR).			
		Total Periods (L)	**35**
List of Practical Experiments:			
I. Chain Surveying			**2**
a) Determine the area of the boundary using chain survey. b) Setting out works – Foundation marking using tapes Single room and Double room.			
II. Compass Surveying			**2**
a) Calculate the area by using Whole Circle Bearing and Reduced Bearing.			
III. Plane Table Surveying			**2**
a) Determine the area by using Two Point and Three Point Problem method.			
IV. Levelling			**2**
a) Determine the Reduced Level for the given points using Height of Instrument method. b) Determine the Reduced Level for the given points using Rise and Fall method.			
V. Theodolite Surveying			**2**
a) Measurements of horizontal angles by reiteration and repetition and vertical angles. b) Determination of Heights and distances by Tangential Tacheometry.			
		Total Periods (P)	**10**
		Total Periods (L+P)	**45**
Text Books			
1.	Punmia,B.C, Ashok K Jain and Arun K Jain, "Surveying" Vol. I & II, Laxmi Publication, 17th Edition, New Delhi, 2016.		
2.	Basak N.N., "Surveying and Levelling," Tata McGraw-Hill Education,2nd Edition,12th reprint 2017.		
References:			
1.	T. P. Kanetkarand S. V. Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 24 th Reprint, 2015.		
2.	Chandra A.M, "Surveying", New Age International Private Ltd Publishers, New Delhi,2nd Edition, 2015.		
3.	Arora, K.R., "Surveying", Vol. I, II, Standard Book House, 2015.		
4.	Bhavikatti S.S, "Surveying and Levelling, Vol. I, II", I.K International, 2nd Edition, 2016.		
5.	Duggal R.K, "Surveying", Vol. I. & Vol. II., Tata McGraw Hill Publishing Company Ltd., New Delhi,2019.		
E-Resources.			
1.	https://www.britannica.com/technology/surveying		
2.	http://www.aboutcivil.org/surveying-levelling%20II.html		
3.	https://nptel.ac.in/courses/105/107/105107122/		

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

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Elayampalayam, Tiruchengode – 637205.

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**III**
Course Code	**U23CE305**	Periods per week		Credit	Maximum Marks
Course Name	**Water Supply and Waste water Engineering**	L	T	P	C	CA	ESE	Total
		3	0	2	3	50	50	100
Objective	To introduce students to various components of water supply scheme, water treatment methods, water storage distribution system, sewage treatment and disposal, intake structures and sewerage system							

Outcomes	At the end of the course the students will be able to	Knowledge Level
	CO1: Explain the various components of water supply scheme and intake structure and conveyance system for water transmission.	K3
	CO2: Understand the process of conventional treatment of water and waste water treatment system and gain knowledge of selection of treatment process and biological treatment process	K2
	CO3: Evaluate water distribution system and water supply in buildings.	K4
	CO4: Illustrate the characteristics and composition of sewage, ability to estimate sewage generation and design sewer system.	K3
	CO5: Compute the various advanced treatment system in water and waste water treatment process and reuse of sewage and sewage disposal methods.	K3

Pre-Requisites	**Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	2	1	1	1				2	3		3	3	2	3
CO 2	2	1							1	2		2	2	1	2
CO 3	3	3	2	2	2				3	3		3	3	3	3
CO 4	3	2	1	1	1				2	3		3	3	2	3
CO 5	3	2	1	1	1				2	3		3	3	2	3

Course Assessment Methods

Direct
1.Continuous Assessment Test I, II & III 2.Assignment 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus			
Unit - I	**WATER SUPPLY AND CONVEYANCE**	**Periods**	**7**
Sources of water and their characteristics- Predicting demand - Impurities of water and their significance - Physical, chemical and bacteriological analysis – Water borne diseases- Standards for potable water- Water quality monitoring Using AI - Conveyance of water - Intake structures and their types.			
Unit - II	**WATER TREATMENT**	**Periods**	**7**
Objectives - Unit operations and processes – Principles and functions of water treatment plant units, Screening -Sedimentation-Coagulation and flocculation – Filtration- Disinfection – Softening – De fluoridation -Desalination process - Construction, Operation and Maintenance aspects.			
Unit - III	**WATER STORAGE AND DISTRIBUTION**	**Periods**	**7**
Components of water supply system- Transmission of water-Distribution system, Various valves used in W/S systems -Maintenance of distribution systems - House service connections- Leak Detection Using AI Techniques			
Unit - IV	**PLANNING AND DESIGN OF SEWERAGE SYSTEM**	**Periods**	**7**
Characteristics and Composition of sewage - Population equivalent - Storm runoff estimation - Sewer appurtenances - Design of sewerage system- Corrosion in sewers - Prevention and control- Plumbing systems for Buildings.			
Unit - V	**SEWAGE TREATMENT AND DISPOSAL**	**Periods**	**7**
Objectives - Principles and Functions of Treatment Methods -Activated Sludge Process- Trickling filters - UASB –Waste Stabilization Ponds - Recent Advances in Sewage Treatment –Effluent Discharge standards- Sludge treatment - Disposal of sludge Construction, Operation and Maintenance aspects.			
		Total Periods (L)	**35**
List of Experiments:			
1. Determination of pH for given water sample. 2. Determination of Turbidity for given water sample. 3. Determination of suspended solids, dissolved solids and total solids of a water sample. 4. Determination of Alkalinity for given water sample. 5. Determination of Acidity for given water sample. 6. Determination of Dissolved Oxygen for the given sample. 7. Determination of Bio chemical Oxygen Demand for the given sample. 8. Determination of Chemical Oxygen Demand for the given water sample. 9. Determination of Optimum Coagulant dosage in waste water sample. 10. Determination of SVI of Biological sludge.			
		Total Periods (P)	**10**
		Total Periods (L+P)	**45**

Text Books

1.	Water Supply Engineering by B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain,Laxmi Publications; Second edition (1 January 2016)
2.	Garg, S.K. Environmental Engineering, Vol.I & II Khanna Publishers, New Delhi, 2015.

