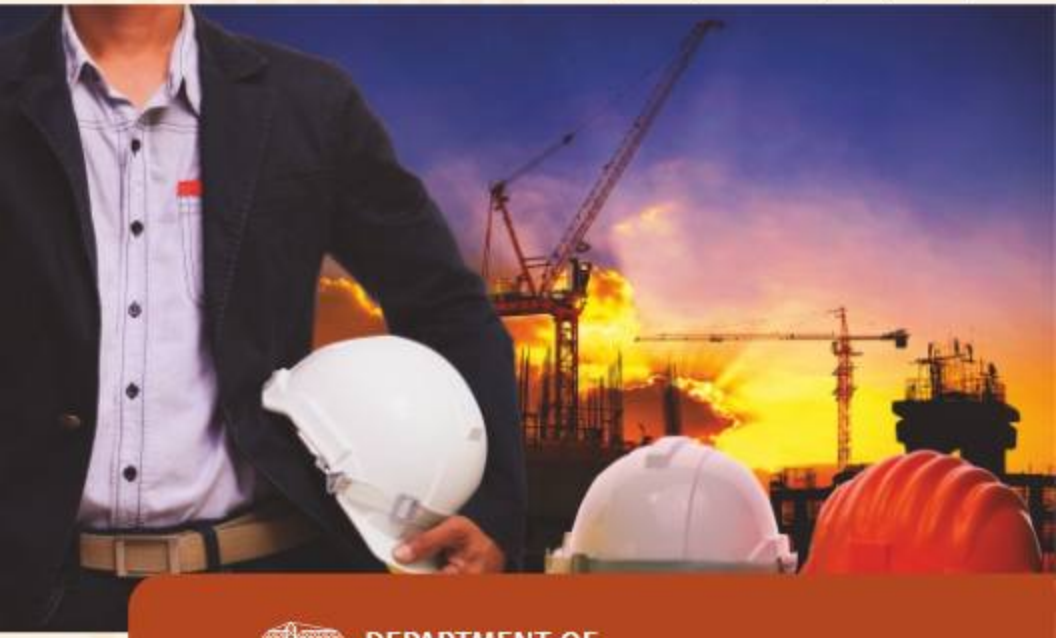
Sri SAIRAM ENGINEERING COLLEGE

An Autonomous Institution

West Tambaram, Chennai - 44

www.sairam.edu.in

Approved by AICTE, New Delhi
Affiliated to Anna University



DEPARTMENT OF CIVIL ENGINEERING

AUTONOMOUS

CURRICULUM AND

SYLLABUS I - IV SEMESTERS

REGULATIONS 2024

Academic Year 2024-25 onwards

SRI SAIRAM ENGINEERING COLLEGE

VISION

To emerge as a "Centre of excellence " offering Technical Education and Research opportunities of very high standards to students, develop the total personality of the individual and instil high levels of discipline and strive to set global standards, making our students technologically superior and ethically stronger, who in turn shall contribute to the advancement of society and humankind.

MISSION

We dedicate and commit ourselves to achieve, sustain and foster unmatched excellence in Technical Education. To this end, we will pursue continuous development of infra-structure and enhance state-of-the-art equipment to provide our students a technologically up-to date and intellectually inspiring environment of learning, research, creativity, innovation and professional activity and inculcate in them ethical and moral values.

Educational Organization Management System (EOMS) Policy

We at Sri Sai Ram Engineering College are committed to empower our students not only to excel academically but also imbibe essential values, enabling them to become exemplary global citizens. We build a better nation by fostering excellence and innovative practices in Engineering, Technology and Management Education. We are dedicated to consistently enhancing our systems, infrastructure and services to meet the needs and expectations of all our stakeholders for sustainable growth

DEPARTMENT OF CIVIL ENGINEERING

VISION

To create competent Civil engineers with ethical values and social responsibility accomplishing societal needs and skill development in sustainable infrastructure development through innovative and responsible use of technology with a sense of humanity.

MISSION

Department of Civil Engineering, SRI SAIRAM ENGINEERING COLLEGE is committed to

M1 Create and provide a platform for continuous learning and sharing of knowledge in modern technological developments.

M2 Encourage research activities with well-equipped laboratories to exhibit their true potential.

M3 Inculcate ethical and moral values to become responsible engineers and better human being.

AUTONOMOUS CURRICULA AND SYLLABI
Regulations 2024

SEMESTER I

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
THEORY							
1	24BSMA101	Matrices and Calculus	3	1	0	4	4
2	24HSEN101	Communicative English	3	0	0	3	3
3	24BSPH101	Engineering Physics	3	0	0	3	3
4	24BSCY101	Engineering Chemistry	3	0	0	3	3
5	24ESCS101	Problem Solving and Programming in C	3	0	0	3	3
6	24ESGE101	Engineering Graphics	1	2	0	3	3
7	24HSTA101	Heritage of Tamils	1	0	0	1	1
PRACTICALS							
1	24BSPL101	Physics and Chemistry Laboratory	0	0	4	4	2
2	24ESPL101	Programming in C Laboratory	0	0	2	2	1
VALUE ADDITIONS - I							
1	24ENTP101	Functional Life Skills	1	0	1	2	1
2	24ESID101	Idea Engineering Lab - I	0	0	2	2	1
ONLINE SUPPLEMENTARY							
		As recommended by BOS					
					Total	**30**	**25**

SEMESTER II

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
THEORY							
1	24BSMA202	Differential Equations, Complex Variables and Transforms	3	1	0	4	4
2	24HSEN201	Professional English	2	0	0	2	2
3	24BSPH204	Physics for Civil Engineering	3	0	0	3	3
4	24BSCY201	Chemistry for Environment and Sustainability	3	0	0	3	3
5	24ESCE201	Engineering Mechanics	3	0	0	3	3
6	24HSTA201	Tamils and Technology	1	0	0	1	1
7	24HSNC201	NCC Course Level 1*	2*	0	0	2*	0
PRACTICALS							
1	24ESGE102	Engineering Practices Laboratory	0	0	4	4	2
VALUE ADDITIONS - II							
1	24ENTP201	Digital Dynamics	0	0	2	2	0
2	24ESID201	Idea Engineering Lab - II	0	0	2	2	1
ONLINE SUPPLEMENTARY							
1	24ESMC201	MS Office (Mandatory - NC)	0	0	0	0	0
					Total	**24**	**19**

*only for NCC cadets, to be conducted beyond working hours

SEMESTER III

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
		THEORY					
1	24BSMA302	Linear Algebra and Partial Differential Equations	3	1	0	4	4
2	24CEPC301	Solid Mechanics	3	0	0	3	3
3	24CEPC302	Fluid Mechanics & Hydraulic Engineering	3	0	0	3	3
4	24CEPC303	Surveying	3	0	0	3	3
5	24CEPC304	Sustainable Construction Materials	3	0	0	3	3
6	24HSMC301	Universal Human Values - II Understanding Harmony	3	0	0	3	3
7	24HSNC301	NCC course Level 2*	3*	0	0	3*	0
		PRACTICALS					
1	24CEPT301	Computer Aided Building Drawing Lab with Theory	1	0	4	5	3
2	24CEPL301	Surveying Laboratory	0	0	4	4	2
		VALUE ADDITIONS - III					
1	24CETP301	Aptitude Skills - I	0	0	2	2	1
2	24CEID301	Innovative Design Lab - I	0	0	2	2	1
		ONLINE SUPPLEMENTARY					
1	24ESMC301	Joy of Computing using Python (Mandatory - NC)	0	2	0	2	0
				Total		**34**	**26**

*only for NCC cadets, to be conducted beyond working hours

SEMESTER IV

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
		THEORY					
1	24BSMA403	Statistics and Numerical Methods	3	1	0	4	4
2	24CEPC401	Soil Mechanics	3	0	0	3	3
3	24CEPC402	Structural Analysis	3	0	0	3	3
4	24CEPC403	Transportation Engineering	3	0	0	3	3
5	24CEPC404	Construction Techniques, Equipment and Practices	3	0	0	3	3
6	24MGOE9xx	Open Elective - I#	3	0	0	3	3
7	24HSNC401	NCC course Level 3*	3*	0	0	3*	0
		PRACTICALS					
1	24CEPL401	Strength of Materials and Hydraulic Engineering Laboratory	0	0	4	4	2
2	24CEPL402	Concrete & Highway Engineering Laboratory	0	0	4	4	2
		VALUE ADDITIONS - IV					
1	24CETP401	Aptitude Skills - II	0	0	2	2	0
2	24CEID401	Innovative Design Lab - II	0	0	2	2	1
		ONLINE SUPPLEMENTARY					
		As recommended by BOS		**Total**		**31**	**24**

*only for NCC cadets, to be conducted beyond working hours #Transportation Management

SEMESTER V

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
		THEORY					
1	24CEPC501	Foundation Engineering	3	0	0	3	3
2	24CEEL5xx	Professional Elective - I	3	0	0	3	3
3	24CEEL5xx	Professional Elective - II	3	0	0	3	3
4	24XXOExxx	Open Elective-II*	3	0	0	3	3
5	24HSMG501	Principles of Engineering Management	3	0	0	3	3
6	24MGMC501	Constitution of India	2	0	0	2	0
		PRACTICALS					
1	24CEPL501	Soil Mechanics Laboratory	0	0	4	4	2
		VALUE ADDITIONS - V					
1	24CETP501	Skill Enhancement	0	0	2	2	1
2	24CEID501	Prototype Development Lab - I	0	0	2	2	1
		ONLINE SUPPLEMENTARY					
		As recommended by BOS					
		Total				**29**	**21**

SEMESTER VI

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
		THEORY					
1	24CEPC601	Environmental Engineering	3	0	0	3	3
2	24CEPC602	Reinforced Concrete Design	3	0	0	3	3
3	24CEPC603	Design of Steel Structures	3	0	0	3	3
4	24CEEL6yy	Professional Elective - III	3	0	0	3	3
5	24CEEL6zz	Professional Elective - IV	3	0	0	3	3
6	24xxOE9xx	Open Elective III	3	0	0	3	3
		PRACTICALS					
1	24CEPL601	Environmental Engineering Laboratory	0	0	4	4	2
		VALUE ADDITIONS - VI					
1	24CETP601	Technical Skill	0	0	2	2	0
2	24CEID601	Prototype Development Lab - II	0	0	2	2	1
		ONLINE SUPPLEMENTARY					
		As recommended by BOS				**26**	**21**
		Total					

SEMESTER VII

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
		THEORY					
1	24CEPC701	Estimation and Quantity Surveying	3	0	0	3	3
2	24CEPC702	Advanced Reinforced Concrete Design	3	0	0	3	3
3	24CEEL7xx	Professional Elective - V	3	0	0	3	3
5	24XXOE9xx	Open Elective - IV	3	0	0	3	3
6	24MGEL703	Creative Innovation and Entrepreneurship	2	0	0	2	2
		PRACTICALS					
1	24CEPT701	Revit Architechture Lab with theory	1	0	4	5	3
2	24CEPJ701	Project Work - Phase I	0	0	8	8	4
		VALUE ADDITIONS - VII					
1	24CETP701	Company Specific Skills	0	0	2	2	1
		ONLINE SUPPLEMENTARY					
		As recommended by BOS					
				Total		**29**	**22**

SEMESTER VIII

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			CONTACT PERIODS	CREDITS
			L	T	P		
		THEORY					
1	24CEEL8xx	Professional Elective – VI	3	0	0	3	3
		PRACTICALS					
1	24CEPJ801	Project Work - Phase II	0	0	12	12	6
		VALUE ADDITIONS - VIII					
1	24CEIN801	Internship	0	0	9	9	3
				Total		**24**	**12**

AUTONOMOUS CURRICULA AND SYLLABI
Regulations 2024

PROFESSIONAL ELECTIVES - I

S. NO	COURSE CODE	COURSE TITLE	CREDIT	DOMAIN
1	24CEEL501	Principles of Construction Management	3	Construction Materials and Technology
2	24CEEL502	Infrastructure Planning and Managements	3	Construction Materials and Technology
3	24CEEL503	Strategic Planning for Infrastructure Sectors	3	Construction Materials and Technology
4	24CEEL504	Introduction to Engineering Seismology	3	Structural Engineering
5	24CEEL505	Structural System in Architecture	3	Structural Engineering
6	24CEEL506	Optimization methods for Civil engineering	3	Structural Engineering
7	24CEEL507	Renewable Energy Systems	3	Environmental Engineering
8	24CEEL508	Air pollution and control Engineering	3	Environmental Engineering
9	24CEEL509	Municipal Solid Waste Management	3	Environmental Engineering
10	24CEEL510	Sustainable Architecture	3	Transportation and Urban Planning
11	24CEEL511	Housing Policy & Planning	3	Transportation and Urban Planning
12	24CEEL512	Introduction to Urban Planning	3	Transportation and Urban Planning
13	24MGEL5xx	Intellectual Property Rights	3	Management

PROFESSIONAL ELECTIVES - II

S. NO	COURSE CODE	COURSE TITLE	CREDIT	DOMAIN
1	24CEEL513	Concrete Technology	3	Construction Materials and Technology
2	24CEEL514	Contract Laws & Regulations	3	Construction Materials and Technology
3	24CEEL515	Disaster Management and Mitigation in Construction	3	Construction Materials and Technology
4	24CEEL516	Introduction to FEM	3	Structural Engineering
5	24CEEL517	Masonry Structures	3	Structural Engineering
6	24CEEL518	Structural Health Monitoring	3	Structural Engineering
7	24CEEL519	Environmental Impact Assessment	3	Environmental Engineering
8	24CEEL520	Hydrology and Water Resource Engineering	3	Environmental Engineering
9	24CEEL521	Integrated Waste Management for a Smart City	3	Environmental Engineering
10	24CEEL522	Remote Sensing and GIS	3	Transportation and Urban Planning
11	24CEEL523	Remote Sensing: Principles and Applications	3	Transportation and Urban Planning
12	24CEEL524	Global Navigation Satellite Systems and Applications	3	Transportation and Urban Planning
13	24MGEL5vv	Total Quality Management	3	Management

AUTONOMOUS CURRICULA AND SYLLABI
Regulations 2024

PROFESSIONAL ELECTIVES - III

S. NO	COURSE CODE	COURSE TITLE	CREDIT	DOMAIN
1	24CEEL601	Development and Applications of Special Concretes	3	Construction Materials and Technology
2	24CEEL602	Construction Management	3	Construction Materials and Technology
3	24CEEL603	Building Fire Codes and Standards	3	Construction Materials and Technology
4	24CEEL604	Geotechnical Earthquake Engineering	3	Structural Engineering
5	24CEEL605	Rock Engineering	3	Structural Engineering
6	24CEEL606	Metallurgy and Material Science	3	Structural Engineering
7	24CEEL607	Climate Change and Mitigation	3	Environmental Engineering
8	24CEEL608	Indoor Air Pollution: Sources, Effects, Monitoring, Control and Modeling	3	Environmental Engineering
9	24CEEL609	Environmental Risk Assessment	3	Environmental Engineering
10	24CEEL610	Ground water	3	Transportation and Urban Planning
11	24CEEL611	Water Quality and Management	3	Transportation and Urban Planning
12	24CEEL612	Surface Water Hydrology	3	Transportation and Urban Planning
13	24MGEL6xx	Disaster management	3	Management

PROFESSIONAL ELECTIVES - IV

S. NO	COURSE CODE	COURSE TITLE	CREDIT	DOMAIN
1	24CEEL613	Modern Construction Materials	3	Construction Materials and Technology
2	24CEEL614	Construction Innovation and Entrepreneurship	3	Construction Materials and Technology
3	24CEEL615	Lean Construction Technology	3	Construction Materials and Technology
4	24CEEL616	Offshore structures	3	Structural Engineering
5	24CEEL617	Prefabricated structures	3	Structural Engineering
6	24CEEL618	Renewable Energy Engineering: Solar, Wind and Biomass Energy Systems	3	Structural Engineering
7	24CEEL619	Environmental Geomechanics	3	Environmental Engineering
8	24CEEL620	Environmental laws and policy	3	Environmental Engineering
9	24CEEL621	Environmental Modeling and Simulation	3	Environmental Engineering
10	24CEEL622	Traffic Engineering	3	Transportation and Urban Planning
11	24CEEL623	Urban Transportation Systems Planning	3	Transportation and Urban Planning
12	24CEEL624	Remote Sensing and GIS for rural development	3	Transportation and Urban Planning
13	24MGEL6yy	Human Rights	3	Management

AUTONOMOUS CURRICULA AND SYLLABI
Regulations 2024

PROFESSIONAL ELECTIVES - V

S. NO	COURSE CODE	COURSE TITLE	CREDIT	DOMAIN
1	24CEEL701	Characterization of construction materials	3	Construction Materials and Technology
2	24CEEL702	Maintenance of Repair and Rehabilitation of Structures	3	Construction Materials and Technology
3	24CEEL703	Safety in Construction	3	Construction Materials and Technology
4	24CEEL704	Prestressed Concrete	3	Structural Engineering
5	24CEEL705	Structural Dynamics	3	Structural Engineering
6	24CEEL706	Earthquake Resistant Design of Foundation	3	Structural Engineering
7	24CEEL707	Industrial Wastewater Treatment	3	Environmental Engineering
8	24CEEL708	Environment Health and Safety	3	Environmental Engineering
9	24CEEL709	Integrated Water Resources Management	3	Environmental Engineering
10	24CEEL710	Urban Land use and Transportation Planning	3	Transportation and Urban Planning
11	24CEEL711	Sustainable Transportation Systems	3	Transportation and Urban Planning
12	24CEEL712	Pavement Materials (Under Pavement Engineering)	3	Transportation and Urban Planning
13	24MGEL7zz	Industrial Psychology	3	Management

PROFESSIONAL ELECTIVES - VI

S. NO	COURSE CODE	COURSE TITLE	CREDIT	DOMAIN
1	24CEEL801	Advanced Concrete Technology	3	Construction Materials and Technology
2	24CEEL802	Construction Equipment and Automation	3	Construction Materials and Technology
3	24CEEL803	Building Services	3	Construction Materials and Technology
4	24CEEL804	Structural Reliability	3	Structural Engineering
5	24CEEL805	Retrofitting and Rehabilitation of civil infrastructure	3	Structural Engineering
6	24CEEL806	Industrial Structures	3	Structural Engineering
7	24CEEL807	Life Cycle Assessment	3	Environmental Engineering
8	24CEEL808	Geo Environmental Engineering	3	Environmental Engineering
9	24CEEL809	Coastal Zone Management	3	Environmental Engineering
10	24CEEL810	Bridge Engineering	3	Transportation and Urban Planning
11	24CEEL811	Urban Utilities Planning : Water Supply, Sanitation and Drainage	3	Transportation and Urban Planning
12	24CEEL812	Urban governance and Development Management (UGDM)	3	Transportation and Urban Planning
13	24MGEL8xx	Introduction to Innovation, IP, Management & Entrepreneurship	3	Management

INDUSTRY CONNECTED PROFESSIONAL ELECTIVES
L&T

S. NO	COURSE CODE	COURSE TITLE	CREDIT	DOMAIN
1	24CEIE501	Design and Construction of Highways and Pavements	3	Transportation Engineering
2	24CEIE502	Engineering Strategies for Sustainability	3	Environmental Engineering
3	24CEIE503	Sustainability Practices in Design of Buildings	3	Environmental Engineering
4	24CEIE504	Transportation Infrastructure for Architects	3	Transportation Engineering
5	24CEIE601	Concrete Building Systems Design	3	Structural Engineering
6	24CEIE602	Precast Members - Systems & Construction	3	Structural Engineering
7	24CEIE603	Structural Steel Buildings - Design and Practices	3	Structural Engineering
8	24IEPJ701	Project Management for Professionals	3	Interdiscipilinary
9	24CEIE702	Metro Rail Transportation Systems & Construction	3	Transportation Engineering
10	24CEIE703	Solid Waste Engineering and System Design	3	Environmental Engineering

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1 Excel in the fundamentals of mathematics, basic sciences, communication and Civil Engineering concepts to solve the real world Civil Engineering problems by imparting sound technical knowledge.

PEO2 Compete professionally with suitable and modern technological skills in the field of research and higher studies.

PEO3 Realize and practice ethical, environmental and professional responsibilities for sustainable development of society and nation.

PEO4 Exhibit strong leadership quality, eagerness for lifelong continuous learning to adopt themselves in Civil Engineering domain

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1 Capably design and build civil engineering-based systems in the context of environmental, economical, and societal requirements and serve the community as ethical and responsible professionals.

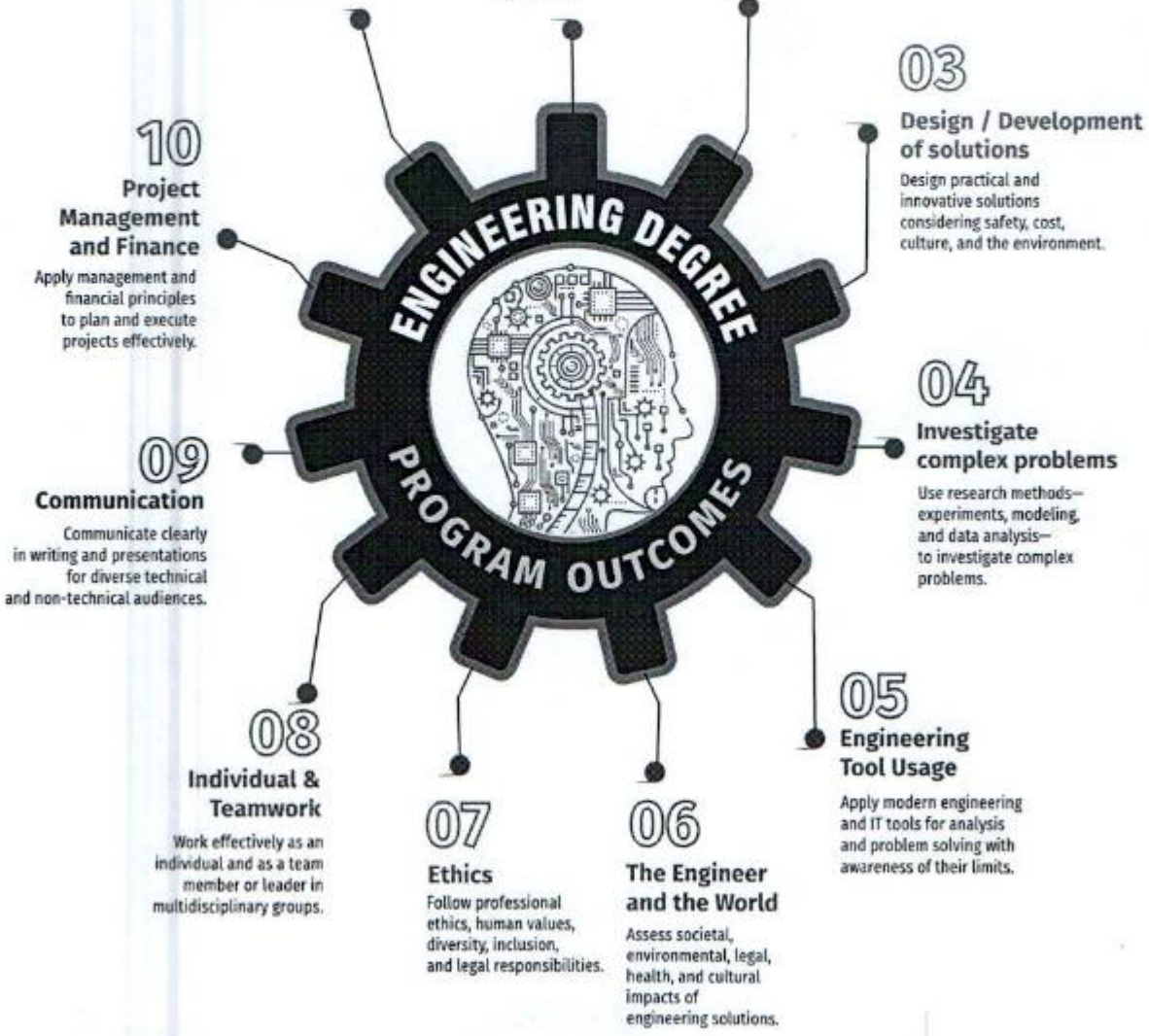
PSO2 Be Able to use knowledge in various domains to identify research gaps and hence to provide solution to new ideas and innovations and engage in lifelong learning for professional growth.

COMPONENTS OF THE CURRICULUM (COC)

Course Component	Curriculum Content (% of total number of credits of the program)	Total number of contact hours	Total Number of credits
Basic Sciences (BS)	16	32	30
Engineering Sciences (ES)	7	15	12
Humanities and Social Sciences (HS)	8	15	14
Professional Electives (EL)	12	20	20
Program Core + Program Lab (PC+PL)	31	66	54
Program theory with Lab (PW) / Program Lab With Theory (PT)	5	5	3
Open Elective (OE)	7	12	12
Training & Placement (TP)	2	14	4
Innovation & Development (ID) / Project (PJ)	10	32	16
Internships (IN)	2	9	3
Mandatory Courses (MC)	0	2	0
Total	100	222	168

PROGRAMME OUTCOMES(POs)

PROGRAM OUTCOME REPRESENTS THE KNOWLEDGE, SKILLS AND ATTITUDES THAT THE STUDENTS WOULD BE EXPECTED TO HAVE AT THE END OF THE 4 YEAR ENGINEERING DEGREE PROGRAM



01 Engineering knowledge
Apply math, science, computing, and engineering knowledge to solve complex engineering problems.

