SENGUNTHAR ENGINEERING COLLEGE
(AUTONOMOUS)
(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)
Recognized Under Section 2(f) & 12(B) of the UGC Act, 1956
NAAC Accredited with 'A' Grade
TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU

CURRICULUM & SYLLABI

B.E. CIVIL ENGINEERING

(CHOICE BASED CREDIT SYSTEM)

REGULATIONS – 2023

(For the Students Admitted in the Academic Year 2023-2024 onwards)

Note: The regulations hereunder are subject to amendments as may be decided by the Academic Council of the Sengunthar Engineering College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates including those already undergoing the program under the same Regulation as may be decided by the Academic Council.

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DEPARTMENT

OF

CIVIL ENGINEERING

REGULATION 2023

CURRICULUM AND SYLLABI

FOR B.E.–CIVIL ENGINEERING

(For the Students admitted in the Academic Year 2023-2024 onwards)

FIRST SEMESTER

TO

EIGHTH SEMESTER

INDEX

III	**MINOR DEGREE / HONOURS**		
	Construction Technology	**----**	99
	Credit Summary	**----**	109

SCHEME FOR CURRICULUM

B.E. -Civil

REGULATIONS 2023
CHOICE BASED CREDIT SYSTEM
B. E. CIVIL ENGINEERING

VISION

- To be a premier Civil Engineering Department to provide quality education and to enrich research and professional service to the society in all areas of civil engineering.

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MISSION

- To impart knowledge in Civil Engineering and allied fields through a dynamic curriculum and best teaching methodologies.
- To produce quality engineers with moral values who are capable of meeting the demands and challenges of the profession by focusing on latest practices.
- To inspire and nurture innovative leaders and entrepreneurs.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates can

- ✓ Gain fundamental technical knowledge and skills in mathematics, science and engineering to recognize and solve problems in the areas of structural design, geo-technical and environmental engineering.
- ✓ Become consultants in civil engineering to fulfil their professional duties and responsibilities in teamwork, ethics, technical leadership,business acumen and lifelong learning.
- ✓ Contribute to the enhancement of knowledge in civil engineering by performing quality research in institutions of international repute or Research organizations or Academia.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO1	**Engineering knowledge**	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
PO2	**Problem analysis**	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design / development of solutions**	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public

		health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
PO6	**The engineer and society**	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work**	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOME (PSOs)

PSO1	Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems
PSO2	Plan, design, construct and operate society economic and social engine that built the environment and also protecting,restoring the natural environment
PSO3	Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

MAPPING OF COURSE OUTCOME AND PROGRAM OUTCOME

Year	Sem	Course Name	PO												PSO		
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
I	I	23HST101- Professional English – I	-	-	-	-	-	1.4	2.2	1.25	1.8	3	-	3	-	-	-
		23MAT101 - Matrices and calculus	3	3	2	-	-	-	-	-	-	-	1	2	-	-	-
		23HST102- தமிழர்மரபு/ Heritage of Tamils															
		23PHE101- Engineering Physics	3	3	1	1	-	-	-	-	-	-	-	-	-	-	-
		23CYE102 - Chemistry for Engineers	1.6	1.6	2.4	1.25	1.8	1	2	-	-	-	-	1.5	-	-	-
		23GEE101 - Programming in C	2.0	2.33	2.33	1.16	2.0	1.66	1.0	0.83	2.0	0.16	2.83	2.33	1.83	2.16	-
		23EEC101 - Soft Skills															
		23MDC101 - Induction Program (2 Weeks)															
	II	23HST201 - Professional English – II	-	-	-	-	2	1.2	1.2	1	2	3	-	3	-	-	-
		23MAT201 - Statistics and Numerical Methods with MATLAB	3	3	1	1	2	-	-	-	1	-	2	3	-	-	-
		23PHT201 - Materials Science	2	3	2	1	1.8	1	1	-	-	-	-	-	-	-	-
		23CYT201 - Environmental Sciences and Sustainability	1.5	1.8	2.2	1.8	1.5	1.4	2.2	2	1	2	-	1	-	-	-
		23CET201-Applied Mechanics	3	3	2	2	-	-	-	-	-	-	-	3	3	3	3
		23HST202 - தமிழரும்															

		தொழில்நுட்பமும்/ Tamil and Technology														
		23GEE201 - Engineering Graphics	3	2	2	-	2	2	-	-	-	2	-	2	2	2	2
		23GEL201 - Engineering Practices Laboratory	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
		23EEC201 - Communication Skills/Foreign Language	-	-	-	-	-	1.2	1.5	1.5	1.8	3	-	3	-	-	-
		23MDC201 - Life Skills & Leadership Enhancement Programme															

MAPPING OF COURSE OUTCOME AND PROGRAM OUTCOME

Year	Sem	Course Name	PO												PSO		
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
II	III	23MAT301 - Transforms and Complex Functions	3	3	1	-	2	-	-	1	2	-	-	2	-	-	-
		23CET301 - Construction Materials and Practices	1.6	2	1.2	2.0	0.8	1	2	2	2	2	2.4	3	2	2	1
		23CET302 - Applied Geology	2.2	2	1.4	1.6	-	2	1.8	2	2	2	2	2	1.4	0.4	0.8
		23CET303 - Soil Mechanics	1.6	2	1.2	0.8	-	1	2	2	2	2	2.4	3	2	2	1
		23CEE301- Surveying and Levelling	3	3	3	3	0.5	2.5	-	-	3	3	-	-	3	3	3
		23CEE302 - Strength of Materials	3	3	3	3	-	3	-	-	2	1	-	1	3	3	2
		23EEC301 - Professional Development															

	IV	23CET401 – Reinforced Concrete Design	3	3	3	3	0.6	2.5	-	-	3	3	-	-	3	3	3
		23CET402 – Structural Analysis	3	3	3	3	0.5	2	-	-	2.5	3	-	-	3	3	3
		23CET403 – Highway Engineering	3	1.8	1.6	-	-	2.6		2.2	2.2	1	-	-	2.2	1.7	1.5
		23CEE401 - Foundation Engineering	2.5	3	3	3	1	1.2	2.5	1	1	1	2	3	2.2	2.8	2.6
		23CEE402 – Fluid Mechanics and Machinery	3	3	3	3		2	1	-	2	1	-	1	3	2	2
		23GEE301 - Problem Solving and Python Programming	2.33	2.5	1.5	1.83	1.83	-	-	-	-	-	1.5	0.66	2.66	0.5	-
		23EEC101 - Value Added Course – I															

CURRICULUM AND SYLLABI

FOR B.E. / B.Tech. DEGREE PROGRAMMES

(For the Students Admitted in the Academic Year 2023-2024 onwards)

B.E - CIVIL ENGINEERING- FIRST SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23HST101	Professional English – I	HS	3	0	0	3	40	60	100
23MAT101	Matrices and Calculus	BS	3	1	0	4	40	60	100
23HST102	தமிழர்மரபு/Heritage of Tamils	HS	1	0	0	1	40	60	100
EMBEDDED COURSE									
23PHE101	Engineering Physics	BS	3	0	2	4	50	50	100
23CYE102	Chemistry for Engineers	BS	3	0	2	4	50	50	100
23GEE101	Programming in C	ES	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC101	Soft Skills	EEC	1	0	0	1	100	-	100
MANDATORY COURSE									
23MDC101	Induction Program (2 Weeks)	MC	-	-	-	-	-	-	-
TOTAL CREDITS IN SEMESTER - I			21						

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
PE : Professional Elective
GE : General Elective
OE : Open Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

B.E - CIVIL ENGINEERING–SECOND SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23HST201	Professional English – II	HS	3	0	0	3	40	60	100
23MAT201	Statistics and Numerical Methods with MATLAB	BS	3	1	0	4	40	60	100
23PHT201	Materials Science	BS	3	0	0	3	40	60	100
23CYT201	Environmental Sciences and Sustainability	HS	3	0	0	3	40	60	100
23CET201	Applied Mechanics	PC	3	1	0	4	40	60	100
23HST202	தமிழரும் தொழில்நுட்பமும் /Tamil and Technology	HS	1	0	0	1	40	60	100
EMBEDDED COURSE									
23GEE201	Engineering Graphics	ES	3	0	2	4	50	50	100
PRACTICALS									
23GEL201	Engineering Practices Laboratory	ES	0	0	4	2	60	40	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC201	Communication Skills /Foreign Language	EEC	0	0	4	2	100	-	100
MANDATORY COURSE									
23MDC201	Life Skills & Leadership Enhancement Programme	MC	3	0	0	0	-	-	-
TOTAL CREDITS IN SEMESTER - II			26						

HS : Humanities and Social Sciences
BS : Basic Sciences
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PE : Professional Elective
OE : Open Elective
GE : General Elective
EEC : Employability Enhancement Courses
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L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

B.E - CIVIL ENGINEERING - THIRD SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23MAT301	Transforms and Complex Functions	BS	3	1	0	4	40	60	100
23CET301	Construction Materials and Practices	PC	3	0	0	3	40	60	100
23CET302	Applied Geology	PC	3	0	0	3	40	60	100
23CET303	Soil Mechanics	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23CEE301	Surveying and Levelling	PC	3	0	2	4	50	50	100
23CEE302	Mechanics of Materials	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC301	Professional Development	EEC	0	0	2	1	100	-	100
TOTAL CREDITS IN SEMESTER - III			22						

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
PE : Professional Elective
OE : Open Elective
GE : General Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

B.E - CIVIL ENGINEERING - FOURTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23CET401	Reinforced Concrete Design	PC	3	1	0	4	40	60	100
23CET402	Structural Analysis	PC	3	1	0	4	40	60	100
23CET403	Highway Engineering	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23CEE401	Foundation Engineering	PC	3	0	2	4	50	50	100
23CEE402	Fluid Mechanics and Machinery	PC	3	0	2	4	50	50	100
23GEE301	Problem Solving and Python Programming	ES	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC401	Value Added Course-I	EEC	0	0	4	2	100	-	100
TOTAL CREDITS IN SEMESTER - IV			25						

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
PE : Professional Elective
OE : Open Elective
GE : General Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

B.E - CIVIL ENGINEERING - FIFTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23CET501	Design of Steel Structures	PC	3	1	0	4	40	60	100
	Professional Elective I	PE	3	0	0	3	40	60	100
	Professional Elective II	PE	3	0	0	3	40	60	100
	Professional Elective III	PE	3	0	0	3	40	60	100
EMBEDDED COURSE									
23CEE501	Concrete Technology	PC	3	0	2	4	50	50	100
23CEE502	Water Supply and Waste Water Engineering	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC501	Value Added Course-II	EEC	0	0	4	2	100	-	100
MANDATORY COURSE									
23MDC501	Mandatory Course-I	MC	3	0	0	0	-	-	-
23MDC502	Survey Camp (2 Weeks)	MC	-	-	2	-	100	-	100
TOTAL CREDITS IN SEMESTER - V			23						

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
PE : Professional Elective
OE : Open Elective
GE : General Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

B.E - CIVIL ENGINEERING - SIXTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23CET601	Estimation and Quantitative Surveying	PC	3	1	0	4	40	60	100
	Professional Elective IV	PE	3	0	0	3	40	60	100
	Professional Elective V	PE	3	0	0	3	40	60	100
	Professional Elective VI	PE	3	0	0	3	40	60	100
	Open Elective –I/ NCC - L1/L3	OE	3	0	0	3	40	60	100
EMBEDDED COURSE									
23CEE602	Building Planning and Drawing	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEJ601	Project Work	EEC	0	0	10	5	40	60	100
MANDATORY COURSE									
23MDC601	Mandatory Course-II	MC	3	0	0	0	-	-	-
TOTAL CREDITS IN SEMESTER - VI						25			

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
PE : Professional Elective
OE : Open Elective
GE : General Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

B.E - CIVIL ENGINEERING - SEVENTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23HST701	Human Values Ethics	HS	3	0	0	3	40	60	100
	Elective-Management	GE	3	0	0	3	40	60	100
	Open Elective-II/ NCC II – L2/L4	OE	3	0	0	3	40	60	100
	Open Elective-III	OE	3	0	0	3	40	60	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC701	Research Paper Writing/ Publication	EEC	0	0	4	2	100	-	100
TOTAL CREDITS IN SEMESTER - VII			14						

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
PE : Professional Elective
OE : Open Elective
GE : General Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

B.E - CIVIL ENGINEERING - EIGHTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
EMPLOYABILITY ENHANCEMENT COURSE									
23EEJ801	Innovative Product Development	EEC	0	0	14	7	40	60	100
23EEC801	Internship	EEC	0	0	4	2	100	-	100
TOTAL CREDITS IN SEMESTER - VIII			9						

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
PE : Professional Elective
OE : Open Elective
GE : General Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

LIST OF HUMANITIES AND SOCIAL SCIENCES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23HST101	Professional English – I	HS	3	0	0	3	40	60	100
23HST102	தமிழர்மரபு/Heritage of Tamils	HS	1	0	0	1	40	60	100
23HST201	Professional English – II	HS	3	0	0	3	40	60	100
23CYT201	Environmental Sciences and Sustainability	HS	3	0	0	3	40	60	100
23HST202	தமிழரும் தொழில்நுட்பமும் /Tamil and Technology	HS	1	0	0	1	40	60	100
23HST701	Human Values Ethics	HS	3	0	0	3	40	60	100

LIST OF BASIC SCIENCES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23MAT101	Matrices and Calculus	BS	3	1	0	4	40	60	100
23PHE101	Engineering Physics	BS	3	0	2	4	50	50	100
23CYE102	Chemistry for Engineers	BS	3	0	2	4	50	50	100
23MAT201	Statistics and Numerical Methods with MATLAB	BS	3	1	0	4	40	60	100
23PHT201	Materials Science	BS	3	0	0	3	40	60	100
23MAT301	Transforms and Complex Functions	BS	3	1	0	4	40	60	100

LIST OF ENGINEERING SCIENCES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23GEE101	Programming in C	ES	3	0	2	4	50	50	100
23GEE201	Engineering Graphics	ES	3	0	2	4	50	50	100
23GEL201	Engineering Practices Laboratory	ES	0	0	4	2	60	40	100
23GEE301	Problem Solving and Python Programming	ES	3	0	2	4	50	50	100

LIST OF PROFESSIONAL CORE

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23CET201	Applied Mechanics	PC	3	1	0	4	40	60	100
23CET301	Construction Materials and Practices	PC	3	0	0	3	40	60	100
23CET302	Applied Geology	PC	3	0	0	3	40	60	100
23CET303	Soil Mechanics	PC	3	0	0	3	40	60	100
23CEE301	Surveying and Levelling	PC	3	0	2	4	50	50	100
23CEE302	Mechanics of Materials	PC	3	0	2	4	50	50	100
23CET401	Reinforced Concrete Design	PC	3	1	0	4	40	60	100
23CET402	Structural Analysis	PC	3	1	0	4	40	60	100
23CET403	Highway Engineering	PC	3	0	0	3	40	60	100
23CEE401	Foundation Engineering	PC	3	0	2	4	50	50	100
23CEE402	Fluid Mechanics and Machinery	PC	3	0	2	4	50	50	100
23CET501	Design of Steel Structures	PC	3	1	0	4	40	60	100
23CEE501	Concrete Technology	PC	3	0	2	4	50	50	100
23CEE502	Water Supply and WasteWater Engineering	PC	3	0	2	4	50	50	100
23CET601	Estimation and Quantitative Surveying	PC	3	1	0	4	40	60	100
23CEE602	Building Planning and Drawing	PC	3	0	2	4	50	50	100