References:

1.	Water Supply and Sanitary Engineering by Rangwala Charotar Publishing House Pvt. Ltd.;30th Edition 2022 (19 February 2022)
2.	Modi, P.N., Water Supply Engineering, Vol.I Standard Book House, New Delhi, 2016.
3.	Metcalf and Eddy – Waste water Engineering – Treatment and Reuse, Tata Mc. Graw – HillCompany, New Delhi, 2010.
4.	Syed R. Qasimand Edward M. Motley Guang Zhu, Water Works Engineering Planning, Design and Operation, Prentice Hall of India Learning Private Limited, New Delhi, 2009
5.	Syed R.Qasim “Waste water Treatment Plants”, CRC Press, WashingtonD.C.,2010

E-Resources.

1.	https://www.google.co.in/books/edition/Water_Supply_And_Sanitary_Engineering/GVTNQEACAAJ?hl=en&kptab=morebyauthor
2.	https://www.google.co.in/books/edition/Water_Supply_Engineering/74HYY31zwhQC?hl=en&gbpv=0&kptab=sideways
3.	https://www.google.co.in/books/edition/Environmental_Engineering/Eez2DwAAQBAJ?hl=en&gbpv=0

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

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Elayampalayam, Tiruchengode – 637205.

Programme	**B.E.**	Programme Code	**110**		Regulation	**2023**		
Department	**Civil Engineering**				Semester	**III**		
Course Code	**U23CE306**	Periods per week			Credit	Maximum Marks		
Course Name	**Construction Materials Laboratory**	L	T	P	C	CA	ESE	Total
		0	0	2	1	60	40	100

Objective	The main objective is: • To develop skills to test various construction materials.	
Outcomes	At the end of the course the students will be able to	Knowledge Level
	CO1: Identify the properties of fine aggregates	K4
	CO2: Discriminate the properties of coarse aggregates	K4
	CO3: Estimate the properties of Bricks	K5
	CO4: Determine the mechanical properties of steel.	K5
	CO5: Evaluate the deflection of beams and springs	K5
Pre-Requisites	**Nil**	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3			3	1				3	3		3	3	3	3
CO 2	3			3	1				3	3		3	3	3	3
CO 3	3			3	2				3	3		3	3	3	3
CO 4	3			3	2				3	3		3	3	3	3
CO 5	3			3	2				3	3		3	3	3	3

Course Assessment Methods

Direct
1.Prelab and Post Lab Test 2.Execution of Experiments and Viva - Voce 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus		
List of Experiments		**COs**
I. TEST ON AGGREGATES		
a) Find the Specific Gravity of Fine Aggregates		**CO1**
b) Grain size distribution - Sieve Analysis for Fine Aggregate		**CO1**
c) Determination of Impact Value of Coarse Aggregate		**CO2**
d) Determination of Flakiness and Elongation Index of Coarse Aggregate		**CO2**
e) Determination of Specify Gravity test of Coarse Aggregate		**CO2**
f) Find the Water Absorption of Coarse Aggregate		**CO2**
II. TEST ON BRICKS		
a) Determination the Compressive Strength of Bricks		**CO3**
b) Determination of Water Absorption of Bricks		**CO3**
c) Determination of Efflorescence of Brick		**CO3**
III. TEST ON STEEL		
a) Tension Test on Mild Steel Rod		**CO4**
b) Torsion Test on Mild Steel Rod		**CO4**
c) Impact Test on Metal Specimen (Izod and Charpy)		**CO4**
d) Hardness Test on Metals (Rockwell and Brinell Hardness Tests)		**CO4**
e) Deflection Test on Metal Beam		**CO5**
f) Spring Test –Open Coil & Closed Coil		**CO5**
	Total Periods	**45**

Text Books

1.	Construction Materials Laboratory Manual, Anna University, Chennai-600 025.
2.	IS 4031 (Part 1) – 1996 – Indian Standard Method for determination of fineness by dry sieving
3.	IS 2386 (Part 1 to Part 6) – 1963 – Indian Standard methods for test for aggregate for concrete
4.	IS 383 – 1970 Indian Standard specification for coarse and fine aggregates from natural sources for concrete.
5.	Punmia ,B.C Building Construction, Laxmi publication (p)ltd..,2008

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Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**III**
Course Code	**U23CE307**	Periods per week		Credit	Maximum Marks
Course Name	**Computer Aided Building Drawing Laboratory**	L: 0	T: 0	P: 2	C: 1	CA: 60	ESE: 40	Total: 100

Objective

The main objective of this course is to:

- Practice drafting the plan, elevation, and sectional views of buildings.
- Incorporate the engineering in developing and satisfying orientation and functional requirements as per the National Building Code.
- Provide orientation on recent technologies and industry practices.

Outcomes

At the end of the course the students will be able to	Knowledge Level
CO1: Apply the basic tools and commands of AutoCAD software to create accurate 2D civil engineering drawings.	K3
CO2: Prepare detailed architectural drawings including key plans, site plans, floor plans, elevations, and sectional views for residential and industrial buildings.	K5
CO3: Develop construction drawings for structural components such as load-bearing walls, RCC framed structures, inclined roof trusses (e.g., King Post Truss), and industrial structures.	K4
CO4: Create detailed plumbing and electrical layout plans for residential buildings, ensuring practical understanding of building services.	K5
CO5: Illustrate reinforcement details for RCC elements like slabs, beams, and columns, including provisions for rainwater harvesting and septic tanks in residential planning and perform a basic AI-based image classification to recognize Building Components.	K4

Pre-Requisites: **Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3			1	1				2	2		2	3	2	3
CO 2	3			3	3				3	3		3	3	3	3
CO 3	3			2	2				3	3		3	3	3	3
CO 4	3			3	3				3	3		3	3	3	3
CO 5	3			2	2				3	3		3	3	3	3

Course Assessment Methods

Direct
1.Prelab and Post lab Test 2.Execution of Experiments and Viva - Voce 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus		
List of Experiments		**COs**
Preparation of line sketches in accordance with functional requirements and rules for the following types of buildings as per the National Building Code.		
1. Introduction to AutoCAD and its tools		**CO1**
2. Prepare a key plan and site plan for a single-storied residential building.		**CO2**
3. Draw the plan, elevation, and section of a single-storied residential building with load-bearing walls.		**CO3**
4. Draw the plan, elevation, and section of a two -storied (G+1) residential building with RCC framed structure.		**CO3**
5. Prepare the DTCP Approval drawing for a single-storied residential building.		**CO2**
6. Draw the plan and sectional elevation of an industrial building with a north light roof structure.		**CO3**
7. Draw the king post truss for an inclined roof as per standard specifications.		**CO3**
8. Prepare the plumbing layout for a single-floor residential building.		**CO4**
9. Prepare the electrical layout for a single-floor residential building.		**CO4**
10. Draw plan and cross section of the septic tank for 25 users.		**CO5**
11. Draw the reinforcement details of slab, beam, and column in RCC construction.		**CO5**
	Total Periods	**45**

