SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur-603203.

(Approved by AICTE, Affiliated to Anna University, 'A' Grade Accredited by NAAC, NBA Accredited, ISO 9001: 2015 Certified)

CURRICULA AND SYLLABI

B.E. Civil Engineering

(Regulations 2023)

SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution Affiliated to Anna University, Chennai,
'A' grade accredited by NAAC, NBA accredited ISO 9001: 2015 certificated)

B.E. CIVIL ENGINEERING

REGULATIONS – 2023

1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

1. To produce graduates who can understand their ethical, environmental as well as professional responsibilities so that they appreciate the impact of the engineering solutions which have sustainability over society and the nation.
2. To develop the graduates who will exhibit strong technical ability to create & synthesize data using relevant tools and concepts, for providing sustainable solutions to civil engineering problems and projects.
3. To equip the graduates with suitable skills making them industry ready when they leave the portals of the Institute and to become a competent distinguished Professional Civil Engineer.
4. To produce students who can exhibit attitude, professionalism, ability to communicate with team members and adapt to the latest technology by engaging themselves in life-long learning

2. PROGRAMME OUTCOMES (POs):

After going through the four years of study, our Civil Engineering Graduates will exhibit ability to:

PO	Graduate Attribute	Programme Outcome
1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
2	Problem analysis	Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate

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

3. PROGRAM SPECIFIC OUTCOMES (PSOs):

By the completion of Civil Engineering program the student will have following Program specific outcomes

1. Establish a Civil Engineering career in industry, government or academic field and achieve professional expertise as appropriate.

2. Execute innovation and excellence in Civil engineering problem solving and design in global and societal contexts.
3. Commit to lifelong learning and professional development in the Civil Engineering field to stay updated in technology, research topics and contemporary issues.
4. Understand the fundamentals of Civil Engineering in commercial contexts and in expediting construction projects.

4. PEO / PO Mapping:

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
I	3	1	1	1	3	3	3	3	3	3	1	3	3	3	2	3
II	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3
III	1			3	3	3	1	1	3		3	1	3	3	3	2
IV	3			1	3	3	3		3	3	3	3	3	3	3	3

		Subject code & Name	PROGRAMME OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
Year I	Semester I	Professional English - I	2.2	2.6	2	2.0	2.0	-	2.0	-	-	2.8	1.0	1.0	-	-	-	-
		Matrices and Calculus	3.0	2.0	2.0	1.0	-	-	-	-	-	-	-	1.0	-	-	-	-
		Engineering Physics	2.8	1.4	1.4	1.0	1.0	1.0	1.0	-	-	-	-	1.0	-	-	-	-
		Engineering Chemistry	2.8	1.8	2.2	1.2	1.0	1.0	2.0	-	-	-	-	2.0	1.0	-	-	-
		Basic Electrical and Electronics Engineering	2.8	1.8	1.7	3.0	2.0	2.0	2.0	-	-	-	-	1.8	1.5	2.5	2.0	-
		தமிழர் மரபு / Heritage of Tamils																
		Physics and Chemistry Laboratory	3.0	2.4	2.6	1.0	1.0	-	-	-	-	-	-	-	-	-	-	-
		Engineering Practices Laboratory	2.0	1.0	0.8	1.0	1.2	-	1.0	-	-	-	-	1.0	2.0	-	-	-
		English Language Learning Laboratory	3.0	2.0	2.3	2.0	2.3	1.0	-	-	1.0	-	1.0	1.0	-	-	-	-
Year I	Semester II	Professional English - II	1.6	1.2	1	1.3	2	-	2	-	-	2.8	-	1	-	-	-	-
		Statistics and Numerical Methods	2.0	2.0	1.4	2.0	2.0	-	2.0	-	-	2.8	1.0	1.0	-	-	-	-
		Physics for Civil Engineering	1.8	1.8	1.5	1.8	2.0	1.6	-	-	-	-	-	1	-	-	-	-
		Chemistry for Construction Materials	2.6	1.6	1.6	2	0.6	0.4	0.4	-	-	-	-	1	-	0.8	0.4	0.2

		Problem solving and Python Programming	2.6	2.4	2.2	1.8	1.7	1.0	1.0	-	-	-	-	2.0	1.5	-	-	-
		தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	2.2	2.4	3.0	2.7	1.8	-	-	-	-	-	1.5	2.0	2.0	-	2.0	1.0
		Engineering Graphics and Design	2.0	-	3.0	-	1.0	-	-	-	1.0	3.0	-	2.0	2.0	1.0	1.0	1.0
		Problem Solving and Python Programming Laboratory	2.0	1.4	1.0	1.0	1.2	2.0	1.5	2.0	-	-	-	-	2.0	-	-	-
		Engineering Sciences Laboratory	3.0	2.4	2.6	1	1	-	-	-	-	-	-	-	-	-	-	-
			2.0	1.4	1	1	1.2	0.4	0.6	0.4	-	-	-	-	-	0.4	-	-
		NSS / YRC / NSO / Club Activities#	2.0	-	3.0	-	1.0	-	-	-	1.0	3.0	-	2.0	2.0	1.0	1.0	1.0
Year II	**Semester III**	Transforms and Partial Differential Equations	3.0	3.0	-	-	1.0	-	-	-	-	-	-	1.0	-	-	-	-
		Applied Mechanics	3.0	1.0	1.0	1.0	1	-	-	-	-	-	-	2.4	3.0	1.2	1.0	2.0
		Fluid Mechanics	2.4	2.0	1.6	1.0	2.4	2.0	1.0	1.0	1.0	1.0	2.4	2.2	2.4	2.8	2.2	2.4
		Surveying and Levelling	2.4	2.5	-	3.0	1.2	2.0	2.0	1.5	2.4	2.4	2.0	2.3	2.4	1.8	2.5	2.6
		Construction Materials	1.3	1.3	1.5	1.5	1.0	2.0	2.5	1.0	2.0	1.5	3.0	2.0	2.5	1.0	2.0	1.5
		Soil Mechanics	2.6	2.6	2.2	2.0	1.0	1.7	1.5	1.0	1.0	2.0	1.0	2.5	1.3	1.5	2.0	2.3
		Surveying and Levelling Laboratory	2.6	2.8	2.0	2.0	1.2	2.0	2.0	1.5	3.0	2.4	2.0	2.6	2.8	1.6	2.6	2.6

		Construction Materials Laboratory	3.0	2.0	-	-	-	-	1.6	1.0	2.0	0.8	0.4	1.6	2.0	-	1.0	3.0
		Computer Aided Drafting and Modelling Laboratory	3.0	-	-	-	3.0	2.0	-	-	2.0	-	-	1.0	2.0	-	1.0	3.0
Year II	**Semester IV**	Applied Mathematics for Civil Engineering	3.0	3.0	3.0	-	-	-	-	-	-	-	-	1.0	-	-	-	-
		Strength of Materials	2.0	3.0	2.0	1.0	1.0	-	-	-	-	-	-	2.4	2.6	1.6	1.0	1.4
		Applied Hydraulic Engineering	3.0	3.0	2.0	1.6	1.0	2.0	2.0	1.0	2.0	1.0	1.0	3.0	2.2	2.4	2.8	2.2
		Construction Techniques and Equipments	1.6	2.8	2.5	2.6	2.4	2.0	2.0	1.0	1.4	1.4	2.4	1.4	2.8	2.6	2.6	2.0
		Irrigation Engineering	3.0	2.0	2.5	2.0	2.3	3.0	2.0	3.0	1.0	2.5	1.3	2.0	2.5	3.0	2.5	2.3
		Foundation Engineering	2.8	2.2	2.5	1.7	-	2.0	2.0	1.6	2.3	1.6	-	3.0	2.8	2.5	2.5	1.5
		NCC Credit Course Level - I*																
		Strength of Materials Laboratory	3.0	2.4	2.0	1.6	1.0	-	-	-	1.0	1.0	-	2.0	2.0	2.4	1.6	1.4
		Fluid Mechanics and Machinery Laboratory	3.0	2.4	2.0	1.6	1.0	2.4	2.0	1.0	1.0	1.0	1.0	2.4	2.2	2.4	2.8	2.2
		Soil Mechanics Laboratory	2.0	1.2	1.8	2.4	2.0	2.0	2.0	-	1.5	-	2.0	2.4	2.6	1.6	1.8	2.4

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REGULATIONS – 2023
CHOICE BASED CREDIT SYSTEM
CURRICULA& SYLLABI (I – IV SEMESTERS)

SEMESTER I

SL NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	EN3111	Professional English - I	HSMC	3	3	0	0	3
2.	MA3122	Matrices and Calculus	BSC	4	3	1	0	4
3.	PH3123	Engineering Physics	BSC	3	3	0	0	3
4.	CH3124	Engineering Chemistry	BSC	3	3	0	0	3
5.	GE3131	Basic Electrical and Electronics Engineering	ESC	3	3	0	0	3
6.	GE3111	தமிழர் மரபு / Heritage of Tamils	HSMC	1	1	0	0	1
PRACTICALS								
7.	GE3121	Physics and Chemistry Laboratory	BSC	4	0	0	4	2
8.	GE3134	Engineering Practices Laboratory	ESC	4	0	0	4	2
9.	EN3119	English Language Learning Laboratory	EEC	2	0	0	2	1
			TOTAL	**27**	**16**	**1**	**10**	**22**

SEMESTER II

SL NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	EN3211	Professional English - II	HSMC	3	3	0	0	3
2.	MA3222	Statistics and Numerical Methods	BSC	4	3	1	0	4
3.	PH3221	Physics for Civil Engineering	BSC	3	3	0	0	3
4.	CH3221	Chemistry of Construction Materials	BSC	3	3	0	0	3
5.	GE3231	Problem solving and Python Programming	ESC	3	3	0	0	3

6.	GE3211	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	HSMC	1	1	0	0	1
PRACTICALS								
7.	GE3221	Engineering Sciences Laboratory	BSC	4	0	0	4	2
8.	GE3232	Problem Solving and Python Programming Laboratory	ESC	4	0	0	4	2
9.	GE3233	Engineering Graphics and Design	ESC	5	1	0	4	3
10.	GE3251	NSS / YRC / NSO / Club Activities #	PCD	0#	0	0	0	0#
			TOTAL	**30**	**17**	**1**	**12**	**24**

 # conducted after college hours

SEMESTER III

SL NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA3321	Transforms and Partial Differential Equations	BSC	3	3	0	0	3
2.	CE3361	Applied Mechanics	PCC	3	3	0	0	3
3.	CE3362	Fluid Mechanics	PCC	3	3	0	0	3
4.	CE3363	Surveying and Levelling	PCC	3	3	0	0	3
5.	CE3364	Construction Materials	PCC	3	3	0	0	3
6.	CE3365	Soil Mechanics	PCC	3	3	0	0	3
PRACTICALS								
7.	CE3366	Surveying and Levelling Laboratory	PCC	4	0	0	4	2
8.	CE3367	Construction Materials Laboratory	PCC	3	0	0	3	1.5
9.	CE3368	Computer Aided Drafting and Modelling Laboratory	PCC	3	0	0	3	1.5
			TOTAL	**28**	**18**	**0**	**10**	**23**

SEMESTER IV

SL NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA3421	Applied Mathematics for Civil Engineering	BSC	2	2	0	0	2
2.	CE3461	Strength of Materials	PCC	3	3	0	0	3
3.	CE3462	Applied Hydraulic Engineering	PCC	3	3	0	0	3
4.	CE3463	Construction Techniques and Equipments	PCC	3	3	0	0	3
5.	CE3464	Irrigation Engineering	PCC	3	3	0	0	3
6.	CE3465	Foundation Engineering	PCC	3	3	0	0	3
7.	GE3451	NCC Credit Course Level - I*	PCD	3*	3*	0	0	3*
PRACTICALS								
8.	CE3466	Strength of Materials Laboratory	PCC	3	0	0	3	1.5
9.	CE3467	Fluid Mechanics and Machinery Laboratory	PCC	3	0	0	3	1.5
10.	CE3468	Soil Mechanics Laboratory	PCC	3	0	0	3	1.5
			TOTAL	**26**	**17**	**0**	**9**	**21.5**

***** *conducted after college hours*

EN3111	PROFESSIONAL ENGLISH – I	L T P C
		3 0 0 3

OBJECTIVES:

- To upgrade the English language skills of students by introducing communication techniques, speaking and grammar learning activities which are relevant to authentic contexts.
- To improve the basic reading and writing skills of the learners.
- To enhance the communicative competence of the first-year engineering students.
- To enable learners to use language effectively in academic/work contexts.
- To help learners understand content- context in relevant situations.

UNIT – I INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION

Listening: Podcast watching – Listening for new words and pronunciation.

Speaking: Note of appreciation for classmates /family member – formal appreciation of someone, expression of feelings.

Reading: Books, shorts stories to be read. Filling forms (i.e.) post office or bank.

Writing: Film and series Review / Book Review, Email and Informal letters.

Language and Vocabulary development: WH questions, Yes/No questions, Single Word Substitutes, Pronouns, Parts of Speech, Question tags, Prefixes and Suffixes.

UNIT – II NARRATION AND SUMMATION

Listening: Books – Short Stories to be read aloud in class for listening purpose.

Speaking: Short stories to be read and narrated in the class.

Reading: Reading favourite blogs on Travel, Sports and Food and expressing opinions regarding the same.

Writing: Paragraph writing, Report – field trip / I.V., Autobiography and Comprehension.

Language and Vocabulary development: Tenses – Past, Antonyms, Synonyms, Subject Verb agreement and Prepositions.

UNIT – III DESCRIPTION OF A PROCESS/PRODUCT

Listening: Listening to snippets from celebrities/ National leaders' lives.

Speaking: Narrating personal experiences/ events – Expression of emotions and feelings.

Reading: Reading short biographies – famous people and description of the same.

Writing: Instruction, Product / Process description and Advertisements (Normal and Block).

Language and Vocabulary development: Adjectives- Degrees of Comparison, Tenses – Present, Compound Nouns, Homonyms, Homophones and Discourse markers – connective and sequence words.

UNIT – IV CLASSIFICATION AND INTERPRETATION

Listening: Listening to Ted Talks.

Speaking: Recreating a Ted talk session in the class.

Reading: Newspaper Reading (Editorial) and understanding.

Writing: Note making, Blogging, Interpretation of charts and graphs.

Language and Vocabulary development: Articles, Collocations and Phrasal Verbs.

UNIT – V EXPRESSION OF THOUGHTS AND IDEAS

Listening: Listening to audio books and answering questions.

Speaking: Presentation on a non-technical topic.

Reading: Edito, rials from newspaper.

Writing: Essay writing – Descriptive and Narrative essays.

Language and Vocabulary development: Tenses – future, Negative statements and questions, Punctuations, Cause and Effect, Content and Function words.

COURSE OUTCOMES

At the end of the course, learners will be able

1. To strengthen the basics of grammar.
2. To narrate informal and informal situations.
3. To describe a process/product and express opinion.
4. To interpret and analyse the content/information given.
5. To write short essays, personal letters and emails in English.

TEXT BOOKS:

1. English for Science and Technology Cambridge University Press,2021. Dr.Veena Selvam, Dr.Sujatha Priyadarshini, Dr. Deep Mary Francis, Dr.K.N.Shoba and Dr.Lourdes Joevani, Department of English, Anna University.

2. Technical Communication – Principles and Practice by Meenakshi Raman & Sangeeta Sharma, Oxford Univ.Press, 2016, New Delhi.

REFERENCES:

1. Effective Communication Skill, Kulbhusan Kumar, R.S.Salaria, Khanna Publishing House.
2. Wings of Fire - An Autobiography by A.P.J Abdul Kalam with Arun Tiwari, Sangam Books Ltd , Edition: 50, 1999.
3. World's Most Popular Short Stories Saki Maupassant, Anton Chekhov, O Henry Paperback.
4. Professional Speaking skills, Aruna Koneru, Oxford University Press.
5. English For Engineers and Technologists, Orient Blackswan Private Ltd. Department of English, Anna University, 2020.

EN3111	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	2	2	2	-	-	-	-	3	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	3	1	1	-	-	-	-
CO3	2	-	2	2	-	-	-	-	-	3	-	1	-	-	-	-
CO4	3	3	-	2	-	-	2	-	-	3	-	-	-	-	-	-
CO5	1	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Average	**2.2**	**2.6**	**2.0**	**2.0**	**2.0**	**-**	**2.0**	**-**	**-**	**2.8**	**1.0**	**1.0**	**-**	**-**	**-**	**-**

MA3122 **MATRICES AND CALCULUS** **L T P C**

3 1 0 4

OBJECTIVES:

- To understand and apply matrix techniques for engineering applications.
- To familiarize the student with basic calculus and traditions of traditional calculus.
- To solve the problems in single and multivariable calculus and plays an important role in science, economics, engineering.
- Vector calculus can be widely used for modeling the various laws of physics.
- To familiarize the student with multiple integrals and their usage in find the area and volume of two and three dimensional objects.

UNIT- I : MATRICES **9L+3T**

Eigen values and Eigen vectors of a real matrix - Characteristic equation - Properties of Eigen values and Eigen vectors - Statement and Applications of Cayley-Hamilton Theorem - Reduction of a quadratic form into canonical form by orthogonal transformation.

UNIT- II : DIFFERENTIAL CALCULUS OF ONE VARIABLE **9L+3T**

Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Rolle's Theorem and Mean Value theorem -Taylor's series- Maxima and Minima of functions of one variable.

UNIT- III : DIFFERENTIAL CALCULUS OF SEVERAL VARIABLES **9L+3T**

Partial derivatives - Total derivatives - Jacobians and properties - Taylor's series for functions of two variables - Maxima and Minima of functions of two variables - Lagrange's method of undetermined multipliers.

UNIT- IV : MULTIPLE INTEGRALS **9L+3T**

Double integrals in Cartesian and polar coordinates - Change of order of integration - Area enclosed by plane curves - Change of variables in Polar coordinates - Triple integrals - Volume of solids.

UNIT- V : VECTOR CALCULUS **9L+3T**

Gradient and directional derivative – Divergence and curl – Vector identities – Irrotational and Solenoidal vector fields – Vector Integration Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

TOTAL: 45L + 15T PERIODS

OUTCOMES:

- To apply the idea of reducing complex problems into simple form using matrix technique.
- Basic application of single variable calculus in engineering problems.
- This course equips the students to have basic knowledge and understanding of multivariable calculus.
- Basic application of Double and Triple integrals used in Engineering real life problems
- To study Vector Calculus and apply the application of vectors in modeling the various laws of physics

TEXT BOOKS:

1. Grewal. B.S, "Higher Engineering Mathematics", 41st Edition, Khanna Publications, Delhi, 2011.3. Gupta S.C and Kapoor V.K, "Fundamentals of Mathematical Statistics", S.Chand Private Ltd.,11th Edition, 2005.
2. Veerarajan.T, "Engineering Mathematics", McGraw Hill Education(India) Private Ltd 2019.