LIST OF PROFESSIONAL ELECTIVE COURSES

Professional Elective - I

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23CEP501	Total Station and GPS Surveying	PE	3	0	0	3	40	60	100
23CEP502	Remote Sensing Concepts	PE	3	0	0	3	40	60	100
23CEP503	Satellite Image Processing	PE	3	0	0	3	40	60	100
23CEP504	Cartography and GIS	PE	3	0	0	3	40	60	100
23CEP505	Photogrammetry	PE	3	0	0	3	40	60	100
23CEP506	Hydrographic Surveying	PE	3	0	0	3	40	60	100

Professional Elective - II

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23CEP507	Advanced Structural Analysis	PE	3	0	0	3	40	60	100
23CEP508	Dynamics and Earthquake Resistant Structures	PE	3	0	0	3	40	60	100
23CEP509	Rehabilitation/ Heritage Restoration	PE	3	0	0	3	40	60	100
23CEP510	Prefabricated Structures	PE	3	0	0	3	40	60	100
23CEP511	Prestressed Concrete Structures	PE	3	0	0	3	40	60	100
23CEP512	Introduction to Finite Element Method	PE	3	0	0	3	40	60	100

Professional Elective - III

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23CEP513	Formwork Engineering	PE	3	0	0	3	40	60	100
23CEP514	Construction Equipment and Machinery	PE	3	0	0	3	40	60	100
23CEP515	Sustainable Construction and Lean Construction	PE	3	0	0	3	40	60	100
23CEP516	Advanced Construction Techniques	PE	3	0	0	3	40	60	100
23CEP517	Construction Management and Safety	PE	3	0	0	3	40	60	100
23CEP518	Energy Efficient Buildings	PE	3	0	0	3	40	60	100

Professional Elective - IV

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23CEP601	Urban Planning and Development	PE	3	0	0	3	40	60	100
23CEP602	Smart Cities	PE	3	0	0	3	40	60	100
23CEP603	Intelligent Transport systems	PE	3	0	0	3	40	60	100
23CEP604	Industrial Waste Water Management	PE	3	0	0	3	40	60	100
23CEP605	Pavement Engineering	PE	3	0	0	3	40	60	100
23CEP606	Transportation planning Process	PE	3	0	0	3	40	60	100

Professional Elective -V

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23CEP607	Ocean Wave Dynamics	PE	3	0	0	3	40	60	100
23CEP608	Marine Geotechnical Engineering	PE	3	0	0	3	40	60	100
23CEP609	Coastal Engineering	PE	3	0	0	3	40	60	100
23CEP610	Offshore Structures	PE	3	0	0	3	40	60	100
23CEP611	Port and Harbour Engineering	PE	3	0	0	3	40	60	100
23CEP612	Coastal Hazards and Mitigation	PE	3	0	0	3	40	60	100

Professional Elective - VI

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23CEP613	Geo-Environmental Engineering	PE	3	0	0	3	40	60	100
23CEP614	Ground Improvement Techniques	PE	3	0	0	3	40	60	100
23CEP615	Pile Foundation	PE	3	0	0	3	40	60	100
23CEP616	Soil Dynamics and Machine Foundations	PE	3	0	0	3	40	60	100
23CEP617	Rock Mechanics	PE	3	0	0	3	40	60	100
23CEP618	Earth and Earth Retaining Structures	PE	3	0	0	3	40	60	100

LIST OF OPEN ELECTIVE COURSES

OPEN ELECTIVES - I

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23MEO601	Introduction to Industrial Engineering	OE	3	0	0	3	40	60	100
23ECO602	Fundamentals of Electronic Devices and Circuits	OE	3	0	0	3	40	60	100
23EEO603	Electric Vehicle Technology	OE	3	0	0	3	40	60	100
23EEO604	Renewable Energy System	OE	3	0	0	3	40	60	100
23MEO605	Resource Management Technique	OE	3	0	0	3	40	60	100
23MAO606	Graph Theory	OE	3	0	0	3	40	60	100
23CEO607	Environmental and Social Impact Assessment	OE	3	0	0	3	40	60	100
23PMO608	Pharamaceutical Nanotechnology	OE	3	0	0	3	40	60	100
23RAO609	Foundation of Robotics	OE	3	0	0	3	40	60	100
23CSO610	Introduction to Drone Technologies	OE	3	0	0	3	40	60	100
23MDO611	Biomolecules	OE	3	0	0	3	40	60	100
23CSO612	Cyber Forensics and Ethical Hacking	OE	3	0	0	3	40	60	100

OPEN ELECTIVES- II

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23HSO701	English for Competitive Examinations	OE	3	0	0	3	40	60	100
23MGO702	Democracy and Good Governance	OE	3	0	0	3	40	60	100
23MEO703	Fundamentals of Mechatronics	OE	3	0	0	3	40	60	100
23CEO704	Remote Sensing Concepts	OE	3	0	0	3	40	60	100
23MDO705	Ultrasound Principles and its Medical Applications	OE	3	0	0	3	40	60	100

23PMO706	IPR For Pharma Industry	OE	3	0	0	3	40	60	100
23RAO707	Concepts in Mobile Robots	OE	3	0	0	3	40	60	100
23ECO708	Energy Technology	OE	3	0	0	3	40	60	100
23EEO709	Sensors and Actuators	OE	3	0	0	3	40	60	100
23MAO710	Operations Research	OE	3	0	0	3	40	60	100
23CSO711	Introduction to Cyber Security	OE	3	0	0	3	40	60	100
23MEO712	3D Printing and Design	OE	3	0	0	3	40	60	100

OPEN ELECTIVES - III

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23HSO713	Project Report Writing	OE	3	0	0	3	40	60	100
23MAO714	Advanced Numerical Methods	OE	3	0	0	3	40	60	100
23CSO715	Fundamentals of Blockchain Technology	OE	3	0	0	3	40	60	100
23EEO716	Electrical,Electronic and Magnetic Materials	OE	3	0	0	3	40	60	100
23CEO717	Geographical Information System	OE	3	0	0	3	40	60	100
23ECO718	VLSI Design	OE	3	0	0	3	40	60	100
23MDO719	Wearable Technology	OE	3	0	0	3	40	60	100
23MEO720	Additive manufacturing	OE	3	0	0	3	40	60	100
23RAO721	Nanomaterials and Application	OE	3	0	0	3	40	60	100
23MGO722	Cost Management of Engineering Projects	OE	3	0	0	3	40	60	100
23HSO723	Food Safety and Quality Regulations	OE	3	0	0	3	40	60	100
23MDO724	Lifestyle Diseases	OE	3	0	0	3	40	60	100

GENERAL ELECTIVES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23NCCL01	NCC AIRFORCE LEVEL-1	GE	3	0	0	3	40	60	100
23NCCL02	NCC AIRFORCE LEVEL-2	GE	3	0	0	3	40	60	100
23NCCL03	NCC ARMY LEVEL – 3	GE	3	0	0	3	40	60	100
23NCCL04	NCC ARMY LEVEL – 4	GE	3	0	0	3	40	60	100

ELECTIVE - MANAGEMENT

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23MGT701	Principles of Management	GE	3	0	0	3	40	60	100
23MGT702	Total Quality Management	GE	3	0	0	3	40	60	100
23MGT703	Engineering Economics and Financial Accounting	GE	3	0	0	3	40	60	100
23MGT704	Human Resource Management	GE	3	0	0	3	40	60	100
23MGT705	Knowledge Management	GE	3	0	0	3	40	60	100
23MGT706	Industrial Management	GE	3	0	0	3	40	60	100
23MGT707	Hospital Management	GE	3	0	0	3	40	60	100
23MGT708	e-Waste Management	GE	3	0	0	3	40	60	100

LIST OF EMPLOYABILITY ENHANCEMENT COURSES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23EEC101	Soft Skills	EEC	1	0	0	1	100	-	100
23EEC201	Communication Skills//Foreign Language	EEC	0	0	4	2	100	-	100
23EEC304	Professional Development	EEC	0	0	2	1	100	-	100
23EEC101	Value Added Course-I	EEC	0	0	4	2	100	-	100
23EEC501	Value Added Course-II	EEC	0	0	4	2	100	-	100
23EEC604	Project Work	EEC	0	0	10	5	40	60	100
23EEC701	Research Paper Writing / Publication	EEC	0	0	4	2	100	-	100
23EEJ801	Innovative Product Development	EEC	0	0	14	7	40	60	100
23EEC801	Internship	EEC	0	0	4	2	100	-	100

LIST OF MANDATORY COURSES

MANDATORY COURSES - I

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23MDC501	Introduction to Women and Gender Studies	MC	3	0	0	0	-	-	-
23MDC502	Elements of Literature	MC	3	0	0	0	-	-	-
23MDC503	Film Appreciation	MC	3	0	0	0	-	-	-
23MDC504	Disaster Risk Reduction and Management	MC	3	0	0	0	-	-	-
23MDC505	Constitution of India	MC	3	0	0	0	-	-	-

MANDATORY COURSES - II

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23MDC601	Well Being with Traditional Practices- Yoga, Ayurveda and Siddha	MC	3	0	0	0	-	-	-
23MDC602	History of Science and Technology in India	MC	3	0	0	0	-	-	-
23MDC603	Political and Economical Thought for a Human Society	MC	3	0	0	0	-	-	-
23MDC604	State,Nation Building and Politics in India	MC	3	0	0	0	-	-	-
23MDC605	Industrial Safety	MC	3	0	0	0	-	-	-

CURRICULUM AND SYLLABI

FOR B.E. / B.Tech. DEGREE PROGRAMMES

(For the Students Admitted in the Academic Year 2023 - 2024 onwards)

CREDIT SUMMARY

B.E. CIVIL ENGINEERING

Category	Credits Per Semester								Credit Total
	I	II	III	IV	V	VI	VII	VIII	
HS	4	7	-	-	-	-	3	-	14
BS	12	7	4	-	-	-	-	-	23
ES	4	4		4	-	-	-	-	12
PC	-	4	17	19	12	8	-	-	60
PE	-	-	-	-	9	9	-	-	18
GE	-	2	-	-	-	-	3	-	05
OE	-	-	-	-	-	3	6	-	09
EEC	1	2	1	2	2	5	-	7	20
MC	-	-	-		-	-	2	2	04
Total	21	26	22	25	23	25	14	09	165

SCHEME FOR SYLLABI

B.E. -Civil

SEMESTER I

23HST101	**PROFESSIONAL ENGLISH – I**	**L T P C**
	(Common to all B.E. & B.Tech. Branches)	**3 0 0 3**

OBJECTIVES

- To develop learning English language through grammar.
- To use grammar efficiently for demonstrating all the four language skills (LSRW).
- To write business letters, dialogue writing, paragraph and essay writing.
- To speak effectively about self introduction and real time situation.
- To build the reading skills through reading comprehension and note taking

UNIT I VOCABULARY **8**

Synonyms and Antonyms - Word Formation - Sentence Types (declarative, imperative, interrogative & exclamatory) - Single Word Substitutes - Use of Abbreviations and Acronyms- Homonyms and Homophones - Collocation - British and American Vocabulary.

UNIT II GRAMMAR **10**

Parts of speech - Be, Have and Do verbs - Punctuation - Tenses - Numerical Adjectives - modal verbs - Single line Definition - Direct and Indirect Speech - Gerunds and Infinitives - Same Word Used as Different Parts of Speech.

UNIT III WRITING **9**

Letter Writing - Business communications - quotations, placing orders, complaints, replies to queries from business customers - Dialogue Writing – Paragraph Writing (descriptive, narrative, expository & persuasive) - Essay Writing - Writing Instructions.

UNIT IV SPEAKING **9**

Self-introduction - Giving personal and factual information - Talking about present circumstances, past experiences and future plans - Expressing opinions and justifying opinions - Agreement / disagreement - Likes and dislikes - Tongue twisters

UNIT V READING SKILLS **9**

Reading Comprehension – Reading techniques, pre-reading, post-reading, comprehension questions (multiple choice questions or short questions) - Short Comprehension Passages, practice skimming - Scanning and Predicting - Reading the passage and taking (Note making) Notes - Scan and understand main contents of the passage.

TOTAL: 45 PERIODS

Mandatory activity: Self Introduction

OUTCOMES

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

- Use a wide range of vocabulary in oral and written communication
- Frame grammatically correct sentences.
- Write letters, frame paragraphs and Essays, develop conversation.
- Develop speaking skills for self-Introduction, delivering speeches and Technical Presentation
- Read and comprehend the passage, technical content and take notes

TEXT BOOKS

1. Board of Editors. Using English A Course book for Under graduate Engineers and Technologists. Orient Black Swan Limited, Hyderabad: 2015.
2. Richards, C. Jack. Interchange Students' Book-2 New Delhi: CUP, 2015.

REFERENCES

1. Department of English, Anna University, "Mindscapes: English for Technologists and Engineers", 1st Edition, Orient Black Swan, Chennai, 2012.
2. MacMillan, Krishna Mohan, Meera Banerji, Developing Communication Skills, Paperback, 2019.

E-RESOURCES

1. http://www.usingenglish.com
2. https://www.khanacademy.org/humanities/grammar

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	-	-	-	-	1	3	1	2	3	-	3	-	-	-
2	-	-	-	-	-	1	2	-	1	3	-	3	-	-	-
3	-	-	-	-	-	3	3	2	3	3	-	3	-	-	-
4	-	-	-	-	-	1	2	1	2	3	-	3	-	-	-
5	-	-	-	-	-	1	1	1	1	3	-	3	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	-	-	-	-	-	1.40	2.20	1.25	1.80	3.00	-	3.00	-	-	-

1- Low 2- Medium 3- High '-' – No Correlation

23MAT101 **MATRICES AND CALCULUS** **L T P C**

(Common to all B.E./ B.Tech. Branches) **3 1 0 4**

OBJECTIVES

- To develop the use of matrix algebra techniques those are needed by engineers for practical applications.
- To familiarize the students with differential and integral calculus.
- To describe the student with functions of several variables.
- To acquire the student with mathematical tools needed in evaluating multiple integrals and their applications.
- To acquaint the student with the concepts of vector calculus that is needed for problems in engineering disciplines.

UNIT I MATRICES **9+3**

Eigen values and Eigen vectors – Properties of Eigen values – Cayley-Hamilton theorem – Reduction of quadratic form to canonical form by orthogonal transformation – Nature of quadratic form.

UNIT II DIFFERENTIAL AND INTEGRAL CALCULUS **9+3**

Differentiation rules: Derivatives of polynomials and exponential functions – The product and quotient Rules – Derivatives of trigonometric functions – The Chain rule – Implicit differentiation – Applications of differentiation: Maximum and Minimum Values – Techniques of integration: Integration by parts – Trigonometric integrals – Integration of rational functions by partial fractions.

UNIT III FUNCTIONS OF SEVERAL VARIABLES **9+3**

Partial derivatives – Homogeneous functions – Euler's theorem – Total derivative – Jacobians – Taylor's theorem for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT IV MULTIPLE INTEGRALS **9+3**

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double integrals.

UNIT V VECTOR CALCULUS **9+3**

Scalar and vector point functions – Gradient – Divergence and curl – Line integral – Surface integral – Green's theorem in a plane – Volume integral – Divergence theorem – Irrotational and Solenoidal fields.

OUTCOMES

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

- Classify the matrix algebra methods for solving practical problems.
- Discover differential calculus tools in solving various application problems and compare different methods of integration in solving practical problems.
- Develop differential calculus ideas on several variable functions.
- Apply multiple integral ideas in solving areas, volumes and other practical problems.
- Solve engineering problems using the concept of vector calculus.

LIST OF TUTORIALS

1. Computation of Eigen values and Eigenvectors.
2. Calculate differentiation and integration of simple functions.
3. Determining Maxima and minima of functions for two variables.
4. Evaluating double and triple integrals.
5. Computing Gradient, divergence and curl of point functions.