Text Books

1.	Sikka V. B., "A Course in Civil Engineering Drawing", 4th Edition, S.K. Kataria and Sons,1998.
2.	George Omura, "Mastering in AUTOCAD 2002", BPB Publications, 2002.
3.	Shah M.G., Kale C.M., and Patki S.Y., "Building Drawing with an Integrated Approach toBuilt Environment", Tata McGraw Hill Publishers Limited, 2004.
4.	Marimuthu V.M., Murugesan R., and Padmini S., "Civil Engineering Drawing", RahejaPublishers, 2008.
5.	Gurcharan Singh, “Building Planning, Designing, and Scheduling”, Standard Publishers Distributors, 2006.

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Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**III**
Course Code	**U23CTCP2**	Periods per week		Credit	Maximum Marks
Course Name	**Personality Development**	L	T	P	C	CA	ESE	Total
		1	0	2	1	60	40	100

Objective

The student should be made to,

- Equip comprehensive understanding of various psychological and cognitive assessment tools
- Analyze, interpret, and apply these tools to improve personal and professional development
- Enhance communication
- Manage stress effectively

Outcomes

At the end of the course the students will be able to	Knowledge Level
CO1: Enhance Self-Awareness	K2
CO2: Improve Communication Skills	K1
CO3: Acquire Better Academic and Life Satisfaction	K2
CO4: Enhance Problem-Solving Abilities	K3
CO5: Effective Stress Management	K3

Pre-Requisites: **Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1						2			2	2		2	1	1	2
CO 2						2			2	2		2	2	2	3
CO 3						2			1	2		2	2	3	3
CO 4						2			2	1		2	3	2	3
CO 5						2			2	1		2	1	1	1

Course Assessment Methods

Direct

1. Self-Assessment
2. Viva-Voce
3. End-Semester Examination

Indirect

1. Course - End Survey

Content of the Syllabus		
List of Experiments		**COs**
1. Rosenberg ‘s and Hare ‘s Self Esteem tool		**CO1**
2. Myers Brigg ‘s 16 types of Personality		**CO1**
3. Social Functioning scale		**CO3**
4. Huebner, Laughlin, Ash, & Gilman ‘s Multidimensional Students Life Satisfaction Scale		**CO3**
5. Body language Assessment		**CO2**
6. Fleming ‘s VARK Learning Theory, bloom ‘s taxonomy based on learners‘queries		**CO2**
7. Alexi ‘s Presentation Secrets Assessment		**CO2**
8. Deductive and inductive logical reasoning assessment		**CO4**
9. Procter and Gamble Assessment Gamified Tests		**CO4**
10. Psychometric Test CO3		**CO3**
11. Stress buster Assessment		**CO5**
	Total Periods	**45**

References	
1.	Allan Pease, ―Body language – how to read other ‘s thoughts by their gestures‖, Sheldon press, London publication, Tenth Impression 1988.
2.	Alexei Kapterev, ―Presentation Secrets‖, John Wiley and Sons, 2011.
E-Resources	
1.	https://scales.arabpsychology.com
2.	http://DOMWebserver.Hitchcock.org/mbti/
3.	https://www.assessmentday.com/free/deductive-reasoning-1/DeductiveFreeTest-Solutions.pdf
4.	www.prepinsta.com

Semester - IV

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Programme	**B.E.**	Programme Code	**110**		Regulation	**2023**		
Department	**Civil Engineering**				Semester	**IV**		
Course Code	**U23MA407**	Periods per week			Credit	Maximum Marks		
Course Name	**Numerical Methods**	L	T	P	C	CA	ESE	Total
		3	1	0	4	40	60	100

Objective

The main Objective of the course is to

- Understand appropriate numerical methods to approximate a function.
- Recognize appropriate numerical methods to solve a differential function.
- Provide information about appropriate numerical methods to evaluate a derivative at a value.
- Introduce appropriate numerical methods to solve the second order differential equations.
- Proficiently understand boundary value problems.

Outcomes

At the end of the course the students will be able to	Knowledge Level
CO1: Apply numerical methods to obtain approximate solutions to mathematical problems	K5
CO2: Derive numerical methods for various mathematical operations and tasks such as interpolation, differentiation, integration and perform an error analysis	K3
CO3: Analyze and evaluate the accuracy of common numerical integral methods	K5
CO4: Determine Solutions of Ordinary Differential Equations using an appropriate numerical method	K4
CO5: Solve boundary value problems by appropriate numerical techniques.	K4

Pre-Requisites: **Nil**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	2	1	1	1								2		
CO 2	3	2	1	1									2		
CO 3	3	2		1	1								2		
CO 4	3	2	1	1									2		
CO 5	3	2	1		1								2		

Course Assessment Methods

Direct

1.Continuous Assessment Test I, II & III
2.Assignment
3. End-Semester Examinations

Indirect

1. Course - End Survey

Content of the Syllabus			
Unit - I	**SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS**	**Periods**	**9+3**
Solution of equation –Fixed point iteration: x=g(x) method – Newton's method – Solution of linear system by Gauss-Jordon method - Iterative method – Gauss Jacobi and Seidel methods – Inverse of a matrix by Gauss Jordon method – Eigenvalues of a matrix by power method and by Jacobi method for symmetric matrix.			
Unit - II	**INTERPOLATION AND APPROXIMATION**	**Periods**	**9+3**
Lagrangian Interpolation – Divided differences – Newton's divided difference formula - Interpolating with a cubic spline – Newton's forward and backward difference formula.			
Unit - III	**NUMERICAL DIFFERENTIATION AND INTEGRATION**	**Periods**	**9+3**
Differentiation using interpolation formulae –Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Two- and Three-point Gaussian quadrature formulae – Double integrals using trapezoidal and Simpson's rules.			
Unit - IV	**INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS**	**Periods**	**9+3**
Single step methods: Taylor series method – Euler method for first order equation – Fourth order Runge – Kutta method for solving first and second order equations – Multistep methods: Milne's and Adam's predictor and corrector methods			
Unit - V	**BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS**	**Periods**	**9+3**
Finite difference solution of second order ordinary differential equations – Finite difference solution of one-dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two-dimensional Laplace and Poisson equations.			
		Total Periods	**60**