REFERENCE BOOKS:

1. Bali N.P and Manish Goyal, "A Text book of Engineering Mathematics", Eighth Edition, Laxmi Publications Pvt. Ltd., 2011.
2. James Stewart, " Calculus : Early Transcendentals ", Cengage Learning, 8th Edition, New Delhi, 2015
3. Sivarama Krishna Das P. and Rukmangadachari E., "Engineering Mathematics", Volume I, Second Edition, Pearson Publishing, 2017.

4. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2012.

MA3122	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	2	2	1	-	-	-	-	-	-	-	1	-	-	-	-
CO2	3	2	2	1	-	-	-		-	-	-	1	-	-	-	-
CO3	3	2	2	1	-	-	-		-	-	-	1	-	-	-	-
CO4	3	2	2	1	-	-	-		-	-	-	1	-	-	-	-
CO5	3	2	2	1	-	-	-		-	-	-	1	-	-	-	-
Average	**3.0**	**2.0**	**2.0**	**1.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.0**	**-**	**-**	**-**	**-**

PH3123 **ENGINEERING PHYSICS** **L T P C**

(Common to all Branches of B.E. / B.Tech. Programmes) **3 0 0 3**

OBJECTIVES:

- To enhance the fundamental knowledge in crystalline materials and its applications.
- To explore the knowledge in the production of ultrasonic waves and its application.
- To familiarize the basics of laser and its technical advances in scientific, industrial and health care areas.
- To understand the principle of optical fibre and its applications.
- To explore basic concepts of quantum physics.

UNIT- I: CRYSTAL PHYSICS **9**

Single crystalline, polycrystalline and amorphous materials - unit cell - space lattice - crystal systems - Bravais lattice - characteristics of unit cell - SC, BCC, FCC and HCP structure - Miller indices - d-spacing - X-ray diffraction (XRD) - Photonic crystals - crystal growth techniques: Czochralski and Bridgmann method.

UNIT- II: ULTRASONICS **9**

Introduction - properties - Production: Magnetostriction and Piezoelectric method **-** Acoustic grating - determination of ultrasonic velocity in liquid - Application: Detection of flaw in materials (Non Destructive Testing) - ultrasonic soldering, welding - SONAR - diagnostic sonography - air bag sensor - dispersion of fog.

UNIT- III: LASER **9**

Basic concepts and characteristics - Einstein's A and B coefficients (derivation) - population inversion - pumping methods - Nd-YAG laser - CO_2 laser - Excimer laser - Applications: laser welding, laser cutting, pattern formation by laser etching, laser bar code scanner - LIDAR - Laser tissue interaction, laser surgery.

UNIT-IV: FIBRE OPTICS **9**

Structure and principle - propagation of light through optical fibre - acceptance angle, numerical aperture - fractional index change - Types of optical fibres (material, mode and refractive index) - Attenuation: absorption, scattering and bending - dispersion - fibre optic communication system (Block diagram) and advantages over conventional methods - fibre optic sensors: pressure and displacement - Endoscope.

UNIT-V: QUANTUM PHYSICS **9**

Black body radiation and energy distribution spectrum - Planck's theory of radiation - matter waves - de-Broglie wavelength in terms energy, voltage and temperature - Electron diffraction - G.P.Thomson experiment - physical significance of wave function - Schrödinger's wave equation**:** time independent and time dependent equations - particle in a one - dimensional box - Scanning Electron Microscope (SEM) - Transmission Electron Microscope (TEM).

TOTAL: 45 PERIODS

OUTCOMES:

After completion of this course, the students should be able to

1. Understand the crystalline material and growth techniques.
2. Understand the basics, generation and application of ultrasonics.
3. Acquire knowledge on the concepts of lasers and their applications in industry and medical field.
4. Conversant on principle behind the fibres and their applications in communication and devices made out of optical fibre.
5. Get knowledge on physics concepts of quantum theory and its applications.

TEXT BOOKS:

1. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.
2. Gaur, R.K. & Gupta, S.L. "Engineering Physics". Dhanpat Rai Publishers, 2012.

3. Pandey, B.K. & Chaturvedi, S. “Engineering Physics”. Cengage Learning India, 2012.
4. M. Arumugam, Engineering Physics. Anuradha agencies and publishers.
5. M.N.Avadhanulu & P.G.Krishnasagar, “A Text Book of Engineering Physics” – IX Edition, S.Chand Publications, 2014.
6. V. Rajendiran, Engineering Physics, Tata McGraw Hill publishing company Ltd.

REFERENCES :

1. Halliday, D., Resnick, R. & Walker, J. “Principles of Physics”. Wiley, 2015.
2. Tipler, P.A. & Mosca, G. “Physics for Scientists and Engineers with Modern Physics" W.H.Freeman, 2007.
3. Shatendra Sharma & Jyotsna Sharma, “Engineering Physics”. Pearson, 2018
4. Allen H. Cherin, McGraw Hill International Edition “Fundamentals of fibre optic communication”.
5. S.L.Gupta & Sanjeev Gupta, “Modern Engineering Physics” – Dhanpat Rai Publications, 2011.

PH3123	PROGRAM OUTCOMES												PSO’s			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	1	1	-	-	1	1	-	-	-	-	1	-	-	-	-
CO2	3	1	1	1	2	1	1	-	-	-	-	1	-	-	-	-
CO3	3	2	2	1	1	1	1	-	-	-	-	1	-	-	-	-
CO4	3	2	2	1	1	1	1	-	-	-	-	1	-	-	-	-
CO5	2	1	1	1	1	1	1	-	-	-	-	1	-	-	-	-
Average	**2.8**	**1.4**	**1.4**	**1.0**	**1.0**	**1.0**	**1.0**	**-**	**-**	**-**	**-**	**1.0**	**-**	**-**	**-**	**-**

CH3124	ENGINEERING CHEMISTRY	L T P C
	(First semester - Common to all Branches)	3 0 0 3

OBJECTIVES

- To make the students familiar with boiler feed water requirements, related problems and domestic water treatment techniques.
- To introduce the basic concepts and applications of chemical thermodynamics.
- To acquaint the student with the principles of chemical kinetics and its applications towards engineering.
- To make the student conversant with the basics of surface chemistry and catalysis.
- To inculcate the students with the basics principles and preparatory methods of nanomaterials.

UNIT-I : WATER TECHNOLOGY **9**

Introduction-sources of water-impurities present in water-hard water and hardness – types, Municipal water treatment: primary treatment and disinfection - Desalination of brackish water: Reverse Osmosis, Boiler troubles: scale and sludge, caustic embrittlement, boiler corrosion priming and foaming, Treatment of boiler feed water – Internal treatment (phosphate, colloidal, sodium aluminate and Calgon conditioning). External treatment: Ion exchange process, cooling waters (Langelier index).

UNIT – II : CHEMICAL THERMODYNAMICS **9**

Introduction-terminology of thermodynamics, the first law of thermodynamics: enthalpy, second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions: Clausius inequality. Free energy and work function: Helmholtz and Gibbs free energy functions, Criteria of spontaneity; Gibbs-Helmholtz equation, Clausius-Clapeyron equation, Maxwell relations, Van't Hoff isotherm and isochore.

UNIT – III: CHEMICAL KINETICS **9**

Introduction-factors influencing the rate of reaction, order and molecularity of a reaction, kinetic equations of different orders (first, second and third order) - determination of the order of a reaction, the temperature dependence of reaction rates, unimolecular reactions, photochemical reactions and chain reactions, Theories of reaction rates, lasers in chemistry, fast reactions.

UNIT - IV : SURFACE CHEMISTRY AND CATALYSIS **9**

Adsorption: classification - adsorption of gases on solids - adsorption from solutions - adsorption isotherms - applications of adsorption - Freundlich's adsorption isotherm - Langmuir's adsorption isotherm, B.E.T isotherm. Catalysis: introduction - types of catalysis - criteria - autocatalysis - catalytic poisoning and catalytic promoters - acid - base catalysis - enzyme catalysis - Michaelis - Menten equation.

UNIT – V : NANOCHEMISTRY **9**

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties; Types of nanomaterials: Definition, properties and uses of - nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electrospinning. Applications of nanomaterials in medicine, agriculture, food science and energy resources.

Total Periods: 45

OUTCOMES

At the end of the course, the student should be able:

1. To infer the quality of water from quality parameter data and propose suitable treatment.
2. To apply the knowledge of chemical thermodynamics for material design and aspects
3. To recommend the proper chemical kinetics for engineering processes and applications.

4. To recognize the surface morphology and its engineering applications.
5. To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.

TEXT BOOKS

1. Payal B. Joshi and Shashank Deep, "Engineering Chemistry", Oxford University Press, New Delhi, 2019.
2. Shikha Agarwal, "Engineering Chemistry"-Fundamentals and Applications, 2nd Edition, Cambridge University Press, New Delhi, 2019.
3. P. C. Jain and Monika Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2019.

REFERENCES

1. R. V. Gadag and A. Nithyananda Shetty, "Engineering Chemistry", 3rd Edition, Wiley & I.K. International (P), LTD, New Delhi, 2019.
2. S.S. Dara and S.S. Umare, "A Text Book of Engineering Chemistry", 12th Edition, S. Chand & Company LTD, New Delhi, 2018.
3. B. Sivasankar, "Engineering Chemistry", Tata McGraw-Hill Publishing Company LTD, 2023.
4. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.

CH3124	PROGRAM OUTCOMES												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	2	3	2	-	1	3	-	-	-	-	2	-	-	-	-
CO2	3	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1		-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	2	1	-	1	-	-	-	-	2	1	-	-	-
Average	**2.8**	**1.8**	**2.2**	**1.2**	**1.0**	**1.0**	**2.0**	**-**	**-**	**-**	**-**	**2.0**	**1.0**	**-**	**-**	**-**

GE3131 BASIC ELECTRICAL AND ELECTRONICS AND INSTRUMENTATION ENGINEERING **L T P C 3 0 0 3**

COURSE OBJECTIVES

- To introduce the basics of electric circuits and analysis**.**
- To impart knowledge in the basics of working principles and application of electrical machines.
- To introduce analog devices and their characteristics.
- To educate on the fundamental concepts of digital electronics.
- To introduce the functional elements and working of measuring instruments.

UNIT- I : ELECTRICAL CIRCUITS **9**

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws –Independent and Dependent Sources – Simple problems- Nodal Analysis, Mesh analysis with independent sources only (Steady state) Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Steady state analysis of RLC circuits (Simple problems only).

UNIT-II : ELECTRICAL MACHINES **9**

Construction and Working principle- DC Separately and Self excited Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, working principle and Applications of Transformer, three phase Alternator, Synchronous motor and Three Phase Induction Motor.

UNIT- III : ANALOG ELECTRONICS **9**

Resistor, Inductor and Capacitor in Electronic Circuits- Semiconductor Materials: Silicon &Germanium – PN Junction Diodes, Zener Diode –Characteristics Applications – Bipolar Junction Transistor-Biasing, JFET, SCR, MOSFET, IGBT – Types, I-V Characteristics and Applications, Rectifier and Inverters.

UNIT-IV : DIGITAL ELECTRONICS **9**

Review of number systems, binary codes, error detection and correction codes, Combinational logic - representation of logic functions-SOP and POS forms, K-map representations – minimization using K maps (Simple Problems only).

UNIT-V : MEASUREMENTS AND INSTRUMENTATION **9**

Functional elements of an instrument, Standards and calibration, Operating Principle, types Moving Coil and Moving Iron meters, Measurement of three phase power, Energy Meter, Instrument Transformers-CT and PT, DSO- Block diagram- Data acquisition.

TOTAL: 45 PERIODS

COURSE OUTCOMES

At the end of the course, the student should be able:

1. Ability to compute the electric circuit parameters for simple problems
2. Ability to explain the working principle and applications of electrical machines
3. Ability to analyze the characteristics of analog electronic devices
4. Ability to explain the basic concepts of digital electronics
5. Ability to explain the operating principles of measuring instruments

TEXTBOOKS

1. Kothari DP and I.J Nagrath, “Basic Electrical and Electronics Engineering”, Second Edition, McGraw Hill Education, 2020.
2. S.K. Bhattacharya “Basic Electrical and Electronics Engineering”, Pearson Education, Second Edition, 2017.
3. Sedha R.S., “A textbook book of Applied Electronics”, S. Chand & Co., 2008.
4. James A. Svoboda, Richard C. Dorf, “Dorf’s Introduction to Electric Circuits”, Wiley, 2018.
5. A.K. Sawhney, Puneet Sawhney ‘A Course in Electrical & Electronic Measurements & Instrumentation’, Dhanpat Rai and Co, 2015.

REFERENCE BOOKS

1. Thomas L. Floyd, 'Digital Fundamentals', 11th Edition, Pearson Education, 2017.
2. Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th edition, 2017.
3. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
4. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010.

GE3135	PO												PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	2	2	-	-	3	-	-	-	-	-	2	-	2	-
CO2	3	2	-	-	-	2	-	2	-	-	-	-	1	2	-	2
CO3	2	3	2	2	-	-	-	-	-	-	-	-	3	-	-	-
CO4	3	3	1	-	3	-	2	-	-	-	-	-	1	-	3	-
CO5	3	3	2	1	-	-	1	-	-	-	-	-	2	1	-	2
Average	**2.8**	**1.8**	**1.7**	**3.0**	**2.0**	**2.0**	**2.0**	**-**	**-**	**-**	**-**	**1.8**	**1.5**	**2.5**	**2.0**	**-**

GE3111	தமிழர்மரபு	L	T	P	C
		1	0	0	1

அலகு I மொழி மற்றும் இலக்கியம் **3**

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

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

நடுகல் முதல் நவீன சிற்பங்கள் வரை –ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள் , பொம்மைகள்- தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள்

அலகு III நாட்டுபுறக் கலைகள் மற்றும் வீர விளையாட்டுகள் **3**

நாட்டுப்புற கதைகள், பாடல்கள்-தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து- ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம்- வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்

அலகு IV தமிழர்களின் திணைக் கோட்பாடுகள் 3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள்- தமிழர்கள் போற்றிய அறக்கோட்பாடு –தமிழ் சங்கம்-சங்கம் வளர்த்த தமிழ்- சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும்- சங்ககால நகரங்களும் துறைமுகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி

அலகு V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு 3

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு இந்தியா மற்றும் வெளிநாட்டின் பிற பகுதிகளின் தமிழ்ப் பண்பாட்டின் தாக்கம்- சுயமாரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு- கல்வெட்டுகள், கையெழுத்துப்படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு

Total Periods: 15 Hours

TEXT CUM REFERENCES:

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் – முனைவர். இல.சுந்தரம். (விகடன் பிரசுரம்)
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & 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 Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

GE3121 PHYSICS AND CHEMISTRY LABORATORY L T P C

(Common to all Branches of B.E./B.Tech. Programmes) **0 0 4 2**

PHYSICS LABORATORY (Any five experiments to be conducted)

OBJECTIVES:

- To familiarize with Physics principles and interpretation of experimental data.
- To elucidate the basics of quantum Physics, optics and thermal Physics.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student as an active participant in each part of all lab exercises.

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

1. Calculation of lattice cell parameter – X-ray diffraction method.

2. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer

3. (a). Compact disc- Determination of width of the groove using Laser.

   (b). Determination of particle size using Laser

4. (a) Determination of wavelength using Laser

   (b) Determination of acceptance angle and numerical aperture in an optical fiber.

5. Determination of Planck's constant using LED.

6. Determination of thickness of a thin wire – Air wedge method

7. Determination of wavelength of mercury spectrum – spectrometer grating

8. Determination of rigidity modulus – Torsion pendulum

9. Determination of Young's modulus by non-uniform bending method.

TOTAL: 30 PERIODS

OUTCOMES:

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

1. Understand the functioning of various physics laboratory equipment.
2. Use graphical models to analyze laboratory data.
3. Use mathematical models as a medium for quantitative reasoning and describing physical reality.
4. Access, process and analyze scientific information.
5. Solve problems individually and collaboratively.

REFERENCE

1. Wilson J.D. and Hernaandez Hall C.A., —Physics Laboratory Experiments, Houghton Mifflin Company, New York, 2005.
2. S. Srinivasan, A Text Book of Practical Physics, S. Sultan Chand publications. 2005.
3. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

GE3127	PROGRAM OUTCOMES												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
Average	3.0	2.4	2.6	1.0	1.0	-	-	-	-	-	-	-	-	-	-	-

CHEMISTRY LABORATORY: (Any five experiments to be conducted)

OBJECTIVES

- To inculcate experimental skills to test basic understanding of water quality parameters, such as acidity, alkalinity, hardness, DO, TDS, chloride, and chlorine.
- To familiarise the students with electroanalytical techniques like conductometry and flame photometry to determine the impurities in aqueous solution.
- To find the various characteristics of domestic water.
- To understand the Pseudo first-order kinetics reaction.
- To make the students know the synthesis of nanoparticles.

LIST OF EXPERIMENTS: (Any five experiments to be conducted)

- Determination of chloride content of water sample by Argentometric method.
- Determination of total, temporary & permanent hardness of water by EDTA method.
- Determination of DO content of water sample by Winkler's method.
- Preparation of Na2CO3 as a primary standard and estimation of acidity of a water sample using the primary standard.
- Determination of types and amount of alkalinity in water samples.
- Estimation of available chlorine in bleaching powder solution.
- Conductometric titration of barium chloride against sodium sulfate (Precipitation titration).
- Estimation of sodium /potassium present in water using a flame photometer.
- Estimation of TDS of a water sample by gravimetry.
- Preparation of nanoparticles (Ag/Au/TiO2/ZnO/CuO).
- Pseudo first-order kinetics- ester hydrolysis.

TOTAL: 30 PERIODS

OUTCOMES

At the end of the course, the student should be able:

1. To infer the quality of water samples for alkalinity, hardness, DO, TDS, chloride, and chlorine.
2. To apply the knowledge on the estimation of metal ions, acidity and its precipitation nature towards their process.
3. To recognize the threshold limit for various characteristics of domestic water.
4. To identify the simple method of synthesis of nanoparticles.
5. To understand the pseudo first-order kinetics reaction from ester hydrolysis.

TEXTBOOKS

1. Vogel's Textbook of Quantitative Chemical Analysis (8th Edition, 2014).
2. Suchi Tiwari, Engineering Chemistry Lab Manual, Scitech Publications (India) Pvt. Ltd. (2nd Edition, 2013).
3. Pushpendra Kumar, Laboratory Manual for Engineering Chemistry, Reyansh Authortopic Pvt. Ltd., (1st Edition, 2022).