TOTAL: 45+15= 60 PERIODS

TEXT BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, 43rd Edition, New Delhi, 2014.
2. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015.

REFERENCES

1. Bali N.P, Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
2. Kanti B. Dutta., "Mathematical Methods of Science and Engineering – Aided with MATLAB", Cengage Learning, New Delhi, 2013.

E-RESOURCES

1. https://nptel.ac.in/courses/111105121 (Differential Calculus and Integral Calculus)
2. https://nptel.ac.in/courses/111107112 (matrix analysis)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	-	-	-	-	-	-	-	1	2	-	-	-
2	3	3	2	-	-	-	-	-	-	-	1	2	-	-	-
3	3	3	2	-	-	-	-	-	-	-	1	2	-	-	-
4	3	3	2	-	-	-	-	-	-	-	1	2	-	-	-
5	3	3	2	-	-	-	-	-	-	-	1	2	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**-**	**-**	**-**

1-Low 2-Medium 3-High '-' – No Correlation

23HST102 **HERITAGE OF TAMILS** **L T P C**
1 0 0 1

UNIT I LANGUAGE AND LITERATURE **3**

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

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE **3**

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

UNIT III FOLK AND MARTIAL ARTS **3**

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

UNIT IV THINAI CONCEPT OF TAMILS **3**

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

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

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

TOTAL:15 PERIODS

TEXT BOOKS

1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
2. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
3. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

4. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
5. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
6. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
7. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

REFERENCE BOOKS

1. Heritage of Tamils,Publishedby:Yes Dee Publishing Pvt Ltd,Chennai
2. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

23HST102 **தமிழர் மரபு** **L T P C**
1 0 0 1

அலகு I மொழி மற்றும் இலக்கியம்: **3**

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

அலகு II மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக்கலை: **3**

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

அலகு III நாட்டுப்புற கலைகள் மற்றும் வீர விளையாட்டுகள்: **3**

தெருக்குத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான்கூத்து, ஒயிலாட்டம், தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி ,புலியட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு IV தமிழர்களின் திணைக்கோட்பாடுகள்: **3**

தமிழகத்தின் தாவரங்களும் விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக்கோட்பாடுகள் – தமிழர்கள் போற்றிய அருட்கோட்பாடு – சங்ககாலத்தில் தமிழ்கத்தில் எழுத்தறிவும் கல்வியும்–சங்ககால நகரங்களும் துறைமுகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாற்றிக்குத் தமிழர்களின் பங்களிப்பு : **3**

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு இந்தியாவின் பிறபகுதிகளில் தமிழப் பண்பாட்டின் தாக்கம் – சுய மரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள் ,கையழுத்துப்படிகள் – தமிழ்ப்புத்தகங்களின் அச்சு வரலாறு.

TOTAL= 15 PERIODS

TEXT BOOKS

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

REFERENCE BOOKS

1. தமிழர் மரபு -முனைவர் ஆ பூபாலன் (வி ஆர்பி பி பப்ளிஷர்ஸ்)

23PHE101 **ENGINEERING PHYSICS** **L T P C**

(Common to Civil, Mechanical, R & A and Pharm.Tech) **3 0 2 4**

OBJECTIVES

- To study the structure of crystalline materials using crystallographic knowledge.
- To learn elasticity, placticity, stress, strain behavior of materials for industrial applications.
- To generalize the fundamentals of ultrasonics and sound waves, as well as their applications.
- To explore the complex physical phenomenon using the fundamental principles of quantum mechanics and Schrödinger's wave equation.
- To exhibit different materials heat transmission modes and fundamentals of thermal conduction in solid and its applications.
- To understand the Engineering Physics that can be applied to optics, acoustics and ultrasonic's, matter characteristics and to determine thermal properties.

UNIT I CRYSTAL PHYSICS **9**

Lattice and Unit cell – Crystal Systems and Bravais lattice – Lattice planes – Miller Indices – d - Spacing in Cubic lattice – Calculation of Number of Atoms per Unit Cell – Atomic radius – Coordination Number – Packing factor for SC, BCC, FCC and HCP structures – Crystal Growth Techniques –Solution Growth – Melt Growth Techniques (Bridgman and Czochralski).- Silicon chip Production Process.

UNIT II MECHANICAL PROPERTIES OF SOLIDS & FLUIDS **9**

Elasticity – Stress-Strain Diagram and its Uses - Factors Affecting Elastic Modulus – Torsional Stress and Deformations – Twisting Couple - Torsion Pendulum: Theory and Experiment - Bending of beams - B ending Moment – Cantilever: Theory and Experiment – Uniform and Non-Uniform Bending: Theory and Experiment - I-Shaped Girders.

UNIT III ACOUSTICS & ULTRASONICS **9**

ACOUSTICS : Classification of Sound – Decibel - Weber Fechner Law- Reverberation-Sabine's formula (Qualitative) - Factors affecting Acoustics of Buildings and their Remedies.

ULTRASONICS: Properties -Production of Ultrasonics - Magnetostriction and Piezoelectric methods - Acoustic Grating - Non Destructive Testing – Pulse echo system, through Transmission and Reflection modes - Medical applications – Sonogram.

UNIT IV QUANTUM PHYSICS **9**

Black Body Radiation – Planck's Theory (derivation) – Wave particle duality – Electron Diffraction – Wave function and its Physical significance – Schrödinger's Wave Equation: Time independent and time dependent equations – Particle in a One-Dimensional box - Scanning Electron Microscope - Transmission Electron Microscope - Quantum Tunneling – Scanning Tunneling Electron Microscope.

UNIT V THERMAL PHYSICS **9**

Transfer of Heat Energy – Thermal expansion of Solids and Liquids – Expansion joints - Bimetallic strips - Thermal Conduction, Convection and Radiation – Heat conductions in Solids – Thermal Conductivity – Lee's disc method: Theory and Experiment - Conduction through Compound Media (series and parallel) – Geothermal Energy - Geothermal power - Thermal battery - Thermal Energy Storage.

TOTAL: 45 PERIODS

:

OUTCOMES

Upon completion of this course, students will be able to;

- Apply crystallographic knowledge to get familiar with the structure of crystalline solids.
- Analyze theories of failure and yield criteria as an elements of properties of matter.
- Understand different materials characterization techniques.
- Apply the basic principles of quantum mechanics and Schrödinger's wave equation to study the complex physical phenomenon.
- Build knowledge about thermal conductivity and its applications.
- Experimentally combine the concepts of thermal, optical, acoustic, and elasticity for use in engineering applications

TEXT BOOKS

1. P.Mani, "A Text book of Engineering Physics" Dhanam Publications, 2018.
2. Rajendran V. "Engineering Physics". TaTa McGraw Hill Publications, 2016
3. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGrawHill, 2017.

REFERENCES

1. Askeland, D. "Materials Science and Engineering". Brooks/Cole, 2010.
2. Wahab, M.A. "Solid State Physics: Structure and Properties of Materials" Narosa Publishing House, 2009
3. Thyagarajan K and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019
4. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015

E-RESOURSES

1. https://archive.nptel.ac.in/courses/122/107/122107035/
2. https://archive.nptel.ac.in/courses/115/101/115101107/

LIST OF EXPERIMENTS

(**Common to Civil, Mechanical, Robotics & Automation & Pharmaceutical Technology**)

(Eight experiments are to be conducted in Lab)

1. Determination of wavelength of laser.
2. Determination of particle Size lycopodium powder using laser.
3. Determination of wavelength of mercury spectrum- Spectrometer.
4. Determination of Young's modulus - Uniform bending.
5. Torsional Pendulum: Determination of moment of inertia and rigidity modulus.
6. Determination of velocity of ultrasonic in liquid.
7. Determination of Viscosity of a liquid – Poiseulle's Method.
8. Determination of thermal conductivity of bad conductor using Lee's Disc Apparatus.
9. Determination of Specific resistance of a given wire using Carey's Foster's Bridge (Virtual).
10. Radiation with Temperature Change Using Stefan's Law. (Virtual)

TOTAL: 15 PERIODS

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	1	1	-	-	-	-	-	-	-	-	-	-	-
2	3	3	1	1	-	-	-	-	-	-	-	-	-	-	-
3	3	3	1	1	-	-	-	-	-	-	-	-	-	-	-
4	3	3	1	1	-	-	-	-	-	-	-	-	-	-	-
5	3	3	1	1	-	-	-	-	-	-	-	-	-	-	-
6	3	3	1	1	-	-	-	-	-	-	-	-	-	-	-
AVG	**3**	**3**	**1**	**1**	-	-	-	-	-	-	-	-	-	-	-

1-Low 2-Medium 3-High '-' – No Correlation

23CYE102 **CHEMISTRY FOR ENGINEERS** **L T P C**

(Common to CIVIL, MECH, R&A) **3 0 2 4**

OBJECTIVES

- To classify the impurities of water and know the treatment and the conditioning methods for domestic and industrial uses.
- To familiarize the types of fuels, calorific value calculations and characteristics of solid, liquid and gaseous fuels.
- To impart knowledge onprinciples and instrumentation of spectroscopy and chromatography.
- To provide students with an understanding of different types of energy sources, energy storage devices, and the principles of energy conversion.
- To be familiar with the types of corrosion and control measures and working of batteries.
- To inculcate practical skills in the determination of water quality parameters and instrumental analysis.

UNIT I WATER TECHNOLOGY 9

Introduction - Characteristics – Hardness – Estimation of hardness by EDTA method – Alkalinity and its estimation - Boiler feed water – Requirements –Boiler troubles (Scale and Sludge) – Internal conditioning (colloidal – Phosphate – Calgon and carbonate conditioning methods) – External conditioning – Zeolite process, Demineralization process – Desalination of brackish water by reverse osmosis-Nano filtration - Municipality water treatment - Break point chlorination.

UNIT II FUELS AND COMBUSTION 9

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 - Diesel oil - Cetane number –Natural gas - Compressed Natural Gas (CNG) –Liquefied Petroleum Gases (LPG) - Power Alcohol and Biodiesel. Combustion of fuels: Introduction - Calorific value - Higher and lower calorific values- Theoretical Calculation of calorific value - Ignition temperature - Spontaneous ignition temperature – Explosive range - Flue gas analysis (ORSAT Method).

UNIT III ANALYTICAL CHEMISTRY 9

Spectroscopy: Electromagnetic spectrum-Absorption of radiation –Electronic, Vibrational and rotational transitions. UV-Visible and IR Spectroscopy-Principles, instrumentation (Block Diagram Only).-Chromatography- General principles - classification - Chromatographic behavior of solutes-Quantitative determination - Gas chromatography - Liquid chromatography – High Pressure Liquid Chromatography –Applications.

UNIT IV ENERGY SOURCES AND STORAGE DEVICES 9

Nuclear Fission – Controlled nuclear fission – Nuclear fusion – Differences between nuclear fission and fusion – Nuclear chain reactions – Nuclear energy – Light water nuclear power plant

– Breeder reactor – Solar energy conversion – Solar cells - Wind energy. Batteries - Types of batteries – Primary battery (dry cell) Secondary battery (lead acid battery, lithium-ion-battery) Fuel Cells - H_2 -O_2 fuel cell – Supercapacitors.

UNIT V ELECTROCHEMISTRY, CORROSION AND ITS CONTROL 9

Introduction-Electrochemical cells applications of electrochemical series-Reference electrode-Standard calomel electrode, ion selective electrode-Glass electrode-Potentiometric titration, Redox titration, Conductometric titration-Strong acid vs Strong base. Corrosion – Types – Chemical Corrosion – Electrochemical Corrosion (galvanic and differential aeration) - Factors influencing corrosion – Material selection and design aspects-Control methods of corrosion – sacrificial anodic and impressed current cathodic protection.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to

- Infer the quality of water and Identify the method of removal of impurities from water for domestic and industrial purpose.
- Illustrate the quality of fuels from its characteristics, to design and develop new combustion systems that are sustainable, efficient, and environmentally friendly.
- Analyze about the interactions of light with matter and the use of analytical techniques to analyze and characterize molecules.
- Recognize different forms of Energy resources and apply them for suitable application in Energy sectors.
- Analyze the causes of corrosion and discuss the control measures and discuss the functions of batteries.
- Determine the water quality parameters and perform quantitative chemical analysis by pH metery, flame photometry, conductometry and potentiometry.

TEXT BOOKS

1. Jain P.C and Monika Jain, "Engineering Chemistry", Dhanpet Rai Publishing Company (P) Ltd.,New Delhi, 2015.
2. S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India Pvt Ltd, New Delhi, 2013.
3. R.Gopalan, "Analytical Chemistry" Sultan Chand & Sons,3th Edition,2017.

REFERENCES

1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company Ltd, New Delhi, 2015.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2012.
3. Shobha Ramakrishnan, Banani Mukhopadhyay," Essentials of Analytical Chemistry"Pearson Education India,2018.

E-RESOURCES

1. https://nptel.ac.in/courses/104105084
2. http://library.iitbbs.ac.in/open-access-e-resources.php

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. Determination of total, temporary & permanent hardness of water by EDTA method.
2. Determination of alkalinity in water sample.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of chloride content of water sample by Argentometric method.
5. Determination of strength of given hydrochloric acid using pH meter.
6. Estimation of sodium and potassium present in water using flame photometer.
7. Conductometric Precipitation Titration using $BaCl_2$ and Na_2SO_4.
8. Conductometric titration of strong acid vs strong base.
9. Estimation of Ferrous ions by Potentiometric Titration.
10. Estimation of copper content in the brass by Iodometry.

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	3	-	1	-	3	-	-	-	-	2	-	-	-
2	1	-	2	-	1	-	-	-	-	-	-		-	-	-
3	2	2	3	1	1	1	-	-	-	-	-	1	-	-	-
4	1	1	2	1		-	-	-	-	-	-	-	-	-	-
5	2	1	2	1	3	-	1	-	-	-	-	-	-	-	-
6	2	3	-	-	3	-	-	-	-	-	-	-	-	-	-
AVG	**1.6**	**1.6**	**2.4**	**1.25**	**1.8**	**1**	**2**	**-**	**-**	**-**	**-**	**1.5**	**-**	**-**	**-**

1-Low 2-Medium 3-High '-' – No Correlation

23GEE101	PROGRAMMING IN C (Lab Embedded Theory Course)	L T P C 3 0 2 4

OBJECTIVES

- To understand the constructs of C Language.
- To study arrays and strings for developing C programs
- To know the functions and pointers application in C programs
- To understand the concepts of structures and Union.
- To understand input/output and file handling in C.
- To develop programs and applications using C.

UNIT I BASICS OF C PROGRAMMING 9

Introduction to programming paradigms – Structure of C program – C programming: Data Types– variables–Storage classes – Constants – Enumeration Constants – Keywords – Operators: Precedence and Associativity – Expressions –Input/Output statements, Assignment statements – Decision making statements – Switch statement – Looping statements – Pre-processor directives – Compilation process.

UNIT II ARRAYS AND STRINGS 9

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 –Sorting – Selection sort, Insertion sort, Merge sort, quick sort – Searching – linear and binary search.

UNIT III FUNCTIONS AND POINTERS 9

Introduction to functions: Function prototype, function call, Built–in functions (string functions, math functions) – Recursion – Example Program: Computation of Sine series, Scientific calculator using built-in functions – Pointers – Pointer operators – Arrays and pointers – Example Program: Sorting of names – Parameter passing: Pass by value, Pass by reference – Example Program: Swapping of two numbers and changing the value of a variable using pass by reference.