02 Problem Analysis
Identify and analyze complex problems using research to draw valid conclusions.

03 Design / Development of solutions
Design practical and innovative solutions considering safety, cost, culture, and the environment.

04 Investigate complex problems
Use research methods—experiments, modeling, and data analysis—to investigate complex problems.

05 Engineering Tool Usage
Apply modern engineering and IT tools for analysis and problem solving with awareness of their limits.

06 The Engineer and the World
Assess societal, environmental, legal, health, and cultural impacts of engineering solutions.

07 Ethics
Follow professional ethics, human values, diversity, inclusion, and legal responsibilities.

08 Individual & Teamwork
Work effectively as an individual and as a team member or leader in multidisciplinary groups.

09 Communication
Communicate clearly in writing and presentations for diverse technical and non-technical audiences.

10 Project Management and Finance
Apply management and financial principles to plan and execute projects effectively.

11 Life-long learning
Engage in independent lifelong learning and adapt to new technologies with critical thinking.

SEMESTER - I

24BSMA101 - SDG NO. 4	MATRICES AND CALCULUS	L	T	P	CP	C
		3	1	0	4	4

OBJECTIVES:

- To understand and gain the knowledge of matrix algebra.
- To introduce the concepts of limits, continuity, derivatives, maxima and minima for functions of several variables.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To provide understanding of double integration, triple integration and their applications.
- To impart the knowledge of Fourier series..

MODULE - I MATRICES **12**

Eigenvalues and Eigenvectors of a real matrix – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton theorem (without proof) – Symmetric and orthogonal matrices - Reduce the Quadratic to Canonical form using orthogonal transformation - Nature of Quadratic forms.

MODULE - II FUNCTIONS OF SEVERAL VARIABLES **12**

Limits, Continuity - Definitions - Partial derivatives -Taylor's series - Jacobians, Maxima and Minima - Method of Lagrange multipliers.

MODULE - III VECTOR DIFFERENTIATION **4**

Scalar and Vector valued functions- Gradient and Directional derivatives – Tangent plane - Divergence and Curl- Irrotational and Solenoidal vector fields - Scalar and Vector Potentials - Vector identities (without proof).

MODULE - IV VECTOR INTEGRATION **8**

Line integral over a plane curve - Surface integral - Area of a curved surface - Volume integral - Greens, Gauss divergence and Stoke's theorems -Verification and Application in evaluating line, Surface and Volume integrals. Problems involving Cube and Cuboids.

MODULE - V MULTIPLE INTEGRALS **12**

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Change of variables from cartesian to polar coordinates-Triple integrals – Volume of solids - Change of variables from cartesian to Spherical and Cylindrical polar coordinates.

Recommended by Board of Studies of H&S dept. Meeting No. 6 Dat 31/05/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - VI FOURIER SERIES 12

Fourier series – Convergence of Fourier series -Half range Sine and Cosine series – Parseval's theorem.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry, G.B. Thomas and R.L. Finney, 9th Edition, Pearson, Reprint, 2002.

REFERENCES:

1. Higher Engineering Mathematics, B. V. Ramana, 11th reprint, Tata McGraw-Hill, New Delhi, 2010.
2. Engineering Mathematics for first year, T. Veerarajan, Tata McGraw-Hill, New Delhi, 2008.
3. A text-book of Engineering Mathematics, N.P. Bali and Manish Goyal, 9th Edition, Laxmi Publications, Reprint, 2008.
4. Higher Engineering Mathematics, B. S. Grewal, 40th Edition, Khanna Publishers, New Delhi, 2007.

WEB REFERENCES:

1. https://math.mit.edu/~gs/linearalgebra/ila0601.pdf
2. http://ocw.mit.edu/ans7870/18/18.013a/textbook/HTML/chapter30/
3. https://ocw.mit.edu/courses/mathematics/18-02sc-multivariable-calculus-fall-2010/2.-partial derivatives/
4. http://ocw.mit.edu/ans7870/18/18.013a/textbook/HTML/chapter31/

ONLINE RESOURCES:

1. https://www.khanacademy.org/math/linear-algebra/alternate-bases/eigen-everything/v/linear algebra-introduction-to-eigenvalues-and-eigenvectors
2. https://www.khanacademy.org/math/differential-calculus

COURSE OUTCOMES:

Upon completion of the course, the student should be able to:

1. Diagonalize the matrix using orthogonal transformation and apply Cayley Hamilton Theorem to find the inverse and integral powers of a square matrix. (K3)
2. Evaluate the limit, examine the continuity and use derivatives to find extreme values for functions of several variables. (K3)

Recommended by Board of Studies of H&S dept. Meeting No. 6 Date: 31/oct/2019

S. Ramachandran
Chairman
Board of Studies
Department of Humanities & Sciences

3. Compute the derivatives of scalar and vector point functions. (K3)
4. Use the vector point function to establish the relation between line, surface and volume integrals. (K3)
5. Apply double and triple integrals to find the area and the volume of a region. (K3)
6. Compute Fourier series expansion of a function. (K3)

CO-PO Mapping:

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

SEMESTER - I

24HSEN101 - SDG NO. 4	COMMUNICATIVE ENGLISH	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- Develop the basic LSRW skills
- Acquire enhanced knowledge of English grammar
- Improve modern and technical vocabulary
- Enhance the communicative and cognitive skills
- Interpret the texts and write reviews critically

MODULE - I COMMUNICATION PROCESS 8

Listening – informal conversations - Speaking – basics in speaking – speaking on given topics & situations – recording speeches and strategies to improve - Reading comprehension – skimming/ scanning/ predicting – question & answers – objective and descriptive answers - Writing – paragraph writing, personal notes - Language Development – parts of speech, prefix, suffix, word formation

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Date 21/6/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - II LANGUAGE BARRIERS, LEVELS AND CHANNELS 8

Listening –interviews - Speaking – describing a simple process – asking and answering questions - Reading – critical reading – finding key information in a given text – ideation, mind mapping - Writing - dialogue,, instructions – Language Development – regular, irregular verbs, tenses, framing questions,

MODULE - III NARRATION AND SUMMATION 8

Listening - long texts - TED talks - extensive speech on current affairs - Speaking – role plays – asking about routine actions and expressing opinions - Reading- longer texts & making a critical analysis of the given text - Writing – essay (comparative / analytical), jumbled sentences, recommendations - Language Development – writing single sentence definitions, sequence words

MODULE - IV WRITING MECHANICS 7

Listening -debates and discussions – practicing multiple tasks –Speaking - self introduction about friends/ places/ hobbies - Reading -Making inference from the reading passage – Predicting the content of the reading passage - Writing – informal letters, e-mails - accuracy, coherence, brevity – Language Development- single word substitutes, compound words- conditionals

MODULE - V INTERPRETATION SKILLS 7

Listening- popular speeches and presentations - Speaking - impromptu speeches -Reading - articles – magazines - Writing – review writing, channel conversion – bar diagram/ table, poster/ picture interpretation - Language Development – modal verbs, collocations, 21st century vocabulary

MODULE - VI COGENT EXPOSITIONS 7

Listening - Motivational speeches - Speaking - Debates and discussion - Reading - analytical reading - newspapers - Writing - process description - Language Development - voices, sentences expressing purpose, synonyms & antonyms

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Board of Editors. Using English: A Coursebook for Undergraduate Engineers and Technologists. Orient Blackswan Limited, Hyderabad: 2015.
2. A Course in Technical English, D. Praveen Sam and K.N. Shoba, Cambridge University Press, 2020

S. Narrakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Date 31/08/2024

REFERENCES:

1. Anderson, Paul V. Technical Communication: A Reader – Centered Approach. Cengage, New Delhi, 2008.
2. Smith-Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage, Mason, USA, 2007.
3. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford, 2007.
4. Chauhan, Gajendra Singh and et.al.Technical Communication (Latest Revised Edition). Cengage Learning India Pvt. Limited, 2018.

WEB REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc19_hs31/preview
2. https://www.myenglishpages.com/speaking/#google_vignette

ONLINE RESOURCES:

1. https://wwPearson.com/english/catalogue/business-english/technical-english.html
2. https://ww.cambridgeenglish.org/learning-english/free-resources/

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Improve understanding and application of listening, speaking, reading, and writing skills (K2)
2. Demonstrate the ability to write personal notes, clear and coherent paragraphs (K2)
3. Apply analytical skills to write essays, rearrange jumbled sentences, and formulate recommendations (K3)
4. Apply skills to develop email etiquette and construct professional emails and informal letters (K3)
5. Analyze and interpret data to write comprehensive and effective reviews (K3)
6. Enhance vocabulary, improve grammatical accuracy, and confidently engage in debates (K2)

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 21/05/2019

S. Narasimhaiah
Chairman
Board of Studies
Department of Humanities & Sciences

CO-PO, PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	3	-	2	-	-
CO2	-	-	-	-	-	-	-	-	3	-	2	-	-
CO3	-	-	-	-	-	-	-	-	3	-	2	-	-
CO4	-	-	-	-	-	-	-	-	3	-	2	-	-
CO5	-	-	-	-	-	-	-	-	3	-	2	-	-
CO6	-	-	-	-	-	-	-	-	3	-	2	-	-

SEMESTER - I

24BSPH101 - SDG NO. 4,7,9,11	ENGINEERING PHYSICS	L	T	P	CP	C
		3	0	0	4	3

OBJECTIVES:

- To understand the basic concepts of mechanics and its use in engineering applications.
- To understand the concept of waves and lasers and its applications.
- To illustrate the various laws of electromagnetic waves and its applications.
- To apply the concepts of quantum mechanics to engineering studies.
- To understand the basics of crystal for engineering applications.
- To identify the basic principles involved in thermal physics and its applications.

MODULE - I PROPERTIES OF MATTER **8**

Elasticity – Hooke's law- Poisson's ratio - Stress - strain diagram and its uses - Twisting couple - shaft - Torsion pendulum: theory and experiment - bending of beams - bending moment - cantilever: theory and experiment - uniform and non-uniform bending: theory and experiment - I-shaped girders.

MODULE - II MECHANICAL WAVES AND LASERS **7**

Waves on a string – standing waves – traveling waves – Energy transfer of a wave – Reflection and refraction of light waves – interference –Theory of air wedge and experiment - Theory of laser – characteristics – Spontaneous and stimulated emission – Einstein's coefficients – population inversion – Nd-YAG laser, CO_2 laser – Basic applications of lasers in industry.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Date 31/08/2024

Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - III ELECTROMAGNETIC WAVES 8

The Maxwell's equations – wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field – properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter – polarization – Producing electromagnetic waves – Energy and momentum in EM - Reflection and transmission of electromagnetic waves from a non-conducting medium vacuum interface for normal incidence.

MODULE - IV BASIC AND APPLIED QUANTUM MECHANICS 7

Black body radiation – Planck's derivation – Electrons and matter waves –The Schrodinger equation (Time dependent and time independent forms) – significance of wave function – Normalization –Free particle – particle in a infinite potential well: 1D, 2D and 3D Boxes; - Barrier penetration and quantum tunneling (qualitative) – Scanning Tunneling Microscope.

MODULE - V CRYSTAL PHYSICS 8

Single crystalline, Polycrystalline and Amorphous materials - single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal - Miller indices - Interplanar distance - X-Ray diffraction - Calculation of number of atoms per unit cell - Atomic radius - Coordination number – packing. factor for SC, BCC, FCC and HCP structures - Polymorphism and allotropy. Crystal Growth: Chochralski technique - Molecular beam epitaxy.

MODULE - VI THERMAL PHYSICS 7

Transfer of heat energy - Conduction, Convection and Radiation - Thermal conductivity, Forbe's method and Lee's disc method - Conduction through compound media - series and parallel methods - Heat exchangers - Refrigerators and Solar water heaters.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. D.K. Bhattacharya & T.Poonam, "Engineering Physics". Oxford University Press, 2015.
2. R.K. Gaur & S.L. Gupta, "Engineering Physics". Dhanpat Rai Publishers, 2012.
3. B.K. Pandey & S.Chaturvedi, "Engineering Physics", Cengage Learning India, 2017.
4. V. Rajendran, "Engineering Physics", Mc Graw Hill Publications Ltd. New Delhi, 2014.
5. M.N. Avadhanulu And P.G. Kshirsagar, "A textbook of Engineering Physics", S. Chand & Co Ltd. 2016.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/Oct/2019

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

REFERENCES:

1. D. Halliday, Resnick & J. Walker, "Principles of Physics", Wiley, 2015.
2. R.A. Serway, & J.W. Jewett, "Physics for Scientists and Engineers", Cengage Learning, 2010.
3. N.K. Verma," Physics for Engineers", PHI Learning Private Limited, 2014.
4. P.A. Tipler & G. Mosca "Physics for Scientists and Engineers", W.H.Freeman, 2020.
5. Brijlal and Subramanyam, "Properties of Matter", S. Chand Publishing, 2018.
6. Shatendra Sharma & Jyotsna Sharma, "Engineering Physics", Pearson, 2018.
7. Arthur Beiser. "Concepts of Modern Physics", McGraw-Hill, 6th Edition. 2003.
8. Charles Kittel, "Introduction to Solid State Physics". John Wiely & Sons. 8th Edition, 2005.

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Apply the concepts of stress, torsion, and bending to study the mechanical behavior of structural elements using theoretical and experimental methods. (K3)
2. Analyze wave phenomena and interference to study energy transfer, and evaluate laser principles with their industrial applications. (K4)
3. Examine Maxwell's equations and electromagnetic wave theory to analyze wave propagation, polarization and reflection-transmission phenomena in different media (K4)
4. Utilize the principles of quantum mechanics to explain black body radiation, matter waves, particle confinement in potential wells and tunneling phenomena. (K3)
5. Examine and compare the characteristics of various crystal structures, polymorphic forms, and crystal growth techniques. (K4)
6. Apply the principles of heat transfer to determine the thermal conductivity and explain the role of heat exchangers in refrigerators and solar water heaters. (K3)

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 21/05/2024

S. Narasaiah
Chairman
Board of Studies
Department of Humanities & Sciences

CO-PO, PSO Mapping:

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

SEMESTER - I

24BSCY101 – SDG NO. 4,7,8,9,11,12,17	ENGINEERING CHEMISTRY	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To enumerate the importance, synthesis, and applications of polymers.
- To impart basic knowledge of chemistry and the principles involved in electrochemistry, energy storage devices, and their commercial applications.
- To familiarize the fundamental laws and concepts of important photophysical and photochemical processes, as well as spectroscopy.
- To explore the fundamental concepts, laws, and principles of thermodynamics, and apply its derivations to optimize and innovate engineering processes across various disciplines.
- To comprehend the chemistry of fuels and combustion, and their applications across various engineering and industrial processes.
- To gain an understanding of the emergence and challenges of nanomaterials and nanotechnology across various scientific and technological disciplines.

MODULE - I POLYMER CHEMISTRY 8

Polymers: Definition, Degree of polymerization, Functionality of monomer, Classification of polymer with examples, Types of polymerization, Mechanism of addition polymerization (Free radical mechanism).

Plastics: Definition and Characteristics - Thermoplastics & Thermosets. Preparation, properties and engineering applications of plastics -PVC, Teflon, Kevlar and Bakelite.

Recommended by Board of Studies of H&S dept. Meeting No 6 Date 31/05/2024

S. Narasimhan Chairman Board of Studies Department of Humanities & Sciences

Fibers: Characteristics fibers - Preparation, properties and applications of Nylon and Dacron. Biodegradable polymers & Conducting Polymers: Characteristics, Classification and their applications.

MODULE - II ELECTROCHEMISTRY AND BATTERY TECHNOLOGY 7

Electrochemistry: Types of Cells (Electrochemical and Electrolytic cell) – Redox reaction – Single and Standard electrode potential, Reference electrodes - SHE, Calomel electrode, Measurement of Single Electrode Potential, Nerns't equation (Derivation & Problems), Electrochemical series and its significance.

Batteries: Evolution of batteries – Primary and Secondary battery (Lead acid battery), Next Generation Battery Technology (NGBT) - Solid-state batteries (Lithium-ion), Sodium-ion batteries.

MODULE - III PHOTOCHEMISTRY & SPECTROSCOPY 7

Photochemistry: Laws of photochemistry - Grotthuss–Draper law, Stark–Einstein law and Lambert-Beer Law. Quantum efficiency – determination-Photo processes - Jablonski diagram (Internal Conversion, Intersystem crossing, Fluorescence, Phosphorescence), Chemiluminescence and Photo-sensitization.

Spectroscopy: Electromagnetic spectrum - Absorption of radiation – Electronic, Vibrational and Rotational transitions. UV-visible and IR spectroscopy – principles, instrumentation (Block diagram only).

MODULE - IV CHEMICAL THERMODYNAMICS 8

Terminology of Thermodynamics - Laws of Thermodynamics – I law – Significance – Mathematical formulation and its applications. II law – Need for the II law. Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes, entropy of phase transitions; Clausius inequality. Helmholtz and Gibbs free energy functions, Criteria of spontaneity, Maxwell relations, Gibbs-Helmholtz equation, Van't Hoff Isotherm and Isochore.

MODULE - V FUELS 8

Fuels: Introduction –Classification of fuels – Coal – Analysis of coal (proximate and ultimate). Carbonization – manufacture of metallurgical coke (Otto Hoffmann method) – Petroleum – manufacture of synthetic petrol (Bergius process). Knocking – Octane number and Cetane number – Gaseous fuels – Compressed natural gas (CNG), Liquefied petroleum gas (LPG). Biofuels – Gobar gas and Biodiesel.

Combustion of fuels: Introduction – Calorific value – Higher and Lower Calorific values- Theoretical calculation of Calorific value(Dulong formula) – Flue gas analysis (ORSAT Method).

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2023

Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - VI NANOCHEMISTRY 7

Introduction - Types of nanomaterials - Emergence and challenges in nanotechnology- Synthesis routes for nanomaterials: Bottom-up and top-down approaches - Sol-gel, precipitation, Thermolysis, Laser ablation, Chemical Vapour Deposition (CVD), Electro deposition - Properties of nanomaterials- Mechanical properties, Chemical, Optical, Electrical and Magnetic properties-applications of nanomaterials (Gold nanoparticles as an example). Quantum Dots - concept, properties and applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand &CompanyLTD, New Delhi, 2015.
2. P. C. Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company (P)LTD, New Delhi, 2015.
3. S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT, LTD,New Delhi, 2013.
4. Ravikrishnan A, 'Engineering Chemistry', Sri Krishna Hitech Publishing Company Pvt. Ltd, New Edition 2024.

REFERENCES:

1. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi,2014.
2. Prasanta Rath, "Engineering Chemistry", Cengage Learning India PVT, LTD, Delhi, 2015.
3. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, 2015.
4. Chemistry of Nanomaterials Vol.1 S.S.R Kumar Challa (Ed).
5. Advanced chemistry by Phillip Matthews Vol.1 and Vol.2.
6. Chemistry in Engineering and Technology Vol. 1 & 2, J.C. Kuriacose and J. Rajaram.
7. Applied chemistry - A textbook for Engineers and Technologists by H.D. Gesser.
8. Chemical and Electrochemical Energy Systems, R. Narayanan, B. Viswanathan, University Press India Limited.

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Explain the importance of polymers in science and technology, describe their roles in different applications and discuss their impacts on modern advancements. (K3)

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Date : 31/oct/2025

Chairman
Board of Studies
Department of Humanities & Sciences

2. Recognize the basic principles of electrochemistry and describe their application in battery technologies. (K3)
3. Apply the concepts of key photophysical and photochemical processes, as well as spectroscopy, to develop and optimize various applications. (K3)
4. Describe the principles of the second law of thermodynamics and its derivations to analyze engineering applications across all disciplines. (K3)
5. Categorize the chemistry of fuels and combustion and their applications at various levels. (K3)
6. Demonstrate the knowledge of nanomaterials, including their properties, behavior, interactions and applications across various disciplines of science and technology. (K3)

CO-PO, Mapping:

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

SEMESTER - I

24ESCS101 106105171 SDG NO. 4 & 9	PROBLEM SOLVING AND PROGRAMMING IN C	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- Interpret Mathematical problems using algorithms, flowchart and pseudocode.
- To understand the programming language.
- To develop C Programs using basic Programming Constructs, Loops, Arrays and Strings.
- To develop applications in C using Functions, Pointers and Structures.
- To perform I/O operations and File Handling in C.

Recommended by Board of Studies of CSE dept. Meeting No. 7 Dated: 30/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
Sri Sairam Engineering College

MODULE - I INTRODUCTION TO PROGRAMMING AND ALGORITHMS FOR PROBLEM SOLVING 7

Introduction to Problem Solving through programs- Algorithm-Flowchart–Pseudocode-Memory, Variables, Values, Instructions, Programs-compilation process-Syntax and Semantic Errors- The language of C : Phases of developing a running computer program in C - Character set – Constants – Keywords – Primitive data types –Declaration, Type Conversion.

MODULE - II BASICS OF C PROGRAMMING 7

Sequential- Arithmetic Operators, Relational Operators, Logical Operators, Increment Decrement Operators, Bitwise Operators, Assignment Operators and Expressions, Precedence and Order of Evaluation, selective – If, Else-If, Switch- repetitive structures-for, while, do while, Nested loops, go to, break, continue –Finding maximum of 3 numbers, Unit converters, Interest calculators, multiplication tables, GCD and LCM, Prime number generation.

MODULE - III ARRAYS AND STRINGS 8

Introduction to Arrays: Declaration, Initialization – One Dimensional Array – Example Program: Computing Mean, Median and Mode - Two Dimensional Arrays – Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) - String Operations: Length, Compare, Concatenate - Copy – Selection Sort - Linear and Binary Search.

MODULE - IV FUNCTIONS AND POINTERS 9

Introduction to Functions: Function Prototype, Function Definition, Function Call, Built-in Functions (String Functions, Math Functions) – Recursion – Example Program: Computation of Sine Series - Scientific Calculator using Built-in Functions - Binary Search using Recursive Functions - Factorial and Fibonacci Generation - Towers of Hanoi problem - – Pointers – Pointer Operators – Pointer Arithmetic – Arrays and Pointers –Array of Pointers – Example Program: Sorting of Names – Parameter Passing: Pass by Value - Pass by Reference – Example Program: Swapping of Two Numbers using Pass by Reference.

MODULE - V STRUCTURES 7

Structure - Nested Structures – Pointer and Structures – Array of Structures – Example Program using Structures and Pointers – Self Referential Structures – Dynamic Memory Allocation - Singly Linked List – Typedef.

MODULE - VI FILE PROCESSING 7

Files – Types of File Processing: Sequential Access, Random Access – Sequential Access File - Example Program: Finding Average of Numbers stored

Recommended by
Board of Studies of CSE dept.
Meeting No. 7 Dated: 30/5/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
Sri Sairam Engineering College

in Sequential Access File - Random Access File - Example Program: Transaction Processing Using Random Access Files – Command Line Arguments.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. R.G. Dromey, "How to solve it by Computers", Reprint, PHI Publishers, 2011.
2. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2018.
3. Kernighan, B.W and Ritchie D.M, "The C Programming language", Second Edition, Pearson Education, 2015.

REFERENCES:

1. Yashwant Kanetkar, "Let us C", 18th Edition, BPB Publications, 2021.
2. Byron Gottfried, "Programming with C", Fourth Edition, Tata McGraw Hill Education, 2018.
3. Paul Deitel and Harvey Deitel, "C How to Program", Seventh edition, Pearson Publication, 2015.
4. Jeri R. Hanly & Elliot B.Koffman, "Problem Solving and Program Design in C", Pearson Education, 2013.
5. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009.
6. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
7. Hanly J R & Koffman E.B, "Problem Solving and Programme design in C", Pearson Education, 2009.

WEB REFERENCES:

1. https://www.learn-c.org/
2. https://codeforwin.org/
3. https://www.cprogramming.com

ONLINE RESOURCES:

1. https://www.linuxtopia.org/online_books/programing_books/gnu_c_programming_tutorial
2. https://nptel.ac.in/courses/106105171
3. https://swayam.gov.in/nd1_noc19_cs42/preview

Recommended by
Board of Studies of CSE dept.
Meeting No. 7 Dated: 30/05/24

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
Sri Sairam Engineering College

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Solve basic problems using algorithms, flowcharts, and pseudo code.(K3)
2. Analyze the various programming constructs for basic computational problems.(K4)
3. Implement simple C programs using arrays and strings. (K3)
4. Use functions, recursion, and pointers to perform calculations, searching, and sorting.(K3)
5. Apply structures and dynamic memory allocation in handling complex programming tasks. (K3)
6. Organize sequential and random file processing techniques to provide solutions for real-world computational problems. (K4)

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	2	2
CO2	-	3	-	-	-	-	-	-	-	-	-	2	2
CO3	3	-	-	-	-	-	-	-	-	-	-	1	2
CO4	-	3	-	-	-	-	-	-	-	-	-	2	2
CO5	-	3	-	-	-	-	-	-	-	-	-	2	3
CO6	-	-	3	-	-	-	-	-	-	-	-	3	3

SEMESTER - I

24ESGE101 - SDG NO. 4,6,7,9,12, 14 & 15	ENGINEERING GRAPHICS	L	T	P	CP	C
		1	2	0	3	3

OBJECTIVES:

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To visualize the job in three dimensions.
- To have a clear conception and appreciation of the shape, size, proportion and design.
- To expose the student community to existing national standards related to technical drawings.