GE3127	PROGRAM OUTCOMES												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	2	1	1	1	1	-	1	-	-	-	-	-	-	-	-	-
CO2	2	1	1	1	1	-	-	-	-	-	-	-	2	-	-	-
CO3	2	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
CO4	2	1	1	1	2	-	-	-	-	-	-	1	-	-	-	-
CO5	2	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-
Average	**2.0**	**1.0**	**0.8**	**1.0**	**1.2**	**-**	**1.0**	**-**	**-**	**-**	**-**	**1.0**	**2.0**	**-**	**-**	**-**

GE3138	ENGINEERING PRACTICES LABORATORY	L	T	P	C
	(Common to all Branches of B.E./B.Tech. Programmes)	0	0	4	2

COURSE OBJECTIVES:

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.
- To provide hands on training for fabrication of components using carpentry, sheet metal and welding equipment / tools
- To gain the skills for making fitting joints and assembling air conditioner
- To develop the skills for making simple electrical wiring connections using suitable tools
- To provide hands on experience for soldering and gain knowledge about the behavior of electronics components.

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE 15

Buildings:

a) Study of plumbing and carpentry components of residential and industrial buildings safety aspects.

Plumbing Works:

a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.

b) Study of pipe connections requirements for pumps and turbines.

c) Preparation of plumbing line sketches for water supply and sewage works.

d) Hands-on-exercise:

Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry works:

a) Study of the joints in roofs, doors, windows and furniture.

b) Hands-on-exercise:

Wood work, joints by sawing, planning and cutting.

II MECHANICAL ENGINEERING PRACTICE 15

Welding:

a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.

b) Gas welding practice - Study

Basic Machining:

a) Facing

b) Simple Turning

c) Step Turning

Sheet Metal Work:

a) Forming & Bending

b) Model making – Trays

Demonstration on:

a) Smithy operations, upsetting, swaging, setting down and bending.

b) Foundry operations like mould preparation for gear and step cone pulley.

c) Assembly of centrifugal pump

d) Assembly of air conditioner

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE 15

1. Residential house wiring using Switches, Fuse, Indicator, Lamp and Energy meter.
2. Fluorescent Lamp Wiring.

3. Staircase Wiring.
4. Measurement of Voltage, Current, Power and Power factor in electrical circuit.
5. Measurement of Energy using Analog & Digital Energy meter.
6. Measurement of Earth Resistance.
7. Study of Industrial house wiring.
8. Identification & Study of protective devices: Fuses & Fuse carriers, MCB, ELCB and Isolators with ratings and usage.

IV ELECTRONICS ENGINEERING PRACTICE 15

1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, RMS period, frequency) using CR.
2. Study of logic gates AND, OR, EX-OR and NOT.
3. Generation of Clock Signal.
4. Soldering practice – Components, Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

1. Carry out various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.
2. Fabricate carpentry components and pipe connections including plumbing works and use welding equipment's to join the structures.
3. Carry out the basic machining operations, make the models using sheet Metal works. Illustrate on centrifugal pump, air conditioner, operations of smithy, foundry and fittings.
4. Carry out basic home electrical works and measure the electrical quantities

5. Elaborate on the electronics components, gates and soldering practices.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.	15 Sets
2. Carpentry vice (fitted to work bench)	15 Nos.
3. Standard woodworking tools	15 Sets
4. Models of industrial trusses, door joints, furniture joints	5 each

MECHANICAL

1. Arc welding transformer with cables and holders	5 Nos.
2. Welding booth with exhaust facility	5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc.	5 Sets
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 Nos.
5. Centre lathe	2 Nos.
6. Hearth furnace, anvil and smithy tools	2 Sets
7. Moulding table, foundry tools	2 Sets
8. Power Tool: Angle Grinder	2 Nos.
9. Study-purpose items: centrifugal pump, air-conditioner	One each
10. Fitting tools, Hack saw frame, 12' file, hack saw blade	15 Nos.

ELECTRICAL

1. Assorted electrical components for house wiring	15 Sets
2. Fluorescent Lamp	15 Sets
3. Electrical measuring instruments	10 Sets
4. Analog & Digital energy meter	5 Sets

5. Megger 2

ELECTRONICS

1. Soldering guns 10 Nos.
2. Assorted electronic components for making circuits 50 Nos.
3. Small PCBs 10 Nos.
4. Multimeters 10 Nos.
5. Study purpose items: Telephone, FM radio, low-voltage power supply.

GE3138	PROGRAM OUTCOMES												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-
CO2	-	1	2	-	3	-	-	-	-	-	1		-	-	-	-
CO3	-	-	-	3	2	-	-	-	-	-	-	1	-	-	-	-
CO4	-	2	3	1	2	-	-	-	-	-	-		-	-	-	-
CO5	-	3	2	2	-	-	-	-	1	-	-		-	-	-	-
Average	3.0	2.0	2.3	2.0	2.3	1.0	-	-	1.0	-	1.0	1.0	-	-	-	-

EN3119 ENGLISH LANGUAGE LEARNING LABORATORY L T P C

0 0 2 1

COURSE OBJECTIVE:

The course aims to

- Enhance the employability and career skills of students.
- Orient the students towards grooming as a professional.
- Make them industry ready.
- Develop their confidence and help them attend interviews successfully.
- Help students to interact confidently in a professional scenario.

UNIT 1: PRONUNCIATION 6

Tone- Pronunciation – Intonation- Reading Aloud and Addressing- Syllable- Rhythm- Accent- Wrongly Pronounced words -Poetry Reading

UNIT 2: NON VERBAL COMMUNICATION 6

Non Verbal Communication - Facial expressions- Eye contact - Subtle (and not so subtle) gestures -Tone of voice – Touch- Posture -Personal space.

UNIT 3: SELF INTRODUCTION AND PRESENTATION 6

Self Introduction- Introducing oneself to the audience- Introducing the Topic – answering questions – Individual Presentation Practice – Presenting Visuals effectively - 5 Minute Presentations.

UNIT 4: BASICS OF SOFT SKILLS 6

Recognizing differences between groups and teams – managing time – networking professionally – Respecting social protocols- understanding career management – Developing a long - term career plan- making career changes.

UNIT 5: GROUP DISCUSSION 6

Introduction to Group Discussion – Participating in Group discussions – Understanding group dynamics – Brainstorming the Topic – Questioning and Clarifying – GD Strategies – activities to improve GD Skills.

TOTAL: 30 PERIODS

COURSE OUTCOME:

At the end of the course, the learners will be able to:

1. Pronounce the words correctly.
2. Understand the nonverbal clues.
3. Make an effective presentation.
4. Adequate soft skills required for the workplace.
5. Participate confidently in Group Discussions.

REFERENCES:

1. Professional Communication by Meenakshi Raman & Sangeeta Sharma, Oxford Univ.Press, 2014.
2. Soft Skills by S. Hariharan , N. Soundarajaran and S.P. Shanmugapriya MJP Publishers, Edition: 2013
3. Soft Skills for Everyone by Butterfield , Jeff, Cengage Learning India Pvt. Ltd.,2015. New Delhi..

EN3119	PROGRAM OUTCOMES												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	-	-	-	1	-	-	-	-	-	3	-	1	-	-	-	-
CO2	1	1	-	-	-	-	1	-	-	2	-	1	-	-	-	-
CO3	2	2	1	2	2	-	-	-	-	3	-	1	-	-	-	-
CO4	2	1	1	-	-	-	3	-	-	3	-	1	-	-	-	-
CO5	-	1	-	1	-	-	-	-	-	3	-	1	-	-	-	-
Average	**1.6**	**1.2**	**1**	**1.3**	**2**	**-**	**2**	**-**	**-**	**2.8**	**-**	**1**	**-**	**-**	**-**	**-**

EN3211 **PROFESSIONAL ENGLISH – II** **L T P C**

3 0 0 3

OBJECTIVES

The course prepares the second semester Engineering students

- To develop strategies and techniques to enhance their reading skills.
- To engage them in meaningful activities in order to improve their listening, speaking, reading and writing skills.
- To improve their ability to write effective job application, resumes and draft impressive reports.
- To develop analytical thinking skills for problem solving in communicative contexts.
- To participate in group discussions.

UNIT – I: MAKING COMPARISON **9**

Listening: Clippings of Ted talk, cartoon and interviews of sports personalities for listening and discussion.

Speaking: Descriptions and discussions based on newspaper.

Reading: Learning shades of meaning (using Thesaurus) and inferring the context from general passages.

Writing: Compare & Contrast essays and Jumbled Sentences.

Language and Vocabulary development: Prepositional phrases, contextual meaning of words. Verbal Analogy, Same word used as Noun and Verb.

UNIT – II: EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING **9**

Listening: Anecdotes to be read from books like Chicken Soup books. Evaluative listening – Advertisement and Product description.

Speaking: Marketing a product, persuasive speech

Reading: Description of any product / jewellery, Brochures and Manual.

Writing: Formal letters- letters of complaint, appreciation, and suggestion, Comprehension and E-mail (formal)

Language and Vocabulary development: Active & Passive, Infinitive, Gerund, Purpose Statements, Adverbs and Word formation

UNIT – III: ABILITY TO PUT IDEAS OR INFORMATION COGENTLY 9

Listening: Listen to English songs and find the lyrics/new words

Speaking: Role play and Interviews

Reading: Reading magazine articles, Excerpts from literary texts

Writing: Job Application, Resume, Cover letter, SWOC Analysis and Recommendations.

Language and Vocabulary development: Correction of errors, If conditional, Sentence completion and Connotations.

UNIT – IV: ANALYZING PROBLEMS AND EXPRESSING SOLUTIONS 9

Listening: Watching Stand-up comedies and comprehending ideas expressed there.

Speaking: Speak about the Stand-up comedies viewed and express personal views about the same

Reading: Reading different types of books (novels, short stories, biographies, magazines etc. and speaking about the same.

Writing: Dialogue Writing, Checklist and Problem Solving essays.

Language and Vocabulary development: Reported Speech, Modals, Slogan writing and Conjunctions.

UNIT – V: REPORTING EVENTS 9

Listening: Listening to spot errors, listening to varied dialects and accents of English.

Speaking: Group discussion- Expression of opinions, assertion, coercion etc.

Reading: Reading life experiences of common man from magazines.

Writing: Accident Report / Survey Report and Letters to the Editor.

Language and Vocabulary development: Numerical Adjective, Idioms, Vocabulary – Shades of Meaning.

TOTAL: 45 PERIODS

COURSE OUTCOME

At the end of the course, learners will be able to

1. To compare and contrast ideas and information from technical texts.
2. To incorporate basic grammar structures to express appreciation, suggestion and complaint in writing**.**
3. To draft effective resumes using appropriate vocabulary and to avoid common errors.
4. To analyse problems so as to arrive at appropriate solutions and to communicate relevantly.
5. To draft technical reports, letters and to express ideas creatively.

TEXT BOOKS:

1. English for Science and Technology Cambridge University Press,2021. Dr.Veena Selvam, Dr.Sujatha Priyadarshini, Dr. Deep Mary Francis, Dr.K.N.Shoba and Dr.Lourdes Joevani, Department of English, Anna University.
2. Technical Communication – Principles and Practice by Meenakshi Raman & Sangeeta Sharma, Oxford Univ.Press, 2016, New Delhi.
3. Technical English for Professional – Advanced by C. Gangalakshmi, B. Rathika and L. Saranraj, Cengage Learning India Pvt. Ltd.,2022.

REFERENCES:

1. Learning to communicate – Dr. V. Chellammal, Oxford Univ.Press,2001 New Delhi.
2. Business Correspondence and Report Writing by Prof. R. C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.

3. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd. 1990, Delhi.
4. Improve Your Writing ed. V.N Arora Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.
5. English For Engineers and Technologists, Orient Blackswan Private Ltd. Department of English, Anna University, 2020.

EN3211	PROGRAM OUTCOMES												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	-	1	2	1	-	-	-	-	-	3	-	1	-	-	-	-
CO2	2	2	1	2	2	-	-	-	-	3	1	1	-	-	-	-
CO3	-	-	1	-	-	-	-	-	-	3	-	-	-	-	-	-
CO4	2	3	2	3	-	-	2	-	-	3	-	-	-	-	-	-
CO5	2	-	1	-	-	-	-	-	-	2	-	-	-	-	-	-
Average	2.0	2.0	1.4	2.0	2.0	-	2.0	-	-	2.8	1.0	1.0	-	-	-	-

MA3222 STATISTICS AND NUMERICAL METHODS L T P C

3 1 0 4

OBJECTIVES:

- This course aims at providing the necessary basic concepts of statistical and Numerical Methods for solving numerically different problems of engineering and Technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and differentiation and integration in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT- I: STATISTICAL HYPOTHESIS TESTS 9L+3T

Sampling distributions - Tests for single mean and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

UNIT- II : EXPERIMENTAL DESIGN FOR ANOVA 9L+3T

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design.

UNIT-III: SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS 9L+3T

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton - Raphson method - Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative method of Gauss Seidel – Dominant Eigenvalue of a matrix by Power method.

UNIT-IV: INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION **9L+3T**

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical integrations using Trapezoidal, Simpson's rules.

UNIT-V: NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS **9L+3T**

Single step methods: Taylor's series method - Euler's method - Modified Euler's method Fourth order Runge-Kutta method for solving first order equations - Multi step methods: Milne's and Adams -Bash forth predictor corrector methods for solving first order equations. **TOTAL: 45L+15T PERIOD**

OUTCOMES:

- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications design of experiments in the field of agriculture.
- Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
- Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
- Solve the ordinary differential equations with initial and boundary conditions by using certain techniques with engineering application.

TEXT BOOKS:

1. Grewal. B.S. and Grewal. J.S., "Numerical Methods in Engineering and Science ", 10th Edition, Khanna Publishers, New Delhi,2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition,2015.

REFERENCE BOOKS:

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning,

2016.

2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Gerald.C.F., Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, NewDelhi, 2006.

MA3222	PROGRAM OUTCOMES												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Average	3.0	3.0	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-

PH3221 PHYSICS FOR CIVIL ENGINEERING L T P C

3 0 0 3

OBJECTIVES:

- To understand the concepts of heat transfer through different materials and to study the thermal performance of buildings.
- To impart knowledge on the ventilation and acoustics of buildings.
- To explore the concepts of lighting designs.
- To gain knowledge on the processing and applications of new engineering materials.
- To create an awareness of natural disasters and safety measures.

UNIT- I: THERMAL PERFORMANCE OF BUILDINGS 9

Principles of heat transfer - fenestrations - thermal conductivity - conduction through compound media: series and parallel - spherical, cylindrical shell method - conductivity of rubber tube - thermal insulation and its benefits - heat gain and heat loss estimation - factors affecting the thermal performance of buildings - shading devices.

UNIT- II: VENTILATION AND ARCHITECTURAL ACOUSTICS 9

Principles of natural ventilation - ventilation measurements - Window type air conditioner - Protection against fire to be caused by A.C. systems - classification of sound - decibel - Weber-Fechner law - Sabine's formula (reverberation time) - derivation using growth and decay method - absorption coefficient and its determination - factors affecting acoustics of buildings and their remedies - methods of sound absorptions - absorbing materials - noise and its measurements - impact of noise in multi-storeyed buildings.

UNIT- III: LIGHTING DESIGNS 9

Radiation quantities - spectral quantities - relationship between luminescence and radiant quantities - photometry: cosines law, inverse square law. Vision - photobic, mesophic, scotopic visions - Visual field glare - day light calculations - day light design of windows - use of models and artificial skies - principles of artificial lighting - types of light fixtures - supplementary artificial lighting.

UNIT- IV: NEW ENGINEERING MATERIALS **9**

Composites: Fibre-reinforced plastics (FRP) and fiber-reinforced metals (FRM) - Metallic glasses - melt spinning method - properties and applications - Shape memory alloys - characteristics and applications - Ceramics - manufacturing methods - Slip casting - Isostatic pressing - properties and applications - Nanomaterials - Top-down and bottom-up approaches - structural applications.

UNIT- V: NATURAL DISASTERS **9**

Seismology and Seismic waves - Earthquake ground motion - Basic concepts and estimation techniques - site effects - Probabilistic and deterministic Seismic hazard analysis - Cyclone and flood hazards - Fire hazards and fire protection, fire-proofing of materials, fire safety regulations and firefighting equipment - Prevention and safety measures.

TOTAL: 45 PERIODS

OUTCOMES:

After completion of the course, the students should be able to

- Understand heat transfer through different materials, thermal performance of buildings and thermal insulation.
- Gain knowledge on the ventilation of buildings and understand the acoustics of buildings.
- Know the concepts of lighting designs.
- Gain knowledge on the new engineering materials and their applications in civil engineering.
- Get an awareness on natural disasters such as earth quake, cyclone, fire,flood and safety measures.

TEXT BOOKS:

1. Marko Pinteric, Building Physics, Springer 2017.
2. D.S.Mathur. Elements of Properties of Matter. S Chand & Company , 2010.
3. Hugo Hens, Building Physics: Heat, Air and Moisture, Wiley, 2017
4. Vibrations, Waves, and Acoustics, 8th Edition by D. Chattopadhyay and P. C. Rakshit, Books & Allied Ltd; 2010.

5. V.Raghavan, Engineering Physics, Tata McGraw Hill.

REFERENCES:

1. W.R.Stevens. Building Physics: Lighting. Pergamon Press, 2013.
2. Hugo Hens, Applied Building Physics, Wiley, 2016.
3. K.G.Budinski and M.K.Budinski. Engineering Materials: Properties and Selection. PearsonEducation, 2016.
4. Peter A. Claisse, Civil Engineering Materials, Elsevier, 2016.
5. Patrick L. Abbott, Natural Disasters, McGraw-Hill, 2017.

Online Resources:

1. Architectural Acoustics by K.B.Ginn , Brüel & Kjaer.
2. Ceramic Matrix Composites,Walter Krenkel, 9783527622405,Wiley, 2008.
3. https://archive.nptel.ac.in/courses/105/104/105104183/

PH3221	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	2	2	-	2	2	2	-	-	-	-	1	-	-	-	-
CO2	3	2	2	2	1	2	2	-	-	-	-	1	-	-	-	-
CO3	3	1	2	1	2	2	1	-	-	-	-	1	-	-	-	-
CO4	3	-	1	1	2	2	1	-	-	-	-	1	-	-	-	-
CO5	2	2	2	2	2	2	2	-	-	-	-	1	-	-	-	-
Average	1.8	1.8	1.5	1.8	2.0	1.6	-	-	-	-	-	1	-	-	-	-

CH3221 **CHEMISTRY OF CONSTRUCTION MATERIALS** **L T P C**

(Second Semester-B.E., Civil Engineering) **3 0 0 3**

OBJECTIVES

- To understand the basic knowledge of electrochemistry, corrosion and its control methods.
- To become skilled at using the basic ideas and applications of phase rule and alloys.
- To provoke the students to familiarize with the basic engineering materials and their applications.
- To be aware of the fundamentals of building materials and their applications.
- To know the limit and uses of techniques for analyzing materials.