UNIT IV STRUCTURES AND UNION 9

Structure – Example Programs – Nested structures – Pointer in Structures – Array of structures -Example Program using structures and pointers – Self referential structures – Dynamic memory allocation.Union- Storage classes

UNIT V FILE PROCESSING 9

Files – Operations of File – Types of file processing: Sequential access, Random access – Sequential access file – Random access file – Command line arguments.

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. Programs using I/O statements, expressions and decision–making constructs.
2. Write a program to find whether the given year is leap year or Not.
3. Design a calculator to perform the operations, namely, addition, subtraction, multiplication, division and square of a number.
4. Check whether a given number is Armstrong number or not?
5. Given a set of numbers like <10, 36, 54, 89, 12, 27>, find sum of weights based on the following conditions.
    a) 5 if it is a perfect cube.
    b) 4 if it is a multiple of 4 and divisible by 6.
    c) 3 if it is a prime number.
6. Populate an array with height of persons and find how many persons are above the average height.
7. From a given paragraph perform the following using built–in functions:(i)Find the total number of words.(ii)Capitalize the first word of each sentence.(iii)Replace a given word with another word.
8. Solve towers of Hanoi using recursion.
9. Locate and Display the Contents of an Array using Pointers.
10. Generate salary slip of employees using structures and pointers.
11. Count the number of account holders whose balance is less than the minimum balance using sequential access file.

TOTAL: 45 +15 = 60 PERIODS

OUTCOMES

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

- Build C programs for simple applications using basic constructs
- Develop C programs using arrays and strings.
- Construct C programs using functions, recursion and pointers
- Implement applications in C using structures.
- Develop applications in C using file processing.
- Develop applications using C programming constructs

TEXT BOOKS

1. E.Balagurusamy,"Programming in ANSI C", Tata McGraw Hill, 8th Edition, 2019.
2. Kernighan, B.W and Ritchie,D.M,"The C Programming language", 2nd Edition, Pearson Education, 2016.

REFERENCES

1. ReemaThareja, "Programming in C", Oxford University Press, 2nd Edition, 2016.
2. Juneja, B. L and Anita Seth, "Programming in C", CENGAGE Learning India pvt.Ltd., 2011.

E – RESOURCES

1. https://nptel.ac.in/courses/106/105/106105085/ (Introduction to C Programming)
2. https://nptel.ac.in/courses/106/106/106106210/ (Stack Operations)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	2	2	1	2	1	1	1	2	-	3	2	1	2	-
2	2	2	2	1	2	1	1	1	2	-	3	3	2	2	-
3	2	3	2	1	2	1	1	1	2	-	3	2	2	2	-
4	3	2	2	1	3	1	1	1	2	-	3	3	2	2	-
5	2	3	3	1	2	1	2	1	2	-	3	2	2	3	-
6	2	2	3	2	1	2	-	-	2	1	2	2	2	2	-
AVG	**2.00**	**2.33**	**2.33**	**1.16**	**2.00**	**1.66**	**1.00**	**0.83**	**2.00**	**0.16**	**2.83**	**2.33**	**1.83**	**2.16**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No correlation

SEMESTER II

23HST201	**PROFESSIONAL ENGLISH – II**	**L T P C**
	(Common to all B.E. & B.Tech. Branches)	**3 0 0 3**

OBJECTIVES

- To use grammatical components effectively in written communication.
- To read and understand on comprehend technical writing.
- To develop skills for writing email, business letters, Job Application Letter and Resume.
- To write checklist, recommendation, transcoding graphics and letter.
- To speak fluently in real contexts.

UNIT I GRAMMAR **9**

Articles - Prepositions - Compound words - Conditionals - Subject verb agreement - Active and Passive voice - Impersonal Passive Voice.

UNIT II LISTENING & READING **9**

Syllabification – Reading Vocabulary - Reading Newspapers - Listening to Youtube Documentaries - Listening to Podcast - Listening to Motivational Movies.

UNIT III BUSINESS WRITING **9**

E-mail writing - fixing an appointment, cancelling appointment, conference details, training programme details, paper submission for seminars and conferences - Job Application Letter and Résumé.

UNIT IV WRITING **9**

Checklist - Writing Recommendations - Transcoding Graphics - Bar Chart, Flow Chart, Pie Chart and Tables - Formal Letter Writing - inviting dignitaries and declining invitations.

UNIT V SPEAKING **9**

Collaborative task - Turn taking (initiating and responding appropriately) - Negotiating - Exchanging - Suggesting - Comparing and Contrasting – Expressing - Finding out facts, attitudes and opinions - Situational Role-play.

TOTAL: 45 PERIODS

Mandatory activity: Power Point Presentation

OUTCOMES

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

- Use grammar to frame sentences and write sentences in passive forms
- Read vocabulary, newspaper and improve listening skills
- Draft emails, write business letters, construct resume with job application letter.
- Frame checklist, write recommendation and Transcoding graphical representation.
- Develop speaking skill for taking part in Collaborative task and Situational Role-play.

TEXT BOOKS

1. S. Sumant Maven Learning. Technical English II.
2. KN Shoba, Lourdes Joavani Rayen. Communicative English. Published by Cambridge university, 2017.

REFERENCES

1. Dr K Elango, Dr. Veena Selvam, Dr. Sujatha Priyadarshini, "Resonance English for Engineers and Technologists", Cambridge University Press, 1st Edition, Foundation Books, New Delhi, 2013.
2. Seely, John. Oxford Guide to Effective Writing and Speaking. Indian ed. New Delhi: Oxford University Press. 2005.
3. Norman Whitby, Business Benchmark- Pre-Intermediate to Intermediate, Students book, Cambridge University Press, 2006.

E-RESOURCES

1. https://www.fluentu.com/Blog/english/english-small-talk
2. https://www.britishcouncil.com

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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2	-	-	-	-	2	1	1	1	2	3	-	3	-	-	-
3	-	-	-	-	2	1	2	1	2	3	-	3	-	-	-
4	-	-	-	-	-	1	1	1	1	3	-	3	-	-	-
5	-	-	-	-	-	2	1	1	3	3	-	3	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**-**	**-**	**-**	**-**	**2.00**	**1.20**	**1.20**	**1.00**	**2.00**	**3.00**	**-**	**3.00**	**-**	**-**	**-**

1- Low 2- Medium 3- High '-' – No Correlation

23MAT201 STATISTICS AND NUMERICAL METHODS WITH MATLAB L T P C

(Common to all B.E./ B.Tech. Branches) **3 1 0 4**

OBJECTIVES

- To provide the necessary basic concepts in testing of hypothesis for small and large samples which plays an important role in real life problems.
- To acquaint the knowledge of classifications of design of experiments.
- To extend the basic concepts of solving algebraic and transcendental equations.
- To apply the numerical techniques of interpolation and integration.
- To produce the knowledge of various techniques in solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS 9+3

Sampling distribution – Testing of significance for single proportion, single mean and difference of means – Test of significance for small samples by 't' test – Snedecor's F- test of significance – Chi-square test : Chi-square test of goodness of fit – Independent of attributes.

UNIT II DESIGN OF EXPERIMENTS 9+3

Basic principles of experimental design – Completely randomised design – Analysis of vaiance for one way classification – Randomised block design – Analysis of variation for two factor experiments variations – Latin square design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3

Solution of algebraic and transcendental equations by Newton Raphson method – Solution of simultaneous algebraic equations by Gauss elimination, Gauss Jordan and Gauss Seidel methods – Matrix Inversion by Gauss Jordan method – Eigen values of a matrix by Power method.

UNIT IV INTERPOLATION AND NUMERICAL INTEGRATION 9+3

Interpolation: Newton's forward and backward interpolation formulae – Lagrange's interpolation formula – Newton's divided difference formula – Numerical integration by Trapezoidal and Simpson's 1/3 rule –Numerical double integration by Trapezoidal rule.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9+3

Euler's method – Modified Euler's method – Fourth order Runge - Kutta method for solving first order equations – Taylor's series method – Predictor-corrector methods: Milne's method – Adams-Bash forth method.

OUTCOMES

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

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

LIST OF TUTORIALS

1. Solving one sample and paired sample't' test.
2. Determination of roots of a polynomial.
3. Solution of linear system of equations by Gauss Seidel methods.
4. Evaluation of line integrals by Trapezoidal rule.
5. Solution of ordinary differential equations by Euler's method.

TOTAL:45+15=60 PERIODS

TEXT BOOKS

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Dr.Kandasamy. P, Dr.Thilagavathy . K and Dr. Gunavathy .K., "Statistics and Numerical Methods", S. Chand and Company Ltd., NewDelhi, 2010.

REFERENCES

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Gupta S.C. and Kapoor V.K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, 12th Edition, New Delhi, 2020.

E-RESOURCES

1. https://nptel.ac.in/courses/111/105/111105041/ (Statistics)
2. https://nptel.ac.in/courses/111/107/111107105/ (Numerical Methods)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	1	1	2	-	-	-	1	-	2	3	-	-	-
2	3	3	1	1	2	-	-	-	1	-	2	3	-	-	-
3	3	3	1	1	2	-	-	-	1	-	2	3	-	-	-
4	3	3	1	1	2	-	-	-	1	-	2	3	-	-	-
5	3	3	1	1	2	-	-	-	1	-	2	3	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**3**	**3**	**1**	**1**	**2**	**-**	**-**	**-**	**1**	**-**	**2**	**3**	**-**	**-**	**-**

1- Low 2- Medium 3- High '-' – No Correlation

23PHT201 **MATERIALS SCIENCE** **L T P C**

(Common to Civil, Mechanical, R & A and Pharm.Tech) **3 0 0 3**

OBJECTIVES

- To learn the principles of cryogenics and superconductivity and applications.
- To be familiar with the application of physics concepts to microscopic and NDT Testing.
- To explore different kind of nano materials and synthesis of nano materials, applications.
- To gain the knowledge of advanced and smart materials for various engineering applications.
- To study different composite materials and synthesize methods.

UNIT I CRYOGENICS **9**

Introduction to Cryogenics - Properties of Cryogenic Fluids- Gas-Liquefaction of Gases and Refrigeration Systems – Cryocoolers -Cryogenic Insulations - Superconductivity: Properties – Type I and Type II Superconductors – BCS theory of Superconductivity - High Tc superconductors – General applications of Superconductors –Cryotron and Magnetic levitation.

UNIT II MATERIALS CHARACTERIZATION **9**

Introduction to materials and Techniques-X-Ray Diffraction (XRD) – Atomic Force Microscopy (AFM)- Fourier Transform Infrared Spectroscopy (FTIR)- UV-Vis Spectroscopy- Non-Destructive Testing (NDT) : Liquid Penetrant Test, Magnetic Detection, Electromagnetic Testing, Ultrasonic Test, Thermal Infrared Testing and Spark Test.

UNIT III NANOMATERIALS & NANODEVICES **9**

Emergence of Nano science - Role of Particle Size - Quantum Structures: Quantum Well, Quantum Wire and Quantum Dot- Properties at Nano Scale (Optical, Electronic and Magnetic) - Synthesis of Nanomaterials: Physical Vapour Deposition (PVD) - Pulsed Laser Deposition (PLD) - Ball Milling - Carbon Nanotubes - Micro Electro Mechanical Systems (MEMS) - Nano Electro Mechanical Systems (NEMS).

UNIT IV SMART MATERIALS **9**

Intelligent / Smart materials – Functional materials – Polyfunctional Materials – Structural Materials, Electrical Materials, Bio-Compatible Materials. – Intelligent Biological Materials - Metallic Glasses: Types, Glass forming ability of Alloys, Melt spinning process, Applications - Shape Memory Alloys: Phases, Shape Memory Effect, Pseudo elastic effect, NiTi alloy, and applications.

UNIT V COMPOSITE MATERIALS **9**

Definitions, Composites, Reinforcements and Matrices, Types of Reinforcements, Types of Matrices, Types of Composites, Carbon Fibre Composites, Properties of Composites in Comparison with Standard Materials, Applications of Metal, Ceramic and Polymer matrix composites. Hand and spray lay - Up, Injection molding, Resin injection, Filament winding, Pultrusion, Centrifugal casting and Prepregs.

TOTAL: 45 PERIODS

OUTCOMES

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

- Learn the potential applications of superconductors.
- Acquire knowledge on various materials characterization techniques.
- Understand the fundamentals of nano materials and various synthesize methods.
- Build knowledge about smart materials and their applications.
- Create methodologies and develop the principles of composite materials.

TEXT BOOKS

1. P.Mani, " A Text book of Engineering Physics " Dhanam Publications, 2018
2. Rajendran V. "Engineering Physics". TaTa McGraw Hill Publications, 2012.
3. Sam Zhang, Lin Ki, Ashok Kumar, Materials Characterization Techniques,CRC Press, Taylor & Francis Group, Boca Raton, Florida, 2009

REFERENCES

1. Askeland, D. "Materials Science and Engineering". Brooks/Cole, 2010.
2. Wahab, M.A. "Solid State Physics: Structure and Properties of Materials" Narosa Publishing House, 2009.
3. P. SanthanaRagavan and P. Ramasamy, "Crystal Growth Processes and Methods", KRU Publications, Kumbakonam, 2017.

E-RESOURCES

1. https://nptel.ac.in/courses/112108150/
2. https://swayam.gov.in/nd1_noc19_mm13/preview

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	3	2	1	2	1	1	-	-	-	-	-	-	-	-
2	2	3	2	1	2	1	1	-	-	-	-	-	-	-	-
3	2	3	2	1	2	1	1	-	-	-	-	-	-	-	-
4	2	3	2	1	1	1	1	-	-	-	-	-	-	-	-
5	2	3	2	1	2	1	1	-	-	-	-	-	-	-	-
AVG	2	3	2	1	1.8	1	1	-	-	-	-	-	-	-	-

1-Low 2-Medium 3-High '-' – No Correlation

23CYT201 ENVIRONMENTAL SCIENCE AND SUSTAINABILITY L T P C
(Common to All B.E /B.Tech Branches) **3 0 0 3**

OBJECTIVES

- To understand the importance of the environment, ecosystem, biodiversity and its conservation.
- To impart knowledge on various kinds of pollutions, solid waste management and precautionary measures for disasters.
- To be familiar with the social issues and identify the possible way to improve the quality of the environment.
- To analyze the problems of overpopulation and understand the value education.
- To familiarize the concept of sustainability and implement sustainable practices in various fields.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 9

Definition, scope and importance of environment – Need for public awareness - Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, rivers, oceans) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – Biogeographically classification of India – Value of biodiversity – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity – Endangered and endemic species of India – Conservation of biodiversity: In-Situ and Ex-Situ conservation of biodiversity.

Activity: Biodiversity in and around the campus and report submission.

UNIT II ENVIRONMENTAL POLLUTION 9

Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – Solid waste management: causes, effects and control measures of municipal solid wastes - E-waste – Role of an individual in prevention of pollution - Pollution case studies – Disaster management: floods, earthquake and cyclone.

Activity: Local pollution case study and report submission.

UNIT III SOCIAL ISSUES AND THE ENVIRONMENT 9

Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns, case studies - Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – Wasteland reclamation – Green Chemistry and principles - Environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – Public awareness.

Activity: Creating environmental awareness.

UNIT IV HUMAN POPULATION AND THE ENVIRONMENT 9

Population growth, variation among nations – Population explosion – Family welfare programme – Environment and human health – Human rights – Value education – HIV / AIDS – Women and child welfare – Role of information technology in environment and human health – Case studies.

Activity: Visit to local primary health center.

UNIT V SUSTAINABLE MANAGEMENT 9

Sustainability-Concept, needs and challenges-economic, social and aspects of sustainability-From unsustainability to sustainability-Millennium development goals, and protocols-Sustainable Development Goals-Targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-Case studies. Zero waste and R concept, Material Life cycle assessment, Environmental Impact Assessment, Sustainable habitat: Energy efficiency, Sustainable transports.