Recommended by Board of Studies of Mech dept. Meeting No. 8 Dated: 1.6.24

CHAIRMAN Board of Studies Mechanical Engineering

MODULE - I PLANE CURVES **6+4**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid on Horizontal Surfaces – Drawing of tangents and normal to the above curves.

MODULE - II PROJECTION OF POINTS, LINES AND PLANES **6+4**

Projection of Points (Concept only). Projection (Elevation and Plan) of straight lines, inclined to both reference planes by rotating line method. Projection of plane surfaces, inclined to one of the reference planes by rotating object method.

MODULE - III PROJECTION OF SOLIDS **6+4**

Projection of regular solids (Prisms, Pyramids, Cylinder and cone) in first quadrant, by rotating object method when the axis is inclined to one of the reference planes.

MODULE - IV ORTHOGRAPHIC PROJECTION **6+4**

Orthographic Projection - Principles of orthographic projections, Orthographic projection of objects from pictorial view.

MODULE - V SECTION AND DEVELOPMENT OF LATERAL SURFACE **6+4**

Projection of sectioned solids (Prisms, Pyramids, Cylinder and cone) and true shape of the sections, when the axis of the solid is perpendicular to HP alone and cutting plane inclined to HP only. Development of lateral surfaces of sectioned regular vertical solids (Prisms, Pyramids, Cylinder and Cone) with cutting plane inclined to HP only.

MODULE - VI ISOMETRIC PROJECTIONS **6+4**

Isometric projection – Principle, isometric scale, Isometric views and Isometric projections of truncated solids - Prisms, Pyramids, Cylinder and Cone in simple vertical positions only.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2011.
2. T. Jeyapoovan, "Engineering Graphics using AUTOCAD", Vikas Publishing House Pvt Ltd, 7th Edition.

Recommended by
Board of Studies of Mech dept.
Meeting No. 8 Dated: 1.6.24

CHAIRMAN
Board of Studies
Mechanical Engineering

REFERENCES:

1. N S Parthasarathy and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
2. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.
3. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.

WEB REFERENCES:

1. https://archive.nptel.ac.in/courses/112/102/112102304/

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/105/104/105104148/
2. https://nptel.ac.in/courses/112/103/112103019/

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Perform free hand drawing of conical sections and cycloids. (K3)
2. Sketch the orthographic projection of lines and plane surfaces of rectangle, square, pentagon and Hexagon. (K3)
3. Draw the orthographic projection of regular solids like prism, pyramids, cylinder and cone using change of position method. (K3)
4. Draw plan, elevation and side views for the 3dimensional isometric drawing by using the concepts of orthographic projection. (K3)
5. Draw the section and development of lateral surfaces for the regular solids like Prism, Pyramid, Cylinder and Cone for the axis perpendicular to HP. (K3)
6. Draw the isometric view, projection for regular and truncated solids like Prism, Pyramid, Cylinder and Cone. (K3)

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	2	-	-	-	3
CO2	3	-	-	-	-	-	-	-	2	-	-	-	3
CO3	3	-	-	-	-	-	-	-	2	-	-	-	3
CO4	3	-	-	-	-	-	-	-	3	-	-	-	3
CO5	3	-	-	-	-	-	-	-	2	-	-	-	3
CO6	3	-	-	-	-	-	-	-	3	-	-	-	3

Recommended by
Board of Studies of Mech dept.
Meeting No. 8 Dated: 16.24

CHAIRMAN
Board of Studies
Mechanical Engg.

SEMESTER - I

24HSTA101 - SDG NO. 4	HERITAGE OF TAMILS	L	T	P	CP	C
		1	0	0	1	1

OBJECTIVES:

- Develop interest for classical language and literature to promote Tamil heritage
- Understand the ancient Tamil sculptures, folk and martial arts and contribution of Tamil to the freedom of India

அலகு ஐ மொழி மற்றும் இலக்கியம்

இந்திய மொழிக் குடும்பங்கள் — திராவிட மொழிகள் — தமிழ் ஒரு செம்மொழி — தமிழ் செவ்விலக்கியங்கள் — சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை — சங்க இலக்கியத்தில் பகிர்தல் அறம் — திருக்குறளில் மேலாண்மைக் கருத்துகள்

UNIT I LANGUAGE AND LITERATURE 5

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural

அலகு II இடைகால மற்றும் நவீன இலக்கியங்கள்

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

Unit II MEDIEVAL AND MODERN LITERATURE 5

Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

அலகு III மரபு ஓ பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை

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

UNIT III HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE 5

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

Recommended by Board of Studies of H&S dt. Meeting No. 6 dated: 31/05/2024

Chairman
Board of Studies
Department of Humanities & Sciences

அலகு IV நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்

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

UNIT IV FOLK AND MARTIAL ARTS 5

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

அலகு V தமிழர்களின் திணைக் கோட்பாடுகள்

தமிழகத்தின் தாவரங்களும், விலங்குகளும் — தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் — தமிழர்கள் போற்றிய அறக்கோட்பாடு — சங்க காலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் — சங்ககால நகரங்களும் துறைமுகங்களும் — சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி — கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

UNIT V THINAI CONCEPT OF TAMILS 5

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

அலகு VI இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு

இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு — இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் — சுயமரியாதை இயக்கம் — இந்தியமருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு — கல்வெட்டுகள், கையெழுத்துப்படிகள் — தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

UNIT VI CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE 5

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

TOTAL: 30 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு — மக்களும் பண்பாடும் — கே.கே. பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் 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)

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 dated: 31/07/2019

S. Nanmakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian> Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - „Sangam City Civilization on the banks of river Vaigai... (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation> Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation> Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

OUTCOMES:

Upon completion of the course, the learners will be able to:

1. மொழிக் குடும்பங்களின் வரலாறு மற்றும் தமிழ் இலக்கியங்களை மதிப்பிடுகிறார்கள் Students evaluate the history of language families and Tamil literatures (K3)
2. பக்தி மரபுகளின் தாக்கம் பெற்ற தமிழ் இலக்கியங்களைப் புரிந்துகொள்கிறார்கள் Students understand Tamil literatures influenced by Philosophical and religious traditions (K3)
3. தமிழகத்தின் பாறை, சிற்பம், ஓவியம்- கலை மரபுகளைப் பகுப்பாய்வு செய்கிறார்கள் Students analyze the artistic traditions of Tamil Nadu such as rock art, sculpture, and painting (K3)
4. தமிழக நாட்டுப்புறக் கலைகள் மற்றும் தற்காப்புக் கலைகளின் மாண்புகளை உணர்ந்து கொள்கிறார்கள் Students realize the significance of Tamil Nadu's folk arts and martial arts (K3)
5. பழந்தமிழரின் திணையியல் வாழ்வியலை மீளாய்வு செய்கிறார்கள் Students re-examine the ecological lifestyle (Thinai-based life) of the ancient Tamils (K3)
6. தேசிய இயக்கம் மற்றும் இந்தியப் பண்பாட்டில் தமிழர்களின் பங்களிப்பினை நினைவுகூர்கிறார்கள் Students recall the contribution of Tamils to the National Movement and Indian culture (K3)

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dt: 31/05/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

CO- PO, PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	3	3	-	-	-	-	-	-	-	2	2	2
CO2	2	3	3	-	-	-	-	-	-	-	2	2	2
CO3	2	3	3	-	-	-	-	-	-	-	2	2	2
CO4	2	3	3	-	-	-	-	-	-	-	2	2	2
CO5	2	3	3	-	-	-	-	-	-	-	2	2	2
CO6	2	3	3	-	-	-	-	-	-	-	2	2	2

SEMESTER - I

24BSPL101 - SDG NO. 6,11,12,17	PHYSICS AND CHEMISTRY LABORATORY	L	T	P	CP	C
		0	0	4	4	2

PHYSICS LABORATORY (Any Five Experiments to be conducted)

OBJECTIVES:

- Demonstrate the wave nature of light using diffraction and interference properties.
- Study the thermal conductivity of a bad conductor.
- Verify experimentally the elastic properties of materials.

Sl.No.	Name of the Experiment
1	(a) Determination of wavelength of Laser (b) Determination of numerical aperture and acceptance angle in an optical fiber. (c) Determination of particle size using laser source.
2	Determination of thermal conductivity of a bad conductor – Lee's Disc method.
3	Determination of Young's modulus by non-uniform bending method.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

Chairman
Board of Studies
Department of Humanities & Sciences

4	Determination of the period of oscillation of a given torsional pendulum for a fixed length and find the rigidity modulus of the wire.
5	Find out the thickness of the given wire by air wedge method.
6	Calculation of lattice cell parameter – X-ray diffraction method.
7	Determination of Planck's constant.
8	Determination of wavelength of mercury spectrum – spectrometer grating.
9	Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.
10	Determination of band gap of a semiconductor.
11	Determination of Hall coefficient by Hall Effect experiment.
12	Determination of solar cell characteristics.

CHEMISTRY LABORATORY (Any Five Experiments to be conducted)

OBJECTIVES:

- To acquaint students with practical knowledge of the basic concepts of chemistry that they will encounter during their studies and in the industry and engineering fields.
- To acquaint students with the determination of the molecular weight of a polymer by viscometry.
- To develop and understand the basic concepts of acidic and basic nature using pH.

Sl.No.	Name of the Experiment
1	Conductometric titration of strong acid vs strong base.
2	Determination of chloride content of water sample by Argentometric method.
3	Determination of strength of acids in a mixture of acids using conductivity meter.
4	Determination of total, temporary & permanent hardness of water by EDTA method.
5	Estimation of iron content of the given solution using potentiometer.
6	Determination of DO content of water sample by Winkler's method.
7	Determination of strength of given hydrochloric acid using pH meter.
8	Estimation of iron content of the water sample using spectrophotometer (1,10- Phenanthroline / thiocyanate method).

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2019

Chairman
Board of Studies
Department of Humanities & Sciences

9 Estimation of Sodium and Potassium in the given sample of water using Flame Photometer.

10 Determination of molecular weights of polymer samples using Ostwald's Viscometer.

11 Synthesis of nano-CdS by precipitation. (Demonstration only)

12 Corrosion experiment-weight loss method.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Engineering Physics Lab, Dr. G. SenthilKumar, VRB publishers. (2019)
2. Engineering Physics Practical, Dr. P. Mani, Dhanam Publications. (2020)

TEXTBOOK:

1. Vogel's Textbook of Quantitative Chemical Analysis (8th edition,2014).
2. Practical Physical chemistry by B. Viswanathan, P. S. Raghavan (Vivabooks), 2009.
3. Foundation of Experimental Chemistry by Jubaraj B. Baruah, ParikshitGogoi, 2010.

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Apply the principles of elasticity and thermal physics to evaluate the various modulus of elasticity and conductivity of a bad conductor. (K3)
2. Explicate the properties of semiconductors by evaluating the band gap, I-V characteristics of solar cells and Hall effect of the materials. (K3)
3. Describe multiple measurement techniques, including volumetric titrations, conductivity, pH, redox potential and optical density measurements, used to estimate the amount of substance present in a solution. (K3)
4. Apply spectroscopic techniques, viscometry, synthesize nanoparticles, analyze the corrosion behavior of materials in different environments. (K3)

CO-PO MAPPING:

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

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 21/08/2024

S. Narasimhan
Chairman
Board of Studies
Department of Humanities & Sciences

SEMESTER - I

24ESPL101 - SDG NO. 4 & 9	PROGRAMMING IN C LABORATORY	L	T	P	CP	C
		0	0	2	2	1

OBJECTIVES:

- To develop programs in C using basic Programming Constructs.
- To develop applications in C using Arrays and Strings.
- To design and implement applications in C using Functions, Structures.
- To develop applications in C using Files.

LIST OF EXPERIMENTS

1. Write a program using I/O statements and expressions.
2. Write programs using decision-making constructs.
3. Write a program to find whether the given year is a leap year or not? (Hint: not every century is a leap. For example 1700, 1800 and 1900 is not a leap year).
4. Write a program to perform the Calculator operations, namely, addition, subtraction, multiplication, division and square of a number.
5. Write a program to check whether a given number is an Armstrong number or not.
6. Write a program to check whether a given number is odd or even.
7. Write a program to find the factorial of a given number.
8. Write a program to find out the average of 4 integers.
9. Write a program to print half pyramid of *.
10. Write a program to display array elements using two dimensional arrays.
11. Write a program to perform swapping using a function.
12. Write a program to display all prime numbers between two intervals using functions.
13. Write a program to solve towers of Hanoi using recursion.
14. Write a program to get the largest element of an array using the function.
15. Write a program to concatenate two strings.
16. Write a program to find the length of String.
17. Write a program to find the frequency of a character in a string.
18. Write a program to store Student Information in Structure and Display it.

Recommended by Board of Studies of CSE dept. Dated: 30/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
Sri Sairam Engineering College

19. The annual examination is conducted for 10 students for five subjects. Write a program to read the data and determine the following:

(a) Total marks obtained by each student.

(b) The highest marks in each subject and the marks of the student who secured it.

(c) The student who obtained the highest total marks.

20. Write a program to demonstrate file operations (e.g. count the number of characters, words and lines in a file, replace a specific word with the given word in the same file).

TOTAL: 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Stand alone desktops with C compiler 30 Nos. (Or)
   Server with C compiler supporting 30 terminals or more.

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Apply basic constructs, arrays, strings,functions and recursion for executing C programming applications.(K3)
2. Analyze C programs involving pointers and structures.(K4)
3. Evaluate applications using sequential and random access files.(K5)

CO-PO, PSO MAPPING:

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

SEMESTER - I

24ENTP101 - SDG NO.4	FUNCTIONAL LIFE SKILLS	L	T	P	CP	C
		1	0	1	2	1

OBJECTIVES:

- Resolve common communication problems
- Observe the effectiveness of nonverbal messages
- Communicate precisely through the digital media
- Understand the importance of empathetic listening
- Explore reading and speaking processes

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2024

S. Narasakhamay
Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - I LISTENING 5

Techniques of effective listening
Listening and comprehending
Probing questions
Barriers to listening
Reflection from listening

MODULE - II SPEECH MECHANICS 5

Pronunciation
Enunciation
Vocabulary
Fluency
Common errors

MODULE - III READING SKILLS 5

Techniques of effective reading
Kinds of reading
Gathering ideas and information from the text
Evaluating the ideas and information
Interpreting the text from multiple angles

MODULE - IV WRITING ASPECTS 5

Writing process
Effective writing strategies
Different modes of writing
Optimizing the use of resources
Editing

MODULE - V PRESENTATION SKILLS 5

Types of presentations
Nonverbal communication
Understanding the purpose and the audience
Beginning and closure of presentations
Presentation tools and strategies

MODULE - VI ARTICULATION ASPECTS 5

Perform exercises
Slow speeches

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2019

S. Narayanan
Chairman
Board of Studies
Department of Humanities & Sciences

Long speeches
Monologues, Dialogues and Conversation
Feedback necessity

TOTAL : 30 PERIODS

REFERENCES:

1. Sen, Madhuchanda.2010, An Introduction to Critical Thinking, Delhi, Pearson.
2. Effective Communication Skills Strategies for Success. Edited by Nitin Bhatnager and Mamta Bhatnager. 2023, Pearson
3. Technical Communication: Principles and Practice, Meenakshi Raman and Sangeeta Sharma. Oxford University Press, 2015

WEB REFERENCES:

1. https://swayam.gov.in/nd1_noc19_hs31/preview
2. https://www.myenglishpages.com/speaking/#google_vignette

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Employ reading, writing, and listening skills to communicate clearly in academic and professional contexts.
2. Demonstrate confident oral communication and presentation skills using appropriate tools and techniques.
3. Interpret ethical, inclusive, and culturally aware communication in team and societal settings

CO-PO, PSO MAPPING:

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

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/[illegible]

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

SEMESTER - I

24ESID101 - SDG NO. 1-17	IDEA ENGINEERING LAB - I	L	T	P	CP	C
		0	0	2	2	1

OBJECTIVES:

- To understand the significance of Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) of the United Nations
- To familiarize with SDG targets and indicators
- To identify the Constitutional implementation pertaining to SDGs in Panchayat Raj
- To acquire knowledge of the State and the Central government welfare schemes
- To recognize the role of educational Institutions in community development
- To develop critical thinking skills to address complex societal challenges through an immersion program

MODULE - 1 United Nations Sustainability and the Sustainable Development Agenda 3

- Introduction to Sustainability
- Indian Rural Environment: Necessity and Sustainability
- Millennium Development Goals (MDGs)
- United Nations Sustainable Development Goals (SDGs) & the Agenda
- Overview of the Sustainable Development Goals (SDGs)

MODULE - 2 Universal SDG Targets 4

- SDG Framework
- Key Components
- Pillars of the SDGs
- Targets of the Goals
- Indicators of the Targets

MODULE-3 SDG and Indian Gram Panchayat 3

- Gram Panchayat
- Salient Features of Constitutional Amendments
- Transition from SDGs to LSDGs (Localizing Sustainable Development Goals)

Recommended by Board of Studies of H&S dept. Meeting No. 6 Dated: 31/08/2024

S. Narasakeshwary
Chairman
Board of Studies
Department of Humanities & Sciences

MODULE-4 Government Schemes 4

- Introduction to State and Central Government Schemes
- Overview of Government Schemes
- Localization and Implementation at the Regional Level
- Impact on Local Communities

MODULE-5 Community Engagement 4

- Key Recommendations of the National Education Policy
- Guidelines for Fostering Social Responsibility
- Awareness
- Participation
- Collaboration

MODULE-6 Idea Generation 12

- Immersion Program
- Focus Areas
- Channelizing Ideas
- Forming Working Teams for SDGs (Sustainable Development Goals)

TOTAL: 30 PERIODS

REFERENCES:

1. Joy Elamon and Ms. Mariamma Sanu George,"The Handbook on Sustainable Development Goals and Gram Panchayats" , State Institute for Rural Development (SIRD).
2. Dr.C.R.Rene Robin, Dr.PA.Shanthi , Dr.B.Thanuja & Dr.V.Yuvaraj ,"Sairam SDG Idea Engineering Lab I", Sri Sairam Engineering College.

WEB REFERENCES

1. UN Sustainable Development Goals
2. https://srmuniv.digimat.in/nptel/courses/video/109106200/L30.html
3. https://avcce.digimat.in/nptel/courses/video/109106200/L26.html

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Analyse and apply the concepts of sustainability,Rural environment,Gram panchayat and various government schemes to design innovative practical solutions that address real life rural challenges. (K2)
2. Compare MDG's,SDG's and LSDG's to analyse village topology and identify specific development targets to propose innovative rural solutions. (K4)

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2024

Chairman
Board of Studies
Department of Humanities & Sciences

3. Analyse the attainment levels of SDG's and write a reflective report on local community.(K4)
4. Formulate problem statement based on local community needs and propose innovative ideas for community development. (K4)
5. Perform an individual presentation of field observation by mapping them with relevant SDG's and justify their significance for rural development. (K4)

CO-PO, PSO MAPPING:

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

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

C. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

SEMESTER - II

24BSMA202 - SDG NO. 4	DIFFERENTIAL EQUATIONS, COMPLEX VARIABLES AND TRANSFORMS	L	T	P	CP	C
		3	1	0	4	4

OBJECTIVES:

- The objective of this course is to familiarize the prospective engineers with techniques in Ordinary differential equations, Complex variables, Z - Transforms, Fourier Transforms and Laplace transforms. It aims to equip the students to deal with advanced levels of mathematics and applications that would be essential for their disciplines.

MODULE - I ORDINARY DIFFERENTIAL EQUATIONS **12**

Second and Higher order linear differential equations with constant coefficients - Method of variation of Parameters -Homogeneous equation of Euler's and Legendre's type - System of simultaneous first order linear differential equations with constant coefficients.

MODULE- II COMPLEX VARIABLES **9**

Analytic functions – Necessary and sufficient conditions for analyticity in cartesian and polar coordinates (without proof)- Properties- Harmonic Conjugate-Construction of analytic functions-Conformal mapping -Bilinear transformation (w =1/z).

MODULE - III COMPLEX INTEGRATION **9**

Cauchy- Goursat theorem (without proof) - Cauchy Integral formula (without proof) - Zeroes of Analytic functions - Singularities - Laurent's Series - Residues – Cauchy Residue theorem (without proof).

MODULE - IV LAPLACE TRANSFORMS **12**

Existence conditions – Transforms of elementary functions – Transform of Unit step function and Unit impulse function – Basic properties – Shifting theorems – Transforms of derivatives – Transform of Periodic functions - Inverse Laplace Transforms - Initial and Final value theorems – Convolution theorem (excluding proof) –- Application of solution of linear second order ordinary differential equations with constant coefficients.

MODULE - V FOURIER TRANSFORMS **9**

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Convolution theorem – Parseval's identity.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Narasakkumar
Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - VI Z-TRANSFORMS 9

Elementary properties – Inverse Z-transform (using partial fraction and residues) – Initial and final value theorems - Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Advanced Engineering Mathematics, Erwin Kresizg, 9th Edition, John Wiley & Sons, 2006.
2. Advanced Modern Engineering Mathematics, Glyn James, 3rd Edition, Pearson Education, 2010.

REFERENCES:

1. Higher Engineering Mathematics, Dass, H.K., and Er. Rajnish Verma, Reprint, S. Chand Private Ltd., 2011.
2. Higher Engineering Mathematics, B.S. Grewal, 44th Edition, Khanna Publishers, 2023.
3. Advanced Engineering Mathematics, Peter V. O'Neil, 7th Edition, Cengage learning, 2012.
4. An Introduction to Ordinary Differential Equations, E. A. Coddinton, 1st Edition, Prentice Hall, 1961.
5. Higher Engineering Mathematics, Ramana. B.V., 11th Reprint, Tata McGraw-Hill, New Delhi, 2010.
6. A Text Book of Engineering Mathematics, N. P. Bali and Manish Goyal, Reprint, Laxmi Publications, 2008.

WEB COURSES:

1. http://archive.nptel.ac.in/courses/111/106/111106100/
2. https://nptel.ac.in/courses/111105134/ (Week-3 Complex Differentiation)
3. https://nptel.ac.in/courses/111105134 (Week 4 Complex Integration)
4. https://archive.nptel.ac.in/courses/111/106/111106111/
5. http://www.nptelvideos.com/course.php?id=90

ONLINE RESOURSES:

1. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/video-lectures/lecture-1-introduction/
2. https://ocw.mit.edu/courses/18-04-complex-variables-with-applications-spring-2018/

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2024

S. Narrakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

COURSE OUTCOMES:

Upon completion of the course, the student should be able to:

1. Solve ordinary differential equations of second and higher order with constant coefficients, variable coefficients and simultaneous linear differential equations. (K3)
2. Construct an analytic function and apply the properties of analytic functions to check for harmonic and orthogonal functions and find the images of circle and straight lines under the standard transformations. (K3)
3. Use Cauchy's integral theorem, formula and Cauchy's Residue theorem to evaluate complex and real integrals, find the Taylor's and Laurent's series expansion. (K3)
4. Apply Laplace and inverse Laplace Transforms to solve the linear ordinary differential equations with constant coefficients. (K3)
5. Find Fourier transforms and Fourier sine and cosine transforms of simple functions. (K3)
6. Solve difference equations using Z-transforms. (K3)

CO-PO, MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	2	3
CO2	3	-	-	-	-	-	-	-	-	-	-	1	3
CO3	3	-	-	-	-	-	-	-	-	-	-	1	3
CO4	3	-	-	-	-	-	-	-	-	-	-	2	3
CO5	3	-	-	-	-	-	-	-	-	-	-	2	3
CO6	3	-	-	-	-	-	-	-	-	-	-	2	3

SEMESTER - II

24HSEN201 - SDG NO.4	PROFESSIONAL ENGLISH	L	T	P	CP	C
		2	0	0	2	2

OBJECTIVES:

- Acquire techniques for comprehending and critically analyzing passages
- Improve the communicative competence
- Enhance learners' ability to read and write complex texts, summaries, definitions and reports
- Write effective formal letters and reports

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/Thirty

S. Narasakshaiah
Chairman
Board of Studies
Department of Humanities & Sciences

- Develop skills for preparing effective job application

MODULE - I EFFECTIVE COMMUNICATION 6

Listening – Listening to conversations – Speaking – making conversations in real life occurrences – Reading - short stories, happenings - Writing – autobiographical writing, preparation of checklist – communication and types of communication – Language Development –- subject - verb agreement, commonly confused words – spellings

MODULE - II BASICS OF TECHNICAL WRITING 5

Listening – listening to advertisements and products – Speaking - creating greetings/wishes/excuses and thanks – Reading – articles/novels - Writing - summary of articles, writing modes, formats, compositions - Language Development - reported speech, numerical adjectives

MODULE - III REPORT WRITING 4

Listening – listening to podcasts – Speaking - practicing telephonic conversations – observing and responding. Reading – regular columns of newspapers/magazines - Writing – reports – feasibility, accident, preparation of agenda and minutes – Language Development - cause & effect expressions, discourse markers

MODULE - IV DIVERSE WRITING SKILLS 5

Listening – documentaries, anecdotes and short stories - Speaking – expressing opinions using verbal and non-verbal communication – Reading biographies/autobiographies, travelog, – Writing – formal letters – inviting guests – acceptance/declining letters - Language Development- degrees of comparison – embedded sentences - acronyms and abbreviations

MODULE - V CAREER COMPETENCIES 6

Listening – expert talks – recommending suggestions & solutions – Speaking – Debate- participating in a group discussion – learning GD strategies – Reading – innovations, ideations - Writing – Job application, resume, – proposals – Language Development – verbal analogies – phrasal verbs

MODULE - VI LEXICAL ENHANCEMENT 4

Listening - technical and general talks - Speaking - oral presentation with visual aids - Reading - successful stories/autobiographies - Writing - writing blogs - Language Development - common errors in English, idiomatic expressions

TOTAL: 30 PERIODS

Recommended by Board of St... H&S dept. Meeting No 6 Dated: 31/08/2019

S. Narasimhan
Chairman
Board of Studies
Department of Humanities & Sciences

TEXT BOOKS:

1. Board of editors. Fluency in English: A Course book for Engineering and Technology. Orient Blackswan, Hyderabad 2016.
2. Raman, Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford University Press.