UNIT - I : ELECTROCHEMISTRY AND CORROSION **9**

Electrode - electrode reaction - redox reaction - origin of electrode potential, oxidation potential - reduction potential - measurement and applications, electrochemical series and its significance - electrochemical cell - Nernst equation (derivation). Corrosion - causes - factors - types - chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control - material selection and design aspects - electroplating of Au - electroless plating of Ni - paints - constituents and function.

UNIT – II : PHASE RULE AND ALLOYS **9**

Phase rule: introduction, the definition of terms with examples, one component system (water system) - reduced phase rule - construction of phase diagram by thermal analysis - simple eutectic systems, two-component systems (Zn-Mg system). Alloys: introduction - definition- properties of alloys - significance of alloying, functions and effect of alloying elements- ferrous alloys - Nichrome and stainless steel - types (18/8) - heat treatment of steel, non-ferrous alloys - brass and bronze.

UNIT - III : ENGINEERING MATERIALS **9**

Abrasives - natural abrasives, artificial abrasives. Refractories - properties - manufacture, common refractory bricks, insulating refractories, cermets, inorganic cermeting materials. Engineering plastics-thermoplastic - thermosetting plastics, Composite materials: Reinforced or filled plastics, polymer blends and alloys.

UNIT- IV : BUILDING MATERIALS **9**

Lime - classification - manufacture and properties of lime - cement - classification - portland cement - chemical composition - manufacture of portland cement by wet method - setting and hardening - analysis of cement - concretes - hot and cold weathering of concrete cement and its prevention methods - special cement - plaster of paris. Glass - manufacture, types, properties and uses - recent trends in construction materials.

UNIT - V : ANALYTICAL TECHNIQUES **9**

Introduction, absorption of radiation, types of spectra, UV-Visible and IR Spectrophotometer: Instrumentation and applications. Thermal methods of analysis TGA, DTA, DSC. Scanning electron microscopy and Mercury intrusion porosimetry (working principle and applications).

Total: 45 Periods

OUTCOMES

At the end of the course, the student should be able:

1. To build up confidence in the importance of electrochemistry and corrosion.
2. To infer a solid foundational knowledge in phase rule systems and alloys.
3. To recognise engineering materials and uses.
4. To recommend selecting building materials for engineering works and applications.
5. To identify suitable technology in analytical aspects.

TEXTBOOKS

1. P. C. Jain and Monica Jain, “Engineering Chemistry”, 18th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2021.
2. S.S. Dara and S.S. Umare, “A Text Book of Engineering Chemistry”, 12th Edition, S. Chand & Company LTD, New Delhi, 2018.
3. Shashi Chawla,” A Text Book of Engineering Chemistry”, Dhanpat Rai & amp; Co (P) Limited, New Delhi, 2017.

REFERENCES

1. O.G. Palanna, “Engineering Chemistry”, 2nd Edition, McGraw Hill Education (India) Private Limited, 2017.
2. Shikha Agarwal, “Engineering Chemistry-Fundamentals and Applications”, 2nd Edition, Cambridge University Press, New Delhi, 2019.
3. P. Purushothama Raj, “Building Construction Materials and Techniques”, Pearson Education India, 2016.
4. Haimai Zhang, “Building Materials in Civil Engineering” Woodhead Publishing; United Kingdom, 2016.

CH3221	PROGRAM OUTCOMES												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	2	-	1	1	-	-	-	-	2	-	2	1	-
CO4	3	-	2	3	-	1	1	-	-	-	-	3	-	2	1	1
CO5	2	1	2	3	3	-	-	-	-	-	-	-	-	0.8	0.4	0.2
Average	**2.0**	**2.0**	**2.0**	**3.0**		**1.0**	**1.0**	**-**	**-**	**-**	**-**	**2.5**	**-**	**1.6**	**0.8**	**0.6**

GE3231 PROBLEM SOLVING AND PYTHON PROGRAMMING L T P C

(Common to All branches) **3 0 0 3**

OBJECTIVES:

- To know the basics of Python programming
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures and its implementation – lists, tuples, dictionaries.
- To understand Object Oriented Concept in Python.

UNIT – I : PYTHON BASICS 9

Introduction to Python – Literals – Variables and Identiiers – Data Types – Input Operation – Comments – Reserved words – Indentation – Operators and Expressions – Modes of python. Conditionals: Boolean values and operators - conditional if - alternative if - chained conditional - Iteration, Illustrative programs: Basic Arithmetic Operations, GCD of numbers, Square root (Newton's Method).

UNIT- II : FUNCTIONS, LIST, TUPLES 9

Functions, function definition and use. **Fruitful functions:** return values, parameters, local and global scope, recursion. **Lists:** list operations, list slices, list methods, list loop, mutability, list parameters; **Tuples:** tuple assignment, tuple as return value. Comparison of Lists and tuples. Illustrative programs: exchange the values of two variables, square root, Linear and Binary search. Fibonacci series using functions.

UNIT – III : STRINGS, DICTIONARY, SET 9

Strings: string slices, immutability, string functions and methods, string module. **Dictionaries:** Operations (create, access, add, remove) and methods. (Insert, delete).Set operation (Access, Add, Remove). Illustrative programs: creates a dictionary of radius of a circle and its circumference.

UNIT- IV : FILES, EXCEPTIONS, MODULES AND PACKAGES 9

Files and exception: Text Files, Reading and Writing files, Format operator; Errors and Exceptions, Handling Exceptions, Multiple Except blocks, Modules, Packages; Illustrative programs: word count, copy file, Creating user defined Exceptions.

UNIT- V : CLASSES AND OBJECTS 9

Classes and Objects: Introduction, Classes and Objects, Defining Classes, Creating Objects, Data Abstraction and Hiding, The Class Method and Self Argument, The __init__( ) method, Class Variables and Object Variables, Public and Private data members, Private Methods. Illustrative Programs: Creating Student Class and Objects.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, learners will be able to:

- Develop simple computational problems using control flow statements.
- Decompose a Python program into functions, Modules and Packages.
- Represent compound data using Python lists, tuples, Strings, Set and dictionaries.
- Read and write data from/to files and Exception handling in Python Programs.
- Understand the concepts of Object Oriented Programming.
- To develop real time applications.

TEXT BOOKS:

1. Reema Thareja, **"Python Programming using Problem solving Approach",** Oxford Higher Education,2018.
2. Allen B. Downey, **"Think Python: How to Think Like a Computer Scientist"**, 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)
3. Guido van Rossum and Fred L. Drake Jr, **"An Introduction to Python**" – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

1. Charles Dierbach, **"Introduction to Computer Science using Python: A Computational Problem-Solving Focus**", Wiley India Edition, 2013.
2. John V Guttag, **"Introduction to Computation and Programming Using Python''**, Revised and expanded Edition, MIT Press , 2013
3. Kenneth A. Lambert, **"Fundamentals of Python: First Programs"**, CENGAGE Learning, 2012.
4. Paul Gries, Jennifer Campbell and Jason Montojo, **"Practical Programming: An Introduction to Computer Science using Python 3"**, Second edition, Pragmatic Programmers,LLC,2013.
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, **"Introduction to Programming in Python: An Inter-disciplinary Approach"**, Pearson India Education Services Pvt. Ltd., 2016.

WEB REFERENCES:

1. http://greenteapress.com/wp/think-python/
2. www.docs.python.org
3. https://nptel.ac.in/courses/106/106/106106182/

GE3231	PO												PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	3	3	2	-	-	-	-	-	2	2	2	-	-	1
CO2	3	3	3	3	2	-	-	-	-	-	2	2	-	-	3	-
CO3	3	3	3	3	2	-	-	-	-	-	2	-	-	-	1	-
CO4	2	2	-	2	2	-	-	-	-	-	1	-	3	-	2	-
CO5	1	2	-	-	1	-	-	-	-	-	1	-	-	-	-	1
CO6	2	2	-	-	2	-	-	-	-	-	1	-	1	-	-	-

GE3211 தமிழரும் தொழில்நுட்பமும் L T P C

1 0 0 1

அலகு I <u>நெசவு மற்றும் பானைத் தொழில்நுட்பம் :</u> 3

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

அலகு II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம் 3

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

அலகு III உற்பத்தித் தொழில்நுட்பம் : 3

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

அலகு IV வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் : 3

அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக

வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார் சமூகம்.

அலகு V அறிவியல் தமிழ் மற்றும் கணித்தமிழ் : 3

அறிவியல் தமிழின் வளர்ச்சி – கணித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின்பதிப்பு செய்தல் – தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகம் – தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம்.

TOTAL : 15 PERIODS

TEXT – CUM – REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு : தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி / வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by : International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by : International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by : International Institute of Tamil Studies.)

9. Keeladi – ‘Sangam City Civilization on the banks of river Vaigal’ (Jointly Published by : Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by : The Author)
11. Porunai Civilization (Jointly Published by : Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by : RMRL) – Reference Book.

GE3211 TAMILS AND TECHNOLOGY L T P C

1 0 0 1

UNIT- I : WEAVING AND CERAMIC TECHNOLOGY 3

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

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY 3

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

UNIT III MANUFACTURING TECHNOLOGY 3

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

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

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

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING 3

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

TOTAL : 15 PERIODS

TEXT – CUM – REFERENCE BOOKS

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

GE3237 ENGINEERING GRAPHICS AND DESIGN L T P C

(Common to all branches of B.E. / B.Tech. Programmes) **1 0 4 3**

OBJECTIVES:

The main learning objective of this course is to impart knowledge

1. To draw the conics curves and special curves.
2. To draw the orthographic projection of lines and plane surfaces.
3. To draw the projections and solids and Isometric projection of simple solids.
4. To draw the projections and solids and Isometric projection of simple solids.
5. To draw free hand sketching of basic geometrical constructions, multiple views of objects and Perspective Projection of simple solids.

CONCEPTS AND CONVENTIONS (Not for Examination) 1

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT-I: PLANE CURVES AND SPECIAL CURVES 11

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid (Rolling Circle rolls on flat surface only). construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

UNIT-II: PROJECTION OF POINTS, LINES AND PLANE SURFACES 12

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

UNIT-III: PROJECTION OF SOLIDS AND ISOMETRIC PROJECTION 12

Projection of simple solids like prisms, pyramids, cylinders and cones when the axis is inclined to one of the principal planes by the rotating object method. Principles of isometric projection – isometric scale – Isometric projections of simple solids - Prisms, pyramids, cylinders, cones - isometric view of the object from the 2D coded plan.

UNIT-IV: PROJECTION OF SECTIONED SOLIDS & DEVELOPMENT OF SURFACES 12

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

UNIT-V: FREE-HAND SKETCHING AND PERSPECTIVE PROJECTIONS 12

Free Hand sketching: Visualization principles – Representation of Three-Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects. Perspective projection of simple solids-Prisms and pyramids by visual ray method.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

Upon completion of this course, the students will be able:

1. To construct the conics curves and special curves.
2. To construct the orthographic projection of lines and plane surfaces.
3. To construct the projections and solids and Isometric projection of simple solids.
4. To construct projections of section of solids and development of surfaces.
5. To construct free hand sketching of basic geometrical constructions, multiple views of objects and Perspective Projection of simple solids.

TEXTBOOKS:

1. N.D.Bhatt, “Engineering Drawing (Plane and Solid Geometry)”, Charotar Publishing House PVT. LTD. 53rd Edition 2019 (Fifth Reprint).

2. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 15th Edition 2018.

REFERENCES :

1. T. Jeyapoovan, “Engineering Graphics Using Auto CAD”, Vikas Publishing House Pvt. LTD, seventh Edition, 2015.
2. Luzzader, Warren.J. and Duff, John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production”, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
3. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2011.
4. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2011.
5. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2013.

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.

2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.

3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.

4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.

5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.

2. All questions will carry equal marks of 20 each making a total of 100.

3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scales to fit solutions within A3 size.

4. The examination will be conducted in appropriate sessions on the same day.

GE3237	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	2	-	3	-	1	-	-	-	1	3	-	2	2	1	1	1
CO2	2	-	3	-	1	-	-	-	1	3	-	2	2	1	1	1
CO3	2	-	3	-	1	-	-	-	1	3	-	2	2	1	1	1
CO4	2	-	3	-	1	-	-	-	1	3	-	2	2	1	1	1
CO5	2	-	3	-	1	-	-	-	1	3	-	2	2	1	1	1
Average	2.0	-	3.0	-	1.0	-	-	-	1.0	3.0	-	2.0	2.0	1.0	1.0	1.0

GE3232	PROBLEM SOLVING AND PYTHON	L T P C
	PROGRAMMING LABORATORY	0 0 4 2

COURSE OBJECTIVES:

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, and dictionaries.
- Read and write data from/to files in Python.
- Knowing about Object Oriented Concepts.

LIST OF PROGRAMS

1. Compute the GCD of two numbers.
2. Find the square root of a number. (Newton's method)
3. Find exponentiation of a number. (power of a number)
4. Find the maximum of a list of numbers.
5. Program for basic calculator operations using functions.
6. Generate Fibonacci series using function.
7. Program for Armstrong number.
8. Program for check the number is Palindrome or Not.
9. Program for sum of array of numbers.
10. How to create, slice, change, add, delete and index elements using list.
11. Linear search and Binary search.
12. Find First n prime numbers.
13. Program to remove duplicate elements from a list.
14. Program for addition and transpose of a matrix.
15. How to create, slice, change, delete and index elements using Tuple.
16. Write a program to reverse the string.
17. How to change, delete, add and remove elements in Dictionary.
18. Create a dictionary of radius of circle and its circumference.
19. Program for count the number of words in a file.

20. Find the most frequent words in a text read from a file.
21. Program for student information system using class and objects.
22. Program for Employee Payroll Processing using class and objects.

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

TOTAL: 60 PERIODS

GE3232	PO												PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	3	3	3	-	-	-	-	-	3	2	1	3	-	-
CO2	3	3	3	3	3	-	-	-	-	-	3	2	-	-	2	-
CO3	3	3	3	3	2	-	-	-	-	-	2	-	-	3		2
CO4	3	2	-	2	2	-	-	-	-	-	1	-	-	-	1	-
CO5	1	2	-	-	1	-	-	-	-	-	1	-	1	-	2	2
CO6	2	-	-	-	2	-	-	-	-	-	1	-	1	-	1	-

GE3221 ENGINEERING SCIENCES LABORATORY L T P C

0 0 4 2

PHYSICS LABORATORY

OBJECTIVES:

- To gain practical knowledge and to co-relate with the theoretical studies.
- To achieve perfectness in experimental skills and the study of practical applications.
- To bring more confidence and ability to develop and fabricate engineering and technical equipment.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To make the student as an active participant in each part of all lab exercises.

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LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

1. Determination of the electrical conductivity of metals by plotting a current-voltage characteristic curve.
2. Determination of band gap of a semiconductor.
3. Determination of Fermi energy. (Measurement of Fermi energy in copper).
4. Study of I-V characteristics of solar cell and determination of its efficiency
5. Determination of electrical resistivity of metal and alloy –Carey foster Bridge.
6. Measurement of susceptibility of paramagnetic solution by Quinke's method.
7. Study of magnetic Hysteresis-B-H curve.
8. Determination of the dark resistance of light detective resister (LDR).
9. Measurement of Temperature using LM35.

TOTAL: 30 PERIODS

OUTCOMES:

At the end of the course, the students should be able

1. To understand the functioning of various physics laboratory equipment.

2. To use graphical models to analyze the laboratory data and to solve problems individually and collaboratively.
3. Use mathematical models as a medium for quantitative reasoning and describing physical reality.
4. Access, process and analyze scientific information.
5. Solve problems individually and collaboratively.

TEXTBOOKS:

1. Wilson J.D. and Hernandez C.A., —Physics Laboratory Experimentsǁ, Houghton Mifflin Company, New York, 2005.
2. S. Srinivasan, A Text Book of Practical physics, S. Sultan Chand publications. 2005
3. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

GE3221	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	1	1	-	-	-	-	-		-	-	-		-
CO3	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-

CHEMISTRY LABORATORY:

OBJECTIVES

- To train the students in basic experimental skills in water contaminants such as copper and chromium.
- To familiarise the students with electroanalytical techniques such as pH metry, potentiometry, and conductometry to determine impurities in aqueous solutions.
- To familiarize the students with the determination of the molecular weight of a polymer by a viscometer.
- To make the student up-to-date with the properties and nature of alloys experimentally.
- To demonstrate the analysis of coal.

LIST OF EXPERIMENTS: (Any five experiments to be conducted)

1. Estimation of copper content of the given solution by Iodometry.
2. Determination of strength and amount of acids in a mixture of acids using a conductivity meter.
3. Determination of strength and amount of HCl present in the whole of the given solution using a conductivity meter.
4. Estimation of the iron content of the given solution using a potentiometer.
5. Determination of chromium by EDTA titration.
6. Determination of strength of given hydrochloric acid using a pH meter.
7. Determine the molecular weight of the polyvinyl alcohol using an Ostwald viscometer.
8. Estimation of Nickel in steel.
9. Proximate Analysis of Coal.
10. Corrosion experiment-weight loss method.
11. Determination of COD value of industrial effluents.

TOTAL: 30 PERIODS

OUTCOMES

At the end of the course, the student should be able:

1. To find the quality of water samples for copper and chromium present in water.
2. To recognize the amount of various ions present in the water sample through volumetric and instrumentation techniques.
3. To identify the molecular weight of the polymer using an Ostwald viscometer.
4. To recognize an environmental hazardous and threshold limit for industrial effluents.
5. To recommend quality of coal and steel when it is exposed to various environment.

TEXT BOOKS:

1. Vogel's Textbook of Quantitative Chemical Analysis (8th Edition, 2014).
2. Suchi Tiwari, Engineering Chemistry Lab Manual, Scitech Publications (India) Pvt. Ltd. (2nd Edition, 2013).
3. Pushpendra Kumar, Laboratory Manual for Engineering Chemistry, Reyansh Authortopic Pvt. Ltd., (1st Edition, 2022).

GE322	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	2	1	1	1	1	-	1	-	-	-	-	-	-	-	-	-
CO2	2	2	1	1	1	-	-	-	-	-	-	-	-	2	-	-
CO3	2	1	1	1	2	-	-	-	-	-	-	-	-	-	-	-
CO4	2	2	1	1	1	2	2	2	-	-	-	-	-	-	-	-
CO5	2	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-

GE3251 **NSS/YRC/NSO & CLUB ACTIVITIES** **L T P C**

0 0 1 1#

Unit – 1 : NATIONAL SERVICE SCHEME (NSS)

Objectives:

The main objectives of this course are:

- To help learners know about NSS in the context of youth, community and voluntary service.
- To teach the importance of health, hygiene and sanitation for a healthy Nation.
- To understand the community in which they work.
- To identify the problems of the community and involve them in problem-solving.
- To develop the capacity to meet emergencies and natural disasters.
- To practice the National integration and social harmony.
- To utilize their knowledge in finding practical solutions to individual and community

Credit:

Total Lecture Hours / Semester	Total Tutorial Hours / Semester	Total Practical Hours / Semester	Credit
6	0	18	1*

* To be conducted after college hours and week ends

Outcome:

Learners will have the knowledge about NSS and its role in the fields of health, hygiene, emergencies & natural disasters and involve them in problem-solving of the nearest community so as to build a strong country.