Text Books	
1.	Veerarjan.T and Ramachandran.T, Numerical methods with programming in C, Second Edition, Tata McGraw-Hill Publishing. Co. Ltd, 2007.
2.	Grewal.B.S and Grewal.J.S, Numerical methods in Engineering and Science, 44th Edition, Khanna Publishers, New Delhi, 2020.
References:	
1.	Gerald.C.F and Wheatley.P.O, Applied Numerical Analysis, 7th Edition, Pearson Education Asia, New Delhi, 2009.
2.	Sankara Rao K, Numerical Methods for Scientists and Engineers, Third Edition, Prentice Hall of India Private Ltd, New Delhi, 2012.
3.	Burden R, L. and Faires J.D., Numerical Analysis, Cengage Learning, 10th Edition, 2015.
4.	M.K.Jain, Numerical Methods for Scientific and Engineering Computations, New Age Publishers
5.	Steven C.Chara Raymond P.Canale, " Numerical Methods for Engineering", Tata McGraw Hill Publishers, 3 rd Edition, 2000.
E-Resources.	
1.	https://www.academia.edu › Numerical Methods for Engineers
2.	www.learnerstv.com/Free-engineering-Video-lectures
3.	www.nptel.ac.in

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Programme	**B.E.**	Programme Code	**110**		Regulation	**2023**		
Department	**Civil Engineering**				Semester	**IV**		
Course Code	**U23CE401**	Periods per week			Credit	Maximum Marks		
Course Name	**Mechanics of Deformable Bodies**	L	T	P	C	CA	ESE	Total
		3	0	0	3	40	60	100
Objective	• This course imparts knowledge about stresses, strains, shear force, bending moment, slope and deflection in beams, concept of torsion in circular shaft and theory of columns.							

Outcomes	At the end of the course the students will be able to	Knowledge Level
	CO1: Determine the various types of stresses and strain	K3
	CO2: Draw the shear force and bending moment diagram for beams under various loading conditions	K3
	CO3: Analyze the bending and shear stresses in beams	K4
	CO4: Asses the slope and deflection in beams and stresses in thin cylinder	K4
	CO5: Analyze the torsional behavior and compute the critical load on columns	K4
Pre-Requisites	**Nil**	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	3	2										3	3	3
CO 2	3	3	2										3	3	3
CO 3	3	3	2										3	3	3
CO 4	3	3	2										3	3	3
CO 5	3	3	2										3	3	3

Course Assessment Methods

Direct
1.Continuous Assessment Test I, II & III 2.Assignment 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus			
Unit - I	**STRESS AND STRAIN**	**Periods**	**9**
Introduction – types of loads - stability, strength and stiffness – stress and strain - strain and strain diagram for steel – elastic limit - hooks law – elastic constants – relationship between elastic constants – factor of safety – deformation of stepped bars - uniformly varying section – composite bars – stresses due to temperature. Strain energy due to axial force - proof of resilience and modulus of resilience.			
Unit - II	**SHEAR FORCE AND BENDING MOMENT IN BEAMS**	**Periods**	**9**
Types of beams – types of supports and loads – plain bending – bending moment and shear force - sign conversion – point of contra flexure – shear and bending moment diagram for cantilever, simply supported and overhanging beams under concentrated load, uniformly distributed load, uniformly varying load and couples.			
Unit - III	**STRESSES IN BEAMS**	**Periods**	**9**
Theory of simple bending and assumption – theory of simple bending equation – analysis of beam for stresses – stress distribution across cross section due to bending moment and shear force for cantilever, simply supported and overhanging beams with different load conditions.			
Unit - IV	**DEFLECTION OF BEAMS AND THIN CYLINDER**	**Periods**	**9**
Beam deflection – Slope – sign conversion – Double Integration method – Macaulay's method – Area moment method – Conjugate beam method. Thin Cylinder – circumferential stress – longitudinal stress – maximum shear stress – changing dimension of thin cylinder.			
Unit - V	**THEORY OF COLUMN AND TORSION**	**Periods**	**9**
Column and strut – classification of column – slenderness ratio – buckling factor – effective length - various end conditions – Euler's theory – assumptions – formula and limitations – rankings formula – crippling load and safe load. Simple torsion – torsional loads - torsion equation for circular shaft and hollow circular shaft – assumptions – torsional rigidity – power transmission – modulus of rupture.			
		Total Periods	**45**

Text Books	
1.	Rajput R.K. "Strength of Materials (Mechanics of Solids)", S. Chand & company Ltd., New Delhi, 2018. 2. Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd.,New Delhi, 2017.
2.	Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain,"Theory of Structures" (SMTS) Vol -II, Laxmi Publishing Pvt Ltd, New Delhi 2017.
References:	
1.	Hibbeler, R.C., "Mechanics of Materials", Pearson Education, Low Price Edition, 2007
2.	Subramanian R., "Strength of Materials", Oxford University Press, Oxford Higher Education Series, 2007.
3.	James M.Gere., Mechanics of Materials, Thomas Canada Ltd., Canada, 2006.
4.	Ferdinand P. Been, Russell Johnson, Jr. and John J. Dewole "Mechanics of Materials", Tata McGraw Hill Publishing co. Ltd., New Delhi, 2005.
5.	Beer. F.P. & Johnston.E.R. "Mechanics of Materials", Tata McGraw Hill, Sixth Edition, New Delhi 2010.
E-Resources.	
1.	https://ocw.mit.edu/courses/2-001-mechanics-materials-i-fall-2006/pages/lecture-notes/?utm_source=chatgpt.com
2.	https://www.scribd.com/document/625863952/ES-MAT-C1-TO-C2/
3.	https://www.studocu.com/row/document/izmir-katip-celebi-university/deformable-bodies/mechanics-of-deformable-bodies-part1 /

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**IV**
Course Code	**U23CE402**	Periods per week		Credit	Maximum Marks
Course Name	**Concrete Technology**	L	T	P	C	CA	ESE	Total
		3	0	0	3	40	60	100
Objective	• This course imparts knowledge about the various ingredients and properties of materials used for concrete and mix design for concrete.							