REFERENCES:

1. Bailey, Stephen. Academic Writing: A Practical Guide for Students. Routledge, New York,2011.
2. Raman, Meenakshi, Sharma, Sangeeta. Technical Communication. Principles and Practice. Oxford University Press, New Delhi, 2014.
3. Muralikrishnan & Mishra Sunitha, Communication skills for Engineers 2nd ed. Pearson, Tamil Nadu, India 2011. P. Kiranmai and Rajeevan, Geetha. Basic Communication Skills, Foundation Books, New Delhi, 2013.
4. Vesilind Aarne P., Public Speaking and Writing Skills for Engineering Students (2nd Ed), Lakeshore press, 2007
5. Richards, Jack C. Interchange Students' Book – 2. Cambridge University Press, New Delhi, 2015.

WEB REFERENCES:

1. https://swayam.gov.in/nd1_noc20_hs21/preview
2. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/109106122/lec1.pdf
3. https://takelessons.com/en-in/search?service=English&sort=1&utm_

ONLINE RESOURCES:

1. https://www.coursera.org/specializations/improve-english?
2. https://www.fluentu.com/blog/educator-english/business-english-conversation-topics/

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Demonstrate an understanding of various types of communication and prepare effective checklists.(K2)
2. Summarize articles/ write ups (K2)
3. Construct feasibility reports, accident reports, survey reports and meeting minutes (K3)
4. Apply skills to compose official letters with emphasis and clarity (K3)

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2019

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

5. Compose job applications and technical proposals (K3)
6. Demonstrate the ability to express opinions in both oral and written forms of communication (K2)

CO-PO, PSO MAPPING:

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

SEMESTER - II

24BSPH204 - SDG NO.4	PHYSICS FOR CIVIL ENGINEERING	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To create an awareness on natural disasters and safety measures
- To introduce the basics of heat transfer through different materials, thermal performance of building and various thermal applications
- To impart knowledge on the ventilation and air conditioning of buildings
- To enable the understanding of the fundamental knowledge about sound in building acoustical concepts.
- To introduce the concepts of sound insulation and lighting designs
- To correlate the theoretical principles with application oriented engineering studies.

MODULE - I GEOPHYSICS 8

Origin of the Earth – Age of the Earth – Interior of the earth – Structure and constitution of the interior of the earth – Earthquake definition – Earthquake Seismology – Seismographs – Distribution of earthquake belts-site effects – Probabilistic and deterministic Seismic hazard analysis – Volcanoes Distribution – causes – Effect of volcanic eruptions.

Revised and Approved by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2024

Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - II THERMAL APPLICATIONS 7

Principles of heat transfer, steady state of heat flow – thermal insulation and its benefits – heat gain and heat loss estimation – factors affecting the thermal performance of buildings, thermal measurements, thermal comfort, indices of thermal comfort, climate and design of solar radiation, shading devices – central heating - thermal insulation paints.

MODULE - III VENTILATION AND REFRIGERATION 7

Requirements, principles of natural ventilation – ventilation measurements, design for natural ventilation - Window types and packaged air conditioners – chilled water plant – fan coil systems – water piping – cooling load – Air conditioning systems for different types of buildings – Protection against fire caused by A.C. Systems.

MODULE - IV ACOUSTICS 8

Introduction – Classification of sound– Characteristics of sound – decibel –Weber-Fechner law – Reverberation - Reverberation time - Sabine's formula – derivation using growth and decay method – Measurement of absorption Coefficient and its determination – Factors affecting acoustics of buildings and their remedies. Methods of sound absorptions – absorbing materials – sound insulation and its measurements.

MODULE - V LIGHTING DESIGNS 8

Basic definitions for Radiometry and photometry – conversion of photometry – cosines law, inverse square law. Vision and Colour – luminous efficiency function – Visual field glare, colour – day light calculations – daylight design of windows, measurement of daylight, use of models and artificial skies – principles of artificial lighting, supplementary artificial lighting.

MODULE - VI NEW ENGINEERING MATERIALS 7

Metallic glasses – Shape memory alloys – Composites – definition and classification – Fibre reinforced plastics (FRP) and fibre reinforced metals (FRM) – Ceramics – Classification – Crystalline and Non Crystalline – Bonded ceramics, Manufacturing methods – Slip casting – Isostatic pressing – Gas pressure bonding – Properties – thermal, mechanical, electrical and chemical – ceramic fibres.

TOTAL = 45 PERIODS

TEXT BOOKS:

1. Alexander.D. "Natural disaster", CRC Press, 2017.
2. Haakon Fossen, "Structural Geology", Cambridge University Press, 2016.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 21/05/2019

Chairman
Board of Studies
Department of Humanities & Sciences

3. Hall,Matthew.R "Materials for energy efficiency and Thermal comfort in building" Woodhead publishing,2010.
4. Roman Skowranek "Basics Building services Light design" Birkhauser 2017
5. Heinrich Kuttruff "Acoustics" S.Chand (G/L) & company Ltd, 2006
6. R.K.Rajput "Engineering Material" S.Chand & company, 2006.
7. P.Mani " Physics for Civil Engineering" Dhanam Publication, 2024

REFERENCES:

1. G.F.Hundy, A.R. Trott and T.C. Welch, "Refrigeration and Air Conditioning and Heat pumps", Elsevier, 2016.
2. Marc Asselineau.,"Building Acoustics ", CRC Press, 2015.
3. Hector Estrada, Luke S.Lee, "Introduction to earthquake", CRC press, 2017.
4. Shearer, P.M. "Introduction to Seismology", Cambridge University Press, 2019.
5. Haakon Fossen, "Structural Geology", Cambridge University Press, 2016.

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Illustrate the concepts of Earth's structure, earthquakes, and volcanoes to explain their causes, effects, and methods of hazard analysis (K3)
2. Apply heat transfer principles to assess building thermal performance and explain the effective insulation and comfort solutions (K3)
3. Analyze the principles, design, and performance of natural ventilation, air conditioning systems, and fire protection measures (K4)
4. Examine the characteristics of sound and building acoustics, and evaluate methods for sound absorption and insulation (K4)
5. Analyze the concepts of photometry, vision, and color to evaluate lighting performance and optimize daylight and artificial lighting in buildings (K4)
6. Have an insight on new engineering materials such as metallic glasses, shape memory alloys, ceramics, composites, biomaterials and their applications (K3)

Recommended by
Board of Studies of H&S dept.
Meeting No 6 Dated: 31/05/2024

S. Narasimhan
Chairman
Board of Studies
Department of Humanities & Sciences

CO-PO MAPPING:

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

SEMESTER - II

24BSCY201 - SDG NO.4	CHEMISTRY FOR ENVIRONMENT AND SUSTAINABILITY	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To gain a comprehensive understanding of environmental science, the intricate relationships within ecosystems, and the crucial role of biodiversity conservation..
- To introduce the structure and components of the atmosphere, and provide an overview of the photochemical reactions involved.
- To foster a sound understanding of water quality parameters and water treatment techniques.
- To explore the various components of soil and understand the steps involved in Solid Waste Management (SWM).
- To advocate the benefits of renewable energy and promote awareness of sustainable energy practices. .
- To implement the principles of Green Chemistry in alignment with the Sustainable Development Goals (SDGs).

MODULE - I INTRODUCTION TO ENVIRONMENTAL SCIENCE 8

Environment: Definition, concept of environment and its components - scope and importance of environment – need for public awareness.

Ecosystem: Structure and functions: Structures - Biotic and Abiotic components. Functions - Energy flow in ecosystems, food chains and food webs. Biogeochemical cycles(C,N&P), Ecological succession.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Narasimhan
Chairman
Board of Studies
Department of Humanities & Sciences

Biodiversity and its conservation: Definition, types, importance of biodiversity, values and threats to biodiversity. Endangered and endemic species - concept and basis of identification of 'Hotspots'; hotspots in India. Strategies for biodiversity conservation: in situ, ex situ and in vitro conservation.

MODULE - II ATMOSPHERIC CHEMISTRY **7**

Atmospheric Chemistry - Composition and structure of atmosphere. Climate change - greenhouse effect - role of greenhouse gases (CO2, CH4, N2O, CFCs) on global warming. Chemical and photochemical reactions in the atmosphere - Formation of smog, PAN, acid rain (causes, effect and control measures). Oxygen and ozone chemistry - Ozone layer depletion (causes, effect and control measures).

MODULE - III WATER CHEMISTRY **8**

Importance and scope of water chemistry - Sources and impurities in water - Water Quality Parameters - Specifications as per WHO/BIS standards. Hardness of water, types, numerical problems on hardness of water. Softening of water - Internal treatment (Lime-soda, Phosphate, Calgon, Sodium Aluminate and Colloidal conditioning). External treatments: Ion exchange and Zeolite processes. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water by Reverse osmosis. Sustainable water management practices (water recycling and rainwater harvesting)

MODULE - IV SOIL CHEMISTRY AND SOLID WASTE MANAGEMENT **7**

Soil Chemistry: Chemical composition of soil, Acid-Base and Ion-Exchange Reactions in Soil, Soil acidity and salinity. Importance of NPK in Soil Fertility. Modern agriculture - Impacts of both excessive and insufficient fertilizer use, alongside the effects of pesticides on soil chemistry and the environment. Sustainable agriculture - Approaches to improve soil salinity (leaching, soil amendments, crop rotation), Design and use of green pesticides for sustainable farming.

Solid Waste Management System: Sources and types of solid waste, Elements of solid waste management, Methods of residential and commercial waste collection, Treatment / processing - Incineration, Composting, Landfill - Dumpsite rehabilitation.

MODULE - V ENERGY AND ENVIRONMENT **8**

Energy sources – Renewable and non-renewable energy sources. Principle and generation of solar energy (solar collectors, photo-voltaic modules, solar ponds), wind energy, geothermal energy; tidal energy, OTEC energy from

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2024

S. Narasakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

biomass, biofuels, Nuclear energy - fission and fusion, Nuclear fuels, Nuclear reactor – principles and types. Need for energy efficiency, Energy conservation and sustainability - action strategies for sustainable energy management from a future perspective.

MODULE - VI GREEN CHEMISTRY AND SUSTAINABILITY 7

Green Chemistry: Introduction to green chemistry, Principles of Green Chemistry (12-principles), the concept of atom economy and chemical synthesis, Important techniques used in green chemistry. Application of green chemistry, viz. replacement of ozone depleting substances including CFCs, manufacture of biodegradable polymers, use of H2O2 as benign bleaching agents in the paper industry.

Sustainable Development: Definition and concepts of sustainable development, Need for sustainable development; Sustainable development goals – 17 SDG goals.

Sustainable practices: Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment and Environmental Impact Assessment.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
2. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
3. Ravikrishnan A, 'Environmental Science and Engineering', Sri Krishna Hitech Publishing Company Pvt. Ltd, Revised Edition 2020.
4. Vogel's Textbook of Quantitative Chemical Analysis (8th edition,2014).

REFERENCES:

1. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
2. Erach Bharucha, "Textbook of Environmental Studies", Universities Press(I) PVT, LTD, Hyderabad, 2015.
3. G. Tyler Miller and Scott E. Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 2014.
4. Chemistry for Environmental Engineering, Clair N. Sawyer, Perry L. Mc Carty, Gene F. Parkin, 4th Edition, McGraw-Hill.
5. Environmental Chemistry - Stanley Manahan, 11th Edition, CRC Press.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/Oct/2023

S. Namakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Develop a foundational understanding of environmental science, the interactions within ecosystems, the significance of biodiversity, and the importance of conservation strategies for maintaining ecological balance. (K3)
2. Identify the primary components of the atmosphere, explain the causes of atmospheric pollution, and propose basic strategies to promote a sustainable and clean atmosphere. (K3)
3. Demonstrate complex water quality parameters, and develop innovative methods for producing cost-effective soft water suitable for both industrial use and potable consumption. (K3)
4. Describe the composition and functions of soil components, analyze the sources and characteristics of solid wastes, and evaluate the methods and strategies employed in solid waste management (SWM). (K3)
5. Explain renewable and non-renewable resources, describe various methods for harnessing energy from different sources and explain their applications in various contexts. (K3)
6. Illustrate a comprehensive understanding of green chemistry principles and their alignment with sustainable development goals, preparing them to contribute to environmentally friendly and sustainable practices in their future careers.(K3)

CO-PO MAPPING:

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

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2024

S. Narasimhaiah
Chairman
Board of Studies
Department of Humanities & Sciences

SEMESTER - II

24ESCE201 - SDG NO. 4, 9, 12	ENGINEERING MECHANICS	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To learn the use scalar and vector analytical techniques for analysing forces.
- To introduce the equilibrium of rigid bodies, vector methods and free body diagram
- To learn the principles of friction, forces and to determine the apply the concepts of frictional forces at the contact surfaces of various engineering systems
- To develop basic dynamics concepts – force, momentum, work and energy.
- To predict the effect of force and motion in the course of carrying out the design functions of Engineering

MODULE - I STATICS OF PARTICLES 7

Introduction – Units and Dimensions – Laws of Mechanics –Newton's laws- Lami's theorem- Parallelogram, triangular Law and polygon law of forces- Principle of transmissibility-Vectorial representation of forces – Fundamental vector operations of forces–Free body diagram- Equilibrium of a particle in 2 D – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces.

MODULE - II EQUILIBRIUM OF RIGID BODIES 9

Beams and Trusses - Moments and Couples - Vectorial representation– Scalar components of a moment – Varignon's theorem- Moment of a force about a point and about an axis- Single equivalent force-Types of supports –Action and reaction forces – types of equilibrium -Equilibrium of Rigid bodies in Two and Three dimensions.

MODULE - III FRICTION 7

Friction force – Types of friction-Laws of Coulomb friction – Simple contact friction-Two bodies in contact- Wedge friction, ladder friction- Rolling resistance.

MODULE - IV PROPERTIES OF SURFACES AND SOLIDS 8

Centroids and Centre of Mass and Volume – Simple and Composite areas and solids -Theorems of pappus- Moments of Inertia of composite areas – Parallel

Recommended by Board of Studies of CIVIL dept. Meeting No. 8 Dated: 6.6.2024

CHAIRMAN Board of Studies Civil Engineering

axis theorem and perpendicular axis theorem –Polar moment of inertia-Radius of gyration-Product of inertia-Principal moments of inertia of plane areas and composite areas – Principal axes of inertia-Mass moment of inertia –Prismatic, Cylindrical and spherical solids from first principle.

MODULE - V DYNAMICS-KINEMATICS **7**

Displacement, Velocity and Acceleration – Relative motion - Curvilinear motion - Newton's laws of motion.

MODULE - VI DYNAMICS-KINETICS **7**

D' Alembert's principle, Work Energy principle - Impulse and Momentum – Impact of elastic bodies. Rigid body motion-Translation and Rotation– General Plane motion of simple rigid bodies such as Cylinder, Disc or Wheel and Sphere.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 8th Edition, Tata McGraw-Hill Publishing Company, New Delhi, 2004.
2. N.H Dubey, "Engineering Mechanics – Statics and Dynamics", McGraw Hill Education (India) Pvt Ltd.
3. Vela Murali, "Engineering Mechanics", Oxford University Press, 2010.

REFERENCES:

1. Bhavikatti, S.S and Rajashekarappa, K.G., "Engineering Mechanics", New Age International (P) Limited Publishers, 1998.
2. Hibbeller, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11th Edition, Pearson Education 2010.
3. Irving H. Shames and Krishna MohanaRao. G., "Engineering Mechanics Statics and Dynamics", 4th Edition, Pearson Education 2006.
4. Meriam J.L. and Kraige L.G., " Engineering Mechanics- Statics - Volume 1, Dynamics- Volume 2", Third Edition, John Wiley & Sons,1993.
5. Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics", 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.
6. Dr.N.Kottiswaran, Engineering Mechanics (statics and Dynamics), Sri Balaji Publications, Erode.

Recommended by

Board of Studies of CIVIL dept.

Meeting No. 8 Dated: 6/6/2024

CHAIRMAN
Board of Studies
Civil Engineering

WEB RESOURCES:

1. https://nptel.ac.in/courses/112/105/112105164/
2. https://nptel.ac.in/courses/112/103/112103109/

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/112/106/112106286/
2. https://nptel.ac.in/courses/112/103/112103108/
3. https://nptel.ac.in/courses/112/106/112106180/
4. https://www.coursera.org/learn/engineering-mechanics-statics

OUTCOMES:

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

1. Interpret the concepts of laws of mechanics, vector operations, systems of Forces and equilibrium of particles in spaces. (K3)
2. Solve the engineering problems based on the concepts moment and couples, support and its types and equilibrium of rigid bodies in 3 dimensions. (K3)
3. Illustrate about Friction, its types, laws of friction, wedge and ladder friction. (K2)
4. Apply the concepts of centroid, centre of gravity, polar moment of inertia and principal moment of inertia for prisms, cylinder and spherical solids. (K3)
5. Solve engineering problems based on the concepts of relative motion and curvilinear motion. (K3)
6. Apply the concepts of Newton's law of motion, work energy method, impulse and momentum and rigid body motion in engineering problems. (K3)

CO – PO, PSO MAPPING:

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

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 8 Dated: 6/6/24

CHAIRMAN
Board of Studies
Civil Engineering

SEMESTER - II

24HSTA201 - SDG NO. 4	TAMILS AND TECHNOLOGY	L	T	P	CP	C
		1	0	0	1	1

OBJECTIVES:

- Understand the techniques that help for a better livelihood
- Identify the methods used for scientific Tamil computing

அலகு-I நெசவு மற்றும் பானைத் தொழில்நுட்பம்

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

UNIT-I WEAVING AND POTTERY (CERAMIC) TECHNOLOGY 5

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

அலகு -II சங்ககாலவடிவமைப்புகள்

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள்ரூசங்க காலத்தில் வீட்டுப்பொருட்களில் வடிவமைப்பு -சங்க காலத்தில் கட்டுமான பொருட்களும்நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள்.

UNIT-II SANGAM AGE DESIGNS 5

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

அலகு -III பழங்காலகட்டிடத் தொழில்நுட்பம்

மாமல்லபுரச்சிற்பங்களும், கோவில்களும் - சோழர்காலத்துப்பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத்தலங்கள் - நாயக்கர்காலக்கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டுவீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக்கட்டிடக் கலை.

UNIT-III ANCIENT CONSTRUCTION TECHNOLOGY 5

Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses> Indo - Saracenic architecture at Madras during British Period.

அலகு- IV உற்பத்தித் தொழில்நுட்பம்

கப்பல் கட்டும் கலை -உலோகவியல் -இரும்புத் தொழிற்சாலை இரும்பை உருக்குதல், எஃகு - வரலாற்றுச்சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் சங்கு மணிகள் -எலும்புத்துண்டுகள் - தொல்லியல்சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

Recommended by Board of Studies of H&S dept. Meeting No. 6 Dated: 31/08/2024

Chairman
Board of Studies
Department of Humanities & Sciences

UNIT-IV MANUFACTURING TECHNOLOGY 5

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 beads - Archaeological evidences - Gem stone types described in Silappathikaram.

அலகு - V வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம்

அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக்குமுழித்தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காகவடிவமைக்கப்பட்டகிணறுகள்- வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள்- கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.

UNIT-V AGRICULTURE AND IRRIGATION TECHNOLOGY 5

Dam, Tank, Ponds, Sluice, Significance of KumizhiThoompu of Chola Period> Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries - Pearl - Conch diving -Ancient Knowledge of Ocean - Knowledge Specific Society.

அலகு-VI அறிவியல்தமிழ்மற்றும்கணித்தமிழ்

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

UNIT-VI SCIENTIFIC TAMIL & TAMIL COMPUTING 5

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: 30 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு — மக்களும் பண்பாடும் — கே.கே. பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் 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.)

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2019

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

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

OUTCOMES:

Upon completion of the course, the learners will be able to:

1. சங்ககால நெசவு மற்றும் பானைத்தொழில்நுட்பங்களைப் பற்றி அறிந்து கொள்ளுதல்
   To learn about the weaving and pottery (ceramic) technologies during the Sangam Age.(K2)
2. சங்ககாலவடிவமைப்புகள் மற்றும் கட்டுமானக்கலையைப் புரிந்து கொள்ளுதல்
   To understand the designs and structural constructions during the Sangam period.(K2)
3. பண்டைய கால கட்டிடக்கலையின்நுட்பங்கள் மற்றும் கட்டிடவடிவமைப்புகளை ஆராய்தல்.
   To explore the techniques and architectural patterns of ancient Tamil structures.(K2)
4. உற்பத்தி மற்றும் உலோகவியல்தொழில்நுட்பங்களைப் பற்றி அறிதல்.
   To gain knowledge on manufacturing and metallurgical technologies of ancient Tamils.(K3)
5. வேளாண்மை, நீர்ப்பாசனம் மற்றும் கடல்சார்தொழில்நுட்பங்களைப் பற்றி அறிந்து கொள்ளுதல்.
   To understand agricultural> irrigation> and marine technologies of ancient Tamil society.(K3)
6. அறிவியல்தமிழ் மற்றும் கணித்தமிழின்வளர்ச்சியையும் அதன் கணினி பயன்பாடுகளையும் புரிந்து கொள்ளுதல்.
   To understand the development of Scientific Tamil and its applications in Tamil computing.(K3)

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2019

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

CO- PO, PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	2	-	-	-	-	-	-	1	2	2
CO2	3	3	3	2	-	-	-	-	-	-	1	2	1
CO3	3	3	3	3	-	-	-	-	-	-	1	2	1
CO4	3	2	3	3	-	-	-	-	-	-	1	2	2
CO5	3	3	3	3	-	-	-	-	-	-	1	2	1
CO6	3	3	3	3	-	-	-	-	-	-	1	2	2

SEMESTER - II

24HSNC201 - SDG NO. 4	NCC COURSE LEVEL 1	L	T	P	CP	C
		2	0	0	2	0

ARMY WING

NCC GENERAL **6**

NCC 1	Aims, Objectives & Organization of NCC	1
NCC 2	Incentives	2
NCC 3	Duties of NCC Cadet	1
NCC 4	NCC Camps: Types & Conduct	2

NATIONAL INTEGRATION AND AWARENESS **4**

NI 1	National Integration: Importance & Necessity	1
NI 2	Factors Affecting National Integration	1
NI 3	Unity in Diversity & Role of NCC in Nation Building	1
NI 4	Threats to National Security	1

PERSONALITY DEVELOPMENT **7**

PD 1	Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving	2
PD 2	Communication Skills	3
PD 3	Group Discussion: Stress & Emotions	2

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S Narasakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

LEADERSHIP **5**

L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code	3
L 2	Case Studies: Shivaji, Jhasi Ki Rani	2

SOCIAL SERVICE AND COMMUNITY DEVELOPMENT **8**

SS 1	Basics, Rural Development Programmes, NGOs, Contribution of Youth	3
SS 4	Protection of Children and Women Safety	1
SS 5	Road / Rail Travel Safety	1
SS 6	New Initiatives	2
SS 7	Cyber and Mobile Security Awareness	1

TOTAL: 30 PERIODS

NAVAL WING

NCC GENERAL **6**

NCC 1	Aims, Objectives & Organization of NCC	1
NCC 2	Incentives	2
NCC 3	Duties of NCC Cadet	1
NCC 4	NCC Camps: Types & Conduct	2

NATIONAL INTEGRATION AND AWARENESS **4**

NI 1	National Integration: Importance & Necessity	1
NI 2	Factors Affecting National Integration	1
NI 3	Unity in Diversity & Role of NCC in Nation Building	1
NI 4	Threats to National Security	1

PERSONALITY DEVELOPMENT **7**

PD 1	Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving	2
PD 2	Communication Skills	3
PD 3	Group Discussion: Stress & Emotions	2

LEADERSHIP **5**

L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code	3
L 2	Case Studies: Shivaji, Jhasi Ki Rani	2

SOCIAL SERVICE AND COMMUNITY DEVELOPMENT **8**

SS 1	Basics, Rural Development Programmes, NGOs, Contribution of Youth	3

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2019

Chairman
Board of Studies
Department of Humanities & Sciences

SS 4	Protection of Children and Women Safety	1
SS 5	Road / Rail Travel Safety	1
SS 6	New Initiatives	2
SS 7	Cyber and Mobile Security Awareness	1

TOTAL: 30 PERIODS

ARMY WING

NCC GENERAL		**6**
NCC 1	Aims, Objectives & Organization of NCC	1
NCC 2	Incentives	2
NCC 3	Duties of NCC Cadet	1
NCC 4	NCC Camps: Types & Conduct	2
NATIONAL INTEGRATION AND AWARENESS		**4**
NI 1	National Integration: Importance & Necessity	1
NI 2	Factors Affecting National Integration	1
NI 3	Unity in Diversity & Role of NCC in Nation Building	1
NI 4	Threats to National Security	1
PERSONALITY DEVELOPMENT		**7**
PD 1	Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving	2
PD 2	Communication Skills	3
PD 3	Group Discussion: Stress & Emotions	2
LEADERSHIP		**5**
L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code	3
L 2	Case Studies: Shivaji, Jhasi Ki Rani	2
SOCIAL SERVICE AND COMMUNITY DEVELOPMENT		**8**
SS 1	Basics, Rural Development Programmes, NGOs, Contribution of Youth	3
SS 4	Protection of Children and Women Safety	1
SS 5	Road / Rail Travel Safety	1
SS 6	New Initiatives	2
SS 7	Cyber and Mobile Security Awareness	1

TOTAL: 30 PERIODS

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2024

S. Narayanasamy
Chairman
Board of Studies
Department of Humanities & Sciences

SEMESTER - II

24ESGE102 SDG NO. 4,9,12	ENGINEERING PRACTICES LABORATORY	L	T	P	CP	C
		0	0	4	4	2

OBJECTIVES:

- To provide exposure to the students with hands-on experience on various basic engineering practices in Electrical and Electronics Engineering, Civil and Mechanical Engineering.