Syllabus:

Semester : I&II Attendance weightage : 50 Activities weightage : 50

Topic - I : Introduction and Basic Concepts of NSS **[8]**

a. History – Aim – Objectives of NSS

b. Emblem – Motto – Badge - Song

c. Organizational structure - Roles and Responsibilities of NSS

d. Regular activities

e. Any approved indoor / outdoor programs by the Principal

Topic-II : Youth Leadership, Social Harmony and National Integration [8]

a. Meaning and types of Leadership

b. Qualities of good leaders and leadership

c. Importance and role of youth leadership

d. Role of youth in peace and Nation building

e. Any approved indoor / outdoor programs by the Principal

Topic-III : Health, Hygiene and Sanitation and Youth Health [8]

a. Definition, Needs and Scope of Health Education

b. Swachh Bharat Abhiyan

c. Healthy Lifestyles

d. HIV, AIDS, Drugs abuse

e. Any approved indoor / outdoor programs by the Principal

Topic-IV : Environment Issues, Emergencies and Disaster Management [8]

a. Environment conservation, enrichment and sustainability

b. Waste management

c. Natural resource management [Rain water harvesting and Energy conservation]

d. Introduction to Disaster Management, Classification of Disasters

e. Any approved indoor / outdoor programs by the Principal

References:

1. National Service Scheme Manual (Revised) 2006, Government of India, Ministry ofYouth Affairs and Sports, New Delhi.
2. National Youth Policy, Government of India, Ministry of Youth Affairs and Sports, New Delhi.
3. https://nss.gov.in/

NSS/NCC/NSO/YRC & CLUB ACTIVITIES

National Sports Organization (NSO)

OBJECTIVES:

1. To create awareness about basic fitness and mental strength
2. To promote the development of physical fitness
3. To develop the sporting activities of the youth
4. To create the social responsibilities and social interaction through participation

ACTIVITIES **5**

INTRODUCTION - Introduction of NSO & Physical Fitness and games Skills Test **(1)**

PHYSICAL FITNESS ACTIVITIES - Importance of Basic Physical Fitness - BMI Calculation - Identification of deformities, **(2)**

SPORTS PRACTICE - Games and fitness activities Physical Fitness Activities **(2)**

COURSE OUTCOMES:

- Get basic knowledge about physical and mental fitness
- NSO create self-esteem and self confidence
- NSO provide opportunity get social interaction
- Development of character and personality through participation

REFERENCES:

1. www.google.com
2. https://scholar.google.com/
3. https://www.medindia.net/patients/lifestyleandwellness/five-essential-components-of-physical-fitness-references.htm
4. https://pubmed.ncbi.nlm.nih.gov/

NSS/NSO/YRC & CLUB ACTIVITIES

YOUTH RED CROSS – Social Service based activities

OBJECTIVES:

- To enhance the societal awareness
- To upgrade the Personality

ACTIVITIES **5**

1. **HEALTH PROMOTION**- Activities that promotes health **(2)**

2. **SOCIETAL SERVICE**-Social Service activities **(2)**

3. **FRIENDSHIP BUILDING** - Friendship building activities between communities **(1)**

COURSE OUTCOME

1. Enhanced Social Awareness

2. Personality development of the individual

REFERENCES:

1. IRCS/YRC Handbook
2. https://www.indianredcross.org/youth/Guidelines-for-JYRC-LR.pdf

NSS/NSO/YRC & CLUB ACTIVITIES

தமிழ் மன்றம்

பாடத்திட்டத்தின் நோக்கங்கள்

- மாணவர்களை சிறந்த மேடைப்பேச்சாளர்களாக உருவாக்குவது
- தாய்மொழியின் மேன்மையை பாதுகாப்பது..

பயிற்சித்திட்டம்

1. பேச்சுக்கலைப் பயிற்சி
2. கவிதை மற்றும் கட்டுரைகள் எழுதும் பயிற்சி
3. அறிவியல் பொறியியல் தொழில்நுட்பங்களைத் தமிழில் எழுதுதல்.
4. பட்டிமன்ற மேடைகளில் பேசும் பயிற்சி.
5. நாட்டுப்புறப்பாடல்கள் பாடுதல் மற்றும் கதைகள் எழுதும் பயிற்சி.

கற்றல் முடிவு

1. பேச்சுக்கலைப் தேர்ச்சி
2. நாட்டுப்புறப்பாடல்கள் பற்றிய புரிதல்

மேற்கோள்கள்

1. https://eegarai.darkbb.com/t63483-topic
2. https://poriyari.in/

RESONANCE – SKILL BASED ACTIVITIES

OBJECTIVES:

- To know the basics and general principles of Physics.
- To provide knowledge of the current trends in Physics.
- To develop a solid scientific and technical competence for investigating and applying the relationships of Physics *phenomena in* various fields of Physics.

ACTIVITIES **5**

1. **QUIZ** - Basics and general principle **(1)**

2**. PAPER PRESENTATION** - Current trends **(2)**

3. **PROJECTS -** Fun with Physics **(2)**

COURSE OUTCOME

Students were able to:

- Recollect the general principles of Physics.
- To explore the topics in the current trends in Physics.
- *Develop practical expertise in various areas of Physics.*

REFERENCES:

1. Principles of Physics, 10Ed, Isv by Robert Resnick Jearl Walker, David Halliday (2015)
2. 'The Feynman Lectures on Physics' (Volume I, II and III) , Matthew Sands, Richard Feynman, and Robert B. Leighton.
3. https://www.science-sparks.com/top-5-physics-experiments-you-can-try-at-home
4. https://www.electronicsforu.com/category/electronics-projects/hardware-diy.

NSS/NCC/NSO/YRC & CLUB ACTIVITIES

Eclectic Lingua – Skill based activities

OBJECTIVES:

- To enhance the communicative competence of the first-year engineering students by means of creating opportunity for impromptu/ /spontaneous speeches.
- To upgrade the English language skills of students by introducing appropriate vocabulary in different situations.

ACTIVITIES **5**

1. **Extempore**- Giving expression to thoughts **(2)**

2. **Building Vocabulary**-Using relevant set of words for different contexts **(2)**

3. **Pronunciation**- Speaking accurately and fluently **(1)**

COURSE OUTCOME

1. To enable students to express themselves easily and coherently.

2. To help students to speak the language using the right words and pronouncing them correctly.

References

https://www.cambridgeenglish.org/learning-english/activities-for-learners/?skill=pronunciation

https://www.quillsandquotes.ca/post/12-fun-games-to-get-students-public-speaking

NSS/NCC/NSO/YRC & CLUB ACTIVITIES

EULER.COM – Skill based activities

OBJECTIVES:

1. To enhance the Logical reasoning of the first-year engineering students by means of creating opportunity to improve the aptitude skill.
2. To explore the applications of Mathematics in the field of Engineering, Science and Technology and to utilize this skill for their academic activities.

ACTIVITIES **5**

1. OLYMPIAD- The students will be provided with 25 questions in Engineering Mathematics. This should be completed in one hour. **(1)**

2. MATHEMATICAL MODELLING- The students are expected to present physical models (Working as well as static models) based on the application of Engineering Mathematics **(2)**

3. PAPER PRESENTATION- Students will be provided 5-7 minutes of time to present their findings in application of Mathematics. **(2)**

COURSE OUTCOME

1. To enable students to explore their mathematical reasoning skills.

2. To motivate the students to apply Mathematics in Engineering and Technology and demonstrate their work by means of Physical model and present their research article.

References:

1. Advanced Engineering Mathematics , Erwin Kreyszig, 10th Edition, Wiely India Pvt Ltd.
2. https://www.stewartcalculus.com/

NSS/NCC/NSO/YRC & CLUB ACTIVITIES

Fine Arts Club VECTORIANS – Skill based activities

OBJECTIVES:

- To enhance the inbuilt talents in arts and crafts and fine arts activities.
- To explore and exhibit theirs qualities in cultural activities as well as in the leadership.

ACTIVITIES **5**

1. **ARTS & CRAFTS** - The students will be given with innovative Theme, they have to Show their talents in one hour time with basic facilities provided. **(1)**

2. **SINGING & DANCING** - The students are expected to present their talents on spot or With given Theme, either solo or group performance. **(2)**

3. **MIME & DRAMA** - Students will be given 5 - 7 minutes of time to present their variety Entertainments in way of Mono acting or Drama . **(2)**

COURSE OUTCOME

1. To enable students to explore their inbuilt talents in fine arts activities.

2. To motivate the students to show case their cultural and leadership qualities.

REFERENCES:

1. https://www.youtube.com/watch?v=1mkESRWiSKc – Teach your own crafts.
2. https://www.youtube.com/watch?v=YHqwrDGywH4 – How to teach Arts & Crafts

NSS/NCC/NSO/YRC & CLUB ACTIVITIES

Catalysis – Skill-based activities

Objectives:

- To inculcate a scientific attitude and temper.
- To provide an opportunity to develop constructive, explorative & inventive ideas among the students.
- To develop training in the scientific method of problem-solving for engineering

1. **Quiz/debate**- the latest advancement in Chemistry towards engineering **(2)**

2. **Essay competition/Chart preparation** - Environmental sustainability **(2)**

3. **Nature Study - field visit to eco-parks etc.** **(1)**

COURSE OUTCOME

1. To promote inquisitiveness among the students and inculcate Scientific mind mapping.

2. To develop students, interest and participation in the practical applications of the knowledge related to environmental sciences.

3. Take part in practical, hands-on science activities close to nature.

REFERENCE

1. M. Senapati, Advanced Engineering Chemistry, Infinity science press, New Delhi, 2007.
2. https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/environmental-sustainability
   https://www.indiabix.com/general-knowledge/chemistry.

MA3321 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS LT P C

3 0 0 3

OBJECTIVES:

- To introduce the effective mathematical tools for the solutions of partial differential equations.
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- Laplace transforms can be used for efficiently solving the problems that occur in various branches of engineering.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To model several physical problems to develop Z transform techniques for discrete time systems.

UNIT-I: PARTIAL DIFFERENTIAL EQUATIONS 9

Solutions Lagrange's linear equation — linear partial differential equations of second and higher order with constant coefficients of homogeneous type.

UNIT-II: FOURIER SERIES 9

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Harmonic analysis.

UNIT-III: LAPLACE TRANSFORMS 9

Existence conditions – Transforms of elementary functions – Basic properties – Inverse transforms – Convolution theorem – Transform of periodic functions.

UNIT-IV: FOURIER TRANSFORMS 9

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

UNIT-V: Z – TRANSFORMS AND DIFFERENCE EQUATIONS 9

Z- Transforms – Elementary properties – Inverse Z – transform (using partial fraction and residues) – Solution of difference equations using Z – transform.

TOTAL: 45 PERIODS

OUTCOMES:

- Understand the fundamental concept of the concepts of Partial differential Equations.
- Understand the basic concepts of mathematical principles on Fourier & Z-transforms.
- Laplace transform and inverse transform of simple functions, properties, are studied.
- Apply the concept of Understand the concept Fourier series and apply the concept in solving PDE.
- Understand the fundamental concept of the concepts of Solution of difference equations

TEXT BOOKS:

1. Veerarajan. T., “Transforms and Partial Differential Equations”, Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
2. Grewal. B.S., “Higher Engineering Mathematics”, 42nd Edition, Khanna Publishers, Delhi, 2012.
3. Narayanan.S., Manicavachagom Pillay.T.K and Ramanaiah.G “Advanced Mathematics for Engineering Students” Vol. II & III, S. Viswanathan Publishers Pvt. Ltd.1998.

REFERENCE BOOKS:

1. Bali.N.P and Manish Goyal, “A Textbook of Engineering Mathematics”, 7th Edition, Laxmi Publications Pvt Ltd, 2007.
2. Ramana.B.V., “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company Limited, NewDelhi, 2008.

3. Glyn James, “Advanced Modern Engineering Mathematics”, 3rd Edition, Pearson Education, 2007.
4. Erwin Kreyszig,“Advanced Engineering Mathematics”, 8th Edition, Wiley India, 2007.5. Ray Wylie. C and Barrett.L.C, “Advanced Engineering Mathematics” Tata McGraw Hill Education Pvt Ltd, Sixth Edition, New Delhi, 2012.
6. P.Sivaramakrishna Das, C.Vijayakumari, Transforms and Partial Differential Equations, Pearson India Education Services Pvt. Ltd, 2019.

	PROGRAM OUTCOMES												PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-
CO2	3	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-
CO3	3	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-
CO4	3	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-
CO5	3	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-
Average	**3.0**	**3.0**	**-**	**-**	**1.0**	**-**	**-**	**-**	**-**	**-**	**-**	**1.0**	**-**	**-**	**-**	**-**

CE3361 **APPLIED MECHANICS** **L T P C**

3 0 0 3

COURSE OBJECTIVES:

To impart knowledge on the following topics

- To learn the use of analytical techniques for analyzing forces in Statically determinate structures
- To introduce the equilibrium of rigid bodies
- To study and understand the distributed forces, surface, loading on beam and stress distribution
- To know about the bending theory.
- To understand the concept of slope and deflection.

UNIT I: STATICS OF PARTICLES **9**

Fundamental Concepts and Principles, Systems of Units, Statics of Particles -Forces in a Plane, Resultant of Forces, Resolution of a Force into Components. Equilibrium of a Particle - Newton's First Law of Motion, Free-Body Diagrams.

UNIT II: EQUILIBRIUM OF RIGID BODIES **9**

Moment of a Force about a Point, Varignon's Theorem, Resolution of a Given Forces, Moment of a Forces & Couple, Equilibrium in Two and Three Dimensions - Reactions at Supports and Connections.

UNIT III: DISTRIBUTION AND TRANSFER OF LOADS IN BEAMS **9**

Centroids of lines and areas – symmetrical and unsymmetrical shapes, Distributed Loads on Beams, Centre of Gravity & Centroid of a Volume. Moments of Inertia of Areas - Polar Moment of Inertia, Radius of Gyration of an Area, Parallel & Perpendicular axis Theorem. Stresses in simple and compound bars – Elastic constants.

UNIT IV: BENDING OF BEAMS **9**

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

stress distribution – Shear stress distribution.

UNIT V: DEFLECTION OF BEAMS **9**

Double Integration method – Macaulay's method –Moment Area method – Conjugate beam method - Strain energy methods for determinate beams.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

- Illustrate the scalar representation of forces.
- Analyse the rigid body in equilibrium and moment of forces.
- Evaluate the distribution of loads and simple stresses.
- Determine concept Shear force and theory of simple bending.
- Calculate the slope and deflection of beams by different methods.

TEXT BOOKS:

1. Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.
2. Kumar, K.L., "Engineering Mechanics", 3rd Revised Edition, Tata McGraw-Hill Publishing company, New Delhi, 2008
3. Bansal. R.K. "Strength of Materials", Laxmi Publications Pvt. Ltd., New Delhi, 2010.
4. Rajput. R. K."Strength of Materials", S. Chand and Co, New Delhi, 2015.

REFERENCES:

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

2. Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., New Delhi, 2009.
3. Meriam J L and Kraige L G, Engineering Mechanics: Statics and Engineering Mechanics: Dynamics, 7th edition, Wiley student edition, 2013
4. Rattan . S. S, "Strength of Materials", Tata McGraw Hill Education Private Limited, New Delhi, 2012.
5. Timoshenko S, Young D H, Rao J V and Sukumar Pati, Engineering Mechanics, 5th Edition, McGraw Hill Higher Education, 2013.

CE3361	PROGRAM OUTCOMES												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	1	-	1	-	-	-	-	-	-	2	3	2	1	2
CO2	3	3	1	-	1	-	-	-	-	-	-	2	3	1	1	2
CO3	3	3	1	-	1	-	-	-	-	-	-	2	3	1	1	2
CO4	3	3	1	1	1	-	-	-	-	-	-	3	3	1	1	2
CO5	3	3	1	1	1	-	-	-	-	-	-	3	3	1	1	2
Average	3.0	1.0	1.0	1.0	1	-	-	-	-	-	-	2.4	3.0	1.2	1.0	2.0

CE3362 **FLUID MECHANICS** **L T P C**

3 0 0 3

COURSE OBJECTIVES:

- To understand the basic properties of the fluid, fluid kinematics, fluid dynamics.
- To analyze and appreciate the complexities involved in solving the fluid flow Problems.
- To understand the dimensional analysis and to derive a rational equation Application of the conservation laws to flow measurements and flow through
- Pipes and forces on pipe bend.
- To understand the concepts involved in boundary layer.

UNIT-I: FLUID PROPERTIES AND FLUID STATICS **9**

Fluid – definition, distinction between solid and fluid - Units and dimensions - Properties of fluids- Fluid statics: concept of fluid static pressure, absolute and gauge pressures - pressure measurements by manometers - forces on planes – centre of pressure – buoyancy and floatation.

UNIT-II: FLUID KINEMATICS AND DYNAMICS **9**

Kinematics: Classification of flows – Streamline, streak-line and path-lines – Stream function and velocity potentials – Flow nets. Dynamics : Application of control volume to continuity, energy and momentum – Euler's equation of motion along a stream line – Bernoulli's equation – Applications to velocity and discharge measurements – Linear momentum equation – Application to Pipe bends – Moment of momentum equation.

UNIT-III: DIMENSIONAL ANALYSIS AND MODEL STUDIES **9**

Fundamental dimensions – Dimensional homogeneity – Rayleigh's method and Buckingham Pi theorem – Dimensionless parameters – Similitude and model studies – Distorted and undistorted models.

UNIT-IV: FLOW THROUGH PIPES **9**

Reynolds experiment – Laminar flow in pipes and between parallel plates – Development of laminar and turbulent flows in pipes – Darcy-Weisbach equation – Moody diagram – Major and minor losses of flow in pipes – Total energy line – Hydraulic grade line – Siphon – Pipes in series and parallel – Equivalent pipes.

UNIT-V: BOUNDARY LAYER **9**

Definition of boundary layers – Laminar and turbulent boundary layers – Displacement, momentum and energy thickness – Momentum integral equation – Applications – Separation of boundary layer – Drag and Lift forces

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course the student will be able to understand

- Basic knowledge of fluids in static, kinematic and dynamic equilibrium.
- The problems related to equation of motion.
- Gain knowledge about dimensional and model analysis.
- Types of flow and losses of flow in pipes.
- The boundary layer problems.