Activity: Field trips to local organizations or facilities with sustainable practices in place.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to

- Acquire knowledge on public awareness & about the environment, ecosystem and biodiversity.
- Find solutions for pollutions and waste management to improve the quality of environment.
- Identify the causes of social issues and apply the concept of green chemistry to maintaining a clean environment.
- Analyze the effects of human population and issues related to the environment and human health.
- Understand the different goals of sustainable development and apply them for suitable technological advancement and societal development.

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. Allen, D. T. and Shonnard, D. R., "Sustainability Engineering: Concepts, Design and Case Studies", 1st edition, Prentice Hall, 2015.

REFERENCES

1. Erach Bharucha, "Textbook of Environmental Studies", Universities Press(I) Pvt Ltd, Hydrabad, 2015.

2. Dharmendra S. Sengar, "Environmental law", Prentice hall of India Pvt Ltd, New Delhi, 2007.
3. Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2005.

E-RESOURCES

1. https://nptel.ac.in/courses/122102006/
2. https://swayam.gov.in/nd1_noc19_ge22/preview

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	1	3	2	-	1	3	-	1	-	-	1	-	-	-
2	2	2	2	2	2	2	1	-	-	-	-	-	-	-	-
3	-	2	2	2	1	1	3	-	-	-	-	-	-	-	-
4	1	2	2	1	1	2	3	3	-	-	-	-	-	-	-
5	-	2	2	2	2	1	1	1	-	2	-	-	-	-	-
AVG	1.5	1.8	2.2	1.8	1.5	1.4	2.2	2	1	2	-	1	-	-	-

1-Low 2-Medium 3-High '-' – No Correlation

23CET201 APPLIED MECHANICS LT P C
3 1 0 4

OBJECTIVES

- To learn the definition of particle, body, force and their equilibrium conditions.
- To introduce the concept of equilibrium of rigid bodies.
- To learn about the properties of surfaces and solids.
- To study and understand the basic concepts of friction.
- To developbasic dynamics concepts – force, momentum, work and energy

UNIT I STATICS OF PARTICLES 9+3

Introduction – Laws of Mechanics – Parallelogram and Triangular Law of forces – Principle of Transmissibility – Force system – Resolution of force –Free body diagram–Equilibrium of a particle in plane – Forces in space – Equilibrium of a particle in space.

UNIT II STATICS OF RIGID BODIES 9+3

Moments: Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar component of moments – Varignon's theorem– Equivalent systems of forces – Single equivalent force. Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions.

UNIT III PROPERTIES OF SURFACES AND SOLIDS 9+3

First moment of area and Centroid of sections – T section- I section- Angle section- Hollow section from primary simpler sections – Second moment of plane areas – Parallel axis theorem and Perpendicular axis theorem – T section – I section- Angle section- Hollow section –Product of Inertia- Principal Moment of Inertia of plane area- Mass moment of inertia.

UNIT IV FRICTION 9+3

Surface Friction – Laws of dry friction – Angle of friction & Angle of repose – Sliding friction – Static and Kinetic friction– Ladder friction – Wedge friction – Belt friction. Rectilinear motion of particles.

UNIT V DYNAMICS OF PARTICLES AND KINEMATICS OF RIGID BODY 9+3

Dynamics of Particles: Newton's law, Work – Energy and Impulse – Momentum equations of particles – Impact of elastic bodies. Kinematics of Rigid body: Translation – Rotation about a fixed axis

TOTAL: 45 +15=60 PERIODS

OUTCOMES

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

- Represent the forces in vector components (both 2D and 3D) and apply equilibrium conditions.
- Calculate the moment produced by various force systems and conclude the static equilibrium equations for rigid body system.
- Compute the centroid, centre of gravity and moment of inertia of geometrical shapes and solids respectively.
- Employ the effect of dry friction and its applications.
- Apply the different principles to study the motion of a body and analyse their constitutive equations.

TEXT BOOKS

1. Beer F.P and Johnston Jr. E.R, "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 10th Edition, Tata McGraw Hill Publishing company, New Delhi, 2017.
2. Kumar K.L, "Engineering Mechanics", 4th Edition, Tata McGraw-Hill Publishing company, New Delhi ,2017.
3. Vela Murali, "Engineering Mechanics", Oxford University Press,New Delhi, 2018.

REFERENCES

1. Hibbeller R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 14th Edition, Pearson Education, 2017.
2. Meriam J L and Kraige L G, "Engineering Mechanics: Statics and Engineering Mechanics: Dynamics", 7th edition, Wiley student edition, 2013.
3. Boresi P and Schmidt J, "Engineering Mechanics: Statics and Dynamics", 1/e, Cengage learning, 2018.

E-RESOURCES

1. https://nptel.ac.in/courses/122/104/122104015/(Engineering Mechanics)
2. https://www.courses.com/indian– institute– of– technology– guwahati/engineering– mechanics (Engineering Mechanics)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	2	-	-	-	-	-	-	-	3	3	3	3
2	3	3	2	2	-	-	-	-	-	-	-	3	3	3	3
3	3	3	2	2	-	-	-	-	-	-	-	3	3	3	3
4	3	3	2	2	-	-	-	-	-	-	-	3	3	3	3
5	3	3	2	2	-	-	-	-	-	-	-	3	3	3	3
AVG	**3**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**3**	**3**

1-Low 2-Medium 3-High '-' – No Correlation

23HST202 TAMIL AND TECHNOLOGY L T P C

1 0 0 1

UNIT I WEAVING AND CERAMIC TECHNOLOGY 3

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

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY 3

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

UNIT III MANUFACTURING TECHNOLOGY 3

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

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

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

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING 3

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

TOTAL: 15 PERIODS

TEXT BOOKS

1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
2. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
3. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

4. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
5. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
6. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
7. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

REFERENCE BOOKS

1. Heritage of Tamils, Published by :Yes Dee Publishing Pvt Ltd, Chennai
2. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

23HST202 **தமிழரும் தொழில்நுட்பமும்** **L T P C**

1 0 0 1

அலகு I நெசவு மற்றும் பானைத் தொழில்நுட்பம்: **3**

சங்க காலத்தில் நெசவுத் தொழில் – பானைத்தொழில்நுட்பம் – கருப்பு சிவப்பு பாண்டங்கள் – பண்டங்களில் கீறல் குறியீடுகள்.

அலகு II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்: **3**

சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்ககாலத்தில் வீட்டுப்பொருட்களில் வடிவமைப்பு- சங்ககாலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச் சிற்பங்களும், கோவில்களும் – சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக்கோயில்கள் மாதிரி கட்டமைப்புகள் பற்றி அறிதல் மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள்–பிரிட்டிஷ்காலத்தில் சென்னையில் இந்தோ – சரோசெனிக் கட்டிடக் கலை.

அலகு III உற்பத்தித் தொழில்நுட்பம்: **3**

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

அலகு IV வேளாண்மை மற்றும் நீர்பாசனத் தொழில் நுட்பம்: **3**

அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமிழித் தூம்பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்து பண்டைய அறிவு – அறிவுசார் சமூகம்.

அலகு V அறிவியல் தமிழ் மற்றும் கணித்தமிழ்: **3**

அறிவியல் தமிழின் வளர்ச்சி – கணித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின்பதிப்பு செய்தல் – தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகம் – தமிழ் மின்நூலகம் – இணையத்தில் தமிழ்அகராதிகள்– சொற்குவைத் திட்டம்

TOTAL: 15 PERIODS

TEXT BOOKS

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

REFERENCE BOOKS

1. தமிழர் மரபு -முனைவர் ஆ பூபாலன் (வி ஆர்பி பி பப்ளிஷர்ஸ்)

23GEE201	ENGINEERING GRAPHICS	L T P C
	(Common to all Programmes)	3 0 2 4

OBJECTIVES

- To acquire the knowledge of various curves.
- To learn projections of points, lines, planes viewed in different positions
- To impart the graphical skills for converting pictorial views of solids in to ortthographical views and perspective projections.
- To learn the principles of projection of solids.
- To gain the knowledge about the section of solids and development of surfaces of the given solids.

UNIT I PLANE CURVES (Manual drafting) 9+3

Principles of Engineering Graphics and their significance, usage of Drawing instruments, Types of Lines, Dimensioning Systems as per BIS conventions. **(Not for Examination)**

Construction of ellipse – Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the curves.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES (Manual drafting) 9+3

Projection of points – Projection of straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to one reference planes.

UNIT III ORTHOGRAPHIC AND PERSPECTIVE PROJECTIONS (Manual drafting) 9+3

Conversion of isometric projection into orthographic projection. Perspective projection of prisms, pyramids, cones and cylinders by visual ray method.

UNIT IV PROJECTION OF SOLIDS (CAD software) 9+3

Projections of solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT V SECTION OF SIMPLE SOLIDS AND DEVELOPMENT OF SURFACES (CAD software) 9+3

Sectioning of simple solids like prisms – pyramids, cylinder and cone - Inclined to one reference plane. Development of lateral surfaces of simple and truncated solids: Prisms, Pyramids, Cylinders and Cones.

TOTAL:45+15=60 PERIODS

OUTCOMES

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

- Predict the construction of various curves.
- Analyze the principles of projection of various planes by different angle to project points, lines and plane surfaces.
- Draw the projection of three dimensional into two dimensional objects and perspective projections**.**
- .Draw the principles of projection of simple solids by change of position method.
- Construct the sectional views of components and develop the component surface.

TEXT BOOKS

1. Venugopal K. and Prabhu Raja V., - "Engineering Graphics", 15th Edition, New Age International (P) Limited, New Delhi, 2018.
2. Natarajan K.V., "Engineering Graphics", 32nd Edition, Dhanalakshmi Publishers, Chennai, 2019.
3. Bhatt N.D., "Engineering Drawing", 53rd Edition Charotar Publishing House Pvt. Ltd., 2014.

REFERENCES

1. K.R. Gopalakrishna, "Engineering Drawing Volume 1 & 2", 55th Edition, Subhas Publications, Bangalore, 2017.
2. T.Jeyapoovan., "Engineering Graphics using Auto CAD" 3rd Edition, vikas publishing house Pvt Ltd, New Delhi, 2017.
3. Dhananjay A. JoIhe, Engineering Drawing with an introduction to AutoCAD, Tata McGraw Hill Publishing Company Limited, 2008.

E- RESOURCES

1. https://nptel.ac.in/courses/112/103/112103019/ - (Geometric Constructions)
2. https://nptel.ac.in/courses/105/104/105104148/ - (Projections)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	-	2	2	-	-	-	2	-	2	2	2	2
2	3	2	2	-	2	2	-	-	-	2	-	2	2	2	2
3	3	2	2	-	2	2	-	-	-	2	-	2	2	2	2
4	3	2	2	-	2	2	-	-	-	2	-	2	2	2	2
5	3	2	2	-	2	2	-	-	-	2	-	2	2	2	2
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Avg	**3**	**2**	**2**	**-**	**2**	**2**	**-**	**-**	**-**	**2**	**-**	**2**	**2**	**2**	**2**

1-Low 2-Medium 3-High '-' – No Correlation

23GEL201 ENGINEERING PRACTICES LABORATORY L T P C
0 0 4 2

OBJECTIVES

- Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planning; making joints in wood materials used in common household wood work.
- Wiring various electrical joints in common household electrical wirework.
- Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
- Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES 15

PLUMBING WORK:

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
b) Preparing plumbing line sketches.
c) Laying pipe connection to the suction side of a pump
d) Laying pipe connection to the delivery side of a pump.
e) Connecting pipes of different materials: Metal, plastic and flexible pipes used inhousehold appliances.

WOOD WORK:

a) Sawing,
b) Planing and
c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

Wood Work Study:

a) Studying joints in door panels and wooden furniture
b) Studying common industrial trusses using models.

PART II **ELECTRICAL ENGINEERING PRACTICES** **15**

a) Introduction to switches, fuses, indicators and lamps - Basic switch boardwiring with lamp, fan and three pin socket
b) Staircase wiring
c) Fluorescent Lamp wiring with introduction to CFL and LED types.
d) Energy meter wiring and related calculations/ calibration
e) Study of Iron Box wiring and assembly
f) Study of Fan Regulator (Resistor type and Electronic type using Diac/Triac/quadrac)
g) Study of emergency lamp wiring/Water heater

GROUP – B (MECHANICAL AND ELECTRONICS)

PART III **MECHANICAL ENGINEERING PRACTICES** **15**

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.
b) Practicing gas welding.

BASIC MACHINING WORK:

a) (simple)Turning
b) (simple)Drilling
c) (simple)Tapping

ASSEMBLY WORK:

a) Assembling a centrifugal pump.
b) Assembling a household mixer.
c) Assembling an airconditioner.

SHEET METAL WORK:

a) Making of a square tray

FOUNDRY WORK:

a) Demonstrating basic foundry operations.

PART IV **ELECTRONIC ENGINEERING PRACTICES** **15**

SOLDERING WORK:

a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK

a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY:

a) Study an elements of smart phone..
b) Assembly and dismantle of LED TV.
c) Assembly and dismantle of computer/ laptop

TOTAL = 60 PERIODS

OUTCOMES:

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

- Draw pipe line plan; layout and connect various pipe fittings used in common household plumbing work; Sawing; planning; making joints in wood materials used in common household wood work.
- Wire various electrical joints in common household electrical wirework.
- Weld various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
- Solder and tests simple electronic circuits; Assembling and testing simple electronic components on PCB

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
2	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
3	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
4	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
5	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
6	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
AVG	**3**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**2**	**2**	**1**	**1**

1-Low 2-Medium 3-High '-' – No Correlation

23EEC201 **COMMUNICATION SKILLS** **L T P C**
(Common to all B.E. & B.Tech. branches) **0 0 4 2**

OBJECTIVES

- To use vocabularies appropriately in a sentence and various situations.
- To improve communicative competence through listening.
- To make effective presentations and group discussions.
- To read and recognize different context.
- To write paragraph, essay and special addresses.

Unit I VOCABULARY **6**

Vocabulary building – Articulate ideas and thoughts; usage of palindromes, greetings, wishes, festival related words - Vocabulary Words with Sentences. - Idiomatic Expressions.

Unit II LISTENING **6**

Listening Skill- Its importance – Purpose - Process - Types- Barriers - Effective Listening strategies- Listening to telephonic conversations – Watching Inspiring Speech videos on Youtube - Listening native speaker's videos for pronunciation - Listening to broadcast, messages, announcements - Listening to Instagram Videos.

Unit III SPEAKING **6**

JAM Talk - Role play - Debate - Conversational skills (formal and informal) - Conversation practice - Group Discussion and Interview Skills – Introducing oneself and others – Goal Settings - Immediate, Long term and short term.

Unit IV READING **6**

Reading for the Main idea- Finding Specific Information - Reading for Detail - Read and recognize different text types ranging from newspaper, articles, magazines, books and Reading autobiographies.

Unit V WRITING **6**

Paragraph Writing - Essay writing - Creative writing - Special Address on Specific topic - Welcome Address, vote of Thanks.

OUTCOMES

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

- Improve vocabulary and express the same contextually.
- Listen and comprehend the general and technical text.
- Speak effectively in presentation, debate and group discussions.
- Read and understand the concept from newspapers, articles, magazines and books.

- Draft special addresses, welcome address, vote of thanks and write paragraph and essay.