Outcomes	At the end of the course the students will be able to	Knowledge Level
	CO1: Explain and assess the properties of the ingredients of concrete	K2
	CO2: Select suitable admixtures for enhancing the properties of concrete	K2
	CO3: Design concrete mixes as per IS method of mix design	K3
	CO4: Determine the fresh and hardened properties of concrete	K3
	CO5: Infer the types of special concrete with its characteristics and applications	K3
Pre-Requisites	**Nil**	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	2	1											2	1	2
CO 2	2	1											2	1	2
CO 3	3	2	1										3	2	3
CO 4	3	2	1										3	2	3
CO 5	3	2	1										3	2	3

Course Assessment Methods

Direct

1.Continuous Assessment Test I, II & III
2.Assignment
3. End-Semester Examinations

Indirect

1. Course - End Survey

Content of the Syllabus			
Unit - I	**CONSTITUENTS OF MATERIALS**	**Periods**	**9**
Cement – Manufacturing process of cement – Types - chemical composition and properties – test on cements – IS specification – Aggregates – classifications – mechanical properties and tests as per BIS grading requirements – Water – quality of water for use in concrete.			
Unit - II	**ADMIXTURES**	**Periods**	**9**
Necessity - Types - Chemical admixtures with specific properties - Accelerators, retarders, plasticizers and super plasticizers and Water proofers – Mineral admixtures – Fly ash, Silica fume, GGBFS and Metakaoline – Their effects on concrete properties.			
Unit - III	**PROPORTIONING OF CONCRETE MIX**	**Periods**	**9**
Principles of Mix Proportioning - Properties of concrete related to Mix Design - Physical properties of materials required for Mix Design - Design Mix and Nominal Mix - BIS Method of Mix Design - Mix Design Examples.			
Unit - IV	**FRESH AND HARDENED CONCRETE PROPERTIES**	**Periods**	**9**
Workability – test for workability of concrete – segregation and bleeding – properties of Hardened concrete – compressive, tensile, flexural strength as per BIS – shrinkage – creep – thermal conductivity – permeability - stress strain characteristics – modulus of elasticity.			
Unit - V	**SPECIAL CONCRETES**	**Periods**	**9**
High Strength Concrete - High Performance Concrete - Fiber Reinforced Concrete - Polymer concrete - Ferro-cement - Lightweight concrete – Ready-mix concrete – Gunite and shotcrete - Self Compacting Concrete - Geopolymer Concrete.			
		Total Periods	**45**

Text Books	
1.	M.S.Shetty - Concrete Technology,Theory & Practice - S.Chand and Co,New Delhi - Edition – 8 - 2019.
2.	Gambhir,M.L. - Concrete Technology - Tata Mc Graw Hill, New Delhi – Edition – 5 - 2017.
References:	
1.	Santhakumar A.R. - Concrete Technology - Oxford University Press,New Delhi – Edition – 2 -2018.
2.	Job Thomas - Concrete Technology - Cengage Learning India Pvt. Ltd., Delhi - 2015
3.	Nevile,A.M. - Properties of Concrete - Trans-Atlantic Publications,Inc. – Edition – 5 - 2012.
4.	Indian standard plain and reinforced concrete – Code of practice - IS:456 (2021).
5.	Indian standard concrete mix proportioning – Guide lines - IS: 10262: (2019).
E-Resources.	
1.	https://elearn.nptel.ac.in/shop/nptel/concrete-technology/?v=c86ee0d9d7ed
2.	https://iricen.gov.in/iricen/books_jquery/concrete_technology_2014.pdf
3.	https://vardhaman.org/wp-content/uploads/2021/03/CONCRETE-TECHNOLOGY.pdf

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**IV**
Course Code	**U23CE403**	Periods per week		Credit	Maximum Marks
Course Name	**Soil Mechanics**	L	T	P	C	CA	ESE	Total
		3	0	0	3	40	60	100

Objective	• This course imparts basic knowledge on the index properties, engineering properties and classification of soil particles. This course also deals with the various concepts such as permeability, stress distribution, settlement, shear strength and slope stability	
Outcomes	At the end of the course the students will be able to	Knowledge Level
	CO1: Determine the index properties of soil and solve problems related to three phase system	K3
	CO2: Determine permeability characteristics and solve the problems related to effective stress and seepage	K3
	CO3: Compute vertical stress distribution and settlement in soil	K3
	CO4: Calculate the shear strength parameters for various soil conditions	K3
	CO5: Analyze the stability of slopes	K4
Pre-Requisites	**Nil**	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	2	1	1									3	2	3
CO 2	3	2	1	1									3	2	3
CO 3	3	2	1	1									3	2	3
CO 4	3	2	1	1									3	2	3
CO 5	3	3	2	2									3	3	3

Course Assessment Methods

Direct
1.Continuous Assessment Test I, II & III 2.Assignment 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus			
Unit - I	**SOIL CLASSIFICATION & COMPACTION**	**Periods**	**9**
Formation of soil - Phase relationships - Soil description and classification for engineering purposes and their significance - Index properties of soils- BIS Classification system-compaction of soil – Theory and Factors influencing compaction of soils-field compaction methods.			
Unit - II	**EFFECTIVE STRESS AND PERMEABILITY**	**Periods**	**9**
Soil water - Static pressure in water – Principles of Effective stress and Quick sand condition- Capillary stress - flow of water through soil-Darcy's law – Permeability-factors affecting permeability-Co-efficient of Permeability-Seepage – seepage velocity – discharge velocity – concepts of flow net – uplift pressure – properties and uses - Piezoelectric analysis for flow nets.			
Unit - III	**STRESS DISTRIBUTION AND SETTLEMENT**	**Periods**	**9**
Stress distribution in homogeneous and isotropic medium - Boussinesq's theory - Westergaard's theory – use of Newmark's influence chart – components of settlement – immediate and consolidation settlement – Terzaghi's one dimensional consolidation theory – computation of rate of settlement – √T and Log T method – e-log p relationship.			
Unit - IV	**SHEAR STRENGTH**	**Periods**	**9**
Shear strength of cohesive and cohesion less soil - Mohr's circle - Mohr-Coulomb failure theory - Measurement of shear strength: Direct shear, Tri-axial compression test, Unconfined compression test and Vane shear test – factor influences shear strength of soil.			
Unit - V	**SLOPE STABILITY**	**Periods**	**9**
Stability analysis – infinite slopes and finite slopes – total stress analysis for saturated clay – friction circle method – use of stability number – method of slices – mechanism of landslide and remedial measures – soil nailing – methods of slope protection.			
		Total Periods	**45**