ELECTRICAL ENGINEERING PRACTICE

1. Residential house wiring using switches, fuse, indicator, lamp, and energy meter.
2. Fluorescent lamp wiring.
3. Staircase wiring.
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of electrical equipment.

ELECTRONICS ENGINEERING PRACTICE

1. Study of Electronic components and equipment – Resistor- colour coding, measurement of AC signal parameter (peak-peak RMS, period, frequency) using CRO.
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 Half Wave Rectifier and Full Wave Rectifier.
6. Simulation of Half Wave Rectifier and Full Wave Rectifier using TinkerCAD.

CIVIL ENGINEERING PRACTICE

Buildings:

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

Recommended by
Board of Studies of Mech dept.
Meeting No. 8 Dated: 1.6.24

CHAIRMAN
Board of Studies
Mechanical Engineering

Plumbing Works:

1. Study of pipeline joints, its location and functions: valves, taps, couplings,unions, reducers, elbows in household fittings.
2. Study of pipe connections requirements for pumps and turbines.
3. Preparation of plumbing line sketches for water supply and sewage works.
4. Hands-on-exercise: Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
5. Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

1. Study of the joints in roofs, doors, windows and furniture.
2. Hands-on-exercise: Wood work, joints by sawing, planing and cutting.

MECHANICAL ENGINEERING PRACTICE

Welding:

1. Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.
2. Gas welding demo practice.

Basic Machining:

1. Simple Turning and Taper turning.
2. Drilling Practice.

Sheet Metal Work:

1. Forming & Bending.
2. Model making – Trays and funnels.
3. Different type of joints.

Demonstration on:

1. Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
2. Foundry operations like mould preparation for gear and step cone pulley.
3. Fitting – Exercises – Preparation of square fitting and V – fitting models.

TOTAL: 60 PERIODS

Recommended by
Board of Studies of Mech dept.
Meeting No. 8 Dated: 1.6.24

CHAIRMAN
Board of Studies
Mechanical Engineering

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

ELECTRICAL

1. Assorted electrical components for house wiring	15 Sets
2. Electrical measuring instruments	10 Sets
3. Study purpose items:	
Iron box, fan and regulator, emergency lamp	1 Each
4. Megger (250V/500V)	1 No
5. Power Tools:	
Range Finder	2 Nos
Digital Live-wire detector	2 Nos

ELECTRONICS

1. Soldering guns	10 Nos
2. Assorted electronic components for making circuits	50 Nos
3. Small PCBs	10 Nos
4. Multimeters	40 Nos

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
5. Power Tools:	
Rotary Hammer	2 Nos
Demolition Hammer	2 Nos
Circular Saw	2 Nos
Planner	2 Nos
Hand Drilling Machine	2 Nos
Jigsaw	2 Nos

MECHANICAL

1. Arc welding transformer with cables and holders	5 Nos
2. Arc welding transformer with cables and holders	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

Recommended by
Board of Studies of Mech dept.
Meeting No. 8 Dated: 1.6.24

CHAIRMAN
Board of Studies
Mechanical Engineering

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. 1 each

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Infer the values of resistance, peak to peak RMS values, time period, frequency. [K2]
2. Outline the logic gates, rectifier, timer circuits and soldering practices. [K2]
3. Demonstrate the measurement of electrical parameters such as voltage, current, resistance, power and energy. (K2)
4. Illustrate the residential wiring, staircase wiring and fluorescent lamp wiring.[K2]
5. Prepare the carpentry and plumbing joints. (K2)
6. Perform the basic operations of welding, sheet metal work and basic machining operations in Lathe and Drilling (K2)

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	2	2
CO2	3	-	-	-	-	-	-	-	-	-	-	2	2
CO3	3	-	-	-	-	-	-	-	-	-	-	2	2
CO4	3	-		-	-	-	-	-	-	-	-	2	2
CO5	2	-	-	-	-	-	-	-	-	-	-	2	2
CO6	2	-	-	-	-	-	-	-	-	-	-	2	2

Recommended by
Board of Studies of Mech dept.
Meeting No. 8 Dated: 1.6.24

CHAIRMAN
Board of Studies
Mechanical Engineering

SEMESTER - II

24ENTP201 - SDG NO. 4	DIGITAL DYNAMICS	L	T	P	CP	C
		1	0	1	2	0

OBJECTIVES:

- Explore online communication
- Master computer skills
- Use virtual platforms
- Understand digital ethics and cyber security
- Observe and follow do's and don'ts

MODULE - I DIGITAL CULTURE AND SOCIETY 6

- Adapting to changes
- Importance in today's digital landscape
- Digital identity and self- presentation
- Online communities and forums
- Digital divide and consequences
- Online collaboration and collective action

MODULE - II DIGITAL LITERACY AND ACCESS TO TECHNOLOGY 5

- Computer skills
- Social and cultural understanding
- Social media campaign and Activism
- Netiquettes
- Trending Technologies
- Digital tools and softwares

MODULE - III DIGITAL ETHICS 3

- Digital ethics and moral panics
- The art of protecting secrets
- Overview of digital tools

MODULE - IV CYBER SECURITY 3

- Threats, vulnerability and consequences
- Data making and usage practice
- Importance of security

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - V DIGITAL NETWORKING 7

- Remote work and virtual teams
- Authenticity in digital interactions
- Engaging content creation
- Tools and and techniques for insightful usage
- Balancing online and offline interactions
- Collaboration for research and innovation

MODULE - VI BUREAU OF INDIAN STANDARDS (BIS):BASIC CONCEPTS, STANDARDS FORMATION PROCESS AND CHALLENGES 6

Standardization –Basic Concepts:

- Basic concepts of standardization
- Purpose of standardization, marking and certification of articles and processes
- Importance of standards to industry, policy makers, trade, sustainability and innovation

Standards Formulation Process and Challenges:

- Objectives, roles and functions of BIS, Bureau of Indian Standards Act, ISO/IEC Directives
- WTO Good Practices for Standardization

World of Standards:

- Important Indian and International Standards

TOTAL: 30 PERIODS

REFERENCES:

1. Communication Skills and Soft Skills – an Integrated Approach. Edited by E. Sureshkumar, P. Sreehari and J. Savithri, Pearson.
2. Silvia. P.J.2007. How to Read a Lot. Washington DC, American Psychological Association.

WEB REFERENCES:

1. https://swayam.gov.in/nd1_noc19_hs31/preview
2. https://www.sscnasscom.com/ssc-projects/capacity-building-and-development/training/gbfs/

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Apply online communication techniques and collaboration skills (K3)
2. Enumerate the principles of digital ethics in online interactions (K2)
3. Understand the importance of Bureau of Indian Standards (BIS). (K2)

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

CO-PO, PSO MAPPING:

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

SEMESTER - II

24ESID201 SDG NO. 1-17	IDEA ENGINEERING LAB - II	L	T	P	CP	C
		0	0	2	2	1

OBJECTIVES:

To impart the basics of technologies that are used to identify sustainable solutions to societal problems

- To Provide awareness on Printed Circuit Board (PCB) design using ORCAD software.
- To Raise awareness of at least three Internet of Things (IoT) projects and their applications.
- To Upskill learners through practical experience with 3D printing and scanning technologies.
- To prepare the learners to correctly align the ideas to SDGs
- To comprehensive knowledge on entrepreneurship and effective idea presentation techniques.
- To evaluate the effectiveness of SDGs and implementation strategy

MODULE-1 BASICS OF DESIGN THINKING IN ELECTRICAL AND ELECTRONIC COMPONENTS 4

- Awareness Session on Basics of Design Thinking
- Study of Active & Passive Electronic Components
- Study of Basic AC & DC Electrical Circuits
- Study of Microprocessors & Microcontrollers
- Demonstration of Arduino Board, ESP 32 Board ,Raspberry Pi Board & PCB design software-Eagle
- Demonstration of PCB design using the software's Orcad, Eagle etc.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/07/2024

Chairman
Board of Studies
Department of Humanities & Sciences

MODULE-2 EMBEDDED SYSTEMS, IOT AND ROBOTICS **4**

- Study of sensors and transducers
- Study of embedded protocols, IOT Protocols & Embedded C
- Demonstration of Robotics & Drone models

MODULE-3 BASICS OF MECHANICAL ENGINEERING **4**

- Study of Mechanical Modeling using Fusion 360
- Demonstration of 3D Scanner,3D Printer, Laser Cutter &RD Works Software
- Study of Slicer Software & Master Cam Software

MODULE 4 ALIGNMENT AND MAPPING OF IDEAS **4**

- **Project Title:** Justification of SDG and SAP - Problem Statement & Solution

MODULE-5 ENTREPRENEURSHIP SKILLS **4**

- Startup Awareness
- Entrepreneurship Opportunities
- Mock Presentations
- Innovation
- Novelty
- Feasibility
- Presentation Skills

MODULE-6 SCOUT for SDG IDEATHON **12**

Evaluation Stages:

- First Round
- Second Round
- Idea Pitching

TOTAL: 30 PERIODS

REFERENCES:

1. D P Kothari and I.J Nagarath, "Basic Electrical and Electronics Engineering", McGraw Hill Education (India) Private Limited, Second Edition, 2020
2. S.K. Bhattacharya, Basic Electrical Engineering, Pearson Education, 2019
3. Elements of Mechanical Engineering by N M Bhatt and J R Mehta, Mahajan Publishing House
4. Basic Mechanical Engineering by Pravin Kumar, Pearson Education

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S Narasimhan
Chairman
Board of Studies
Department of Humanities & Sciences

5. Robert Barton, Patrick Grossetete, David Hanes, Jerome Henry, Gonzalo Salgueiro, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", CISCO Press, 2017.
6. R.K.Mittal and I.J.Nagrath, Robotics and Control, Tata McGraw Hill, New Delhi,4th Reprint, 2017.
7. JohnJ.Craig ,Introduction to Robotics Mechanics and Control, Third edition, Pearson Education, 2009.

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc24_ee112/preview
2. https://onlinecourses.nptel.ac.in/noc24_cs115/preview
3. https://onlinecourses.nptel.ac.in/noc24_me104/preview
4. https://onlinecourses.nptel.ac.in/noc24_me88/preview

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Gain the knowledge on Basic Electronics & Electrical Circuits (K2)
2. Understand the Basics of Embedded systems,IOT & Robotics (K1)
3. Explore the the Basics of Mechanical Modeling (K2)
4. Interpret the mapping of SDGs to ideas. (K4)
5. Illustrate the ideas in the Ideathon event emphatically .(K4)

CO-PO, PSO MAPPING:

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

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

Chairman
Board of Studies
Department of Humanities & Sciences

SEMESTER - III

24BSMA302 - SDG NO. 4	LINEAR ALGEBRA AND PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	CP	C
		3	1	0	4	4

OBJECTIVES:

- The aim of this course is to impart knowledge in the concepts of linear algebra as a prerequisite for the recent thrust areas of technological advancement.
- To know the importance of partial differential equations in modelling various engineering problems.

MODULE - I VECTOR SPACES 9

Vectors and Linear combinations-Vector spaces (Definitions and examples) – Subspaces (Definitions and examples) – Linear independence and linear dependence – Bases and dimensions.

MODULE - II LINEAR TRANSFORMATION 12

Linear transformation - Null and range spaces - Dimension theorem (Statement only) - Matrix of a linear transformation

MODULE - III INNER PRODUCT SPACES 9

Inner product - Norm - Gram Schmidt orthogonalization process(Statement only) - QR decomposition.

MODULE - IV ADJOINT OPERATORS 9

Adjoint of a linear operator - Least square approximation- Normal and self - adjoint operators.

MODULE - V SOLUTIONS OF FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS 12

Solutions of standard types of first order partial differential equations - Singular integral - Complete integral – Lagrange's linear equation.

MODULE - VI SOLUTIONS OF LINEAR PARTIAL DIFFERENTIAL EQUATIONS 9

Linear homogeneous and non-homogeneous partial differential equations of second and higher order with constant coefficients.

Recommended by Board of Studies of H&S dept. Meeting No. 6 Dated: 31/07/2024

TOTAL: 60 PERIODS

S. Narasimhan
Chairman
Board of Studies
Department of Humanities & Sciences

TEXT BOOKS:

1. Linear Algebra, Friedberg A.H., Insel A.J. and Spence L., 4th Edition, Pearson, 2018.
2. Transforms and Partial Differential Equation, Veerarajan T., 3rd Edition, Tata McGraw Hill Education Pvt. Ltd., , New Delhi, 2016.

REFERENCES:

1. Linear Algebra and its applications, Strang G., 4th Edition, Thomson (Brooks/Cole), New Delhi, 2005.
2. Linear Algebra and its Applications ,Lay D. C. , 5th Edition, Pearson Education, 2015.
3. Linear Algebra – A Geometric Approach, Kumaresan S.,1st Edition, Prentice Hall of India, New Delhi, Reprint, 2010.
4. Higher Engineering Mathematics, B. V. Ramana, 11th reprint, Tata McGraw-Hill, New Delhi, 2010.
5. A text-book of Engineering Mathematics, N.P. Bali and Manish Goyal, Reprint, Laxmi Publications, 2008.
6. Higher Engineering Mathematics, B. S. Grewal, 40th Edition, Khanna Publishers, New Delhi, 2007.

WEB RESOURCES

1. https://theengineeringmaths.com/wp-content/uploads/2016/02/Partial-differential-equations.pdf
2. https://www.math.hkust.edu.hk/~mabfchen/Math111/Week7-9.pdf
3. https://math.mit.edu/~sschiavo/18-700/Lectures/LessonPlan17.pdf

ONLINE RESOURCES:

1. https://www.khanacademy.org/math/linear-algebra
2. https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/video_galleries/video-lectures/
3. https://nptel.ac.in/courses/111106135
4. https://onlinecourses.nptel.ac.in/noc25_ma111/preview

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 dated: 31/08/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

COURSE OUTCOMES

Upon completion of the course, the student should be able to:

1. Determine the bases and dimension of vector spaces and subspaces. (K3)
2. Analyse the matrix of a linear transformation for its rank and nullity. (K4)
3. Construct an orthonormal basis using Gram-Schmidt orthogonalization process and use it for QR decomposition of a matrix. (K3)
4. Determine the adjoint of a linear operator and solve least squares approximation problems. (K3)
5. Classify the solutions of first order partial differential equations including Lagrange's linear equation. (K4)
6. Solve linear homogeneous and non-homogeneous partial differential equations of second and higher order with constant coefficients. (K3)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	2	2
CO2	-	3	-	-	-	-	-	-	-	-	-	2	2
CO3	3	-	-	-	-	-	-	-	-	-	-	2	2
CO4	3	-	-	-	-	-	-	-	-	-	-	2	3
CO5	-	3	-	-	-	-	-	-	-	-	-	3	3
CO6	3	-	-	-	-	-	-	-	-	-	-	3	3

SEMESTER - III

24CEPC301 105104160 SDG NO. 4, 9	SOLID MECHANICS	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- Understand basic concepts of stress, strain, and deformation.
- Analyze shear force and bending moment in beams.
- Evaluate forces in determinate and indeterminate trusses.
- Solve indeterminate beams using appropriate methods.
- Apply column and cylinder stress theories.
- Interpret 3D stress states and failure theories.

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

MODULE - I STRESS, STRAIN AND DEFORMATION OF SOLIDS 7

Simple Stresses and strains – Elastic constants - Relationship between elastic constants – Stress Strain Diagram – Ultimate Stress – Yield Stress – Deformation of axially loaded member - Composite Bars - Thermal Stresses – State of Stress in two dimensions – Stresses on inclined planes – Principal Stresses and Principal Planes – Maximum shear stress - Mohr's circle method

MODULE - II TRANSFER OF LOADS AND STRESSES IN BEAMS 8

Types of loads, supports, beams – concept of shearing force and bending moment - Relationship between intensity of load, Shear Force and Bending moment - Shear Force and Bending Moment Diagrams for Cantilever, simply supported and overhanging beams with concentrated load, uniformly distributed load, uniformly varying load and concentrated moment. Theory of Simple Bending – Stress Distribution due to bending moment and shearing force - Flitched Beams.

MODULE - III ANALYSIS OF TRUSSES 7

Determinate and indeterminate trusses - Analysis of pin jointed plane determinate trusses by method of joints, method of sections and tension coefficient – Analysis of Space trusses by tension coefficient method.

MODULE - IV INDETERMINATE BEAMS 8

Concept of Analysis - 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,

MODULE - V COLUMNS AND CYLINDERS 7

Euler's column theory – critical load for prismatic columns with different end conditions – Effective length – limitations - Rankine-Gordon formula - Eccentrically loaded columns – middle third rule - core of a section – Thin cylindrical and spherical shells – stresses and change in dimensions - Thick cylinders – Compound cylinders

MODULE - VI STATE OF STRESS IN THREE DIMENSIONS 8

Stress tensor at a point – Stress invariants - Determination of principal stresses and principal planes - Volumetric strain. Theories of failure: Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Total Strain energy theory – Maximum distortion energy theory – Application problems.

TOTAL : 45 PERIODS

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

TEXT BOOKS:

1. Beer. F.P. & Johnston.E.R."Mechanics of Materials", Tata McGraw Hill, Sixth Edition, New Delhi 2010.
2. M. L. Gambhir , "Fundamentals of Solid Mechanics - A Treatise on Strength of Materials" , Phi Learning 2009
3. R.C Hibbeler, "Mechanics of Materials", Prentice-Hall, New Delhi. 2022.
4. Rajput R.K. "Strength of Materials (Mechanics of Solids)", S.Chand & company Ltd., New Delhi, 2018.

REFERENCES:

1. Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 2017
2. William A .Nash, "Theory and Problems of Strength of Materials", Schaum's Outline Series,Tata McGraw Hill Publishing company, 2017.
3. Singh. D.K., " Strength of Materials", Ane Books Pvt. Ltd., New Delhi, 2021
4. Egor P Popov, "Engineering Mechanics of Solids", 2nd edition, PHI Learning Pvt. Ltd., NewDelhi, 2015
5. Irwing H.Shames, James M.Pitarresi, Introduction to Solid Mechanics, Prentice Hall of India, New Delhi, 2002
6. James M.Gere., Mechanics of Materials, Thomas Canada Ltd., Canada, 2006.

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/112/106/112106286/
2. https://nptel.ac.in/courses/112/103/112103108/
3. https://nptel.ac.in/courses/112/106/112106180/

WEB REFERENCES:

1. https://www.ndl.gov.in/
2. http://www.brainkart.com/subject/Strength-of-Materials_75/
3. https://en.wikibooks.org/wiki/Strength_of_Materials

OUTCOMES

Upon completion of the course, the student will be able to:

1. Understand and apply the concepts of stress, strain, principal stresses, and principal planes in materials under different loading conditions. (K3)
2. Determine and draw shear force and bending moment diagrams, and calculate stress distribution in various types of beams. (K3)

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

3. Analyze pin-jointed plane and space trusses to find forces in members under given loads. (K3)
4. Calculate the load-bearing capacity of columns, and analyze stresses in thin and thick cylinders as well as spherical shells. (K3)
5. Identify principal stresses in complex loading scenarios and apply suitable failure theories to assess material safety. (K3)
6. Analyze complex stress conditions using principal stress and failure theories to predict material behavior and failure. (K3)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	0	0	0	0	0	0	0	0	1	1	2
CO2	3	3	2	0	2	0	0	0	0	0	1	2	2
CO3	2	3	2	0	1	0	0	1	0	0	0	2	2
CO4	2	2	1	0	1	2	0	0	0	0	1	2	2
CO5	3	3	2	1	2	1	1	0	0	0	2	2	3
CO6	3	3	2	1	2	1	1	0	0	0	2	2	3

SEMESTER - III

24CEPC302 - SDG NO. 4,9&15	FLUID MECHANICS AND HYDRAULIC ENGINEERING	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To understand the Fundamentals of properties of fluids and their role in fluid statics.
- To study the principles of kinematics, hydrodynamics, and its applications.
- To analyze laminar and viscous flows in pipes and calculate energy losses.
- To understand the principles of open channels and energy concepts.
- To learn the equation of GVF and RVF, flow profile and concept of energy dissipation.
- To explore the working principles of hydraulic turbines and pumps.

MODULE - I FLUIDS PROPERTIES AND FLUID STATICS 7

PROPERTIES OF FLUIDS – Density, specific weight, specific gravity, viscosity, surface tension, capillarity, and compressibility

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

FLUID STATICS – Pressure: static, absolute, and gauge pressure; forces on plane and curved surfaces

MODULE - II FLUID KINEMATICS & DYNAMICS **7**

FLUID KINEMATICS - Classification of flows-Stream line, streak-line and path-lines, Stream function and velocity potentials- Flow net.

FLUID DYNAMICS - Equation of motion, Euler's and Bernoulli's equations derivations, Applications of Bernoulli's equations: Venturimeter, Orifice meter and Pitot tube, Momentum equation.

MODULE - III LAMINAR AND VISCOUS FLOW **7**

Laminar flow in pipes and between parallel plates -Darcy-Weisbach equation-Moody diagram, Flow through pipes -Major and minor losses of energy in pipes, hydraulic gradient, total energy line, pipes in series, pipes in parallel, –Equivalent pipes, and hydraulic transmission of power.

MODULE - IV UNIFORM FLOW **8**

Definition and differences between pipe flow and open channel flow -Types of Flow - Properties of open channel - Steady uniform flow: Chezy equation, Manning equation - Best hydraulic sections for uniform flow - Specific energy and specific force - Critical flow.

MODULE - V GRADUALLY AND RAPIDLY VARIED FLOWS **8**

GRADUALLY VARIED FLOW- Dynamic equations of gradually varied - Water surface flow profile classifications- Profile determination by Numerical method: Direct step method and Standard step Method – Change in Grades.

RAPIDLY VARIED FLOW- Application of the momentum equation for RVF - Hydraulic jumps - Types - Energy dissipation - Celerity - Rapidly varied unsteady flows (positive and negative surges)

MODULE - VI TURBINES AND PUMPS **8**

TURBINES -Classification of Turbines - Pelton wheel - Francis turbine - Kaplan turbine- Specific speed -Characteristic Curves of Turbines,

PUMPS- Classification of Pumps - Centrifugal pumps - Minimum speed to start the pump - NPSH - Multistage pumps - Characteristics curve - Reciprocating pumps - Negative slip - Indicator diagrams and its variations - Field visit to hydraulic research station and urban drainage systems.

TOTAL : 45 PERIODS

Recommended by

Board of Studies of CIVIL dept.

Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

TEXT BOOKS:

1. P.N. Modi and S.M. Seth-Hydraulics and Fluid Mechanics, including Hydraulic machines, standard Book House, New Delhi
2. K Subramanya- Fluid Mechanics and Hydraulic Machines, Tata McGraw-Hill, New Delhi.
3. R.K. Bansal- A text book of Fluid Mechanics and Hydraulic Machines-Laxmi Publications, New Delhi.
4. Robert W. Fox, Alan T. McDonald, Philip J. Pirtchard John W. Mitchell, Introduction to Fluid Mechanics, 9th Edition, Wiley Publications, 2015.

REFERENCE BOOKS:

1. Jain A.K. "Fluid Mechanics including Hydraulic Machines", Khanna Publishers, NewDelhi, 2014.
2. Narayana Pillai N. "Principles of Fluid Mechanics and Fluid Machines", (3rd.Ed.) University Press(India) Pvt.Ltd.2009.
3. Mays L.W., Water Resources Engineering, John Wiley and Sons (WSE), NewYork, 2005.
4. VenTe Chow, Open Channel Hydraulics, McGraw Hill, New York, 2009.
5. Subramanya K, Flow in open channels, Tata Mc Graw Hill, New Delhi, 2000.