TEXT BOOKS:

1. Bansal.R.K., "Fluid Mechanics and Hydraulic Machines", Laxmi Publications Pvt. Ltd., New Delhi, 2013
2. Jain.A. K.., "Fluid Mechanics" (Including Hydraulic Machines), Khanna Publishers Twelfth Edition, 2016.
3. Subramanya. K "Fluid Mechanics and Hydraulic Machines", Tata McGraw Hill Education Private Limited, New Delhi, 2010.
4. Rajput.R.K. "Fluid Mechanics", S.Chand and Co, New Delhi, 2008.

REFERENCES:

1. Streeter, V.L., and Wylie, E.B., "Fluid Mechanics", McGraw Hill, 2000.
2. Fox W.R. and McDonald A.T., "Introduction to Fluid Mechanics", John-Wiley and Sons, Singapore, 2013.
3. White, F.M., "Fluid Mechanics", Tata McGraw Hill, 5th Edition, New Delhi, 2017.
4. Mohd. Kaleem Khan, "Fluid Mechanics and Machinery", Oxford University Press, New Delhi, 2015.
5. Modi P.N and Seth "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House New Delhi, 2009.

CE3362	PROGRAM OUTCOMES												PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	1	1	1	2	2	1	1	1	1	2	2	2	3	2
CO2	3	2	1	1	1	2	2	1	1	1	1	2	2	3	3	3
CO3	3	2	3	2	1	2	2	1	1	1	1	2	3	2	2	2
CO4	3	3	3	2	1	3	2	1	1	1	1	3	2	2	3	2
CO5	3	3	2	2	1	3	2	1	1	1	1	3	2	3	3	2
Average	**2.4**	**2.0**	**1.6**	**1.0**	**2.4**	**2.0**	**1.0**	**1.0**	**1.0**	**1.0**	**2.4**	**2.2**	**2.4**	**2.8**	**2.2**	**2.4**

CE3363 SURVEYING AND LEVELLING L T P C

3 0 0 3

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for:

- To introduce the fundamentals of surveying, its principles, accessories for chain and ranging.
- To expose students about the concepts of compass and plane table surveying.
- To learn the various types of theodolite and modern surveying.
- To introduce the concepts of levelling.
- To impart knowledge on levelling applications.

UNIT-I: FUNDAMENTALS OF CONVENTIONAL SURVEYING 9

Definition – Classifications – Principles – Equipment and accessories for ranging and chaining – Methods of ranging – Well conditioned triangles – Chain traversing – Compass – Basic principles – Types – Bearing – System and conversions – Sources of errors and Local attraction – Magnetic declination – Dip – compass traversing – Plane table and its accessories – Merits and demerits.

UNIT-II: LEVELLING 9

Level line – Horizontal line – Datum – Benchmarks – Levels and staves – Temporary and permanent adjustments – Methods of leveling – Fly leveling – Check leveling – Procedure in leveling – Booking – Reduction – Curvature and refraction – Reciprocal leveling – Precise leveling - Contouring.

UNIT-III: THEODOLITE SURVEYING 9

Horizontal and vertical angle measurements – Temporary and permanent adjustments – Heights and distances – Tacheometric surveying – Stadia Tacheometry – Tangential Tacheometry – Trigonometric leveling – Single Plane method – Double Plane method.

UNIT- IV: CONTROL SURVEYING AND ADJUSTMENT **9**

Horizontal and vertical control – Methods – Triangulation – Traversing – Gale‘s table – Trilateration – Concepts of measurements and errors – Error propagation and Linearization – Adjustment methods - Least square methods – Angles, lengths and levelling network.

UNIT-V: MODERN SURVEYING **9**

Total Station: Digital Theodolite, Electronic Distance Measurer –- Coordinate Geomentry functions – Field procedure and applications. Geographical positioning system: Advantages – System components – Signal structure – Selective availability and anti spoofing receiver components and antenna – Planning and data acquisition – Data processing – Errors – Field procedure and applications.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of this course, learners will be able to:

1. Introduce the rudiments of various surveying and its principles.
2. Imparts knowledge in computation of levels of terrain and ground features.
3. Imparts concepts of Theodolite Surveying for complex surveying operations.
4. Understand the procedure for establishing horizontal and vertical control.
5. Imparts the knowledge on modern surveying instruments.

TEXT BOOKS:

1. Dr. B. C. Punmia, Ashok K. Jain and Arun K Jain, Surveying Vol. I & II, Lakshmi Publications Pvt Ltd, New Delhi, Sixteenth Edition, 2016.
2. T. P. Kanetkarand S. V. Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 2008.

REFERENCES:

1. R. Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
2. S. K. Roy, Fundamentals of Surveying, Second Edition, Prenticeˆ Hall of India2010.
3. K. R. Arora, Surveying Vol I & II, Standard Book house, Twelfth Edition 2013.

CE3363	PROGRAM OUTCOMES												PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	-	-	-	1	3	-	3	1	3	2	2	3	1	3	3
CO2	2	3	-	-	1	2	-	1	3	2	-	2	2	3	-	2
CO3	3	3	-	-	1	2	-	1	2	2	-	3	3	2	3	2
CO4	2	2	-	-	1	1	-	-	3	3	2	-	2	1	2	3
CO5	2	2	-	3	2	2	2	1	3	2	2	2	2	2	2	3
Average	**2.4**	**2.5**	**-**	**3.0**	**1.2**	**2.0**	**2.0**	**1.5**	**2.4**	**2.4**	**2.0**	**2.3**	**2.4**	**1.8**	**2.5**	**2.6**

CE3364 **CONSTRUCTION MATERIALS** **L T P C**

3 0 0 3

COURSE OBJECTIVES:

- To develop the skills for identification of suitable construction materials for Civil Engineering Projects.
- The Knowledge about the latest construction materials used in the construction.
- The Characteristics and various properties of construction materials.
- The knowledge about the various tests to check the quality of the construction materials in field and lab.
- Gives students a comprehensive understanding of the composition, microstructure, and engineering behavior of materials used in civil engineering applications.

UNIT- I: STONES - BRICKS - CONCRETE BLOCKS - LIME **9**

Stone as building material - criteria for selection - Tests on stones - Bricks - Classification - Manufacturing of clay bricks - Tests on bricks - Compressive strength - Water Absorption - Efflorescence - Bricks for special use - Lime - Preparation of lime mortar – Concrete Soild and hollow blocks - Lightweight concrete blocks.

UNIT-II: CEMENT – AGGREGATES – MORTAR **9**

Cement – Ingredients – Manufacturing process – Types and Grades – Properties of cement and Cement mortar – Tests on Cement - Fly ash – Properties of fine and coarse aggregates –-Bulking of sand.

UNIT-III: CONCRETE **9**

Concrete – Ingredients - Manufacturing Process - Batching plants – RMC - Properties of fresh concrete - Slump , Flow and Compaction factor - Properties of Hardened concrete – Non-destructive testing - Mix Specification - Mix proportioning - BIS method - High Strength Concrete and High Performance Concrete - Self Compacting Concrete.

UNIT-IV: TIMBER AND OTHER MATERIALS **9**

Timber - Market forms - Plywood - Veneer - False ceiling materials - Laminates - Steel - Mechanical treatment - Aluminum and Other Metallic Materials - Uses - Market forms - Paints – Varnishes – Distempers – Bitumens.

UNIT-V: MODERN MATERIALS **9**

Glass – Ceramics – Sealants for joints – Glassfibre reinforced plastic – Clay products – Refractories – Composite materials – Types – Applications of laminar composites – Fibre textiles – Geomembranes and Geotextiles for earth reinforcement.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of this course, learners will be able to:

- Able to Identify the good quality of brick for construction purposes.
- Design the concrete mixes for different exposure conditions.
- Understand material properties of cement and aggregates.
- Study the market forms of timber and steel.
- Identify the modern construction materials for various applications.

TEXT BOOKS:

1. Varghese.P.C, Building Construction,Second Edition PHI Learning ltd., 2016.
2. Shetty.M.S., Concrete Technology (Theory and Practice), S Chand and company limited.

REFERENCES:

1. Arora S.P and Bindra S.P Building construction, Dhanpat Rai and sons,1997.
2. Punmia ,B.C Building construction , Laxmi publication (p)ltd..,2008.
3. Neville A.M Properties of concrete, fourth edition, Pearson education ltd.2012.
4. IS 456 – 2000: Indian Standard specification for plain and reinforced concrete, 2011.

5. IS 10262:2019 Concrete Mix proportioning – Guide lines.
6. IS 383–1970: Indian Standard specification for coarse and fine aggregate from natural Sources for concrete, 2011.
7. IS 4926 – 2003: Indian Standard specification for ready–mixed concrete, 2012.

CE3364	PROGRAM OUTCOMES												PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	1	1	-	-	1	-	3	-	-	2	-	-	3	-	-	-
CO2	1	-	2	1		2	-	-	-	-	-	2	-	-	-	2
CO3	-	-	1	-	1	-	-	1	-	1	-	-	-	1	-	-
CO4	-	2	-	2	-	-	2	-	2	-	3	-	-	-	2	-
CO5	2	1	-	-	1	-	-	1	-	-	-	-	2	-	-	1
Average	**1.3**	**1.3**	**1.5**	**1.5**	**1.0**	**2.0**	**2.5**	**1.0**	**2.0**	**1.5**	**3.0**	**2.0**	**2.5**	**1.0**	**2.0**	**1.5**

CE3365 **SOIL MECHANICS** **L T P C**

3 0 0 3

COURSE OBJECTIVES:

- To impart knowledge to classify the soil based on index properties and to assess their engineering properties based on the classification.
- To determine the permeability of soil and sketch flow net for various hydraulic structures to calculate the seepage quantity.
- To familiarize on the fundamental concepts of compaction and to estimate the settlement of soil.
- To analyze the stress distribution for different loading conditions and to determine the shear strength of the soil.
- To impart knowledge on theanalysis and design of both finite and infinite slopes.

UNIT- I: SOIL CLASSIFICATION 9

History – formation and types of soil – composition - Index properties - clay mineralogy structural arrangement of grains – description – Classification – BIS – US – phase relationship.

UNIT-II: EFFECTIVE STRESS AND PERMEABILITY 9

Soil water – Static pressure in water - Effective stress – Capillary phenomena– Permeability – Factors influencing permeability of soils - Laboratory Determination and field measurement of permeability - Seepage - Flow nets.

UNIT-III: COMPACTION AND CONSOLIDATION 9

Compaction – laboratory determination - field compaction method – factors influencing compaction – Components of settlement – Factors influencing settlement – Terzaghi's one dimensional consolidation theory – Computation of rate of settlement - e-log p relationship – Computation of settlement.

UNIT-IV: STRESS DISTRIBUTION AND SHEAR STRENGTH 9

Stress distribution in homogeneous and isotropic medium – Boussinesq theory – Use of Newmark's influence chart - Shear strength of cohesive and cohesionless soils – Mohr-Coulomb failure theory – shear strength determination.

UNIT-V: SLOPE STABILITY 9

Infinite slopes and finite slopes – Slip Circle - Friction circle method – Use of stability number – Guidelines for location of critical slope surface in cohesive and c- soil – Slope protection measures.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of this course, learners will be able to:

- Classify the soil and assess the engineering properties, based on index properties.
- Understand the stress concepts in soils.
- Understand and identify the settlement in soils.
- Determine the shear strength of soil.
- Analyze both finite and infinite slopes.

TEXT BOOKS:

1. suganyadevik.civil@srmvalliammai.ac.in
2. Murthy, V.N.S., "Text book of Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi, 2014.
3. Arora, K.R., "Soil Mechanics and Foundation Engineering", Standard Publishersand Distributors, New Delhi, 7th Edition, 2017(Reprint).
4. Gopal Ranjan, A S R Rao, "Basic and Applied Soil Mechanics", New Age International Publication, 3rd Edition, 2016.
5. Punmia, B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 16th Edition,2017.

REFERENCES:

1. McCarthy, D.F., "Essentials of Soil Mechanics and Foundations: Basic Geotechnics". Prentice-Hall, 2006.
2. Coduto, D.P., "Geotechnical Engineering – Principles and Practices", Prentice Hall of India Pvt. Ltd. New Delhi, 2010.
3. Braja M Das, "Principles of Geotechnical Engineering", Cengage Learning India Private Limited, 8th Edition,2014.
4. Palanikumar.M., "Soil Mechanics", Prentice Hall of India Pvt. Ltd, Learning Private Limited Delhi, 2013.
5. Craig.R.F., "Soil Mechanics", E & FN Spon, London and New York, 2012.
6. Purushothama Raj. P., "Soil Mechanics and Foundations Engineering",2nd Edition, Pearson Education, 2013.

	PROGRAM OUTCOMES												**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	2	2	1	1	-	1	1	-	1	2	-	3	1	-	1	3
CO2	2	3	3	2	-	-	2	-	-	-	-	-	2	2	3	-
CO3	3	3	2	3	-	3	-	-	-	-	1	-	1	1	2	3
CO4	3	3	2	2	-	-	2	-	-	-	-	2	1	1	2	-
CO5	3	2	3	2	1	1	1	1	-	-	-	-	-	2	2	1
Average	**2.6**	**2.6**	**2.2**	**2.0**	**1.0**	**1.7**	**1.5**	**1.0**	**1.0**	**2.0**	**1.0**	**2.5**	**1.3**	**1.5**	**2.0**	**2.3**

CE3366 SURVEYING AND LEVELLING LABORATORY L T P C

0 0 3 2

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for:

- To train the student to acquire skill on chain and compass surveying.
- To train students to gain experience on plane table surveying.
- To have hands on experience on operating theodolite.
- To gain practical knowledge on levelling.
- To gain practical knowledge on total station.

Chain Survey

1. Study of chains and its accessories, Aligning, Ranging, Chaining and Marking Perpendicular offset

Compass Survey

2. Compass Traversing – Measuring Bearings & arriving included anglesLevelling - Study of levels and levelling staff

3. Fly levelling using Dumpy level &Tilting level

4. Check leveling

Theodolite - Study of Theodolite

5. Measurements of horizontal angles by reiteration and repetition and vertical angles

6. Determination of elevation of an object using single plane method when base is Accessible/inaccessible.

Tacheometry – Tangential system – Stadia system

7. Determination of Tacheometric Constants

8. Heights and distances by stadia Tacheometry

9. Heights and distances by Tangential Tacheometry

Total Station - Study of Total Station, Measuring Horizontal and vertical angles

10**.** Traverse using Total station and Area of Traverse

11. Determination of distance and difference in elevation between two inaccessible

points using Total station

12. Setting out works – Foundation marking using tapes single Room

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of this course, learners will be able to:

1. Impart knowledge on the usage of basic surveying instruments like chain/tape, compass and levelling instruments.
2. Able to use levelling instrument for surveying operations.
3. Able to use theodolite for various surveying operations.
4. Able to carry out necessary surveys for social infrastructures.
5. Able to prepare planimetric maps.

REFERENCES:

1. T. P. Kanetkarand S. V. Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 24th Reprint, 2015.

2. Dr. B. C. Punmia, Ashok K. Jainand Arun K Jain, Surveying Vol. I & II, Lakshmi Publications Pvt Ltd, New Delhi, 17th Edition, 2016.

3. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, McGraw Hill 2001.

4. Bannisterand S. Raymond, Surveying, Seventh Edition, Longman 2004 a. David Clark, Plane and Geodetic Surveying for Engineers, Volume I, Constable and Company Ltd, London, CBS, 6th Edition, 2004.

5. David Clark and James Clendinning, Plane and Geodetic Surveying for Engineers, Volume II, Constable and Company Ltd, London, CBS, 6th Edition, 2004.

6. S. K. Roy, Fundamentals of Surveying, Second Edition, Prentice ‘Hall of India 2004.

7. K. R. Arora, Surveying Vol. I & II, Standard Book house, Eleventh Edition, 2013.

CE3366	PROGRAM OUTCOMES												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	-	-	1	1	3	-	3	3	3	2	2	3	1	3	3
CO2	2	3	-	-	1	2	-	1	3	2	-	3	3	1	3	2
CO3	3	3	-	-	1	2	-	1	3	2	-	3	3	3	3	2
CO4	2	2	-	-	1	1	-	-	3	3	2	3	3	1	2	3
CO5	3	3	2	3	2	2	2	1	3	2	2	2	2	2	2	3
Average	**2.6**	**2.8**	**2.0**	**2.0**	**1.2**	**2.0**	**2.0**	**1.5**	**3.0**	**2.4**	**2.0**	**2.6**	**2.8**	**1.6**	**2.6**	**2.6**

CE3367 CONSTRUCTION MATERIALS LABORATORY L T P C

0 0 3 1.5

COURSE OBJECTIVES:

To impart knowledge on the following topics

- To facilitate the understanding of the behavior cement.
- To know about the various test procedures on Fine aggregates
- To know about the various test procedures on Coarse aggregates
- To know about the various test procedures on Bricks.
- To understand applications various construction materials.

LIST OF EXPERIMENTS:

I.TESTS ON CEMENT

a. Determination of fineness of cement

b. Determination of consistency of cement

c. Determination of specific gravity of cement

d. Determination of setting time of cement

II. TESTS ON FINE AGGREGATE

a. Determination of specific gravity and water absorption of fine aggregate

b. Determination of grading of fine aggregate

c. Determination of water absorption for fine aggregate

III. TESTS ON COARSE AGGREGATE

a. Determination of compacted and loose bulk density of coarse aggregate

b. Determination of impact value of coarse aggregate

c. Determination of elongation index and flakiness index of coarse aggregate

d. Determination of aggregate crushing value of coarse aggregate

e. Determination of specific gravity and water absorption of coarse aggregate

IV. TESTS ON BRICKS

a. Determination of compressive strength, water absorption and efflorescence of bricks

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:

Sl.No.	Description of Equipment	Quantity
1.	Vicat Appratus	1
2.	Le chatelier Appratus	1
3.	Pycnometer	1
4.	Weighing Balance	1
5.	Compression testing machine	1
6.	Aggregate impact testing machine	1
7.	Length Gauge	1
8.	Thickness Gauge	1
9.	Aggregate Crushing Value Apparatus	1
10.	Trovels and planers	1 Set
11.	Sieves	1 Set

TOTAL: 45 PERIODS

COURSE OUTCOMES:

1. The students will have the required knowledge in the area of testing of construction materials.
2. Will be able to test the quality of cement.
3. Will be analyze the properties of fine aggregate.
4. Will be analyze the properties of coarse aggregate.
5. Will be able to test brick's quality.

REFERENCES:

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.