Text Books	
1.	Punmia, B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 2015.
2.	Gopal Ranjan and Rao, A.S.R., "Basic and Applied Soil Mechanics", New Age Ltd. International Publisher New Delhi (India) 2016.
References:	
1.	McCarthy,D.F., "Essentials of Soil Mechanics and Foundations". Pearson Education,7 th Edition 2014.
2.	Purushothama Raj. P., "Soil Mechanics and Foundations Engineering",2nd Edition, Pearson Education, 2013.
3.	Coduto, D.P., Yeung, M.R., and Kitch, W.A.. "Geotechnical Engineering: Principles and Practices, 2nd, Pearson, New York, 2011.
4.	Das, B.M., "Principles of Geotechnical Engineering". Brooks / Coles / Thompson Learning Singapore, 10th Edition, 2020.
5.	J.H. Atkinson, "An Introduction to the Mechanics of Soils and Foundations," 2nd Edition, Pearson Education, 2007.
E-Resources.	
1.	https://ocw.mit.edu/courses/1-361-advanced-soil-mechanics-fall-2004/download/
2.	https://www.youtube.com/watch?v=mDiOpl2gZGg
3.	https://ocw.tudelft.nl/wp-content/uploads/SoilMechBook.pdf

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(An Autonomous Institution Affiliated to Anna University, Chennai)

Elayampalayam, Tiruchengode – 637205.

Programme	**B.E.**	Programme Code	**110**		Regulation	**2023**		
Department	**Civil Engineering**				Semester	**IV**		
Course Code	**U23CE404**	Periods per week			Credit	Maximum Marks		
Course Name	**Surveying - II**	L	T	P	C	CA	ESE	Total
		3	0	2	3	50	50	100

Objective

To impart knowledge on

- Geometric design of curves on roads and their significance.
- Basics of different geodetic methods of surveying.
- Different sources of errors and their adjustments in a traverse.
- Importance of Advanced surveying techniques.
- Gain knowledge on Geospatial data collection in various surveying applications.

Outcomes

At the end of the course the students will be able to	Knowledge Level
CO1: Carry out different types of geometric design of curves on engineering projects.	K2
CO2: Determine heights and elevation differences, improving the accuracy of vertical positioning.	K3
CO3: Recognize and categorize various types of errors in surveying.	K3
CO4: To perform field surveys with a high degree of precision and efficiency.	K2
CO5: Precise and reliable measurements in fieldwork and geospatial analysis.	K2

Pre-Requisites: **Surveying - I**

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	2	1							1	1		1	2	1	2
CO 2	3	2	1	1					2	2		2	3	2	3
CO 3	3	2	1	1					2	2		2	3	2	3
CO 4	2	1							1	1		1	2	1	2
CO 5	2	1							1	1		1	2	1	2

Course Assessment Methods

Direct
1.Continuous Assessment Test I, II & III 2.Assignment 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus			
Unit - I	**CURVES**	**Periods**	**7**
Introduction - Curve ranging - Types of curves and their necessity- Horizontal and vertical curves - Simple curves - Compound curves - Transition curves - Functions and requirements - Setting out by offsets and angles - Vertical curves.			
Unit - II	**CONTROL SURVEYING**	**Periods**	**7**
Triangulation - Orders and accuracies - Signals and towers - Baseline measurement - Instruments and accessories - Extension of baseline - Satellite stations - Reduction to center - Trigonometrical levelling - Observations for heights and distances.			
Unit - III	**SURVEY ADJUSTMENTS**	**Periods**	**7**
Errors - Sources, classification - True and most probable values - Laws of weights - Weighted observations - Principle of least squares - Normal equation - Method of Correlates - Spatial Statistics & AI Toolkits.			
Unit - IV	**TOTAL STATION SURVEYING**	**Periods**	**7**
Basic Principle – Classifications - Working principle, Sources of Error, Infrared and Laser Total Station instruments- Care and maintenance of Total Station instruments. Modern positioning systems – Smart Target Recognition using AI.			
Unit - V	**GPS SURVEYING**	**Periods**	**7**
Basic Concepts - Different segments - space, control and user segments - satellite configuration - signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability- Task of control segment – Basics of Photogrammetry and Remote Sensing - LiDAR.			
		Total Periods (L)	**35**
List of Practical Experiments:			
I. Curves			**2**
a) Setting out of a simple curve using linear and angular method. b) Setting out of a compound curve.			
II. Trigonometric Levelling			**3**
a) Determine the elevation of the top of a building using trigonometric levelling by Base Accessible and Base Inaccessible. b) Determine the Height and Distances using Tachometric Surveying. c) Determine the Tacheometric Constants.			
III. Total Station			**3**
a) Study of Total Station, Measuring Horizontal and vertical angles. b) Determine the area of a given plot using total station. c) Determine the distance and difference in elevation between two inaccessible points using Total station.			
IV. GPS Surveying			**2**
a) Determination of area using GPS. b) Determination of coordinates of a given station.			
		Total Periods (P)	**10**
		Total Periods (L+P)	**45**
Text Books			
1.	Basak N.N., “Surveying and Levelling,” Tata McGraw-Hill Education, 2017.		
2.	Duggal R.K, “Surveying”, Vol. I., 2019 & Vol. II., 2017 Tata McGraw Hill Publishing Company Ltd., New Delhi.		
References:			
1.	Subramanian R, “Surveying and Levelling”, Oxford University Press, New Delhi,2nd Edition, 2015.		
2.	T. P. Kanetkarand S. V. Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 24th Reprint, 2015.		
3.	Arora, K.R., “Surveying”, Vol. I, II, Standard Book House, 2015.		
4.	Bhavikatti S.S, “Surveying and Levelling, Vol. I, II”, I.K International, 2nd Edition, 2016.		
5.	Madhu.N, Sathishkumar.R and Satheesh Gobi, “Advanced Surveying: Total Station, GIS and Remote Sensing”, Pearson India, New Delhi,2017.		
E-Resources.			
1.	https://civiltoday.com/surveying/87-surveying-lecture-notes-pdf		
2.	https://learnengineering.in/ce6404-surveying-ii/		
3.	https://archive.nptel.ac.in/courses/105/104/105104100/		