ONLINE RESOURCES:

1. https://www.edx.org/learn/fluid-mechanics
2. https://staging.capabilitydevelopment.org/Coursedesc/FLUID-MECHANICS
3. https://www.udemy.com/course/open-channel-hydraulics/
4. https://www.udemy.com/course/fluid-mechanics-udemy/

WEB REFERENCES:

1. https://archive.nptel.ac.in/courses/105/103/105103095/
2. https://archive.nptel.ac.in/courses/105/105/105105203/
3. https://www.slideshare.net/slideshow/r-k-bansal-a-textbook-of-fluid-mechanics-and-hydraulic-machines-9laxmipdf/255316731
4. https://civil.aitmbgm.ac.in/wp-content/uploads/2023/01/Fluid-Mechanics-Fluid-Machines.pdf

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

OUTCOMES

Upon completion of the course, the student will be able to:

1. Apply fluid properties and the principles of fluid statics to determine forces acting on plane and curved surfaces. (K3)
2. Apply concept of different types of fluid flow using streamlines, flow nets, and dynamic equations for flow measurement applications. (K3)
3. Apply laminar and turbulent flow equations to compute head losses and design efficient piping systems. (K3)
4. Solve uniform flow problems in open channels using Manning's and Chezy's equations to determine flow parameters and optimal hydraulic sections. (K3)
5. Identify gradually and rapidly varied flows in open channels using water surface profiles and momentum-based methods. (K3)
6. Demonstrate the performance and efficiency of turbines and pumps using characteristic curves and operational parameters. (K3)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	0	0	0	0	0	0	0	0	1	3	1
CO2	3	2	0	0	0	0	0	0	0	0	1	3	2
CO3	3	2	3	0	2	0	0	0	0	0	1	3	1
CO4	3	2	3	0	2	0	0	0	0	0	1	2	2
CO5	3	2	2	0	2	0	0	0	0	0	1	2	2
CO6	3	2	3	0	2	0	0	0	0	0	1	3	2

SEMESTER - III

24CEPC303 - SDG NO. 4, 9	SURVEYING	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- Understand basic principles and methods of traditional surveying.
- Learn levelling techniques and contour mapping.
- Use theodolites and tachometers for angle and distance measurements.
- Apply control surveying and error adjustment methods.
- Use modern instruments like Total Stations and GPS.
- Explore applications in route, hydrographic and astronomical surveying.

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

MODULE - I FUNDAMENTALS OF SURVEYING 7

Classifications and basic principles of surveying – Equipment and accessories for ranging and chaining – Basic principles Compass surveying- Local attraction - Plane Table Surveying accessories and methods.

MODULE - II LEVELLING AND ITS APPLICATION 8

Levels and staves - Methods of levelling - Booking - Reduction – Curvature and refraction correction - Contouring – Characteristics of contours – Methods of contouring – Interpolation of contours - Contour gradient – Uses of contour plan and map

MODULE - III THEODOLITE SURVEYING AND COMPUTATIONS 8

Horizontal and vertical angle measurements by Theodolite – Heights and distances - Trigonometric levelling - single and reciprocal observations - Tacheometer - Stadia Constants - Analytic Lens -Tangential and Stadia Tacheometry surveying.

MODULE - IV CONTROL SURVEYING AND ADJUSTMENT 8

Horizontal and vertical control- Methods – Triangulation - satellite stations – reduction to centre - Traversing – Gale's table- Trilateration - Concepts of measurements and errors – adjustment methods – least square methods – angles, lengths and levelling network.

MODULE - V MODERN SURVEYING 7

Total Station: Digital Theodolite, EDM, Electronic field book - Advantages – Parts and accessories - working principle – Observables – Errors – COGO functions – Field procedure and applications. GPS: Advantages – System components – Signal structure – Selective availability and anti spoofing – receiver components and antenna – Planning and data acquisition – Data processing - Errors in GPS – Field procedure and applications – Case studies

MODULE - VI MISCELLANEOUS SURVEYING 7

Route Surveying - Reconnaissance - Route surveys for highways, railways and waterways - Simple curves – Compound and reverse curves – Transition curves - Setting out different methods of simple curve - Vertical curves - Hydrographic surveying – Tides - MSL - Sounding methods - Three-point problem – Tides - MSL - Sounding methods – Fundamental of Astronomical surveying

TOTAL : 45 PERIODS

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

TEXT BOOKS:

1. T.P.Kanetkar and S.V.Kulkarni, Surveying and Levelling, Parts1 & 2,Pune Vidyarthi Griha Prakashan, Pune, 2008
2. Dr.B.C.Punmia, Ashok K.Jain and Arun K Jain, Surveying Vol.I & II, Lakshmi Publications Pvt Ltd, New Delhi, 2016.

REFERENCES:

1. R. Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
2. Bannister and S. Raymond, Surveying, Seventh Edition, Longman 2004
3. S.K. Roy, Fundamentals of Surveying, Second Edition, Prentice' Hall of India 2004
4. K.R. Arora, Surveying Vol I & II, Standard Book house, Twelfth Edition.2013.
5. James M. Anderson and Edward M. Mikhail, "Surveying, Theory and Practice", 7th Edition, McGraw Hill, 2001.

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/105/104/105104101/
2. https://nptel.ac.in/courses/105/107/105107122/

WEB REFERENCES:

1. https://www.britannica.com/technology/surveying
2. http://egyankosh.ac.in/handle/123456789/39480
3. https://www.isro.gov.in/spacecraft/satellite-navigation

OUTCOMES

Upon completion of the course, the student will be able to:

1. Calculate the direct and indirect measurements in conventional surveying such as chain surveying, compass surveying and plane table surveying. (K3)
2. Apply the knowledge of Levelling in the fieldwork and contour map. (K3)
3. Apply the concepts of Theodolite Surveying, Tacheometric surveying and Trigonometrical Levelling in field observations and computations (K3)
4. Solve the errors occurring in field observations by using various methods like normal equations. method of correlates and least squares. (K3)
5. Demonstrate the knowledge on Modern Surveying such as Total station and GPS in the field work (K3)
6. Determine the measurement of elements in Route surveying. Hydrographic surveying, Curve surveying. (K3)

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	3	-	-	-	-	-	-	3	2
CO2	3	2	-	2	3	-	-	-	-	-	-	3	2
CO3	3	2	-	2	3	-	-	-	-	-	-	3	3
CO4	3	3	-	3	-	-	-	-	-	-	-	2	3
CO5	3	-	-	2	2	2	-	-	-	-	2	3	3
CO6	3	2	2	2	2	2	-	-	-	-	2	3	2

SEMESTER - III

24CEPC304 - SDG NO. 4,9,11	SUSTAINABLE CONSTRUCTION MATERIALS	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To explore the properties of common construction materials and how they relate to sustainability, including their embodied energy, durability, and potential for reuse.
- To learn the availability, classifications, manufacturing, tests, properties and uses of conventional and sustainable construction materials
- To learn about different types of sustainable materials and how to select the appropriate materials
- To learn the importance of considering the entire life cycle of a building, from material extraction to demolition and disposal, and how to minimize environmental impacts at each stage
- To learn about green building certifications like LEED, GRIHA, and others, and how they can be used to assess and improve the sustainability performance of buildings
- To learn the alternative construction materials developed and promoted by various government and non-government organizations

MODULE - I INTRODUCTION TO CONCEPTS OF SUSTAINABILITY 8

Introduction to concepts of sustainability: impacts of global warming, sustainability indicators- Carbon footprint, Embodied energy and carbon, sustainability analysis - Life Cycle Analysis, Concept of Green Buildings, Green building rating systems.

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

MODULE - II CONVENTIONAL MATERIALS STONES-BRICKS - CONCRETE BLOCKS - LIME **8**

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 hollow blocks Lightweight concrete blocks

MODULE - III CONVENTIONAL MATERIALS CEMENT-AGGREGATE-CONCRETE **9**

Cement – Ingredients - Manufacturing process - Types and grades - Properties of cement and Cement mortar- Tests on Cement - Fineness - Soundness, Consistency – Setting time - Coarse Aggregate – Crushing strength - Impact strength - Flakiness Index – Elongation Index - Abrasion resistance Grading – Fine aggregate - grading – Bulking. Concrete - Ingredients –Manufacturing-Hydration-– Properties of fresh concrete - Slump, Flow and Compaction factor - Properties of Hardened concrete - Compressive, Tensile and Shear strength Modulus of rupture tests.

MODULE - IV SUSTAINABLE BUILDING MATERIALS I **6**

Introduction to sustainable building materials, qualities, use, examples - Natural building materials, locally available and locally manufactured materials –wood, earth, stone and lime based materials. concrete eco block, stabilized blocks, Fal-G Blocks, prefabs / structural insulating panels, cellulose insulation, adobe, rammed earth.

MODULE - V SUSTAINABLE BUILDING MATERIALS II **6**

Bio materials from industrial waste, mining waste, mineral waste, agricultural waste - Use of waste materials such as paper, glass bottles, tires, shipping containers - Use of post-consumer and industrial waste such as fly-ash, bags, building construction & demolition waste – use of salvaged and recycled materials from flooring, columns, beams, timber, glass, etc

MODULE - VI ALTERNATIVE BUILDING MATERIALS **8**

Overview and definition of alternative or appropriate building materials - Alternative materials developed and promoted by government organizations like CSIR labs: CBRI and SERC, GRIHA, ASTRA (IISc), BMTPC, HUDCO and its building centers-Case studies -Alternative materials developed and promoted by non-government organizations DA, Auroville, TERI.

TOTAL : 45 PERIODS

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

TEXT BOOKS:

1. Er.R.K.Rajput ,Engineering materials, S chand & Company,2000
2. Sustainable Building - Design Manual Pt 1 & 2, The Energy and Resources Institute, TERI, 2004.
3. Ross Spiegel.G, Green Building Materials A Guide to Product Selection and Specification,3rd Edition by, John Wiley &Sons, 2010.

REFERENCE BOOKS:

1. Jagadish. K.S. Alternative Building Materials and Technologies, New age International PvtLtd Publishers, 2008.
2. Traci Rose Rider, Stacy Glass, Jessica McNaughton, Understanding Green BuildingMaterials, W.W.Norton andCompany, 2011
3. BIS, National Building Code 2005, New Delhi, 2005.
4. Energy Conservation Building Code of India, User manual, 2007
5. Jagadish. K.S. Building with stabilised mud,I.K. International Publishing House Pvt.Limited, 2007

ONLINE RESOURCES:

1. http://www.infocobuild.com/education
2. https://freevideolectures.com/course/3516/modern-construction materials

WEB REFERENCES:

1. https://onlinecourses.swayam2.ac.in/arp19_ap75/preview
2. https://archive.nptel.ac.in/courses/105/102/105102195/
3. https://nptel.ac.in/courses/105102088/
4. https://swayam.gov.in/nd1_noc20_ce01/preview

OUTCOMES

Upon completion of the course, the student will be able to:

1. Develop the concepts of sustainability including global warming, Carbon foot print, and Life Cycle Analysis related to construction materials. [K3]
2. Illustrate the origin, classifications, manufacturing and different tests on stones, bricks, lime and concrete hollow blocks. [K3]
3. Interpret the ingredients, manufacturing process, types, properties and tests of cement, aggregates and concrete. [K3]
4. Summarize the availability, qualities and properties of sustainable building materials, including Natural building materials, locally available and locally manufactured materials. [K3]

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

5. Describe the availability, qualities and properties of Bio materials from industrial waste and post-consumer industrial waste materials. [K3]
6. Explain the alternative construction materials developed and promoted by various government and non-government organizations. [K3]

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	-	3	-	-	-	-	2	3	2
CO2	2	2	1	-	2	1	-	-	-	-	1	2	-
CO3	2	2	2	-	3	1	-	-	-	-	1	3	1
CO4	2	3	3	-	2	3	-	-	-	-	2	3	2
CO5	2	2	2	-	2	3	-	-	-	-	1	2	2
CO6	2	2	3	-	2	3	-	-	-	-	2	2	2

SEMESTER - III

24HSMC301 - SDG NO. 4 & 9	UNIVERSAL HUMAN VALUES – II UNDERSTANDING HARMONY	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Developing clarity with harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.
- Recognizing the potential of excellence than competition

SYLLABUS:

The course has 28 lectures and 14 practice sessions in 6 modules:

MODULE - I COURSE INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION (5+2)

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
2. Self-Exploration-what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self- exploration

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/2025

CHAIRMAN
Board of Studies
Civil Engineering

3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly-A critical appraisal of the current scenario

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

MODULE-II UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF (5+2)

6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.
7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
8. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of 'I' and harmony in 'I'
11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

MODULE-III UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY HARMONY IN HUMAN-HUMAN RELATIONSHIP (6+2)

12. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values ofrelationship
13. Understanding the meaning of Trust; Difference between intention and competence
14. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/2025

CHAIRMAN
Board of Studies
Civil Engineering

15. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

MODULE - IV UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE - WHOLE EXISTENCE AS COEXISTENCE (6+2)

16. Understanding the harmony in the Nature
17. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self- regulation in nature
18. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
19. Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion ofresources and role of technology etc.

MODULE - V IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS (4+4)

20. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family
21. Natural acceptance of human values
22. Definitiveness of Ethical Human Conduct
23. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
24. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people- friendly and eco friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

MODULE - VI UNIVERSAL HUMAN ORDER (4+3)

25. Programs to ensure Sanyam and Health
26. Case studies of typical holistic technologies, management models and production systems
27. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations

Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/2025

CHAIRMAN
Board of Studies
Civil Engineering

28. Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. to discuss the conduct as an engineer or scientist etc

TOTAL : 45 PERIODS

TEXT BOOKS:

1. A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 3rd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.

REFERENCES:

1. AICTE Model Curriculum in Humanities, Social Science and Management Courses (UG Engineering & Technology)Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values,A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence-JC Kumarappa
8. Bharat Mein Angreji Raj- Pandit Sunderlal
9. Rediscovering India- by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda- Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

OUTCOMES

Upon completion of the course, the student will be able to:

1. Express the harmony of relationship among human being, family, society, nature and existence with right understanding and right feeling. (K2)
2. Develop the responsibility of handling problems by finding holistic and sustainable solutions based on the natural acceptance for maintaining mutual human relationships. (K2)
3. Develop a holistic perspective of life based on self-exploration about self, family, society and nature/existence. (K2)
4. Elucidate a critical ability for dedicative commitment towards human values, relationships and society. (K2)

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/23

CHAIRMAN
Board of Studies
Civil Engineering

5. Implement the process of verification and validation of learning in daily life. (K2)
6. Develop self reflection, commitment and courage to act in life challenging situations. (K2)

CO – PO, PSO MAPPING:

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

SEMESTER - III

24HSNC301 - SDG NO. 4	NCC COURSE LEVEL 2	L	T	P	CP	C
		3	0	0	3	0

ARMY WING

PERSONALITY DEVELOPMENT **9**

PD 3 Group Discussion: Change your mindset, Time Management, Social Skills 6

PD 5 Public Speaking 3

LEADERSHIP **7**

L 2 Case Studies: APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murty, Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965 7

DISASTER MANAGEMENT **13**

DM 1 Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation 3

DM 2 Initiative Training, Organising Skills, Do's & Don't's, Natural Disasters, Man Made Disasters 9

DM 3 Fire Service & Fire Fighting 1

Recommended by Board of Studies of H&S dept. Meeting No. 6 Dated: 31/08/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

ENVIRONMENTAL AWARENESS & CONSERVATION **3**

EA 1 Environmental Awareness and Conservation 3

GENERAL AWARENESS **4**

GA 1 General Knowledge 4

ARMED FORCES 6

AF 1 Armed Forces, Army, CAPF, Police 6

ADVENTURE 1

AD 1 Introduction to Adventure Activities 1

BORDER & COASTAL AREAS **2**

BCA 1 History, Geography & Topography of Border/Coastal areas 2

TOTAL: 45 PERIODS

NAVAL WING

PERSONALITY DEVELOPMENT **9**

PD 3 Group Discussion: Change your mindset, Time Management, Social Skills 6

PD 5 Public Speaking 3

LEADERSHIP 7

L 2 Case Studies: APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murty, Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965 7

DISASTER MANAGEMENT **13**

DM 1 Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation 3

DM 2 Initiative Training, Organising Skills, Do's & Don't's, Natural Disasters, Man Made Disasters 9

DM 3 Fire Service & Fire Fighting 1

ENVIRONMENTAL AWARENESS & CONSERVATION **3**

EA 1 Environmental Awareness and Conservation 3

GENERAL AWARENESS **4**

GA 1 General Knowledge 4

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2019

S Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

NAVAL ORIENTATION 6

AF 1	Armed Forces and Navy Capsule	3
EEZ 1	EEZ Maritime Security and ICG	3

ADVENTURE 1

AD 1	Introduction to Adventure Activities	1

BORDER & COASTAL AREAS 2

BCA 1	History, Geography & Topography of Border/Coastal areas	2

TOTAL: 45 PERIODS

AIR FORCE WING

PERSONALITY DEVELOPMENT 9

PD 3	Group Discussion: Change your mindset, Time Management, Social Skills	6
PD 5	Public Speaking	3

LEADERSHIP 7

L 2	Case Studies: APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murty, Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965	7

DISASTER MANAGEMENT 13

DM 1	Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation	3
DM 2	Initiative Training, Organising Skills, Do's & Don't's, Natural Disasters, Man Made Disasters	9
DM 3	Fire Service & Fire Fighting	1

ENVIRONMENTAL AWARENESS & CONSERVATION 3

EA 1	Environmental Awareness and Conservation	3

GENERAL AWARENESS 4

GA 1	General Knowledge	4

GENERAL SERVICE KNOWLEDGE 6

GSK 1	Armed Forces & IAF Capsule	2
GSK 2	Modes of Entry in IAF, Civil Aviation	2
GSK 3	Aircrafts - Types, Capabilities & Role	2

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2024

S. Narasakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

ADVENTURE 1

AD 1	Introduction to Adventure Actitivities	1

BORDER & COASTAL AREAS **2**

BCA 1	History, Geography & Topography of Border/Coastal areas	2

TOTAL :45 PERIODS

SEMESTER - III

24CEPT301 - SDG NO. 4, 9	COMPUTER AIDED BUILDING DRAWING LAB WITH THEORY	L	T	P	CP	C
		1	0	4	5	3

OBJECTIVES:

- To understand the principles of building planning, orientation, and design of functional units in buildings.
- To learn the architectural detailing of doors, windows, and roofs as per building standards.
- To acquire skills in drafting building plans, elevations, and sections using Computer-Aided Design (CAD) software.
- To study industrial building design, including north light roof trusses.
- To understand the fundamentals of Building Information Modeling (BIM).
- To interpret and detail reinforcement drawings of RCC structural elements and footings.

MODULE - I PRINCIPLES OF PLANNING AND ORIENTATION **10**

Principles of building planning – Aspect, Prospect, Grouping, Circulation, Privacy, Elegance, Roominess, Sanitation, Flexibility, Economy. Orientation of buildings with respect to Sun, Wind, and Site conditions. Study of building bye-laws, plot coverage, FSI, setbacks, and ventilation. Design and detailing of panelled and glazed doors and windows as per IS codes.

LIST OF EXPERIMENTS

1. Principles of planning and orientation(Panelled and Glazed doors and window)

MODULE - II RESIDENTIAL BUILDING DRAWINGS (LOAD BEARING & RCC ROOF) **10**

Functional planning of residential buildings (single and double storey). Drawing plan, elevation, and section for buildings with load bearing walls. RCC

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

slab and beam roof details. Plumbing and electrical layout introduction. Drafting residential drawings using AutoCAD.

LIST OF EXPERIMENTS

1. Buildings with load bearing walls and RCC roof (Plan, section, elevation)

MODULE - III BUILDINGS WITH SLOPING ROOFS **10**

Types of sloping roofs – lean-to, gable, hipped, and combined. Constructional details of sloping roofs using timber and steel trusses. Preparation of plan, elevation, and section for sloping roof structures. Introduction to drafting 3D views and rendering in CAD.

LIST OF EXPERIMENTS

1. Buildings with sloping roof

MODULE - IV INDUSTRIAL BUILDINGS **10**

Functional requirements of industrial buildings. Components: column, truss, purlin, bracing, north light roof truss. Preparation of plan, elevation, and sectional details of industrial sheds. Layout planning of industrial buildings using CAD.

LIST OF EXPERIMENTS

1. Industrial buildings – North light roof truss

MODULE - V BUILDING INFORMATION MODELING (BIM) **10**

Introduction to BIM – concept, advantages over CAD. BIM software tools: Revit, ArchiCAD, etc. Creating and editing building elements – walls, floors, roofs, doors, windows. Generating 3D models, schedules, and documentation. Introduction to rendering and walkthroughs.

LIST OF EXPERIMENTS (STUDY)

1. Building information modeling.

MODULE - VI REINFORCEMENT DETAILING **10**

General principles of detailing as per IS 456:2000. Reinforcement detailing of RCC beam, slab, and column. Reinforcement detailing of isolated and combined footings. Study of structural drawing conventions and bar bending schedules.

LIST OF EXPERIMENTS (STUDY)

1. Reinforcement detailing of RCC Structural elements-study (Beam, slab, column)study
2. Reinforcement detailing of Footing (Isolated and combined footing)-study

TOTAL: 60 PERIODS

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

1. Models of Structures 1 each
2. Computers Pentium IV 30 Nos
3. CADD Software - Minimum 5 user License 1 No

OUTCOMES

Upon completion of the course, the student will be able to:

1. Apply the principles of planning and orientation in building design. (K3)
2. Prepare architectural and structural drawings of residential buildings using AutoCAD or equivalent software. (K4)
3. Prepare architectural and structural drawings of industrial buildings using AutoCAD or equivalent software. (K4)
4. Illustrate and detail doors, windows, and roof structures. (K3)
5. Create BIM models of buildings using software. (K3)
6. Read and prepare reinforcement detailing drawings for RCC elements and footings. (K4)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1	2	0	1	1	0	0	1	1	1	3	1
CO2	2	1	3	1	2	0	0	1	2	2	1	2	1
CO3	2	2	3	1	2	1	0	1	2	2	1	3	1
CO4	2	2	3	2	2	1	1	1	2	1	2	3	2
CO5	2	2	3	1	2	1	0	1	2	2	1	3	1
CO6	2	2	3	2	2	1	1	1	2	1	2	3	2

SEMESTER - III

24CEPL301 - SDG NO. 4, 9	SURVEYING LABORATORY	L	T	P	CP	C
		0	0	4	4	2

OBJECTIVES:

- Develop proficiency in using surveying instruments for accurate measurements.
- Correct surveying errors through techniques like local attraction adjustment and check levelling.

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

- Gain exposure to modern tools like Total Station for data collection and mapping.
- Apply tacheometric methods for measuring heights, distances, and elevations.

LIST OF EXPERIMENTS

1. Determination of distance between two points by ranging and chaining
2. Determination of area of a field by Cross staff survey
3. Compass traversing - Computation of Included angle after adjustment of Local Attraction
4. Planimetric mapping of an area using Plane table surveying (Radiation, Intersection)
5. Fly leveling using dumpy level.
6. Check Leveling.
7. Horizontal angle observations by Repetition and Reiteration methods
8. Vertical angle observation using Theodolite surveying.
9. Determination of elevation of an object using single plane method when base is accessible /inaccessible.
10. Determination of Tacheometric Constants
11. Heights and distances by Stadia & Tangential Tacheometry.
12. Study of Total Station

TOTAL: 60 PERIODS

LAB REQUIREMENT FOR A BATCH OF 30 STUDENTS:

S. No.	EQUIPMENTS	
1.	Total station	1 no.
2.	Theodolite	Atleast 1 for every 5 students
3.	Dumpy level	Atleast 1 for every 5 students
4.	Plane table	Atleast 1 for every 5 students
5.	Ranging rods	1 for a set of 5 students
6.	Levelling staff	1 for a set of 5 students
7.	Cross staff	1 for a set of 5 students
8.	Chains	1 for a set of 5 students
9.	Tapes	1 for a set of 5 students
10.	Arrows	1 for a set of 5 students
11.	Prismatic compass	10 nos.
12.	Surveyor's compass	5 nos.

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

OUTCOMES

Upon completion of the course, the student will be able to:

1. Demonstrate proficiency in using conventional surveying instruments such as chains, tapes, compasses, and plane tables for civil engineering applications. (K3)
2. Apply levelling techniques to accurately determine the reduced levels of various points in civil engineering projects. (K3)
3. Compute heights and distances through the use of horizontal and vertical angle measurements with Theodolite and Tacheometric surveying methods. (K3)
4. Gain hands-on experience with modern surveying tools like the Total Station, enhancing field data collection and mapping skills. (K3)

CO – PO, PSO MAPPING:

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

SEMESTER - III

24CETP301 - SDG NO. 4	APTITUDE SKILLS - I	L	T	P	CP	C
		0	0	2	2	1

APTITUDE & COGNITIVE SKILLS – PHASE 1

OBJECTIVES:

- Enrich students on quantitative ability, reasoning ability, and verbal ability
- Build a strong foundation for solving recruitment-based problems with speed and accuracy.
- Enhance creative thinking skills and Strengthen problem-solving skills.