CE3367	PROGRAM OUTCOMES												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	-	-	-	-	-	2	1	2	2	0	2	2	-	1	3
CO2	3	-	-	-	-	-	2	1	2	0	0	2	2	-	1	3
CO3	3	2	-	-	-	-	0	1	2	0	2	0	2	-	1	3
CO4	3	2	-	-	-	-	2	1	2	0	0	2	2	-	1	3
CO5	3	-	-	-	-	-	2	1	2	2	0	2	2	-	1	3
Average	**3.0**	**2.0**	**-**	**-**	**-**	**-**	**1.6**	**1.0**	**2.0**	**0.8**	**0.4**	**1.6**	**2.0**	**-**	**1.0**	**3.0**

CE3368	COMPUTER AIDED DRAFTING AND MODELLING LABORATORY	L T P C 0 0 3 1.5

COURSE OBJECTIVES:

- To develop skill to use software to create 2D and 3D models.
- To apply basic concept to drawing, edit, dimension, hatching etc., to develop 2D&3D Modelling
- To Understand and interpret the engineering drawings.
- To introduce standards and codes to produce engineering drawings.
- To provide hands on training to become proficient with 2D Computer Aided drafting of simple objects.

LIST OF EXPERIMENTS:

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems.

2. Creation of simple figures like polygon and general multi-line figures and Title Block with necessary text, projection and symbols.

3. Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.

4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.

5. Drawing front view, top view and side view of objects from the given pictorial views.

6. Drawing sectional views of prism, pyramid, cylinder, cone, etc

7. Drawing isometric projection of simple objects

8. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-Dmodel

9. Drawing of a plan of residential building.

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:

Sl.No.	Description of Equipment	Quantity
1.	Pentium IV computer or better hardware, with suitable graphics facility	30 No.
2.	Licensed software for Drafting and Modeling.	30 Licenses
3.	Laser Printer or Plotter to print / plot drawings	2 No

TOTAL: 45 PERIODS

COURSE OUTCOMES:

1. The students will have the required knowledge in the area of 2D & 3D Views using computer aided drafting software.
2. Will be able to construct accurate 2D geometry as per the dimensions following standard drawing practices with proper dimensioning using Computer Aided drafting software.
3. Will be able to develop isometric drawings views using Computer Aided drafting software
4. Will be understand the Create 2D representations of 3D objects as plan view, elevations, side views and sections / auxiliary views using Computer Aided drafting software
5. Will be able to standard drawing codes and practices which is required for producing engineering drawings.

TEXTBOOKS:

1. Sikka V.B., A Course in Civil Engineering Drawing, 4th Edition, S.K.Kataria and Sons, 2015.
2. George Omura, Mastering in Autocad 2005 and Autocad LT 2005– BPB Publications, 2008.

REFERENCES:

1. Chuck Eastman, Paul Teicholz, Rafael Sacks, Kathleen Liston, BIM Handbook: A Guide to building information modeling for Owners, Managers, Designers, Engineers, and Contractors, John Wiley and Sons. Inc.,2011.
2. Marimuthu V.M., Murugesan R. and Padmini S., Civil Engineering Drawing-I, PratheebaPublishers, 2008.
3. Vijay Duggal, “A general guide to Computer Aided Design & Drafting”, Mailmax Publications, 2000.

CE3368	PROGRAM OUTCOMES												PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	-	-	-	3	2	-	-	2	-	-	1	2	-	1	3
CO2	3	-	-	-	3	2	-	-	2	-	-	1	2	-	1	3
CO3	3	-	-	-	3	1	-	-	2	-	-	1	2	-	1	3
CO4	3	-	-	-	3	2	-	-	2	-	-	1	2	-	1	3
CO5	3	-	-	-	3	3	-	-	2	-	-	1	2	-	1	3
Average	**3.0**	**-**	**-**	**-**	**3.0**	**2.0**	**-**	**-**	**2.0**	**-**	**-**	**1.0**	**2.0**	**-**	**1.0**	**3.0**

MA3421 APPLIED MATHEMATICS FOR CIVIL ENGINEERING L T P C

2 0 0 2

OBJECTIVES:

- To familiarize the students with ordinary differential equations
- To develop the use of ordinary differential equations that is needed by engineers for practical application.
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems?
- To acquaint the student with Fourier series techniques in solving one dimensional wave equations used in various situations.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.

UNIT- I : ORDINARY DIFFERENTIAL EQUATIONS 6

Higher order linear differential equations with constant coefficients – Method of variation of parameters.

UNIT- II : APPLICATION OF ORDINARY DIFFERENTIAL EQUATIONS 6

Solution of ODE related to bending of beams, motion of a particle in a resisting medium and simple harmonic motion.

UNIT- III : APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS - ONE DIMENSIONAL WAVE EQUATIONS 6

Classification of PDE - Solutions of one dimensional wave equation.

UNIT- IV: APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS - ONE DIMENSIONAL HEAT EQUATIONS 6

One dimensional equation of heat conduction- Zero to zero- Non zero to zero – Non zero to non zero boundary conditions.

UNIT- V: APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS-TWO

DIMENSIONAL HEAT EQUATIONS **6**

Steady state solution of two dimensional equation of heat conduction in infinite plates (excluding insulated edges) and circular plates.

TOTAL: 30 PERIODS

OUTCOMES:

1. Understand how to solve the given ordinary differential equations.
2. Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
3. Appreciate the physical significance of Fourier series techniques in solving one dimensional wave equations.
4. Appreciate the physical significance of Fourier series techniques in solving one dimensional heat flow problems.
5. Appreciate the physical significance of Fourier series techniques in solving two dimensional heat flow problems.

TEXT BOOKS:

1. Veerarajan. T., “Transforms and Partial Differential Equations”, Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
2. Grewal. B.S., “Higher Engineering Mathematics”, 42nd Edition, Khanna Publishers, Delhi, 2012.
3. Narayanan.S., Manicavachagom Pillay.T.K and Ramanaiah.G “Advanced Mathematics for Engineering Students” Vol. II & III, S. Viswanathan Publishers Pvt. Ltd.1998.

REFERENCE BOOKS:

1. Bali.N.P and Manish Goyal, “A Textbook of Engineering Mathematics”, 7th Edition,Laxmi Publications Pvt Ltd, 2007.
2. Ramana.B.V., “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
3. Glyn James, “Advanced Modern Engineering Mathematics”, 3rd Edition, Pearson Education, 2007.

4. Erwin Kreyszig,“Advanced Engineering Mathematics”, 8th Edition, Wiley India, 2007.

MA3421	PROGRAM OUTCOMES												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	3	-	-	-	-	-	-	-	-	1	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	1	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	1	-	-	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	1	-	-	-	-
CO5	3	3	3	-	-	-	-	-	-	-	-	1	-	-	-	-
Average	**3.0**	**3.0**	**3.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.0**	**-**	**-**	**-**	**-**

CE3461 **STRENGTH OF MATERIALS** **L T P C**

3 0 0 3

COURSE OBJECTIVES:

To impart knowledge on the following topics

- To learn unsymmetrical bending and analyze plane trusses.
- To estimate the various states of stresses and study about the failure theories.
- To understand the method of finding the unknowns in indeterminate beams.
- To estimate the load carrying capacity and failure modes of columns and cylinders.
- To understand about theory of torsion and deflection of springs.

UNIT - I: TRUSSES AND UNSYMMETRICAL BENDING **9**

Analysis of pin jointed plane determinate trusses by method of joints and method of sections. Unsymmetrical bending of beams - Shear Centre.

UNIT- II: STATE OF STRESS **9**

State of Stress in two dimensions – Stresses on inclined planes – Principal Stresses and Principal Planes - Mohr's circle method - Stress tensor – Stress invariants - Volumetric strain. Theories of failures – Application problems.

UNIT - III: INDETERMINATE BEAMS **9**

Propped cantilever and fixed beams - fixed end moments and reactions – sinking and rotation of supports - Theorem of three moments – analysis of continuous beams – shear force and bending moment diagrams.

UNIT - IV: COLUMNS & CYLINDERS **9**

Euler's column theory – critical load for prismatic columns with different end conditions - Rankine-Gordon formula - Eccentrically loaded columns – core of a section – Thin and thick cylinders.

UNIT - V: TORSION & SPRINGS **9**

Theory of Torsion – Stresses and Deformations in Solid and Hollow Circular Shafts – combined bending moment and torsion of shafts - Closed and Open Coiled helical springs.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

1. Analyze pin jointed trusses.
2. Determine principal stresses in 2-D state and analyze various theories of failures.
3. Analyze indeterminate beams for external loadings and support settlements.
4. Find the load carrying capacity & stresses in columns and cylinders.
5. Solve for torsion problems and deflection of springs.

TEXT BOOKS:

1. Rajput R.K. "Strength of Materials (Mechanics of Solids)", S.Chand & company Ltd., New Delhi, 2015.
2. Bansal.R.K. "Strength of Materials", Laxmi Publications Pvt. Ltd., New Delhi,2010.
3. Jindal U.C., "Strength of Materials", Asian Books Pvt. Ltd., New Delhi, 2009.

REFERENCES:

1. Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., New Delhi, 2009.
2. Rattan . S. S, "Strength of Materials", Tata McGraw Hill Education Private Limited, New Delhi, 2012.
3. Singh. D.K., ―Strength of Materials‖, Ane Books Pvt. Ltd., New Delhi, 2016
4. Subramanian R., "Strength of Materials", Oxford University Press, Oxford Higher Education Series, 2007.

CE3461	PROGRAM OUTCOMES												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	2	3	2	-	1	-	-	-	-	-	-	2	2	2	1	1
CO2	2	3	2	-	1	-	-	-	-	-	-	2	3	1	1	1
CO3	2	3	2	-	1	-	-	-	-	-	-	2	2	2	1	1
CO4	2	3	2	1	1	-	-	-	-	-	-	3	3	2	1	2
CO5	2	3	2	1	1	-	-	-	-	-	-	3	3	1	1	2
Average	2.0	3.0	2.0	1.0	1.0							2.4	2.6	1.6	1.0	1.4

CE3462 **APPLIED HYDRAULIC ENGINEERING** **L T P C**

3 0 0 3

COURSE OBJECTIVES:

- To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines.
- Application of the law of energy principle applicable to gradually varied flow.
- Application of the law of conservation of laws to momentum applicable to rapidly varied flow.
- To understand the concepts and basic principles of working of hydraulic machineries and to design Pelton wheel, Francis and Kaplan turbine.
- To understand the concepts and basic principles of working of hydraulic machineries and to design Centrifugal and Reciprocating pumps.

UNIT- I: UNIFORM FLOW **9**

Definition and differences between pipe flow and open channel flow - Types of Flow - Properties of open channel - Fundamental equations - Sub-critical, Super-critical and Critical flow - Velocity distribution in open channel - Steady uniform flow - Best hydraulic sections for uniform flow - Computation in Uniform Flow - Specific energy and specific force, Weir and Notches -Types.

UNIT- II: VARIED FLOWS **9**

Dynamic equations of gradually varied flow- Water surface flow profile classifications: Hydraulic Slope, Hydraulic Curve - Profile determination by Numerical method: Direct step method and Standard step method - Change in Grades.

UNIT- III: RAPIDLY VARIED FLOWS **9**

Application of the momentum equation for Rapidly varied flow - Hydraulic jumps - Types - Energy dissipation – Celerity - Positive and Negative surges.

UNIT- IV: TURBINES **9**

Impact of Jet on flat, curved plates, Stationary and Moving - Turbines - Classification - Impulse turbine – Pelton wheel - Reaction turbines - Francis turbine - Kaplan turbine - Draft tube - Cavitation - Performance of turbine - Specific speed - Runaway speed – Minimum Speed to start the pump.

UNIT-V: PUMPS **9**

Classification of Pumps- Centrifugal pumps - Minimum speed to start the pump - NPSH - Cavitation's in pumps - Operating characteristics - Multistage pumps - Reciprocating pumps - Negative slip - Indicator diagrams and its variations - Air vessels - Savings in work done- Gear pump.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of this course, learners will be able to:

1. 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
2. Analyse steady gradually varied flow, water surface profiles and its length calculation using direct and standard step methods with change in water surface profiles due to change in grades.
3. Derive the relationship among the sequent depths of steady rapidly varied flow and estimating energy loss in hydraulic jump with exposure to positive and negative surges.
4. Design turbines and explain the working principle
5. Differentiate pumps and explain the working principle with characteristic curves and design centrifugal and reciprocating pumps.

TEXT BOOKS:

1. Dr. R. K. Bansal.,A Textbook of Fluid Mechanics and Hydraulic Machines, Laxmi Publications, Tenth edition,.
2. Chandramouli P N, Applied Hydraulic Engineering, Yes Dee Publisher, 2017

3. Subramanya K., Flow in open channels, Tata McGraw Hill, New Delhi, 2019.

REFERENCES:

1. VenTe 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. Jain. A.K., Fluid Mechanics, Khanna Publishers, Delhi, 2010

CE3462	PROGRAM OUTCOMES												PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	1	1	1	2	2	1	2	1	1	3	2	2	3	2
CO2	3	3	1	1	1	2	2	1	2	1	1	3	2	3	3	3
CO3	3	3	3	2	1	2	2	1	2	1	1	3	3	2	2	2
CO4	3	3	3	2	1	2	2	1	2	1	1	3	2	2	3	2
CO5	3	3	2	2	1	2	2	1	2	1	1	3	2	3	3	2
Average	**3.0**	**3.0**	**2.0**	**1.6**	**1.0**	**2.0**	**2.0**	**1.0**	**2.0**	**1.0**	**1.0**	**3.0**	**2.2**	**2.4**	**2.8**	**2.2**

CE3463 CONSTRUCTION TECHNIQUES AND EQUIPMENTS L T P C

3 0 0 3

COURSE OBJECTIVES:

- The various construction techniques used in the construction field.
- The latest construction practices used in the construction.
- The various construction methods for the sub-structure used in the construction sites.
- The knowledge about the various construction procedures for super-structure such as bridge deck, offshore structures, domes etc.
- The various equipmentS needed for construction of various types of structures to handle the materials.

UNIT- I : CONSTRUCTION TECHNIQUES 9

Structural systems - Load Bearing Structure - Framed Structure - Load transfer mechanism – floor system - Development of construction techniques - High rise Building Technology - Seismic effect - Environmental impact of materials – responsible sourcing - Eco Building - Material used - Construction methods - Natural Buildings - Passive buildings - Intelligent(Smart) buildings - Building automation - Energy efficient buildings for various zones.

UNIT- II: CONSTRUCTION SEQUENCES 9

Specifications, details and sequence of activities and construction co-ordination – Site Clearance – Marking – Earthwork - masonry – stone masonry – Bond in masonry - concrete hollow block masonry – flooring – damp proof courses – construction joints – movement and expansion joints – pre cast pavements – Building foundations – basements – temporary shed – centering and shuttering – slip forms – scaffoldings – de-shuttering forms – Fabrication and erection of steel trusses – frames – weather and water proof – roof finishes.

UNIT- III : CONSTRUCTION OF SUB STRUCTURES **9**

Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement-Tunneling techniques – Piling techniques - well and caisson - sinking cofferdam cable anchoring and grouting - driving diaphragm walls, sheet piles - shoring for deep cutting well points -Dewatering and stand by Plant equipment for underground open excavation.

UNIT- IV : CONSTRUCTION OF SUPER STRUCTURES **9**

Launching girders, bridge decks, off shore platforms – special forms for shells - techniques for heavy decks – in-situ pre-stressing in high rise structures, Material handling - erecting light weight components on tall structures - Support structure for heavy Equipment and conveyors Erection of articulated structures, braced domes and space decks.

UNIT- V : CONSTRUCTION EQUIPMENTS **9**

Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end waders, earth movers – Equipment for foundation and pile driving. Equipment for compaction, batching, mixing and concreting - Equipment for material handling and erection of structures – types of cranes - Equipment for dredging, trenching and tunneling.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of this course, learners will be able to:

1. Know the different construction techniques and structural systems.
2. Understand various techniques and practices on masonry construction, flooring, and roofing.
3. Apply appropriate techniques used for sub structure construction.
4. Identify and apply different techniques for super structure construction.
5. Identify the different construction equipments for various applications.

TEXT BOOKS:

1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., "Construction Planning, Equipment and Methods", 5th Edition, McGraw Hill, Singapore, 1995.
2. Arora S.P. and Bindra S.P., "Building Construction, Planning Techniques and Method of Construction", Dhanpat Rai and Sons, 1997.
3. Varghese, P.C. "Building construction", Prentice Hall of India Pvt. Ltd, New Delhi, 2007.

REFERENCES:

1. Jha J and Sinha S.K., "Construction and Foundation Engineering", Khanna Publishers, 1999.
2. Sharma S.C. "Construction Equipment and Management" ,Khanna Publishers New Delhi, 2002.
3. Deodhar, S.V. "Construction Equipment and Job Planning", Khanna Publishers, New Delhi,2012.
4. Dr. Mahesh Varma, "Construction Equipment and its Planning and Application", Metropolitan Book Company, New Delhi, 1983.
5. Gambhir, M.L, "Concrete Technology", Tata McGraw Hill Publishing Company Ltd, New Delhi, 2004.

CE3463	PROGRAM OUTCOMES												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	2	2	1	3	3	2	2	-	1	1	2	1	2	3	3	2
CO2	1	-	-	2	2	2	3	-	1	1	2	1	3	2	3	2
CO3	2	3	3	2	3	3	2	1	2	2	3	2	3	3	2	2
CO4	2	3	3	3	2	1	2	1	1	1	2	1	3	3	3	2
CO5	1	3	3	3	2	2	1	1	2	2	3	2	3	2	2	2
Average	**1.6**	**2.8**	**2.5**	**2.6**	**2.4**	**2.0**	**2.0**	**1.0**	**1.4**	**1.4**	**2.4**	**1.4**	**2.8**	**2.6**	**2.6**	**2.0**

CE3464 **IRRIGATION ENGINEERING** **L T P C**

3 0 0 3

COURSE OBJECTIVES:

- To impart the basis of irrigation properties and estimation of crop water.
- Student is exposed to different phases in irrigation practices and irrigation project planning and development.
- Student is exposed to various types of hydraulic structure includes dams, spillways and dissipaters.
- Design the components of irrigation canal includes canal drops and cross drainage works.
- To gain the concepts of Irrigation water management.

UNIT- I: IRRIGATION AND CROP WATER REQUIREMENT **9**

Need and classification of irrigation- historical development and merits and demerits of irrigation- physical properties of the soil that influence the soil moisture characteristic - types of crops, season, duty, delta and base period- consumptive use of crops - estimation of Evapotranspiration using experimental and theoretical methods.

UNIT- II: IRRIGATION METHODS **9**

Tank irrigation – Well irrigation – Irrigation methods: Surface and Sub-Surface and Micro Irrigation design of drip and sprinkler irrigation – ridge and furrow irrigation- Irrigation scheduling – Water distribution system- Irrigation efficiencies- planning and development of irrigation projects.

UNIT- III: DAMS, DIVERSION AND IMPOUNDING STRUCTURES **9**

Factors affecting the location of dam-Forces on a dam– Gravity dam -Design of Gravity dams, Earth dams, Arch dams- Spillway- Energy dissipaters. Diversion Head works - Weirs and Barrages- Types of Impounding structures.