TEXT BOOKS

1. Gramer F. Margot and Colin S. Ward Reading and Writing (Level 3) Oxford University Press: Oxford, 2011
2. Brooks,Margret. Skills for Success. Listening and Speaking. Level 4 Oxford University Press, Oxford: 2011

REFERENCES

1. Davis, Jason and Rhonda LIss. Effective Academic Writing (Level 3) Oxford University Press: Oxford, 2006
2. E. Suresh Kumar and et al. Enriching Speaking and Writing Skills. Second Edition. Orient Black swan:
3. Anderson, Kenneth et al. Study Speaking: A Course in Spoken English for Academic Purposes. United Kingdom: Cambridge University Press 1992.
4. Technical communication by Asraf rezvi

EXTENSIVE READING

1. Dr. A. P. J. Abdul Kalam " Wings of Fire "

E-RESOURCES

1. https://youglish.com
2. https://newsinlevels.com
3. https://britishcouncil.org
4. https://writeandimprove.com

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	-	-	-	-	1	1	1	1	3	-	3	-	-	-
2	-	-	-	-	-	1	-	-	1	3	-	3	-	-	-
3	-	-	-	-	-	1	2	2	3	3	-	3	-	-	-
4	-	-	-	-	-	2	2	-	3	3	-	3	-	-	-
5	-	-	-	-	-	1	1	-	1	3	-	3	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	-	-	-	-	-	1.20	1.50	1.50	1.80	3.00	-	3.00	-	-	-

1-Low 2-Medium 3-High '-' – No Correlation

SEMESTER III

23MAT301	**TRANSFORMS AND COMPLEX FUNCTIONS**	**L T P C**
	[Common to Civil, EEE, Mech, R&A and PT]	**3 1 0 4**

OBJECTIVES

- To explain Fourier transforms techniques used in wide variety of situations.
- To utilize the effective mathematical tools to develop Z transform techniques for discrete time systems.
- To apply the Fourier series analysis to many applications in engineering to solve boundary value problems.
- To develop the fundamental concepts in analytic functions, conformal mapping and bilinear transformations.
- To extend the standard techniques of complex integration.

UNIT I FOURIER TRANSFORMS **9+3**

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

UNIT II Z-TRANSFORMS AND DIFFERENCE EQUATIONS **9+3**

Z-transforms: Some standard Z-transforms – Elementary properties – Some useful Z-transforms and inverse Z- transforms – Convolution theorem – Evaluation of Inverse Z-transforms by partial fraction method – Application to difference equations.

UNIT III FOURIER SERIES **9+3**

Euler's formulae – Conditions for a Fourier expansion – Functions having points of discontinuity – Odd and even function – Half range series – Parseval's formula – Practical Harmonic analysis.

UNIT IV ANALYTIC FUNCTIONS **9+3**

Cauchy-Riemann equations – Analytic functions – Properties of analytic functions – Harmonic functions – Orthogonal system – Construction of analytic functions – Bilinear transformation – Conformal transformation by w = 1/z.

UNIT V COMPLEX INTEGRATION **9+3**

Cauchy's theorem – Cauchy's integral formula –Taylor's and Laurent's series – Residues: Residue theorem – Calculation of residues – Evaluation of real definite integrals: Integration around the unit circle.

OUTCOMES

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

- Analyze some of the physical problems of engineering by Fourier transforms.
- Apply Z transforms techniques in solving difference equation.
- Solve differential equations using Fourier series analysis.
- Develop the concept of analytic functions, conformal mapping and bilinear transformations.
- Evaluate integrals using Cauchy's integral formula and residue theorem.

LIST OF TUTORIALS

1. Calculate Fourier transform of simple functions.
2. Solve difference equations by Z transforms.
3. Computation of Fourier series coefficient.
4. Determination of Bilinear transformation for the given set of points.
5. Calculate complex line integration.

TOTAL: 45+15=60 PERIODS

TEXT BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. Erwin Kreyszig, "Advanced Engineering Mathematics ", 10thEdition, John Wiley, India, 2016.

REFERENCES

1. N.P. Bali. and Manish Goyal, "A Textbook of Engineering Mathematics", 9thEdition, Laxmi Publications Pvt. Ltd, 2014.
2. Dr.Kandasamy. P, Dr.Thilagavathy . K and Dr. Gunavathy .K, "Engineering Mathematics – Volume III", S. Chand and Company Ltd., NewDelhi, 2010.

E-RESOURCES

1. https://archive.nptel.ac.in/courses/111/102/111102129/# (Transforms)
2. https://archive.nptel.ac.in/courses/111/105/111105134/ (Complex functions)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	1	-	2	-	-	1	2	-	-	2	-	-	-
2	3	3	1	-	2	-	-	1	2	-	-	2	-	-	-
3	3	3	1	-	2	-	-	1	2	-	-	2	-	-	-
4	3	3	1	-	2	-	-	1	2	-	-	2	-	-	-
5	3	3	1	-	2	-	-	1	2	-	-	2	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**3**	**3**	**1**	**-**	**2**	**-**	**-**	**1**	**2**	**-**	**-**	**2**	**-**	**-**	**-**

1-Low 2-Medium 3-High '-' – No Correlation

23CET301 CONSTRUCTION MATERIALS AND PRACTICES L T P C
3 0 0 3

OBJECTIVES

- To understand the basic of Bricks, Cement and Concrete Blocks.
- To learn the Characteristics of lime, cement, aggregates and mortar.
- To relate the fundamentals of timber and building component.
- To learn the basic concepts of modern materials.
- To study the importance of good concrete construction.

UNIT I STONES, BRICKS AND CONCRETE BLOCKS 9

Stone as Building Material – Criteria for Selection – Tests on Stones – Deterioration and Preservation of Stone Work – Bricks – Classification – Manufacturing of Clay and Fly Ash Bricks – Tests on Bricks– Compressive Strength – Water Absorption – Efflorescence – Bricks for Special Use – Refractory Bricks – Cement, Concrete Blocks – Light weight Concrete Blocks.

UNIT II LIME,CEMENT , AGGREGATES AND MORTAR 9

Lime: Characteristics, Classification, Manufacturing Process – Cement: Ingredients, Types and Grades, Properties, Manufacturing process, Testing of Cement – Industrial By – products: Fly ash – Aggregates: Natural Stone Aggregates, Classification Characteristics of Aggregates, Testing of Aggregates – Cement Mortar: Functions, Uses of Mortar, Types of Mortar, Ingredients of Mortar, Tests.

UNIT III TIMBER AND OTHER MATERIALS 9

Timber – Market Forms – Industrial Timber– Plywood – Veneer – Thermacole – Panels Laminates-Steel – Aluminum and Other Metallic Materials – Composition–Aluminium composite panel–Uses– Market forms – Mechanical treatment – Paints – Varnishes – Distempers – UPVC in doors, windows, MDF materials – Paneling materials and false ceiling techniques.

UNIT IV MODERN MATERIALS 9

Glass – Ceramics – Sealants for Joints – Fibre Glass Reinforced Plastic – Clay Products – Refractories – Composite Materials – Types – Applications of Laminar Composites – Fibre Textiles – Geo – membranes and Geo – textiles for Earth Reinforcement – Recycled Aggregates.

UNIT V CONSTRUCTION PRACTICES 9

Specifications, Details and Sequence of Activities and Construction Co-ordination – Site Clearance – Marking – Earthwork – Masonry – Stone masonry – Bond in Masonry – Concrete Hollow Block Masonry – Flooring – Damp Proof Courses – Construction Joints – Movement and Expansion Joints – Precast Pavements – Building Foundations – Basements Temporary Shed – Centering and Shuttering – Slip forms –

Scaffoldings –De-shuttering Forms – Laying Brick Weather and Waterproof – Roof Finishes – Acoustic and Fire Protection.

TOTAL: 45 PERIODS

OUTCOMES

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

- Illustrate the suitable construction materials for building construction.
- Apply the knowledge on lime, cement, aggregates and mortar.
- Interpret the basic properties of timber and other materials
- Establish appropriate advanced and modern building materials for various construction applications.
- Develop the site clearance and bond in masonry

TEXT BOOKS

1. R.K.Gupta, "Civil Engineering Materials and Practices", Jain Brothers, New Delhi,2014
2. Varghese P.C, "Building Materials", Prentice Hall India Pvt Limited; New Delhi, 2015.
3. Rajput R.K, "Engineering Materials", S Chand and Company; New Delhi,2008.

REFERENCES

1. Taylor G.D, "Materials in Construction: An Inroduction",Longman Inc, USA, 2016
2. Gambhir M.L and Neha Jamwal, "Building Materials, products, properties and systems", Tata McGraw Hill Educations Pvt. Ltd, New Delhi, 2012.
3. S.K Kharma,"Building Consruction",S.Chand Publishers ,New Delhi,2017

E-RESOURCES

1. https://nptel.ac.in/courses/105/102/105102088/(Building Materials and Construction)
2. https://nptel.ac.in/noc/courses/noc21/SEM1/noc21– ce10/ (Basic construction materials)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	2	-	1	2	2	2	2	2	3	2	2	1
2	2	2	1	2	-	1	2	2	2	2	2	3	2	2	1
3	1	2	1	2	-	1	2	2	2	2	2	3	2	2	1
4	1	2	1	2	2	1	2	2	2	2	3	3	2	2	1
5	1	2	2	2	2	1	2	2	2	2	3	3	2	2	1
Avg	**1.6**	**2**	**1.2**	**2.0**	**0.8**	**1**	**2**	**2**	**2**	**2**	**2.4**	**3**	**2**	**2**	**1**

1-Low 2-Medium 3-High '-' – No Correlation

23CET302 **APPLIED GEOLOGY** **L T P C**
3 0 0 3

OBJECTIVES

- To understand the branches of geology and its importance to civil engineering.
- To learn the physical properties and formation of minerals.
- To introduce about classification of rocks and engineering properties of rocks.
- To gain knowledge about the geological maps,study of structures, folds, faults, joints and geophysical methods.
- To study the geological investigation for dams, tunnels etc.

UNITI PHYSICAL GEOLOGY **9**

Geology in Civil Engineering – Branches of Geology – Structure of Earth and its composition Weathering of rocks – Scale of weathering – Soils - Landforms and processes associated with River, Wind, Groundwater and Sea – Relevance to Civil Engineering. Plate tectonics – Earth quakes – Seismic zones in India.

UNITII MINERALOGY **9**

Physical properties of minerals – Quartz group, Feldspar group, Pyroxene - Hypersthene and Augite, Amphibole – Hornblende, Mica – Muscovite and Biotite, Calcite, Gypsum and Clay minerals.

UNIT III PETROLOGY **9**

Classification of rocks, Distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, Occurrence, Engineering properties, Distribution and Uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.

UNIT IV STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS **9**

Geological Maps – Attitude of Beds, Study of Structures – Folds, Faults and Joints – Their Bearing on Engineering Construction. Geophysical methods – Seismic and Electrical methods for Subsurface Investigations.

UNIT V APPLICATION OF GEOLOGICAL INVESTIGATIONS **9**

Remote Sensing for Civil Engineering applications; Geological conditions necessary for designing and construction of Dams, Reservoirs, Tunnels and Road cuttings - Hydrogeological investigations and Mining - Coastal protection structures. Investigation of Landslides, Causes and mitigation.

TOTAL : 45 PERIODS

OUTCOMES

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

- Understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.
- Illustrate the importance on properties of minerals.
- Classify the types of rocks, their distribution and uses.
- Develop the methods of study on geological structure and subsurface investigations.
- Understand the application of geological investigation in projects such as Dams, Reservoirs, Tunnels and Road cuttings.

TEXT BOOKS

1. Chenna Kesavulu N, "Textbook of Engineering Geology", Macmillan Publishers India Limited,New Delhi, 2018.
2. Parbin Singh A, "Engineering and General Geology", S.K.Kataria and Sons, New Delhi, 2010.
3. Varghese P.C, "Engineering Geology for Civil Engineers", Prentice Hall of India Leaning Private Limited ,New Delhi ,2012.

REFERENCES

1. S.K.Duggal, " Engineering Geology", McGraw Hill Book company,New Delhi, 2017.
2. Blyth F.G.H and de Freitas M.H, "Geology for Engineers", Edward Arnold, London, 2010.
3. Krynine and Judd, "Engineering Geology and Geotechniques", McGraw Hill Book Company,New Delhi, 2018.

E-RESOURCES

1. https://nptel.ac.in/courses/105/105/105105106/(Introduction to Engineering Geology)
2. https://archive.nptel.ac.in/courses/105/105/105105106/(Geologic Structures)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	-	-	2	2	2	2	2	2	2	1	-	-
2	2	2	1	2	-	2	2	2	2	2	2	2	2	-	-
3	2	2	1	2	-	2	2	2	2	2	2	2	1	-	2
4	2	2	2	2	-	2	2	2	2	2	2	2	1	-	-
5	2	2	2	2	-	2	1	2	2	2	2	2	2	2	2
AVG	**2.2**	**2**	**1.4**	**1.6**	**-**	**2**	**1.8**	**2**	**2**	**2**	**2**	**2**	**1.4**	**0.4**	**0.8**

1-Low 2-Medium 3-High '-' – No Correlation

23CET303 **SOIL MECHANICS** **L T P C**
3 0 0 3

OBJECTIVES

- To learn the basic properties and classification of soil.
- To apply the effective stress concepts of soil.
- To determine the vertical stress distribution and settlement in soil.
- To understand the behaviour of soil under shear.
- To analyze the stability of slopes.

UNIT I SOIL CLASSIFICATION AND COMPACTION 9

Nature of Soil – Problems with Soil – Phase Relation – Sieve Analysis – Sedimentation Analysis – Atterberg Limits – Classification for Engineering Purposes – BIS Classification System – Soil Compaction – Factors Affecting Compaction – Laboratory Compaction Methods.

UNIT II SOIL WATER AND PERMEABILITY 9

Soil Water – Various Forms – Influence of Clay Minerals – Capillary Rise – Suction – Effective Stress– Concepts in Soil –Total, Neutral and Effective Stress Distribution in Soil –Permeability– Darcy"s Law– Permeability Measurement in the Laboratory – Quick Sand Condition – Seepage – Introduction to Flow Nets – Properties and Uses – Application to Simple Problems.

UNIT III STRESS DISTRIBUTION, COMPRESSIBILITY AND SETTLEMENT 9

Stress Distribution – Soil Media – Boussinesq Theory – Use of Newmark's Influence Chart – Components of Settlement – Immediate and Consolidation Settlement – Terzaghi's One Dimensional Consolidation Theory – Computation of Rate of Settlement. – √t and log t Methods – e-log p Relationship – Factors Influencing Compression Behaviour of soils.

UNIT IV SHEAR STRENGTH 9

Shear strength of Cohesive and Cohesion less Soils – Mohr – Coulomb Failure Theory – Saturated Soil – Strength Parameters – Measurement of Shear Strength, Direct Shear, Tri-axial Compression, UCC and Vane Shear Tests – Types of Shear Tests Based on Drainage and their Applicability – Drained and Un–drained Behavior of Clay and Sand.

UNIT V SLOPE STABILITY 9

Slope Failure Mechanisms – Modes – Infinite Slopes – Finite Slopes – Total and Effective Stress Analysis – Stability Analysis for Purely Cohesive and C – ø Soil – Method of Slices – Modified Bishop's Method – Friction Circle Method – Stability Number – Problems – Slope Protection Measures.

TOTAL: 45 PERIODS

OUTCOMES:

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

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

TEXTBOOKS:

1. K. R Arora, "Soil Mechanics and Foundations", Standard Publishers, New Delhi,2019
2. Gopal Ranjan and Rao A.S.R, "Basic and applied Soil Mechanics", New Age Internationals,New Delhi, 2017.
3. Punmia B.C, Ashok Kumar Jain, Arun Kumar Jain, "Soil Mechanics and Foundations",Laxmi Publications, New Delhi ,2021.