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

MODULE - I QUANTITATIVE ABILITY 22

- Number Properties, Speed Math, HCF and LCM, Percentages, Time and Work, Time Speed and Distance, Ratio Proportion and Variations, Averages Mixtures and Alligation

MODULE - II QUANTITATIVE ABILITY REASONING ABILITY 16

- Profit and Loss, Simple Interest and Compound Interest, Blood Relation, Directions, Coding and Decoding, Series, Ranking and Arrangements

MODULE - III VERBAL ABILITY 7

- Subject-Verb Agreement, Tenses, Prepositions - Concepts, Error Spotting, Sentence Correction, Fill in the Blanks

TOTAL: 45 PERIODS

REFERENCES:

1. Quantitative Aptitude for Competitive Examinations – R.S. Aggarwal
2. A Modern Approach to Logical Reasoning – R.S. Aggarwal
3. High School English Grammar & Composition – Wren & Martin
4. Word Power Made Easy – Norman Lewis.
5. Fast Track Objective Arithmetic – Rajesh Verma

LIFE SKILLS,RANGER AND ROVER & BIS STANDARDS – PHASE 2

OBJECTIVES:

- Familiarize the team and leadership skills.
- Gain Scouting spirit.
- Understand the standards relevant to CIVIL.

MODULE - I JEEVAN KAUSHAL 2.0 – TEAM SKILLS AND LIFE SKILLS 12

Trust and Collaboration: Importance of Trust in Creating a Collaborative Team- Agree to Disagree and Disagree to Agree – Spirit of Teamwork - Understanding Fear of Being Judged and Strategies to Overcome.

Brainstorming: Basics and the process – Effective technique for ideation – Types – Importance and Benefits

Internal Communication: Internal Communication – Meaning and the Need, Use of Various Channels for Transmitting Information to Team Members including Digital and Physical.

Leadership Skills: Leadership concept - Leadership skills – Leadership moralities – Leadership models

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

MODULE - II RANGER AND ROVER **10**

Four Bonds of BSG: Sign, Salute, Left Handshake, Moto and Good Turn.

Discipline and Uniform: Uniform of Rovers and Rangers, 14 Programme ideals.

Knowledge of Merit: Know about Knowledge of Merit Badges (Proficiency Badge).

Sustainability E-learning: (Online Course Available in WOSM Learning Zone).

Activating the Earth Tribe Initiative in your Community.

MODULE - III STANDARDIZATION – BASICS & BUILDING MATERIALS 8

Basic concepts of standardization; Purpose of Standardization, marking and certification of articles and processes; Importance of standards to industry, policy makers, trade, sustainability and innovation–Objectives, roles and functions of BIS, Bureau of Indian Standards Act, ISO/IEC Directives; Standards on different types of building materials like cement, aggregates, glass and glazing, Reinforcing and prestressing steel, concrete, bricks, stones, timber and bamboo.

TOTAL: 30 PERIODS

REFERENCES:

1. Curriculum and Guidelines for Life Skills (Jeevan Kaushal) 2.0, UGC, New Delhi.
2. A World Built on Standards: A Textbook for Higher Education, Published by: Danish Standards Foundation, 2015.
3. SO / IEC Guide 59, BIS Standards Formulation Manual, 2nd Revision, 2022.

ONLINE RESOURCES

1. https://www.cambridgeenglish.org/learning-english
2. https://lms.scout.org/course_items/show/1172182?course_id=214307#course-item-id=1172182
3. https://lms.scout.org/courses/show/214123?force_course_hub=true

OUTCOMES

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

1. Apply quantitative aptitude for solving numerical problems [K3]
2. Describe logical reasoning to tackle emotional challenges. [K2]
3. Use verbal communication and comprehension skills through grammar and language exercises. [K3]
4. Apply critical thinking and problem-solving skills in various cognitive scenarios. [K3]

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

5. Interpret language nuances in diversified situations and exhibit scouting spirits amidst communities. [K2]
6. Explain the basic principle of BIS Standards relevant to EMC and EMI. [K2]

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	2	-	-	-	-	1	-	-
CO3	-	-	-	-	-	-	-	-	2	-	1	-	-
CO4	-	2	-	-	-	-	-	-	-	-	1	-	-
CO5	-	-	-	-	-	-	-	2	3	-	1	-	-
CO6	-	-	-	-	-	3	-	-	-	-	1	-	-

SEMESTER - III

24CEID301 - SDG NO. 4,11,15	INNOVATIVE DESIGN LAB - I	L	T	P	CP	C
		0	0	2	2	1

OBJECTIVES:

- To provide opportunities for students to develop an entrepreneurial mindset and explore real-world problem-solving through a startup-centric approach.
- To enable hands-on experience in identifying market needs
- To enable development of skill sets for designing, validating, and realizing a Minimum Viable Product (MVP) for an entrepreneurial venture.
- To guide students in validating market opportunity, and formulating a solution with realistic constraints.
- To inculcate ethical research practices, foster a commitment to lifelong learning, and promote the development of socially responsible and sustainable innovations aligned with relevant Sustainable Development Goals (SDGs).
- To prepare students to design sustainable business models and present entrepreneurial ideas through structured, outcome-driven business pitches using core startup frameworks.

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

COURSE METHODOLOGY:

1. This initiative is designed to inculcate ethical principles of research and to get involved in a life-long learning process for the students, specifically through the lens of entrepreneurship and innovation.
2. The project work must involve identifying a problem, validating market opportunity, and developing a solution with realistic constraints, culminating in a business plan and prototype/MVP. It must also include appropriate elements of the following: market research, competitive analysis, value proposition design, business model development, financial feasibility, go-to-market strategy, and potentially software/hardware development for the MVP.
3. Project can be individual work or a group project, with a maximum of 3 students. In case of a group project, the individual project report of each student should specify the individual's contribution to the group project. The roles and responsibilities of all team members must be well-defined and documented.
4. On completion of the project, the student shall submit a detailed project report outlining their entrepreneurial journey, solution development, and business plan. The project should be reviewed and the report shall be evaluated, and the students shall appear for a viva-voce oral examination on the project approved by the Coordinator and the project guide.

EVALUATION:

1. First evaluation (Milestone 1 - Week 4): 20 marks (Focus on Problem Identification, Opportunity Discovery, Customer & Markets, Value Proposition)
2. Second evaluation (Milestone 2 - Week 8): 30 marks (Focus on Competitive Advantage, Business Model, and MVP Development)
3. Final evaluation (Milestone 3 & 4 - Last week of the semester): 50 marks (Focus on Financial Feasibility, Go-to-Market Strategy, Growth and Scale, Funding Strategy, and Overall Project Report & Viva-Voce)

Note: All three evaluations are mandatory for course completion and for awarding the final grade.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Apply entrepreneurial thinking to identify and articulate real-world problems and explore market needs using structured approaches. (K3)

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

2. Develop skill sets to design potential solutions and validate market opportunities within realistic constraints. (K4)
3. Evaluate sustainable, ethical, and responsible innovation strategies, and communicate business models effectively. (K5)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	-	-	-	2	-	-	-	2	2
CO2	3	3	2	-	-	-	-	2	-	-	-	2	2
Co3	3	3	2	-	-	-	-	2	-	-	-	2	2

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

SEMESTER - IV

24BSMA403 - SDG NO. 4	STATISTICS AND NUMERICAL METHODS	L	T	P	CP	C
		3	1	0	4	4

OBJECTIVES:

- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems
- To identify relationship between multiple input variables
- To introduce the basic concepts of solving algebraic and transcendental equations
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines
- To introduce the knowledge of various techniques and methods of solving ordinary and partial differential equations

MODULE - I TESTING OF HYPOTHESIS **12**

Sampling distributions - Statistical hypothesis - large sample tests based on single proportion and difference proportions, single mean and difference of means -Tests based on t, and F-distributions for mean, variance respectively - Chi-square test for independence of attributes - Goodness of fit.

MODULE - II DESIGN OF EXPERIMENTS **9**

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

MODULE - III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS **12**

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 methods of Gauss Jacobi and Gauss Seidel - Maximum Eigenvalues of a matrix by Power method.

MODULE - IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION **9**

Lagrange's and Newton's divided difference interpolation – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials – Numerical single integrals using Trapezoidal and Simpson's 1/3 rules.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/07/2024

S Narasakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS **9**

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step method : Milne's predictor corrector method for solving first order differential equations.

MODULE - VI NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS **9**

Solution of two-dimensional Laplace's and Poisson's equations on rectangular domain-Forward time central space scheme - One dimensional heat flow equation by Crank Nicholson Method-One dimensional wave equation by explicit method.

TOTAL : 60 PERIODS

TEXT BOOKS:

1. Miller and Freund's Probability and Statistics for Engineers, Johnson, R.A., Miller, I and Freund J., 8th Edition, Pearson Education, Asia, 2015.
2. Numerical methods for Scientific and Engineering Computation, Jain M. K., Iyengar S. R. K. , Jain R. K., 4th Edition, New Age international Publishers, 2003
3. Numerical Methods in Engineering and Science, Grewal. B.S. and Grewal. J.S., 10th Edition, Khanna Publishers, New Delhi, 2015.

REFERENCES:

1. Numerical Analysis, Burden, R. L. and Faires, J. D., 9th Edition, Cengage Learning, 2016.
2. Probability and Statistics for Engineering and the Sciences, Devore J. L., 8th Edition, Cengage Learning, New Delhi, 2014.
3. Applied Numerical Analysis, Gerald C. F. and Wheatley P.O., 7th Edition, Pearson Education, Asia, New Delhi, 2006.
4. Probability and Statistics for Engineers and Scientists, Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., , 8th Edition, Pearson Education, Asia, 2007.
5. Numerical methods, Kandasamy P., Thilagavathy K., Gunavathy K., 3rd Edition, S. Chand, 2006.

WEB REFERENCES:

1. https://www.classcentral.com/course/swayam-numerical-analysis-17709
2. https://online-learning.harvard.edu/course/statistics-and-r?delta=1

Recommended by Board of Studies of H&S dept. Meeting No. 6 Dated: 31/07/2019

Chairman
Board of Studies
Department of Humanities & Sciences

ONLINE RESOURCES:

1. https://freevideolectures.com/course/3057/numerical-methods-and-computation
2. https://nptel.ac.in/courses/111107105/

COURSE OUTCOMES

Upon completion of the course, the student should be able to:

1. Apply appropriate statistical hypothesis tests for large and small samples to make inferences about population parameters using t, F, and Chi-square distributions. (K3)
2. Apply appropriate experimental designs such as CRD, RBD, and Latin Square to analyze and interpret data from one-way and two-way classifications. (K3)
3. Apply numerical methods to solve algebraic, transcendental, and linear systems of equations, and compute dominant Eigenvalues using the Power method. (K3)
4. Apply interpolation techniques and numerical methods to approximate derivatives and evaluate definite integrals. (K3)
5. Apply single-step and multi-step numerical methods to solve first-order ordinary differential equations. (K3)
6. Apply finite difference methods to solve partial differential equations such as Laplace, Poisson, heat, and wave equations. (K3)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	2	3
CO2	3	-	-	-	-	-	-	-	-	-	-	2	3
CO3	3	-	-	-	-	-	-	-	-	-	-	3	3
CO4	3	-	-	-	-	-	-	-	-	-	-	2	3
CO5	3	-	-	-	-	-	-	-	-	-	-	3	3
CO6	3	-	-	-	-	-	-	-	-	-	-	3	3

Recommended by
Board of Studies of H&S Dept.
Meeting No. 6 Dated: 31/07/2024

S. Narasakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

SEMESTER - IV

24CEPC401 105104147 SDG NO. 4,9,11,15	SOIL MECHANICS	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To explore the fundamentals of soil origin, properties, classification, and analysis methods for engineering applications.
- To assess soil permeability, hydraulic conductivity, seepage mechanisms, and flow net construction in geotechnical engineering
- To understand and evaluate stress distribution and effective stress in soil mechanics
- To examine soil compaction and consolidation behavior through testing and theoretical principle
- To investigate shear strength behavior of soils using Mohr's Coulomb theories and laboratory tests
- To evaluate slope stability using limit equilibrium methods and recommend protective measures

MODULE - I SOIL CLASSIFICATION 8

Introduction - Origin and formation of soils - Rock cycle - Weathering of rock - Clay mineralogy - Soil structure - Mechanical analysis of soil - Particle size distribution - Sieve analysis - Hydrometer analysis - Phase relationship – Index properties – Significance – Soil classification - Particle size classification - Textural classification - HRB classification - Unified classification system - Indian standard soil classification system - Field identification of soils

MODULE - II PEREMABILITY AND SEEPAGE IN SOIL MASS 7

Flow of water through soils – Capillary rise in soils – Hydraulic conductivity – Darcy's law – Estimation of hydraulic conductivity – Constant head and falling head methods – Factors influencing permeability of soils – Vertical and horizontal permeability - Permeability of stratified soil deposits – Seepage analysis – Seepage pressure – Quick sand condition - Laplace equation for 2D flow - Flow nets – Properties – Methods of construction – Applications – Seepage through anisotropic and non-homogeneous soils – Seepage through Earthen dam

MODULE - III STRESS DISTRIBUTION IN SOILS 7

Stress Distribution in soils - Type of stresses in soil - Effective stress concept - Effect of water table fluctuation on effective stress - Effects of seepage and capillarity on effective stress - Stress in soil due to applied load - Bousinessq's

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

equation - Distribution of stresses within soil mass caused by concentrated load, uniformly distributed load on circular and rectangular areas - Isobar and pressure bulb concept - Stress distribution on horizontal and vertical planes - Newmark's chart and its application - Contact pressure

MODULE - IV COMPACTION AND CONSOLIDATION **8**

Soil compaction - Compaction mechanism - Factors affecting compaction – Effect of compaction on soil properties - Density moisture content relationship in compaction test - Standard and modified proctor compaction tests - Field compaction methods - Relative compaction - Compaction control - Introduction to consolidation process - Spring analogy - Primary consolidation and secondary compression - One dimensional consolidation - Terzaghi's theory of one dimensional consolidation - Consolidation test - Determination of coefficient of consolidation

MODULE - V SHEAR STRENGTH **8**

Shear strength of soil - Mohr's stress circle – Theory of failure for soils - Determination of shear strength - Direct shear test - Triaxial compression test - Unconfined compression test - Vane shear test – Pore pressure parameters - Shear characteristics of Cohesive and Cohesion less soils

MODULE - VI STABILITY ANALYSIS **7**

Stability analysis - Infinite slopes and finite slopes – Total stress analysis for saturated clay – Friction circle method – Use of stability number – Method of slices – Fellenious and Bishop's method – Slope protection measures

TOTAL : 45 PERIODS

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Coduto, D.P., "Geotechnical Engineering – Principles and Practices", Prentice Hall of India Pvt. Ltd. New Delhi, 4th edition 2010.
2. Das,B.M., "Principles of Geotechnical Engineering", Cengage Learning India Private Limited, 8th Edition, 2014.

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

3. Gopal Ranjan, A S R Rao, "Basic and Applied Soil Mechanics" New Age International Publication, 3rd Edition, 2016.
4. McCarthy, D.F., "Essentials of Soil Mechanics and Foundations: Basic Geotechnics". Prentice-Hall, 4th edition, 2006.

ONLINE RESOURCES:

1. https://www.youtube.com/watch?v=DSsh9UebGqA
2. https://nptel.ac.in/courses/105/103/105103177

WEB REFERENCES:

1. https://ocw.mit.edu/courses/civil-and-environmental-engineering/1-361- advanced-soil-mechanics-fall-2004/lecture-notes/
2. https://nptel.ac.in/courses/105/103/105103097/

OUTCOMES

Upon completion of the course, the student will be able to:

1. Develop the concepts of soil formation like soil structure, index properties, engineering properties and Unified soil classification system [K3]
2. Determine the flow characteristics of water through soils, including hydraulic conductivity, permeability estimation, seepage analysis, and flow net construction, to analyze seepage-related issues in geotechnical engineering applications. [K3]
3. Analyze stress distribution in soils, including effective stress, seepage effects, and applied load responses, using theoretical approaches like Bousinessq's equation, isobars, and Newmark's chart [K3]
4. Apply compaction and consolidation principles to assess soil behavior, utilizing compaction tests, field methods, and Terzaghi's theory for geotechnical engineering applications. [K3]
5. Apply shear strength concepts to analyze soil behavior using failure theories and shear tests for cohesive and cohesion less soils in geotechnical engineering applications. [K3]
6. Develop and evaluate slope stability solutions using techniques like total stress analysis, friction circle, and method of slices to enhance slope safety in geotechnical engineering [K4]

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/23

CHAIRMAN
Board of Studies
Civil Engineering

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	0	1	2	1	0	0	0	0	1	0	1
CO2	3	3	1	3	3	2	0	0	0	0	2	0	1
CO3	3	3	2	2	2	2	0	0	0	0	1	0	1
CO4	3	3	2	2	2	2	0	0	0	0	2	0	1
CO5	3	3	2	2	2	2	0	0	0	0	1	0	1
CO6	3	3	3	3	2	3	1	2	1	2	2	1	2

SEMESTER - IV

24CEPC402 - SDG NO. 4, 9, 12	STRUCTURAL ANALYSIS	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To understand strain energy concepts and analyze indeterminate structures.
- To construct and apply influence lines in structural analysis.
- To study the behavior of arches and cables under various effects.
- To analyze beams and frames using slope deflection and moment distribution.
- To apply these methods to multi-storey and laterally loaded frames.
- To introduce matrix methods for analyzing indeterminate structures.

MODULE - I STRAIN ENERGY PRINCIPLES 7

Concept of strain energy and its applications in structural analysis. Determination of static and kinematic indeterminacies. Strain energy method for analyzing continuous beams, plane frames, and indeterminate plane trusses (up to two degrees of redundancy). Application of Castigliano's theorem in structural analysis.

MODULE - II INFLUENCE LINES 9

Influence lines for reactions, shear force, and bending moment in statically determinate beams. Muller Breslau's principle and its applications. Influence lines for shear force, bending moment, and support reactions in statically indeterminate beams (propped cantilever, continuous beams, simply supported beams).

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

MODULE - III ARCHES AND CABLES 7

Types of arches – Three-hinged, two-hinged, and fixed arches. Parabolic and circular arches – Effects of settlement and temperature changes. Equilibrium of cables – Length of cable, anchorage of suspension cables. Stiffening girders – Influence lines for three-hinged stiffening girders.

MODULE - IV SLOPE DEFLECTION AND MOMENT DISTRIBUTION METHOD - BEAMS 8

Slope deflection equations and equilibrium conditions. Analysis of continuous beams. Rigid frames with inclined members. Support settlements, symmetric and skew-symmetric loading. Stiffness and carry-over factors. Moment distribution method – Distribution and carry-over of moments. Analysis of continuous beams.

MODULE - V SLOPE DEFLECTION AND MOMENT DISTRIBUTION METHOD - FRAMES 7

Advanced applications of slope deflection and moment distribution methods. Multi-storey rigid frames and lateral load analysis. Support settlements and special conditions in moment distribution analysis. Application of slope deflection and moment distribution in complex structures.

MODULE - VI FLEXIBILITY AND STIFFNESS METHODS 7

Primary structures and compatibility conditions. Formation of flexibility matrices – Direct flexibility approach. Stiffness method – Formation of stiffness matrices and equilibrium conditions. Analysis of continuous beams, pin-jointed plane frames by direct stiffness method.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. S.S. Bhavikatti, "Structural Analysis", Vol.1 & 2, Vikas Publishing House Pvt. Ltd., New Delhi, 2014.
2. V.N. Vazrani & M.M. Ratwani, "Analysis of Structures", Vol. II, Khanna Publishers, 2015.

REFERENCES:

1. B.C. Punmia, Ashok Kumar Jain & Arun Kumar Jain, "Theory of Structures", Laxmi Publications, 2004.
2. William Weaver Jr. & James M.Gere, "Matrix Analysis of Framed Structures", CBS Publishers, 1995.
3. C.S. Reddy, "Basic Structural Analysis", Tata McGraw Hill Publishing Company, 2005.
4. Hibbeler, R.C., "Structural Analysis", VII Edition, Prentice Hall, 2012.

Recommended by Board of Studies of CIVIL dept. Meeting No. 9 Dated: 4/3/18

CHAIRMAN Board of Studies Civil Engineering

5. Rajasekaran S. & G. Sankarasubramanian, "Computational Structural Mechanics", PHI Learning Pvt. Ltd, 2015.

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/105/105/105105166/
2. https://nptel.ac.in/courses/105/105/105105180/
3. https://nptel.ac.in/courses/105/106/105106050/
4. https://www.nps.gov/arch/index.htm

WEB REFERENCES:

1. NPTEL Course on Structural Analysis
2. NPTEL Course on Influence Lines & Plastic Analysis
3. Structural Analysis LibreTexts

OUTCOMES

Upon completion of the course, the student will be able to:

1. Understand and calculate strain energy in structures and apply this knowledge to analyze statically indeterminate structures. (K3)
2. Construct and use influence line diagrams for determining forces in beams and trusses under moving loads. (K3)
3. Analyze the behavior of arches and suspension cables subjected to different types of loading. (K4)
4. Analyze continuous beams and rigid frames using slope-deflection and moment distribution methods. (K4)
5. Apply structural analysis methods to analyze multi-storey buildings and frames subjected to lateral loads like wind or earthquake. (K4)
6. Use matrix methods for analyzing indeterminate structures. (K4)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	1	2	1	0	0	0	0	2	3	2
CO2	3	2	2	2	2	1	0	0	1	0	2	3	2
CO3	3	3	2	2	2	3	2	0	0	0	2	3	3
CO4	3	3	2	2	2	1	0	0	0	0	2	2	2
CO5	3	3	3	2	2	2	1	0	1	1	2	3	3
CO6	3	3	3	3	3	2	1	0	1	1	3	3	3

Recommended by Board of Studies of CIVIL dept. Meeting No. 9 Dated: 4/8/25

CHAIRMAN
Board of Studies
Civil Engineering

SEMESTER - IV

24CEPC403 - SDG NO. 4,9&11	TRANSPORTATION ENGINEERING	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To understand road development, classification, and basic geometric design of highways.
- To learn pavement types, design methods, materials, and construction practices.
- To study railway components and apply geometric design principles for railways.
- To understand construction, maintenance, and operational aspects of railway systems.
- To gain knowledge of airport planning, runway design, and layout considerations.
- To learn harbour types, design principles, and components of coastal structures.

MODULE - I HIGHWAY PLANNING AND GEOMETRIC DESIGN 7

History of road development in India – Classification of highways - Engineering surveys for alignment, objectives, conventional and modern methods. - Typical cross sections of Urban and Rural roads – Cross sectional elements – Horizontal curves, super elevation, transition curves, widening of curves – Sight distances – Vertical curves, gradients, hairpin bends

MODULE - II DESIGN OF PAVEMENT & HIGHWAY CONSTRUCTION 8

Pavement components and their role - Design practice for flexible and rigid pavements - Highway construction materials, properties, testing methods – Construction practice of flexible and concrete pavements including modern materials and methods, Highway drainage

MODULE - III RAILWAY PLANNING AND GEOMETRIC DESIGN 7

Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, Selection of gauges - coning of wheels, creep in rails, defects in rails - Geometric design of railway, gradient, super elevation, widening of gauge on curves - Level Crossings

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

MODULE - IV RAILWAY CONSTRUCTION AND MAINTENANCE **7**

Earthwork–Stabilization of track on poor soil-Tunneling Methods, drainage and ventilation–Calculation of Materials required for track laying - Construction and maintenance of tracks – Signaling - Railway Station and yards and passenger amenities

MODULE - V AIRPORT PLANNING AND DESIGN **8**

Airport classification - airport planning: objectives, components, layout characteristics, socio-economic characteristics of the Catchment area, airport site selection - Runway Design: Orientation, Wind Rose Diagram, Problems on basic and Actual Length, Geometric Design, Configuration and Pavement Design Principles– Airport Zones – Runway and Taxi way Markings.

MODULE - VI HARBOUR ENGINEERING **8**

Definition of Basic Terms: Harbour, Port, Satellite Port, Docks, Waves and Tides - Planning and Design of Harbours: Requirements, Classification, Location and Design Principles – Harbour Layout and Terminal Facilities – Coastal Structures: Piers, Break waters, Wharves, Jetties, Quays, Spring Fenders, Dolphins and Floating Landing Stage – Coastal Regulation Zone, 2011 – Case studies.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. Subramanian K.P., Highways, Railways, "Airport and Harbour Engineering", Scitech Publications (India), Chennai, 2010
2. C.Venkatramaiah., "Transportation Engineering - Vol.1 & 2 Railways, Airports, Docks and Harbours, Bridges and Tunnels", Universities Press (India) Pvt. Limited, Hyderabad, 2015.

REFERENCES:

1. Vazirani. V. NandChandola. S. P, "Transportation Engineering - Vol.II", Khanna Publishers, NewDelhi, 2015.
2. Mundrey JS, "Railway Track Engineering", Mc Graw Hill Education (India) Private Ltd, NewDelhi, 2013.
3. Saxena Subhash, C. and Satyapal Arora, "A Course in Railway Engineering", Dhanapat Rai and Sons, Delhi,1998
4. Khanna. S. K. Arora. M. G and Jain. S. S, "Airport Planning and Design", Nemachand and Bros, Roorkee, 1994
5. Srinivasan R. "Harbour Docks and Tunnel Engineering", Charotar publishing house Pvt. Ltd., 2016.