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**IV**
Course Code	**U23CE405**	Periods per week		Credit	Maximum Marks
Course Name	**Applied Hydraulics Engineering**	L: 3	T: 0	P: 2	C: 3	CA: 50	ESE: 50	Total: 100
Objective	• The aim is to provide students with essential knowledge on open channel flows, including the analysis of uniform, gradually varied and rapidly varied flows. Furthermore, students will be introduced to the basic principles of hydraulic machinery operation and the design of Pelton wheels, Francis and Kaplan turbines, as well as centrifugal and reciprocating pumps."				

Outcomes	At the end of the course the students will be able to	Knowledge Level
	CO1: Describe the basics of open channel flow, its classification and analysis of uniform flow in steady state conditions with specific energy concept and its application	K3
	CO2: Analyse steady flow, water surface profiles and its length calculation using direct and standard step methods with change in grades.	K4
	CO3: Derive the relationship between the sequent depths in steady, rapidly varied flow and estimate the energy loss in a hydraulic jump, considering the effects of positive and negative surges.	K4
	CO4: Design turbines and describe their working principles.	K4
	CO5: Differentiate between pumps, explain their working principles with characteristic curves, and design centrifugal and reciprocating pumps.	K2
Pre-Requisites		

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3	2	1	1	1				2	2		2	3	2	3
CO 2	3	3	2	2	2				3	3		3	3	3	3
CO 3	3	3	2	2	2				3	3		3	3	3	3
CO 4	3	3	2	2	2				3	3		3	3	3	3
CO 5	2	1							1	1		1	2	1	2

Course Assessment Methods

Direct
1.Continuous Assessment Test I, II & III 2.Assignment 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus			
Unit - I	**UNIFORM FLOW**	**Periods**	**9**
Flow in Channels-Types-Velocity Distribution in open channel- Chezy's equation, Manning Equation-Computation in Uniform Flow - Specific energy and specific force-Economical hydraulic sections for uniform flow.			
Unit - II	**VARIED FLOWS**	**Periods**	**9**
Dynamic equations of gradually varied flow-Draw down and Back Water Curve-Characteristics of flow profile-Profile Determination-Graphical Integration, Direct Step and Standard Step-Water surface flow profile classifications using AI technology			
Unit - III	**RAPIDLY VARIED FLOWS**	**Periods**	**9**
Impulse Momentum Equation-Application of the Linear momentum Principle – Hydraulic jumps - Types - Energy dissipation – Flow through transition-Positive and Negative surges.			
Unit - IV	**PUMPS**	**Periods**	**9**
Pumps-Classification-Centrifugal pumps –working Principle - Cavitation's in pumps - Operating characteristics - Multistage pumps – Reciprocating Pump - Indicator diagrams and its variations - Air Vessels-Working Principles of Jet Pumps - Savings in work done.			
Unit - V	**TURBINES**	**Periods**	**9**
Turbines - Classification –Working Principles and Design of pelton wheel, Franics and Kaplan Turbine- velocity triangle-Draft Tube-Theory and types - Cavitation - Performance of turbine - Specific speed - Runaway speed.			
		Total Periods (L)	**45**

List of Experiments:

A. FLOW MEASUREMENT

1. Flow through Venturimeter
2. Flow through Orifice meter
3. Bernoulli's Experiment

B. LOSSES IN PIPES

4. Determination of friction factor in pipes.
5. Determination of minor losses

C. PUMPS

6. Characteristics of Centrifugal pump
7. Characteristics of Submersible pump
8. Characteristics of Gear pump (Demonstration Only)

D. TURBINES

9. Characteristics of Pelton wheel turbine
10. Characteristics of Francis turbine

E. DETERMINATION OF METACENTRIC HEIGHT

11. Determination of metacentric height of floating bodies.

	Total Periods (P)	**15**
	Total Periods (L+P)	**60**

Text Books

1.	Chandramouli P N, Applied Hydraulic Engineering, Yes Dee Publisher, 2017
2.	Jain. A.K., Fluid Mechanics, Khanna Publishers, Delhi, 2010.

References:

1.	Ven Te Chow, Open Channel Hydraulics, McGraw Hill, New York, 2009.
2.	Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics, Standard Book House, New Delhi, 19th edition, 2013.
3.	Mays L. W., Water Resources Engineering, John Wiley and Sons (WSE), New York, 2019
4.	Subramanya K., Flow in open channels, Tata McGraw Hill, New Delhi, 2019.
5.	R.K. Bansal , "A Textbook of Fluid Mechanics and Hydraulic Machines", 10 th Edition, Laxmi Publications, New Delhi, 2019.

E-Resources.

1.	https://books.google.co.in/books?id=0clZbfwgiyUC&lpg=PR4&pg=PR12#v=onepage&q&f=false
2.	https://books.google.co.in/books?id=KqIbEAAAQBAJ&printsec=frontcover&source=gbs_atb#v=onepage&q&f=false
3.	https://books.google.co.in/books/about/Fluid_Mechanics_Hydraulic_Machines.html?id=mLpf6YjHM5AC

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**IV**
Course Code	**U23CE406**	Periods per week		Credit	Maximum Marks
Course Name	**Soil Mechanics Laboratory**	L	T	P	C	CA	ESE	Total
		0	0	2	1	60	40	100
Objective	• To develop skills to test the soils for their index and engineering properties and to characterize the soil based on their properties.							