UNIT-IV: CANAL IRRIGATION **9**

Classification of canals - Canal regulations – direct sluice - Canal drop – Cross drainage works- Canal outlets – Design of prismatic canal-canal alignments-Canal lining - Kennedy ‘s and Lacey’s Regime theory Design of unlined canal.

UNIT-V: WATER MANAGEMENT IN IRRIGATION **9**

Automated Irrigation System and IoT system - Rehabilitation – Optimization of water use- Minimizing water losses- On form development works - Participatory irrigation management - Water resources associations- Changing paradigms in water management-Performance Evaluation-Economic aspects of irrigation.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

1. Have knowledge and skills about properties of soil and crop water requirements.
2. To understand the methods and management of irrigation
3. Gain knowledge regarding various hydraulic structures like diversion, dam and spillway structures
4. to understand the various components and design of canal and cross drainage work
5. To gain knowledge regarding the Irrigation water management, water user association for participatory irrigation management

TEXT BOOKS:

1. Dilip Kumar Majumdar, “Irrigation Water Management”, Prentice-Hall of India, New Delhi, 2013.
2. Punmia B.C., et. al; “Irrigation and water power Engineering”, Laxmi Publications, 17th Edition, New Delhi, 2021.
3. Garg S. K., “Irrigation Engineering and Hydraulic structures”, Khanna Publishers, 23rd Revised Edition, New Delhi, 2009

REFERENCES:

1. Duggal, K.N. and Soni, J.P., “Elements of Water Resources Engineering”, New Age International Publishers, 2005.
2. Linsley R.K. and Franzini J.B, “Water Resources Engineering”, McGraw-Hill Inc,2000.
3. Chaturvedi M.C., “Water Resources Systems Planning and Management”, Tata McGraw Hill Inc., New Delhi, 1997.
4. Sharma R.K. “Irrigation Engineering”, S.Chand & Co. 2008.
5. Michael A.M., “Irrigation Theory and Practice”, 2nd Edition, Vikas Publishing House Pvt.Ltd., Noida, UP, 2008.
6. Asawa, G.L., “Irrigation Engineering”, New Age International Publishers, New Delhi, 2000.
7. Basak, N.N, “Irrigation Engineering”, Tata McGraw Hill Publishing Co. New Delhi, 2008.

CE3464	PROGRAM OUTCOMES												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	-	1	-	-	2	-	-	-	-	3	-	-	2	-	-	-
CO2	3	-	-	2	3	-	-	-	1	-	-	2	3	-	2	2
CO3	3	3	2	-	-	-	-	3	-	-	1	-	-	3	-	-
CO4	3	-	3	-	-	-	2	-	-	-	1	-	-	3	3	2
CO5	-	-	-	2	2	3	-	-	1	2	2	2	-	-	-	3
Average	3.0	2.0	2.5	2.0	2.3	3.0	2.0	3.0	1.0	2.5	1.3	2.0	2.5	3.0	2.5	2.3

CE3465	FOUNDATION ENGINEERING	L T P C
		3 0 0 3

COURSE OBJECTIVES:

- To impart knowledge to plan and execute a detail site investigation programme.
- To select geotechnical design parameters and type of foundations.
- To familiarize the students for the geotechnical design of different type of foundations and retaining walls.
- To know the settlement of foundations on shallow and deep foundations.
- To learn the contact pressure and settlement of foundations for various footings and rafts.

UNIT-I: SITE INVESTIGATION AND SELECTION OF FOUNDATION 9

Scope and objectives – Methods of exploration - Depth and spacing of bore holes – Soil samples – Sampling methods – Penetration test – Data interpretation - Strength parameters - Bore log report- Selection of foundation based on soil condition.

UNIT-II: BEARING CAPACITY AND SETTLEMENT 9

Location and depth of foundation – Codal provisions – Bearing capacity of shallow foundation on homogeneous deposits – Factors affecting bearing capacity – Bearing capacity determination – Determination of Settlement of foundations on granular and clay deposits – Total and differential settlement – Seismic considerations in bearing capacity evaluation - Codal provision.

UNIT-III: SHALLOW FOUNDATION 9

Types of Isolated footing, Combined footing, Mat foundation – Contact pressure and settlement distribution – Proportioning of foundations for conventional rigid behaviour –– Applications – Codal provision.

UNIT-IV: PILE FOUNDATION **9**

Types of piles and their functions – Factors influencing the selection of pile – Load Carrying capacity of pile – Design methodology for piles - Static formula – Dynamic formulae – Capacity from insitu tests –Negative skin friction – Group capacity – Settlement of pile groups – Pile load test - Under reamed piles – Codal provisions.

UNIT-V: RETAINING WALLS **9**

Introduction- Plastic equilibrium in soils – Active and passive states – Rankine's theory – Cohesionless and cohesive soil – Coulomb's wedge theory – Condition for critical failure plane – Earth pressure on retaining walls of simple configurations – Culmann's Graphical method.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of this course, learners will be able to:

1. Understand the site investigation, methods and sampling.
2. Get knowledge on bearing capacity and testing methods.
3. To design various types of shallow footings.
4. Determine the load carrying capacity, settlement of pile foundation.
5. Determine the earth pressure on retaining walls and analysis for stability.

TEXT BOOKS:

1. Venkatramaiah.C., "Geotechnical Engineering", New Age International Pvt. Ltd., New Delhi, 2017
2. Arora, K.R., "Soil Mechanics and Foundation Engineering", Standard Publishersand Distributors, New Delhi, 7th Edition,2017(Reprint).
3. Punmia, B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi,16th Edition,2017.
4. Murthy, V.N.S., "Text book of Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi, 2014

REFERENCES:

1. Braja M Das, ―Principles of Foundation Engineering‖ (8th Edition), Cengage Learning 2014.
2. Kaniraj, S.R. ―Design aids in Soil Mechanics and Foundation Engineering‖, Tata McGraw Hill publishing company Ltd., New Delhi, 2014.
3. Joseph E bowles, ―Foundation Analysis and design‖, McGraw Hill Education, 5th Edition, 2015.
4. IS Code 6403:1981 (Reaffirmed 1997) ―Bearing capacity of shallow foundation‖, Bureau of Indian Standards, New Delhi.
5. IS Code 8009 (Part 1):1976 (Reaffirmed 1998) ―Shallow foundations subjected to symmetrical static vertical loads‖, Bureau of Indian Standards, New Delhi.
6. IS Code 8009 (Part 2):1980 (Reaffirmed 1995)‖Deep foundations subjected to symmetrical static vertical loading‖, Bureau of Indian Standards, New Delhi.
7. IS Code 2911 (Part 1): 1979 (Reaffirmed 1997) ―Concrete Piles‖ Bureau of Indian Standards, New Delhi.
8. IS Code 2911 (Part 2): 1979 (Reaffirmed 1997) ―Timber Piles‖, Bureau of Indian Standards, New Delhi.
9. IS Code 2911 (Part 3) : 1979 (Reaffirmed 1997) ―Under Reamed Piles, Bureau of Indian Standards, New Delhi.
10. IS Code 2911 (Part 4): 1979 (Reaffirmed 1997) ―Load Test on Piles‖, Bureau of Indian Standards, New Delhi.
11. IS Code 1904: 1986 (Reaffirmed 1995) ―Design and Construction of Foundations in Soils‖, Bureau of Indian Standards, New Delhi.
12. IS Code 2131: 1981 (Reaffirmed 1997) ―Method for Standard Penetration test for Soils‖, Bureau of Indian Standards, New Delhi.
13. IS Code 2132: 1986 (Reaffirmed 1997), ―Code of Practice for Thin – walled tube sampling for soils‖, Bureau of Indian Standards, New Delhi.
14. IS Code 1892 (1979): ―Code of Practice for subsurface Investigation for Foundations‖. Bureau of Indian Standards, New Delhi.
15. IS Code 14458 (Part 1): 1998 ―Retaining Wall for Hill Area – Guidelines, Selection of Type of Wall‖, Bureau of Indian Standards, New Delhi.

CE3465	PROGRAM OUTCOMES												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	2	1	-	-	-	-	2	2	2	2	-	3	2	-	-	-
CO2	3	2	2	-	-	-	2	1	-	1	-	3	3	2	2	1
CO3	3	3	3	2	-	2	2	2	2	2	-	3	3	3	3	2
CO4	3	3	3	2	-	2	2	1	-	1	-	3	3	3	3	2
CO5	3	2	2	1	-	2	2	2	3	2	-	3	3	2	2	1
Average	**2.8**	**2.2**	**2.5**	**1.7**	**-**	**2.0**	**2.0**	**1.6**	**2.3**	**1.6**	**-**	**3.0**	**2.8**	**2.5**	**2.5**	**1.5**

GE 3451	NCC Credit Course Level - I	L T P C
	(Common to Army, Navy & Air)	3 0 0 3

Objective:

1. To know the basic structure of NCC and Role of NCC
2. To improve the cadet's personality skill and leadership quality
3. To make the interest of cadets to involve in social activities
4. Preventing the potential damage and suffering
5. to destruction of the enemy's ability to fight and will to fight

Unit - I : Introduction to NCC **9**

Aims, Objectives & Organization of NCC, Incentives, Duties of NCC Cadet, NCC Camps and Types National Integration: Importance & Necessity, Factors Affecting National Integration, Unity in Diversity & Role of NCC in Nation Building, Threats to National Security.

Unit - II :Personality Development **9**

Personal Transformation, Personal Productivity Skills - time management, organizational and planning skills, problem solving and decision-making abilities, basics of psychology, Leadership, Meditation

Unit - III : Social Service and Community Development **9**

Basics, Rural Development Programmes, NGOs, Contribution of Youth, Protection of Children and Women Safety, Road / Rail Travel Safety, New Initiatives, Cyber and Mobile Security Awareness

Unit - IV : Disaster Managements and its Awareness **9**

Importance of Hazards and Disaster, Types of disasters, Earthquakes and its types, flood types and its management, landside and its managements case studies of disasters in Sikkim, Training and drills for disaster preparedness, Awareness generation program, Usages of GIS and Remote sensing techniques in disaster management

Unit – V : War and Peace in Contemporary World **9**

Conceptual framework of War and Peace, Concepts of theories and approaches, Modern /war fare: Conventional, nuclear, Guerilla and Irregular Warfare, Limited and Specialized Warfare with reference to mountain, desert and jungle warfare, terrorism as a new mode of conflict, War as an Economic Problem, Defence and Development, Defence and Development, Defence and Development

TOTAL: 45 PERIODS

Note: NCC Credit Course Level – I is offered for NCC students only. The grades earned by the students will be recorded in the marksheet, however the same shall not be considered for the computation of CGPA

Course outcome:

At the end of the course, the student should be able to:

1. Understand their roles and responsibilities
2. Demonstrate the knowledge of human values and morals
3. Actively participate in social service and development activities
4. Understand the importance of disaster management
5. Analyse the issues related to war and its effects.

Text Books

1. R. Gupta's NCC Handbook of NCC Cadets 'A', 'B' and 'C' certificate Examiantions

Reference book:

1. V. B. RAO, Personality Development and Soft Skills, BS Publications
2. Harish K. Gupta, Disaster Management, Universities press.

CE3466 STRENGTH OF MATERIALS LABORATORY L T P C

0 0 3 1.5

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for

- To gain knowledge on the shear, compressive and tensile properties of materials.
- To understand gain knowledge on the impact and hardness properties of materials.
- To determine the deflection test on spring and steel beam.
- To understand about impact loading and testing.
- To study on various mix proportions and testing of concrete specimens.

LIST OF EXPERIMENTS:

- Tension test on steel rod
- Compression test on wood
- Double shear test on metal rod
- Torsion test on mild steel rod
- Impact test on metal specimen (Izod and Charpy)
- Hardness test on metals (Rockwell and Brinell Hardness Tests)
- Deflection test on metal beam
- Compression test on helical spring
- Mix Design as per IS Standards
- Tensile and Compressive strength test on Concrete

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:

Sl.No.	Description of Equipment	Quantity
1.	UTM of minimum 40 ton capacity	1
2.	Torsion testing machine	1
3.	Izod & Charpy impact testing machine	1
4.	Hardness testing machine	1
5.	Beam deflection test apparatus	1
6.	Spring testing machine	1
7.	Vernier calipers	3
8.	Dial gauge	3
9.	Concrete cube moulds	6
10.	Concrete cylinder moulds	3
11.	Weighing Balance	1
12.	Seive set	1
13.	Trowels and planers	1 Set

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of this course, learners will be able to:

1. Acquire knowledge in the area of determining the strength of various construction materials.
2. Analyze hardness of materials experimentally.
3. Analyze deflection of specimens experimentally.
4. Understand the mix proportion of concrete.

5. Determine the strength of hardened concrete.

REFERENCES:

1. Laboratory Manual prepared by Course Coordinator(Preferably Laboratory In-charge)
2. Strength of Materials Laboratory Manual, Anna University, Chennai-600 025.
3. M.S. Shetty, —Concrete Technology-Theory and Practicell, S. Chand & Company Ltd., New Delhi, 2008.
4. IS 10262 - 2009 – Indian Standard methods for concrete mix proportioning - guidelines.
5. IS 456 – 2000 Indian Standard for plain and reinforced concrete - Code of practice.

CE3466	PROGRAM OUTCOMES												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	2	1	1	1	-	-	-	1	1	-	1	2	2	2	2
CO2	3	2	1	1	1	-	-	-	1	1	-	2	2	3	2	1
CO3	3	2	3	2	1	-	-	-	1	1	-	-	2	2	1	1
CO4	3	3	3	2	1	-	-	-	1	1	-	-	2	2	1	1
CO5	3	3	2	2	1	-	-	-	1	1	-	3	2	3	2	2
Average	**3.0**	**2.4**	**2.0**	**1.6**	**1.0**	**-**	**-**	**-**	**1.0**	**1.0**	**-**	**2.0**	**2.0**	**2.4**	**1.6**	**1.4**

CE3467 FLUID MECHANICS AND MACHINERY LABORATORY L T P C

0 0 3 1.5

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for

- To gain knowledge on the Flow measurement,
- To understand about the Losses in Pipes,
- To gain knowledge on the Working performance of Pumps,
- To gain knowledge on the Working performance of Turbine,
- To study on the Determination of Metacentric Height,

LIST OF EXPERIMENTS:

A. FLOW MEASUREMENT

1. Calibration of Rotameter
2. Flow through Orifice meter/mouthpiece, Venturimeter and Notches
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 pumps
7. Characteristics of Gear pump
8. Characteristics of Reciprocating pump

D. TURBINES

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

E. DETERMINATION OF METACENTRIC HEIGHT

12. Determination of metacentric height of floating bodies.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

1. Apply Bernoulli equation for calibration of flow measuring devices.
2. Measure friction factor in pipes and compare with Moody diagram.
3. Determine the performance characteristics of rotodynamic pumps.
4. Determine the performance characteristics of positive displacement pumps.
5. Determine the performance characteristics of turbines.

REFERENCES:

1. Laboratory Manual prepared by Course Coordinator(Preferably Laboratory In-charge)

2. Hydraulic Laboratory Manual, Centre for Water Resources, Anna University, 2015.

3. Subramanya K, Fluid Mechanics and Hydraulic Machines, Tata McGraw Hill Edu. Pvt. Ltd. 2011 Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics. Standard Book House. New Delhi, 2017.

CE3467	PROGRAM OUTCOMES												PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	1	1	1	2	2	1	1	1	1	2	2	2	3	2
CO2	3	2	1	1	1	2	2	1	1	1	1	2	2	3	3	3
CO3	3	2	3	2	1	2	2	1	1	1	1	2	3	2	2	2
CO4	3	3	3	2	1	3	2	1	1	1	1	3	2	2	3	2
CO5	3	3	2	2	1	3	2	1	1	1	1	3	2	3	3	2
Average	**3.0**	**2.4**	**2.0**	**1.6**	**1.0**	**2.4**	**2.0**	**1.0**	**1.0**	**1.0**	**1.0**	**2.4**	**2.2**	**2.4**	**2.8**	**2.2**

CE3468 **SOIL MECHANICS LABORATORY** **L T P C**

0 0 3 1.5

OBJECTIVES:

- To study the particle size distribution of different soil.
- To enhance the knowledge on various index properties of soil.
- To gain knowledge about the compaction characteristics of soil.
- To learn about the shearing properties of soil.
- To study about the bearing capacity of soil.

EXERCISES:

1. DETERMINATION OF INDEX PROPERTIES

a. Specific gravity of soil solids

b. Grain size distribution of cohesionless soil – Sieve analysis

c. Grain size distribution of cohesive soil- Hydrometer analysis

d. Liquid limit and Plastic limit tests on cohesive soil

e. Shrinkage limit and Differential free swell tests for cohesive soil.

2. DETERMINATION OF INSITU DENSITY AND COMPACTION CHARACTERISTICS

a. Field density Test (Sand replacement method)

b. Determination of moisture – density relationship using standard Proctor Compaction test.

c. Determination of relative density for the given sample.

3. DETERMINATION OF ENGINEERING PROPERTIES

a. Constant Head Permeability determination for given sample.

b. Falling Head Permeability determination for given sample.

c. One dimensional consolidation test (Demonstration only)

d. Direct shear test in cohesionless soil

e. Unconfined compression test in cohesive soil

f. Laboratory vane shear test in cohesive soil

g. Tri-axial compression test in cohesionless soil (Demonstration only)

h. California Bearing Ratio Test for the given soil

TOTAL: 45 PERIODS

OUTCOMES:

1. Students are able to classify the soil based on IS Code
2. Students are able to conduct tests to determine both the index properties
3. Students are able to conduct tests on engineering properties of soils
4. Students are able to conduct tests on characterization of the soil based on their properties.
5. Students are able to conduct field tests on soil.

REFERENCE BOOKS:

1. Soil Engineering Laboratory Instruction Manual, published by Engineering College Cooperative Society, Anna University, Chennai, 2010.
2. Lambe T.W., —Soil Testing for Engineers‖, John Wiley and Sons, New York,1951. Digitized 2008.
3. Saibaba Reddy, E.Ramasastri, K. —Measurement of Engineering Properties of Soils New Age International (P) Limited Publishers, New Delhi, 2002.
4. IS Code of Practice (2720) Relevant Parts, as amended from time to time, Bureau of Indian Standards, and New Delhi.

CE3468	PROGRAM OUTCOMES												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	1	1	3	-	-	-	-	1	-	-	2	3	1	1	3
CO2	2	2	3	1	-	2	1	-	-	-	-	3	2	1	2	2
CO3	2	1	2	3	-	-	-	-	-	-	-	2	2	2	1	3
CO4	2	1	1	2	2	2	2	-	-	-	2	2	3	2	2	2
CO5	1	1	2	3	-	2	3	-	2	-	2	3	3	2	3	2
Average	**2.0**	**1.2**	**1.8**	**2.4**	**2.0**	**2.0**	**2.0**	**-**	**1.5**	**-**	**2.0**	**2.4**	**2.6**	**1.6**	**1.8**	**2.4**