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

6. Veeraragavan. A, Khanna.K and Justo.C.E.G. "Highway Engineering", Nem Chand & Bros Publishers, 2014.

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/105/101/105101087/
2. https://nptel.ac.in/courses/105/107/105107123/
3. https://nptel.ac.in/courses/114106025/
4. http://www.iricen.gov.in/iricen/ELearning.jsp

WEB REFERENCES:

1. https://www.ice.org.uk/knowledge-and-resources/transportation
2. http://www.iricen.gov.in/iricen/Home
3. https://www.faa.gov/airports/engineering/

OUTCOMES

Upon completion of the course, the student will be able to:

1. Apply the knowledge on development, classification, planning, alignment and engineering surveys of highways & Geometric design of all elements. (K3)
2. Design various types of pavements to meet specified needs of safety, efficiency and long-time sustainability and derive knowledge on properties, testing methods of conventional and modern Highway construction materials. (K4)
3. Classify the various functions of Rails, Sleepers, ballast, fixtures and fastenings and geometric design of all elements (K3)
4. Determine the materials required for tracklaying and acquire the knowledge on conventional and modern methods in route alignment. (K3)
5. Gain an insight on the planning and site selection of Airport Planning and design the elements for orientation of runways (K3)
6. Demonstrate the various feature in Harbours and Ports, their construction, coastal protection works and coastal Regulations to be adopted (K3)

Recommended by

Board of Studies of CIVIL dept.

Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	-	2	2	-	-	-	-	1	3	2
CO2	3	2	3	-	2	2	-	-	-	-	2	3	2
CO3	3	2	2	-	1	2	-	-	-	-	1	2	2
CO4	3	2	2	-	1	2	-	-	-	-	1	2	2
CO5	3	2	2	-	2	2	-	-	-	-	1	3	2
CO6	3	2	2	-	2	2	-	-	-	-	1	3	2

SEMESTER - IV

24CEPC404 - SDG NO. 4,9,11	CONSTRUCTION TECHNIQUES, EQUIPMENT AND PRACTICES	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- A reasonable knowledge about the various construction procedures for sub to super structure
- Knowledge about the equipment needed for construction of various types of structures from foundation to super structure.
- Insight on the different functions and operations of different equipment and techniques during construction
- Knowledge about the various types of construction equipment, their functions, and how to apply them effectively.
- Learned about the importance of safety practices and the use of equipment to improve efficiency and quality in construction projects.
- Exposed to common construction challenges and provide strategies for quality control and problem-solving

MODULE - I CONSTRUCTION TECHNIQUES 8

Structural systems, Load Bearing Structure, Framed Structure, Load transfer mechanism, floor system, High rise Building Technology, Eco Building (Green Building), Material used, Construction methods — Natural Buildings, Passive buildings, Intelligent (Smart) buildings — Meaning, Building automation, Energy efficient buildings for various zones-Case studies of residential, office buildings and other buildings in each zone.

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

MODULE - II CONSTRUCTION PRACTICES **8**

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, weather and water proof, roof finishes, acoustic and fire protection.

MODULE - III SUB STRUCTURE CONSTRUCTION **8**

Techniques of Box jacking, Pipe Jacking, tunneling techniques, sheet piles, shoring for deep cutting - Piling techniques, cable anchoring and grouting.

MODULE - IV UNDER WATER CONSTRUCTION **6**

Well and caisson — sinking cofferdam - under water construction of diaphragm walls and basement driving diaphragm walls— well points - Dewatering and stand by Plant equipment for underground open excavation.

MODULE - V SUPER STRUCTURE CONSTRUCTION **9**

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

MODULE - VI CONSTRUCTION EQUIPMENT **8**

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 —types of cranes — Equipment for dredging, trenching, tunneling.

TOTAL : 45 PERIODS

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.

Recommended by

Board of Studies of CIVIL dept.

Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

REFERENCE BOOKS:

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. Mahesh Varma, "Construction Equipment and its Planning and Application", Metropolitan Book Company, New Delhi, 1983.

ONLINE RESOURCES:

1. https://www.coursera.org/specializations/piling-construction-and-practices
2. https://www.classcentral.com/course/swayam-construction-methods-and-equipment-management-22940

WEB REFERENCES:

1. http://acl.digimat.in/nptel/courses/video/105103206/L20.html
2. https://online.umich.edu/courses/construction-equipment-and-methods/
3. https://onlinecourses.nptel.ac.in/noc21_ce21/preview
4. http://www.digimat.in/nptel/courses/video/105102088/L01.html

OUTCOMES

Upon completion of the course, the student will be able to:

1. Explain the Structural systems in various buildings including Natural Buildings, Passive buildings, Intelligent Smart buildings with Building automation [K3]
2. Describe the sequence of activities in construction, bonds in masonries, construction joints and building foundations, water proofing along with acoustic and fire protection. [K3]
3. Summarize the sub structure techniques like jacking, Tunneling, Piling techniques, cable anchoring and grouting [K3]
4. Describe the techniques for under water sub structure constructions [K3]
5. Explain the super structure construction and erection techniques [K3]
6. Summarize the various equipments adapted for different activities of construction [K3]

Recommended by

Board of Studies of CIVIL dept.

Meeting No. 9 Dated: 4/3/25

106

CHAIRMAN
Board of Studies
Civil Engineering

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	-	2	2	-	-	-	-	2	3	2
CO2	3	3	2	2	-	2	-	-	-	-	2	3	2
CO3	3	3	2	-	3	2	-	-	-	-	2	2	3
CO4	3	2	2	-	3	3	-	-	-	-	2	3	2
CO5	3	3	2	-	3	2	-	-	-	-	2	3	2
CO6	3	2	2	-	3	2	-	-	-	-	2	3	3

SEMESTER - IV

24HSNC401 - SDG NO. 4	NCC COURSE LEVEL 3	L	T	P	CP	C
		3	0	0	3	0

ARMY WING

PERSONALITY DEVELOPMENT **9**

PD 3 Group Discussion: Team Work 2

PD 4 Career Counselling, SSB Procedure & Interview Skills 3

PD 5 Public Speaking 4

BORDER & COASTAL AREAS **4**

BCA 2 Security Setup and Border/Coastal management in the area 2

BCA 3 Security Challenges & Role of cadets in Border management 2

ARMED FORCES 3

AF 2 Modes of Entry to Army, CAPF, Police 3

COMMUNICATION **3**

C 1 Introduction to Communication & Latest Trends 3

INFANTRY **3**

INF 1 Organisation of Infantry Battalion & its weapons 3

MILITARY HISTORY **23**

MH 1 Biographies of Renowned Generals 4

MH 2 War Heroes - PVC Awardees 4

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

MH 3	Study of Battles - Indo Pak War 1965, 1971 & Kargil	9
MH 4	War Movies	6

TOTAL: 45 PERIODS

NAVAL WING

PERSONALITY DEVELOPMENT **9**

PD 3	Group Discussion: Change your mindset, Time Management, Social Skills	6
PD 5	Public Speaking	3

LEADERSHIP 7

L 2	Case Studies: APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murty, Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965	7

DISASTER MANAGEMENT **13**

DM 1	Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation	3
DM 2	Initiative Training, Organising Skills, Do's & Don't's, Natural Disasters, Man Made Disasters	9
DM 3	Fire Service & Fire Fighting	1

ENVIRONMENTAL AWARENESS & CONSERVATION **3**

EA 1	Environmental Awareness and Conservation	3

GENERAL AWARENESS **4**

GA 1	General Knowledge	4

NAVAL ORIENTATION 6

AF 1	Armed Forces and Navy Capsule	3
EEZ 1	EEZ Maritime Security and ICG	3

ADVENTURE 1

AD 1	Introduction to Adventure Activities	1

BORDER & COASTAL AREAS **2**

BCA 1	History, Geography & Topography of Border/Coastal areas	2

TOTAL: 45 PERIODS

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

AIR FORCE WING

PERSONALITY DEVELOPMENT		**9**
PD 3	Group Discussion: Team Work	2
PD 4	Career Counselling, SSB Procedure & Interview Skills	3
PD 5	Public Speaking	4
BORDER & COASTAL AREAS		**4**
BCA 2	Security Setup and Border/Coastal management in the area	2
BCA 3	Security Challenges & Role of cadets in Border management	2
AIRMANSHIP		**1**
A 1	Airmanship	1
BASIC FLIGHT INSTRUMENTS		**3**
FI 1	Basic Flight Instruments	3
AERO MODELLING		**3**
AM 1	Aero Modelling Capsule	3
GENERAL SERVICE KNOWLEDGE		**2**
GSK 4	Latest Trends & Acquisitions	2
AIR CAMPAIGNS		**6**
AC 1	Air Campaigns	6
PRINCIPLES OF FLIGHT		**6**
PF 1	Principles of Flight	3
PF 2	Forces acting on Aircraft	3
NAVIGATION		**5**
NM 1	Navigation	2
NM 2	Introduction to Met and Atmosphere	3

TOTAL :45 PERIODS

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

SEMESTER - IV

24CEPL401 - SDG NO. 4, 9	STRENGTH OF MATERIALS AND HYDRAULIC ENGINEERING LABORATORY	L	T	P	CP	C
		0	0	4	4	2

OBJECTIVES:

- To supplement the theoretical knowledge gained in Mechanics of Solids and Fluid Mechanics with practical testing for determining the strength of materials under externally applied loads
- To enable the students to have a clear understanding of the Design for strength and stiffness and losses in pipe flow
- To understand the flow measurements.
- To analyses the Performance of various Pumps and Turbines

LIST OF EXPERIMENTS :

1. Tension test on a mild steel rod
2. Double shear test on Mild steel and Aluminium rods
3. Torsion test on mild steel rod
4. Impact test on metal specimen
5. Hardness test on metals - Brinnell and Rockwell Hardness Number
6. Deflection test on beams
7. Compression test on helical springs

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:

S.No	NAME OF THE EQUIPMENT	QTY
1	Universal Tensile Testing machine with double shear attachment	1
2	Torsion Testing Machine	1
3	Impact Testing Machine	1
4	Brinell Hardness Testing Machine	1
5	Rockwell Hardness Testing Machine	1
6	Spring Testing Machine for tensile and compressive loads	1

HYDRAULIC ENGINEERING LABORATORY

LIST OF EXPERIMENTS

1. Determination of the Coefficient of discharge of given Orifice meter.
2. Determination of the Coefficient of discharge of given Venturi meter.
3. Determination of friction factor for a given set of pipes.

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

4. Conducting experiments and drawing the characteristic curves of centrifugal pump/submergible pump.
5. Conducting experiments and drawing the characteristic curves of reciprocating pump.
6. Conducting experiments and drawing the characteristic curves of Gear pump.
7. Conducting experiments and drawing the characteristic curves of Pelton wheel, Francis and Kaplan Turbine.

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:

1	Bernoulli's Apparatus.	1 No.
2	Orifice meter setup	1 No.
3	Venturi meter setup	1 No.
4	Pipe Flow analysis setup	1 No.
5	Centrifugal pump/submergible pump setup	1 No.
6	Reciprocating pump setup	1 No.
7	Gear pump setup	1 No.
8	Pelton wheel Turbine setup	1 No.
9	Francis turbine setup	1 No.
10	Kaplan turbine setup	1 No.

TOTAL : 60 PERIODS

OUTCOMES

Upon completion of the course, the student will be able to:

1. Explain and perform different destructive testing's such as Tension test, Shear test, Impact test, Hardness test to estimate the strength under externally applied loads with due consideration to safety. (K4)
2. Estimate and compare the elastic constants such as Young's modulus and Rigidity modulus of the given specimen through Deflection testing and spring testing with standard values. (K4)
3. Measure the flow rate of fluid using different flow measuring devices and calculate the friction loss and other minor losses in a pipe flow. (K4)
4. Predict the basic performance characteristics of hydraulic Pumps. and Turbines.(K4)

Recommended by

Board of Studies of CIVIL dept.

Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

CO – PO, PSO MAPPING:

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

SEMESTER - IV

24CEPL402 - SDG NO. 4, 9	CONCRETE AND HIGHWAY ENGINEERING LABORATORY	L	T	P	CP	C
		0	0	4	4	2

OBJECTIVES:

- To learn the principles and procedures of testing Concrete and Highway materials and to get hands on experience by conducting the tests and evolving inferences.
- To evaluate the consistency and workability of fresh concrete using tests like the slump test and compaction factor test
- To determines the properties of coarse and fine aggregates used in pavement construction
- To analyze the characteristics of bitumen, the binder used in flexible pavements, including penetration, ductility, and viscosity.

LIST OF EXPERIMENTS

I TESTS ON CEMENT

1. Consistency tests
2. Initial and final setting time

II. TESTS ON FRESH CONCRETE

1. Slump cone test
2. Compaction factor
3. Vee bee test.

III. TESTS ON HARDENED CONCRETE

1. Compressive strength - Cube & Cylinder
2. Flexure test

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

IV. TESTS ON AGGREGATES

1. Gradation of Aggregate
2. Abrasion Value
3. Impact Value
4. Flakiness and Elongation Indices

V. TESTS ON BITUMEN

1. Penetration
2. Softening Point
3. Ductility
4. Viscosity

VI. TESTS ON BITUMINOUS MIXES

1. Study on Determination of Binder Content
2. Study on Marshall Stability and Flow values

LAB REQUIREMENT FOR A BATCH OF 30 STUDENTS:

1.	Concrete cube moulds	6
2.	Concrete cylinder moulds	3
3.	Concrete Prism mould	1
4.	Sieves	1 set
5.	Slump cone	3
6.	Vicat needle apparatus	2
7.	Trovels and planers	1 set
8.	Compression Testing Machine (CTM)	1
9.	Vee Bee Consistometer	1
10.	Aggregate impact testing machine	1
12.	Los - Angeles abrasion testing machine	1
13.	Marshall Stability Apparatus	1
14.	Bitumen Penetration apparatus	1
15.	Softening point Apparatus	1
16.	Pycnometer	2
17.	Thickness Gauge	1
18.	Length Gauge	1
19.	Weighing balance	1
20.	Compaction Factor Apparatus	1
21.	Oven	1
22.	Tamping rods	2

TOTAL : 60 PERIODS

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

OUTCOMES

Upon completion of the course, the student will be able to:

1. Explain the tests on fresh concrete and find its workability [K5]
2. Experiment the mechanical strength of hardened concrete. [K4]
3. Identify the properties and quality of aggregates using various tests. [K5]
4. Test the properties of bitumen and Bituminous mixes[K4]

CO – PO, PSO MAPPING:

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

SEMESTER - IV

24CETP401 - SDG NO. 4	APTITUDE SKILLS - II	L	T	P	CP	C
		0	0	2	2	0

PROBLEM SOLVING TECHNIQUES USING C PROGRAMMING – PHASE 1

OBJECTIVES:

- Build a strong foundation in C programming concepts and problem-solving techniques.
- Develop the ability to write efficient and modular code.
- Enhance understanding of data structures, memory management, and algorithms for optimized solutions.

MODULE - I FOUNDATIONS OF PROGRAMMING 12

- Understanding Programming Languages: Why they are essential and their various types.
- Operators in C: Exploring assignment, arithmetic, relational, and logical operators.
- Tokens and Identifiers: Learning about keywords, naming conventions, and best practices.
- Control Structures in C: Choosing the right structure for efficient programming.

Recommended by Board of Studies of CIVIL dept. Meeting No. 9 Dated: 4/3/25

CHAIRMAN Board of Studies Civil Engineering

- Selective Control (Decision-making statements)
- Iterative Control (Loops for repetition)
- Unconditional Control (Jump statements)

MODULE - II DATA TYPES, NUMBER SYSTEMS, AND FUNCTIONS 12

- Operators in Depth: Understanding increment, decrement, and short-circuit operators.
- Number Systems & Conversions: Mastering different number systems, conversions, and format specifiers.
- Data Types in C: Exploring signed and unsigned types (int, float, char) and their usage.
- Functions in C:
- Importance of modular programming.
- Writing and using functions effectively.

MODULE - III POINTERS, ARRAYS, AND PROBLEM-SOLVING 21

- Pointers in C:
- Understanding memory management.
- How pointers enable direct hardware communication.
- Arrays in C:
- Efficiently storing multiple elements.
- Single-dimensional and multi-dimensional arrays.
- Problem-Solving Techniques:
- Tackling challenges related to arrays and strings.
- Optimizing algorithms for efficiency.

TOTAL: 45 PERIODS

REFERENCES:

1. Let Us C – Yashavant Kanetkar
2. Programming in ANSI C – E. Balagurusamy
3. The C Programming Language – Brian W. Kernighan and Dennis M. Ritchie
4. C: How to Program – Paul Deitel and Harvey Deitel
5. Problem Solving and Program Design in C – Jeri R. Hanly and Elliot B. Koffman

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

LIFE SKILLS, RANGER AND ROVER & BIS STANDARDS - PHASE 2

OBJECTIVES:

- Explore core domain BIS standards related to Information security and AI.
- Implement strategies to learn career and managerial skills for career growth.

MODULE - I JEEVAN KAUSHAL 2.0 – CAREER SKILLS AND MANAGERIAL SKILLS **14**

Group Discussion Skills - Meaning and Methods of Group Discussion - Procedure of Group Discussion - Group Discussion - Simulation - Group Discussion - Common Errors.

Managerial Skills - Basic Managerial Skills - Planning for effective management - How to organize teams? - Recruiting and retaining talent - Delegation of tasks - Learn to coordinate - Conflict management - Self-management Skills - Understanding self-concept - Developing self-awareness - Self-examination - Self-reflection and Introspection - Self-regulation.

Entrepreneurial Skills - Basics of Entrepreneurship - Meaning of entrepreneurship – Classification and types of entrepreneurships - Traits and competencies of entrepreneur -. Creating Business Plan - Problem identification and idea generation - Idea validation - Pitch making.

Managing Personal Finance - Budgeting - Setting personal goals - Estimate likely expenses Monitor spending to obtain the most value for the available funds - Saving and Investing - Advantages of saving money - Concept of present and future value of money.

MODULE - II RANGER AND ROVER **10**

Scouting for Boys: Scout Craft, Campaigning.

Knots: Managing of rope, types of ropes and uses, Basic Knots: - Clove Hitch, Reef Knot, Fisherman knot, Sheet bend, Bowline, Sheep shank, whippings.

Growing Together: Understanding the growth context.

Intergenerational Dialogue: How to enhance learning and cooperation across generations.

Module - III STANDARDS FOR SOIL TESTING AND CONCRETE **6**

Introduction to standards for soil testing and identification, sub-surface investigation, general requirements for foundations, shallow and deep foundations and ground improvement technologies. Introduction to standards on concrete production, mix design, types of concrete and their applications, test method standards of fresh and hardened concrete.

TOTAL: 30 PERIODS

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

REFERENCES:

1. Curriculum and Guidelines for Life Skills (Jeevan Kaushal) 2.0, UGC, New Delhi.
2. Principles of Geotechnical Engineering, Braja M. Das & Khaled Sobhan, Cengage Learning, 9th Edition, 2017.
3. IS: 10262 – Guidelines for Concrete Mix Design Proportioning, Bureau of Indian Standards (BIS), 2019.
4. IS: 456 – Code of Practice for Plain and Reinforced Concrete, Bureau of Indian Standards (BIS), 2000.
5. IS: 516 – Methods of Tests for Strength of Concrete, Bureau of Indian Standards (BIS), 1959 (Reaffirmed 2018).

ONLINE RESOURCES

1. https://lms.scout.org/courses/show/214175?force_course_hub=true
2. https://lms.scout.org/courses/show/214194?force_course_hub=true

OUTCOMES

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

1. Understand and apply the fundamentals of C programming for problem-solving. (K2)
2. Utilize control structures, operators, and functions to write modular programs. (K2)
3. Implement pointers and arrays for efficient memory and data management. (K2)
4. Solve real-world problems by designing and optimizing algorithms. (K2)
5. Demonstrate career and managerial skills. (K2)
6. Understand BIS standards for Information security and AI domain. (K2)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	2	2	-	-	-	-	-	-	2	-	-
CO2	2	2	2	2	1	-	-	-	1	-	2	-	-
CO3	2	2	2	2	-	-	-	-	1	-	2	-	-
CO4	2	2	2	2	1	-	-	-	1	-	2	-	-
CO5	-	-	-	-	-	3	-	-	1	-	2	2	2
CO6	-	-	-	-	-	3	-	-	1	-	2	2	2

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/2/25

CHAIRMAN
Board of Studies
Civil Engineering

SEMESTER - IV

24CEID401 - SDG NO. 4,11,15	INNOVATIVE DESIGN LAB - II	L	T	P	CP	C
		0	0	2	2	1

OBJECTIVES:

- To empower students to transform innovative ideas into viable venture blueprints through structured entrepreneurial exploration and opportunity framing.
- To provide experiential learning in adaptive product evolution by focusing on user-centric redesign, iterative testing, and technical refinement.
- To develop proficiency in assessing market traction, decoding customer behavior, and aligning product strategy with investment-readiness metrics.
- To instill a foundation of ethical entrepreneurship by integrating inclusive design principles, sustainability values, and responsible leadership.
- To enable data-driven innovation by leveraging field research, applying performance analytics, and integrating emerging technologies for solution optimization.
- To facilitate multidisciplinary problem-solving through advanced engineering integration, MVP systemization, and standards-compliant validation.

COURSE METHODOLOGY:

1. This initiative is designed to inculcate ethical principles of research and to get involved in a life-long learning process for the students, focusing on the practical execution and refinement of entrepreneurial ventures.
2. The project work must involve the continuous development, iterative enhancement, and potential launch of an entrepreneurial solution. It must also include appropriate elements of the following: compliance with advanced engineering standards, iterative design analysis, enhanced prototyping, robust experimentation, real-world user feedback collection, data correlation, and advanced software/hardware development for the solution.
3. Projects can be individual work or group projects, with a maximum of Three students. In case of a group project, each student must submit an individual project report clearly specifying their unique contributions to the collective work.

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

4. On completion of the project, the student shall submit a detailed project report encompassing the evolution of their venture, technical implementation, market validation, and future roadmap. The project shall undergo a formal review process, after which the report will be evaluated. Students shall appear for a mandatory viva-voce examination on the project, approved jointly by the Coordinator and the respective project guide.

EVALUATION:

1. First evaluation (Immediately after first internal examination): 20 marks (Focus on refined problem statement, advanced MVP design, and detailed development plan)
2. Second evaluation (Immediately after second internal examination): 30 marks (Focus on prototype/MVP implementation, initial testing, and preliminary market validation results)
3. Final evaluation (Last week of the semester): 50 marks (Focus on the complete refined solution, comprehensive market validation, growth strategy, final project report, and viva-voce)

Note: All three evaluations are mandatory for course completion and for awarding the final grade.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Apply structured entrepreneurial exploration to convert innovative ideas into venture blueprints, incorporating user-centric and iterative design approaches. (K4)
2. Assess customer behavior and market traction to align product strategies with ethical and sustainable entrepreneurship principles. (K5)
3. Integrate multidisciplinary knowledge, field data, and emerging technologies to optimize and validate engineered solutions. (K6)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	-	-	-	2	-	-	-	2	2
CO2	3	3	2	-	-	-	-	2	-	-	-	2	2
Co3	3	3	2	-	-	-	-	2	-	-	-	2	2

Recommended by
Board of Studies of CIVIL dept.
Meeting No. 9 Dated: 4/3/25

CHAIRMAN
Board of Studies
Civil Engineering

Imagine the Future and

Make it happen!

Together let's build a better world where there is **NO POVERTY** and **ZERO HUNGER.**

We have **GOOD HEALTH AND WELL BEING** **QUALITY EDUCATION** and full **GENDER EQUALITY** everywhere.

There is **CLEAN WATER AND SANITATION** for everyone. **AFFORDABLE AND CLEAN ENERGY**

which will help to create **DECENT WORK AND ECONOMIC GROWTH.** Our prosperity shall be fuelled

by investments in **INDUSTRY, INNOVATION AND INFRASTRUCTURE** that will help us to

REDUCE INEQUALITIES by all means. We will live in **SUSTAINABLE CITIES AND COMMUNITIES.**

RESPONSIBLE CONSUMPTION AND PRODUCTION will help in healing our planet.

CLIMATE ACTION will reduce global warming and we will have abundant,

flourishing **LIFE BELOW WATER**, rich and diverse **LIFE ON LAND.**

We will enjoy **PEACE AND JUSTICE** through **STRONG INSTITUTIONS**

and will build long term **PARTNERSHIPS FOR THE GOALS.**

For the goals to be reached, everyone needs to do their part: governments, the private sector, civil society and **People like you.**

Together we can...

Sai Prakash Leo Muthu

Chairman & CEO – Sairam Institutions

We build a Better nation through Quality education.

Sairam INSTITUTIONS

Sri SAI RAM ENGINEERING COLLEGE

An Autonomous Institution

Affiliated to Anna University & Approved by AICTE, New Delhi

Accredited by NBA and NAAC "A+"

ISO/ISO 21001 : 2018 (EOMS) Certified by BIS

and NIRF ranked institution

College Campus

Sai Leo Nagar, West Tambaram,
Chennai - 600 044. Ph : 044-2251 2222

Administrative Office

"Sai Bhavan", 31B, Madley Road, T.Nagar,
Chennai - 600 017. Ph : 044-4226 7777

e-mail : sairam@sairamgroup.in

www.sairamgroup.in