REFERENCES:

1. McCarthy D.F, "Essentials of Soil Mechanics and Foundations: Basic Geotechnics". Prentice Hall of India, New Delhi, 2006.
2. Muni Budhu, "Soil Mechanics and Foundations", John Willey & Sons Inc,United States 2016.
3. Venkatramaiah C, "Geotechnical Engineering", New Age International,New Delhi , 2018.

E-RESOURCES

1. https://nptel.ac.in/courses/105/101/105101084/(Soil Mechanics)
2. http://www.nptelvideos.in/2012/11/soil– mechanics.html (Soil Mechanics)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	-	-	1	2	2	2	2	2	3	2	2	1
2	2	2	1	-	-	1	2	2	2	2	2	3	2	2	1
3	1	2	1	-	-	1	2	2	2	2	2	3	2	2	1
4	1	2	1	2	-	1	2	2	2	2	3	3	2	2	1
5	1	2	2	2	-	1	2	2	2	2	3	3	2	2	1
AVG	**1.6**	**2**	**1.2**	**0.8**	**-**	**1**	**2**	**2**	**2**	**2**	**2.4**	**3**	**2**	**2**	**1**

1-Low 2-Medium 3-High '-' – No Correlation

23CEE301 **SURVEYING AND LEVELLING** **L T P C**
(Lab Embedded Theory Course) **3 0 2 4**

OBJECTIVES

- To understand the principles and concepts of chain and compass surveying.
- To apply the concept of levelling and Contours in field measurement.
- To determine the elevation of objects by using theodolite survey.
- To aware the concept of tacheometric and triangulation survey.
- To compute the measurements with modern digital instruments.
- To carry out the Survey field exercises for land measurement.

UNIT I CHAIN AND COMPASS SURVEYING 9

Definition – Principles – Classification – Plan and map – Scales – Ranging and chaining – Corrections – Types of Compass – Bearing – Types – True and magnetic bearing –Systems and conversions– Dip and declination – Local attraction – Adjustment of errors.

UNITII LEVELLING AND CONTOURING 9

Level line – Horizontal line – Spirit level – Mean sea level – Sensitiveness – Bench marks – Levelling instruments – Types of Levelling – Booking and reduction of levels – Curvature and refraction – Calculation of areas and volumes – Contouring – Characteristics and uses.

UNIT III THEODOLITE SURVEY AND CURVE SETTING 9

Theodolite survey – Omitted measurements – Curves –types – components and elements of simple curve – Setting out a simple curve by Rankine's method and two theodolite method – Transition curves – Functions and requirements.

UNIT IV TACHEOMETRIC AND TRIANGULATION SURVEY 9

Tacheometric systems – Tangential and stadia methods – Stadia systems – Determination of stadia constants – Anallactic Lens – Triangulation – Corrections – Satellite station – Reduction to centre – Trigonometric Levelling – Single and reciprocal observations.

UNIT V DIGITAL SURVEY 9

Introduction, Aerial Photogrammetry, Terrestrial Photogrammetry, Stereoscopy, Types of EDM Instruments - Total station – Principles of Remote Sensing and its Applications - Basics of GIS & GPS.

LIST OF EXPERIMENTS

1. Chain Surveying: Determination of given area using chain and cross staff survey.
2. Compass Surveying: Determination of bearings and calculation of included angles using compass.
3. Levelling: Determination of elevation of given points by fly leveling.

4. Levelling: Determination of height difference between the points by conducting differential and reciprocal levelling.
5. Theodolite Surveying: Determination of elevation between two points condition by base is accessible and Inaccessible
6. Tachometric Surveying :Determination of Stadia Constant
7. Tachometric Surveying: Determination of distance and elevation by stadia method
8. Tachometric Surveying: Determination of distance and elevation by tangential method.
9. Total Station: Measurement of distance, elevation and area.
10. Total Station: Setting out works – foundation, column marking

TOTAL: 45+15=60 PERIODS

OUTCOMES

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

- Observe the chain and compass surveying.
- Compute the levels and to calculate the area and volume.
- Determine the adjustments of closed traverse for errors and setting out the simple curves.
- Estimate the tacheometric and triangulation Survey
- Apply the principles, concepts and applications of digital surveying
- Develop the practical knowledge on handling basic survey instruments including theodolite, tacheometry and total Station.

TEXT BOOKS

1. Punmia B.C, "Surveying, Vol. I and II", Laxmi Publications,New Delhi, 2016.
2. Basak N.N, "Surveying and Levelling", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2017.
3. Kanetkarand T P, Kulkarni S.V, "Surveying and Levelling", Parts 1 & 2, Pune Vidyarthi GrihaPrakashan, Pune, 2018.

REFERENCES

1. Kanetkar T. P, "Surveying and Levelling Vols. I &II", United Book Corporation, Pune, 2018.
2. Roy S K, "Fundamentals of Surveying", Fifth Edition, Prenticeˆ Hall of India ,New Delhi2018.
3. Subramanian R, "Surveying and Levelling", 2nd Edition, Oxford University Press, New Delhi, 2018

E-RESOURCES

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

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	-	3	-	-	-	3	-	-	3	3	3
2	3	3	3	3	-	2	-	-	3	3	-	-	3	3	3
3	3	3	3	3	-	3	-	-	3	3	-	-	3	3	3
4	3	3	3	3	-	2	-	-	3	3	-	-	3	3	3
5	3	3	3	3	3	3	-	-	3	3	-	-	3	3	3
6	3	3	3	3	-	2	-	-	3	3	-	-	3	3	3
AVG	**3.0**	**3.0**	**3.0**	**3.0**	**0.5**	**2.5**	-	-	**2.5**	**3.0**	-	-	**3.0**	**3.0**	**3.0**

1-Low 2-Medium 3-High '-' – No Correlation

23CEE302	MECHANICS OF MATERIALS	L T P C
	(Lab Embedded Theory Course)	3 0 2 4

OBJECTIVES

The main objective of this course is to:

- Learn the fundamental concepts of Stress, Strain and deformation of solids.
- Determine the Shear force and Bending moment.
- Know bending stress and shear stress distribution in various sections.
- Calculate the deflection of beams under the application of external forces.
- Evaluate the performance of columns.
- Inspect the behavior of various materials under tension, compression, shear and torsion.

UNIT I STRESS, STRAIN AND DEFORMATION 9

Introduction – Stress, Strain – Types – Elastic limit – Hooke's law – Stress Strain curves – Elastic constants and its relationships–Deformation of simple and compound bars– Principles of Superposition – Varying cross section – Thermal stress in composite bars – Principal stresses and principal planes.

UNIT II SHEAR FORCE AND BENDING MOMENT 9

Types of beams – Types of loads, supports and reactions–Bending moment and Shear force – Sign conventions – Point of contraflexure–Shear force and bending moment diagrams for concentrated load, uniformly distributed load and uniformly varying load.

UNIT III STRESSES IN BEAMS AND SHAFTS 9

Types of Bending stresses – Theory of simple bending – Derivation of flexure/bending equation – Bending stress distribution – Position of N.A and centroidal axis – Stiffness equation –Theory of Pure Torsion – Assumptions – Torsion equation– Shear stress distribution in circular section due to torsion.

UNIT IV DEFLECTION OF BEAMS 9

Beam Deflection – Slope - Sign conventions - Double integration method –Macaulay's Method – Moment area method – Mohr's Theorems – Conjugate beam method.

UNIT V THEORY OF COLUMN 9

Column and strut – Classification of columns – Slenderness ratio – Buckling load and factor – Effective length – Various end conditions–Euler's theory, assumptions, formula and limitations – Rankine's formula – Crippling load and Safe load.

LIST OF EXPERIMENTS

1. Tension test on mild steel / deformed steel bars.
2. Deflection test on Simply Supported Beams of(a) wood and (b) steel.
3. Impact Test on mild steel by performing Izod/Charpy tests.
4. Torsion test on mild steel bar to determine the Modulus of Rigidity.
5. Double Shear test on metal.
6. Hardness test on metals (Rockwell and Brinell Hardness Tests).
7. Compression test on helical spring.
8. Deflection test on carriage spring.
9. Fatigue test on steel rod
10. Thermal expansion test on steel rod

TOTAL: 45+15 = 60 PERIODS

OUTCOMES

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

- Understand various types of stresses and strains developed in the member.
- Draw the shear force and bending moment diagram for beams under various loading conditions.
- Analyze the bending and shear stresses in beams and shafts.
- Compute the slope and deflection of beams by different methods.
- Describe the failure modes for various types of columns.
- Determine the mechanical properties of steel.

TEXT BOOKS

1. Rajput R.K. "Strength of Materials", S.Chand& company Ltd., New Delhi, 2018.
2. Bansal R.K, "Strength of Materials", Laxmi Publications, New Delhi, 2018.
3. Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2017.

REFERENCES

1. William A .Nash, "Theory and Problems of Strength of Materials", Schaums Outline Series, Tata McGraw Hill Publishing Company Ltd, New Delhi ,2007.
2. Egor P Popov, "Engineering Mechanics of Solids", Prentice Hall of India,New Delhi 2010.
3. Subramanian R ,"Strength of Materials", Oxford University Press, New Delhi, 2010.

E–RESOURCES

1. https://nptel.ac.in/courses/112/107/112107146(Strength of Materials)
2. https://nptel.ac.in/courses/105/105/105105108/(Introduction to Strength of Materials)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	-	3	-	-	2	1	-	1	3	3	2
2	3	3	3	3	-	3	-	-	2	1	-	1	3	3	2
3	3	3	3	3	-	3	-	-	2	1	-	1	3	3	2
4	3	3	3	3	-	3	-	-	2	1	-	1	3	3	2
5	3	3	3	3	-	3	-	-	2	2	-	1	3	3	2
6	3	3	3	3	-	3	-	-	2	2	-	1	3	3	2
Avg.	**3**	**3**	**3**	**3**	**-**	**3**	**-**	**-**	**2**	**1**	**-**	**1**	**3**	**3**	**2**

1-Low 2-Medium 3-High '-' – No Correlation

SEMESTER IV

23CET401 **REINFORCED CONCRETE DESIGN** **L T P C**

(IS 456: 2000 and SP 16 Code Books are to be Permitted) **3 1 0 4**

OBJECTIVES

- To introduce the different types of philosophies related to design of basic structural elements.
- To study about bond, anchorage, shear &torsion.
- To give an exposure to design of slab and staircase.
- To understand the axial, uniaxial and biaxial eccentric loadings column.
- To study the footing with reference to Indian standard code of practice.

UNIT I METHODS OF DESIGN OF CONCRETE STRUCTURES 9+3

Objective of structural design – Steps in RCC Structural Design Process – Type of Loads on Structures and Load combinations – Code of practices and Specifications – Concept of Working Stress Method, Ultimate Load Design and Limit State Design Methods for RCC – Properties of Concrete and Reinforcing Steel – Analysis and Design of Singly reinforced Rectangular beams by working stress method – Limit State philosophy as detailed in IS code – Advantages of Limit State Method over other methods – Analysis and design of singly and doubly reinforced rectangular beams by Limit State Method.

UNIT II LIMIT STATE DESIGN FOR BOND, ANCHORAGE SHEAR &TORSION 9+3

Behaviour of RC members in Shear, Bond and Anchorage – Design requirements as per current code– Behaviour of Rectangular RC beams in Shear and Torsion – Design of RC members for combined Bending, Shear and Torsion.

UNIT III LIMITS STATE DESIGN FOR FLEXURE AND STAIRCASE 9+3

Analysis and design of one way and two way rectangular slab subjected to uniformly distributed load for various boundary conditions and corner effects. Analysis and design of Flanged beams. Types of Staircases – Design of dog-legged Staircase.

UNIT IV LIMIT STATE DESIGN OF COLUMNS 9+3

Types of columns – Axially Loaded columns – Design of short Rectangular, Square and circular columns – Design of Slender columns – Design for Uniaxial and Biaxial bending using Column Curves.

UNIT V LIMIT STATE DESIGN OF FOOTING 9+3

Design of wall footing – Design of axially and eccentrically loaded rectangular footing – Design of combined rectangular footing for two columns only.

TOTAL: 45+15=60 PERIODS

OUTCOMES

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

- Understand the various design methodologies for the design of RCC elements.
- Evaluate the shear, bond and torsion effects in beams.
- Design the various types of slabs, flanged beams and staircase by limit state method.
- Design columns for axial,uniaxial and biaxial eccentric loadings.
- Design of footing by limit state method.

TEXT BOOKS

1. Subramanian N,"Design of Reinforced Concrete Structures", Oxford University Press,New Delhi,2017.
2. Krishnaraju N, "Design of Reinforced Concrete Structures ", CBS Publishers & Distributors Pvt. Ltd., New Delhi,2016.
3. Varghese P.C, " Limited State Design of Reinforced Concrete ",Prentice Hall of India,New Delhi,2016.

REFERENCES

1. Shah V L Karve S R, "Limit State Theory and Design of Reinforced Concrete" Structures Publications, Pune,2015.
2. Punmia.B.C, Ashok Kumar Jain, Arun Kumar Jain," Limit State Design of Reinforced Concrete",Laxmi Publication Pvt. Ltd., New Delhi,2017.
3. Sinha N C Roy S K, " Fundamentals of reinforced concrete", S Chand Publishers, New Delhi,2007.

E-RESOURCES

1. https://nptel.ac.in/courses/105/105/105105105/(Design of reinforced concretestructures)
2. https://nptel.ac.in/courses/105/105/105105104/(Design of concretestructures)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	-	3	-	-		3	-	-	3	3	3
2	3	3	3	3	-	2	-	-	3	3	-	-	3	3	3
3	3	3	3	3	-	3	-	-	3	3	-	-	3	3	3
4	3	3	3	3	-	2	-	-	3	3	-	-	3	3	3
5	3	3	3	3	3	3	-	-	3	3	-	-	3	3	3
AVG	**3**	**3**	**3**	**3**	**0.6**	**2.5**	-	-	**3**	**3**	-	-	**3**	**3**	**3**

1-Low 2-Medium 3-High '-' – No Correlation

23CET402 STRUCTURAL ANALYSIS L T P C
3 1 0 4

OBJECTIVES

- To introduce the basic concepts of structural analysis and the classical methods for analysis of buildings.
- To learn the method of drawing influence lines and its uses in various applications like beams, bridges and plane trusses.
- To enable the student to undergo analysis procedure using slope deflection method
- To illustrate analysis procedure using moment distribution method
- To impart knowledge of rotation contribution method of analysis

UNIT I FUNDAMENTALS OF STRUCTURAL ANALYSIS 9+3

Determination of static indeterminacy and kinematic indeterminacy – Deficiency for beams, frames and pin jointed trusses – Behaviors of Structures – Principle of superposition – Analysis of pin jointed space trusses by method of tension coefficient.

UNIT II INFLUENCE LINE FORSTATICALLY DETERMINATE STRUCTURES 9+3

Influence line for Statically Determinate Beams for Bending moment and Shear force – Muller Breslau's Principles – Influence lines for forces in members for statically determinate trusses – Parallel chord truss – Reversal of stresses – Focal length.

UNIT III SLOPE DEFLECTION METHOD 9+3

Slope deflection equations – Equilibrium conditions – Analysis of continuous beams and rigid frames – Rigid frames with inclined members – Support settlements –Symmetric frames with symmetric and skew – Symmetric loadings.

UNIT IV MOMENT DISTRIBUTION METHOD 9+3

Stiffness and carry over factors – Distribution and carryover of moments – Analysis of continuous beams – Plane rigid frames with and without sway – Support settlement – Symmetric frames with symmetric and skew– Symmetric loadings.