Outcomes	At the end of the course the students will be able to	Knowledge Level
	CO1: Evaluate the basic properties of soils	K4
	CO2: Conduct tests to determine the index properties of soils	K4
	CO3: Determine the insitu density and compaction characteristics.	K3
	CO4: Conduct tests to determine the permeability and consolidation of soils.	K4
	CO5: Determine the compressibility and shear strength of soils.	K3
Pre-Requisites	**Nil**	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)											PSOs		
	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**	**PSO 3**
CO 1	3			2	2				3	3		3	3	3	3
CO 2	3			2	2				3	3		3	3	3	3
CO 3	3			1	1				2	2		2	3	2	3
CO 4	3			2	2				3	3		3	3	3	3
CO 5	3			1	1				2	2		2	3	2	3

Course Assessment Methods

Direct
1.Prelab and Post lab Test 2.Execution of Experiments and Viva - Voce 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus		
List of Experiments		**COs**
I.	**Determination of Index Properties**	
a)	Determination of specific gravity of soil solids by Pycnometer method.	**CO1**
b)	Determination of grain size distribution of the soil using I.S. sieves.	**CO1**
c)	Determination of grain size distribution of the soil by hydrometer analysis.	**CO1**
d)	Determination of liquid limit of fine soil by Casagrande apparatus.	**CO2**
e)	Determination of Plastic limit of the soil sample.	**CO2**
f)	Determination of Shrinkage limit of the soil sample.	**CO2**
II.	**Determination of In-Situ Density and Compaction Characteristics**	
a)	In-situ density test (Sand replacement method and Core cutter method).	**CO3**
b)	Determination of moisture-density relationship using standard Proctor compaction test.	**CO3**
III.	**Determination of Engineering Properties**	
a)	Determination of co-efficient of permeability by Constant head and falling head method.	**CO4**
b)	Determination of coefficient of consolidation of a soil sample. (one dimensional)	**CO4**
c)	Determination of shearing strength of the cohesion-less soil using Direct shear apparatus	**CO5**
d)	Determination of unconfined compressive strength of soil sample.	**CO5**
e)	Determine the tri-axial compressive strength of a cohesion-less soil sample (Demonstration only)	**CO5**
	Total Periods	**45**

References

1.	Braja M. Das, Principles of Geotechnical Engineering, Cengage Learning, 2015.
2.	Arora K.R., Soil Mechanics and Foundation Engineering, Standard Publishers Distributors, 2017.
3.	Murthy V.N.S., Soil Mechanics and Foundation Engineering, CBS Publishers & Distributors Pvt. Ltd., 2018.
4.	Lambe T.W. and Whitman R.V., Soil Mechanics, Wiley Eastern Ltd., 2008
5.	Braja M. Das, Principles of Geotechnical Engineering, Cengage Learning, 2015.

E-Resources

1.	Virtual lab e-manual, source IIIT-Hyderabad.
2.	https://smfe-iiith.vlabs.ac.in/List%20of%20experiments.html
3.	http://ce.cet.ac.in/visuallab.php

Programme	**B.E.**	Programme Code	**110**	Regulation	**2023**
Department	**Civil Engineering**			Semester	**IV**
Course Code	**U23CE407**	Periods per week		Credit	Maximum Marks
Course Name	**Concrete Laboratory**	L	T	P	C	CA	ESE	Total
		0	0	3	1	60	40	100
Objective	• The objective of this lab is to teach the student basic concrete fundamentals in various civil engineering applications.							

Outcomes	At the end of the course the students will be able to	Knowledge Level
	CO1: Evaluate the properties of cement and aggregates	K5
	CO2: Analyze the characteristics of aggregates.	K4
	CO3: Perform the tests on fresh concrete and find their properties	K3
	CO4: Evaluate the strength of the hardened concrete	K4
	CO5: Determine the stress – strain behaviour of concrete	K3
Pre-Requisites	**Nil**	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

CO/PSO Mapping

COs	Programme Outcomes (POs)												PSOs		
	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**	**PSO 3**
CO 1	3			3	3				3	3		3	3	3	3
CO 2	3			2	2				3	3		3	3	3	3
CO 3	3			1	1				2	2		2	3	2	3
CO 4	3			2	2				3	3		3	3	3	3
CO 5	3			1	1				2	2		2	3	2	3

Course Assessment Methods

Direct
1.Prelab and Post lab Test 2.Execution of Experiments and Viva - Voce 3. End-Semester Examinations
Indirect
1. Course - End Survey

Content of the Syllabus		
List of Experiments		**COs**
I.	**Tests on Cement and Aggregate**	
a)	Determination of specific gravity of cement	**CO1**
b)	Determination of fineness of cement	**CO1**
c)	Determination of consistency of cement	**CO1**
d)	Determination of initial and final setting time of cement	**CO1**
e)	Determination of soundness of cement	**CO1**
f)	Determination of compressive strength of cement	**CO1**
g)	Determination of fineness modulus of coarse aggregate	**CO2**
II.	**Tests on Fresh Concrete**	
a)	Determination of slump value for fresh concrete by Slump Cone Test	**CO3**
b)	Determination of Compaction Factor Ratio by Compaction Factor Test	**CO3**
c)	Determination of Flow Value by Flow Table Test	**CO3**
d)	Determination of workability of fresh concrete by Vee Bee Consistometer Test.	**CO3**
III.	**Tests on Hardened Concrete**	
a)	Determination of compressive strength of mortar.	**CO4**
b)	Determination of compressive strength of concrete	**CO4**
c)	Determination of split tensile strength of concrete	**CO4**
d)	Determination of Flexural strength of concrete	**CO4**
e)	Determination of stress – strain behavior of concrete	**CO5**
	Total Periods	**45**

References

1.	M.S.Shetty. – Concrete Technology, Theory & Practice – S.Chand and Co,New Delhi - Edition – 8 – 2019.
2.	Gambhir,M.L. - Concrete Technology - Tata Mc Graw Hill, New Delhi – Edition – 5 - 2017.
3.	Nevile,A.M. - Properties of Concrete - Trans-Atlantic Publications, Inc. – Edition – 5 - 2012.
4.	Job Thomas - Concrete Technology - Cengage Learning India Pvt. Ltd., Delhi - 2015
5.	Santhakumar A.R. - Concrete Technology - Oxford University Press, New Delhi – Edition – 2 -2018.

E-Resources

1.	https://elearn.nptel.ac.in/shop/nptel/concrete-technology/?v=c86ee0d9d7ed
2.	https://iricen.gov.in/iricen/books_jquery/concrete_technology_2014.pdf
3.	https://vardhaman.org/wp-content/uploads/2021/03/CONCRETE-TECHNOLOGY.pdf