UNIT V ANALYSIS OF ARCHES 9+3

Analysis of three hinged arches of parabolic and circular profiles – Analysis of two hinged symmetric parabolic and circular arches. Settlement and temperature effects – Influence lines for bending moment,normal thrust and radial shear at sections of an arch.

TOTAL: 45+15=60 PERIODS

OUTCOMES

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

- Determine the static and kinematic indeterminacy of beam, truss and frame.
- Draw the influence line diagrams for determinate and indeterminate beams.
- Analyze the structures for internal forces by theorem of three moments and slope deflection method.
- Analyze the structures for internal forces by Moment distribution method.
- Analyze the three hinged, two hinged and fixed arches.

TEXTBOOKS

1. Bhavikatti S.S, "Structural Analysis" – Vol.I& II, Vikas Publishing Private Limited,New Delhi, 2013
2. Menon D,"StructuralAnalysis",Alpha Science International Limited, Reprint 2020.
3. Punmia B.C, Ashok Kumar J, Arun Kumar J, "Theory of Structures", Laxmi Publications, NewDelhi, 2021.

REFERENCES

1. Wang, C.K, "Analysis of Indeterminate Structures", Tata McGraw-Hill Publishing Company,NewDelhi, 2000.
2. Pandit.G.S,"Theory of Structures ",Vol–I, McGraw Hill Education Private Limited, New Delhi, 2017.
3. Reddy.C.S, "Basic Structural Analysis",Tata Mc Graw Hill Publishing Company,New Delhi ,2020.

E-RESOURCES

1. https://nptel.ac.in/courses/105/105/105105166/(StructuralAnalysis I)
2. https://nptel.ac.in/courses/105/101/105101085/(StructuralAnalysis I)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	-	3	-	-	-	3	-	-	3	3	3
2	3	3	3	3	-	2	-	-	3	3	-	-	3	3	3
3	3	3	3	3	-	3	-	-	3	3	-	-	3	3	3
4	3	3	3	3	-	2	-	-	3	3	-	-	3	3	3
5	3	3	3	3	3	3	-	-	3	3	-	-	3	3	3
6	3	3	3	3	-	2	-	-	3	3	-	-	3	3	3
Avg.	**3**	**3**	**3**	**3**	**0.5**	**2.5**	**-**	**-**	**3**	**3**	**-**	**-**	**3**	**3**	**3**

1-Low 2-Medium 3-High '-' – No Correlation

23CET403 HIGHWAY ENGINEERING L T P C
3 0 0 3

OBJECTIVES

- To learn the basics of highway planning and its alignment.
- To design various highway cross sectional elements.
- To evaluate the desirable properties of highway materials and construction practice.
- To differentiate the rigid and flexible pavements.
- To select the pavement evaluation and strengthening methods.

UNIT I HIGHWAY PLANNING AND ALIGNMENT 9

Scope of Highway Engineering - Highway Development and Planning in India – Jayakar Committee Recommendations and Realizations - Requirements of Ideal Alignment - Factors Controlling Highway Alignment - Engineering Surveys for Alignment – Classification of Roads (IRC).

UNIT II GEOMETRIC DESIGN OF HIGHWAYS 9

Highway Cross Sectional Elements – Sight Distances – Design of Horizontal Alignment – PIEV Theory – Widening of Curves – Transition Curves – Design of Vertical Alignment – Gradient and Curves.

UNIT III HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE 9

Materials used in Highway Construction – Properties and Testing of Highway Materials – Features of Highway Construction.

UNIT IV FLEXIBLE AND RIGID PAVEMENTS 9

Flexible Pavements – Components and their Functions – Factors Affecting the Design of Flexible Pavements – Stresses in Flexible Pavement – Flexible Pavement Design Methods – Rigid Pavement - Components and their Functions – Factors Affecting the Design of Rigid Pavements – Stresses in Rigid (IRC Method and Recommendations).

UNIT V PAVEMENT MAINTENANCE AND EVALUATION 9

Types of Maintenance – Defects in Flexible Pavements – Types of Failures, Causes and Treatment – Defects in Rigid Pavement – Pavement Evaluation Techniques – Strengthening of Pavements.

TOTAL: 45 PERIODS

OUTCOMES

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

- Determine the best highway planning and alignment.
- Analyze the geometric design of highway cross sectional elements.
- Identify the highway construction materials and their properties.
- Design the flexible and rigid pavements as per IRC codes.
- Discuss the highway maintenance, evaluation and strengthening.

TEXT BOOKS

1. Khanna S.K, Justo.C.E.G,Veeraragavan A, "Highway Engineering", Nemchand Publishers, Roorkee, 2021.
2. Kadiyali L.R ,Lal N.B, "Principles and Practice of Highway Engineering (Including expressways and Airport Engineering)", Khanna Publishers, New Delhi, 2013.
3. Partha Chakroborthy, Animesh Das, "Principles of Transportation Engineering", Prentice-Hall of India, New Delhi, 2011.

.REFERENCES

1. Yang H Haung, "Pavement Analysis and Design", 9th Edition, Pearson Education, South Asia, 2019
2. Ian D Walsh, "ICE Manual of Highway Design and Management", ICE publishers, USA, 2020.
3. Indian Road Congress (IRC), "Guidelines for the Design of Flexible Pavements", IRC:37-2012.

E-RESOURCES

1. https://nptel.ac.in/courses/105/101/105101087/ (Pavement Design)
2. https://nptel.ac.in/courses/105/105/105105107/(Introduction to Transport Engineering)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	-	-	1	-	1	1	-	-	-	1	1	1
2	3	1	2	-	-	3	-	3	3	-	-	-	3	-	-
3	3	1	1	-	-	3	-	2	2	-	-	-	2	-	-
4	3	3	2	-	-	3	-	3	3	1	-	-	3	2	2
5	3	2	2	-	-	3	-	2	2	-	-	-	2	2	-
Avg.	**3**	**1.8**	**1.6**	-	-	**2.6**	-	**2.2**	**2.2**	**0.2**	-	-	**2.2**	**1**	**0.6**

1-Low 2-Medium 3-High '-' – No Correlation

23CEE401	FOUNDATION ENGINEERING	L T P C
	(Lab Embedded Theory Course)	3 0 2 4

OBJECTIVES

- To impart knowledge on soil exploration
- To know the necessity of settlement
- To impart knowledge on bearing capacity and settlement of shallow foundation
- To design the pile foundation
- To perform the stability analysis of slopes
- To study the various earth pressure theories.

UNIT I SOIL INVESTIGATION AND CHOICE OF FOUNDATION 9

Methods of Soil Exploration – Boring – Sampling – Disturbed and undisturbed Sampling – Sampling techniques – Bore log and soil investigation report – Function and requirements of good foundation – Choice of foundation based on soil conditions.

UNIT II BEARING CAPACITY AND SETTLEMENT 9

Location and depth of foundations – Bearing capacity of shallow foundations on homogeneous deposit–Terzaghi's Theory – IS Code method – Problems – Field tests (SPT and SCPT) – Factors influencing Bearing Capacity – Settlement of foundations – Components of settlement – Allowable and maximum differential settlement.

UNIT III SHALLOW FOUNDATION 9

Types of footings – Contact pressure distribution: isolated footing – Combined footings – Proportioning – Mat foundation – Types and applications – Floating foundation.

UNIT IV PILE FOUNDATION 9

Need for deep foundations – Types of piles – Classification of piles – Load carrying capacity of piles in granular and cohesive soils – Static and Dynamic formulae – Pile carrying capacity by field tests – Pile load test – Group Capacity – Settlement of Pile groups – Negative skin friction – Introduction to pileraft.

UNIT V STABILITY OF SLOPES AND EARTH PRESSURE 9

Slopes – Infinite and finite slopes – Types of failure – Causes of failure – Procedure for slip circle method – Earth pressure in soils: active and passive states – Lateral earth pressure – Rankine's theory– Graphical method – Stabilization of soil using various methods – Landslide – Mechanics oflandslide.

LIST OF EXPERIMENTS

1. Grain Size Distribution – Sieve Analysis.
2. Grain Size distribution – Hydrometer Analysis.
3. Specific Gravity ofSoil.
4. Relative density of Sands.
5. Field Density by Core Cutter Method and Sand Replacement Method.
6. Atterberg's LimitsTest.
7. Coefficient of Permeability – Variable and Constant Head Method.
8. Unconfined CompressionTest.
9. Direct Shear Test.
10. Standard Proctor CompactionTest.

TOTAL: 45+15=60 PERIODS

OUTCOMES

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

- Understand the importance of soil investigation in various civil Engineering projects.
- Estimate bearing capacity incorporating IS codal provisions.
- Design the shallow foundation and get exposure in foundation analysis.
- Estimate the pile group capacity and group efficiency for various types of soils.
- Analyze earth retaining structures for various soil conditions.

TEXT BOOKS

1. Arora K.R,"Soil Mechanics andFoundation Engineering",Standard Publishers and Distributors, New Delhi, 7th Edition,2017.
2. Punmia B.C,"Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 16th Edition,2017.
3. Gopal Ranjan and Rao A.S.R, "Basic and applied Soil Mechanics", New Age Internationals, New Delhi,3rd Edition,2017.

REFERENCES

1. Muni Budhu, "Soil Mechanics and Foundations", John Willey & Sons, Inc,New Delhi2016.
2. Kaniraj, S.R. "Design aids in Soil Mechanics and Foundation Engineering", Tata McGraw Hill publishing company Ltd., New Delhi,2016.
3. Venkatramaiah C. "Geotechnical Engineering", New Age International, New Delhi, 2018.

E-RESOURCES

1. https://nptel.ac.in/courses/105/105/105105176/(FoundationEngineering)
2. https://nptel.ac.in/courses/105/107/105107120/(FoundationEngineering)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	3	3	3	1	2	1	1	1	1	1	**3**	3	2	3
2	2	3	3	3	1	2	2	1	1	1	1	**3**	2	3	2
3	2	3	3	3	1	2	1	1	1	1	2	**3**	2	3	2
4	3	3	3	3	1	1	1	1	1	1	2	**3**	2	3	3
5	3	3	3	3	1	2	1	1	1	1	2	**3**	2	3	3
6	3	3	3	3	1	2	1	1	1	1	2	**3**	2	3	3
Avg.	**2.5**	**3**	**3**	**3**	**1**	**1.2**	**2.5**	**1**	**1**	**1**	**2**	**3**	**2.2**	**2.8**	**2.6**

1-Low 2-Medium 3-High '-' – No Correlation

23CEE402 **FLUID MECHANICS AND MACHINERY** **L T P C**
(Lab Embedded Theory Course) **3 0 2 4**
(Common to Civil and Mechanical Engineering)

OBJECTIVES

- To impart knowledge on the properties of fluid flow characteristics and its dynamics.
- To understand the difference between laminar and turbulent flow through circular conduits and losses in pipe flow.
- To gain the knowledge of dimensional and model analysis.
- To improve the knowledge of types of pumps, working principle, application and performance analysis of fluid pumps.
- To recognize the basic knowledge of types of turbines, working principle, velocity triangle and performance curves of hydraulic turbines.
- To verify the principles studied in fluid mechanics theory by performing experiments in lab.

UNIT I FLOW CHARACTERISTICS AND DYNAMICS OF FLUID FLOW 9

Introduction - Properties of fluids - Flow characteristics - Rate of flow, concept of control volume and continuity equation for one dimensional flow. Dynamics of fluid flow - Euler's equation of motion, Bernoulli's equation and its application.

UNIT II FLUID FLOW TYPES AND FLOW THROUGH PIPES 9

Flow of viscous fluid through circular pipe- Hagen Poiseuille equation - Types of fluid flow - Steady and unsteady, Uniform and non-uniform, Laminar and Turbulent, Compressible and incompressible, Rotational and irrotational (Qualitative treatment). Flow through pies (Loss of energy in pipes) - Major losses - Darcy-Weisbach equation and Chezy's formula - Minor losses - Moody diagram (Qualitative treatment) - Flow though pipes in series and in parallel.

UNIT III DIMENSIONAL AND MODEL ANALYSIS 9

Introduction - Derived quantities - Dimensional Homogeneity - Method of dimensional analysis - Rayleigh's method and Buckingham's π- theorem. Similitude - Types of similitude - Dimensionless numbers - Model laws - Application of dimensionless parameters - Model analysis.

UNIT IV HYDRAULIC PUMPS 9

Classification of pumps - Centrifugal pumps - Working principle - Heads and efficiencies– Velocity triangles - Work done by the impeller - Performance curves - Reciprocating pump working principle - Indicator diagram and it's variations - Work saved by fitting air vessels - Rotary pumps.

UNIT V HYDRAULIC TURBINE 9

Impact of jets - Velocity triangles - Theory of rotodynamic machines - Classification of turbines - Working principles - Pelton wheel - Modern Francis turbine - Kaplan turbine - Work done - Efficiencies - Draft tube - Specific speed - Performance curves for turbines.

LIST OF EXPERIMENTS

1. Coefficient of discharge of Venturi meter.
2. Coefficient of discharge of Orifice meter.
3. Determination of friction factor for a given set of pipes.
4. Determination of co-efficient of discharge for an external mouth piece.
5. Performance test on centrifugal pump.
6. Performance test on reciprocating pump.
7. Performance test on gear pump.
8. Performance analysis of Pelton wheel.
9. Performance analysis of Francis turbine.
10. Performance analysis of Kaplan turbine.

TOTAL: 45+15=60 PERIODS

OUTCOMES

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

- Analyze the dynamics of fluid flow and summarize the flow characteristics.
- Identify the flow characteristics and calculate major and minor losses associated with pipe flow in piping networks.
- Apply the principles of dimensional analysis and model analysis to fluid flow problems.
- Evaluate the performance of pumps.
- Examine the performance study on different turbines.
- Apply the Bernoulli's principle to find the coefficient of discharge, determine the friction factor for set of pipes, and analyze the performance characteristics of turbine and pumps.

TEXT BOOKS

1. Bansal R.K, "Fluid Mechanics and Hydraulic Machines", Laxmi Publications, New Delhi, 2019.
2. Modi P.N and Seth S.M, "Hydraulics and Fluid Mechanics includingHydraulic Machines", Standard Book House, New Delhi. 2019.
3. Rajput R.K , "Fluid Mechanics and Hydraulic Machines", S. Chand Publishing Limited, New Delhi ,2016.

REFERENCES

1. K.L Kumar, "Engineering Fluid Mechanics", Eurasia Publishing House (P) Ltd., New Delhi, 7th Edition, 2016.

2. Giles, R.V, Evett, J.B & Liu C, "Fluid Mechanics and Hydraulics", Tata McGraw Hill, New Delhi,2015.
3. Khurmi R S, "Fluid mechanics& hydraulic Machines. (in S.I. units)", S Chand & Company Limited,New Delhi,2015.

E-RESOURCES

1. https://nptel.ac.in/courses/112/105/112105171/ - (Fluid Mechanics)
2. https://nptel.ac.in/courses/112/105/112105182/ - (Introduction to Fluid Mechanics and Compressible flow)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	2	-	2	2	-	2	-	-	2	3	2	3
2	3	3	2	2	-	2	2	-	2	-	-	2	3	2	3
3	3	3	2	2	-	2	2	-	2	-	-	2	3	2	3
4	3	3	2	2	-	2	2	-	2	-	-	2	3	2	3
5	3	3	2	2	-	2	2	-	2	-	-	2	3	2	3
6	3	3	2	2	-	2	2	-	2	-	-	2	3	2	3
AVG	3	3	2	2	-	2	2	-	2	-	-	2	3	2	3

1- Low 2- Medium 3- High '-' – No Correlation

23GEE301 **PROBLEM SOLVING AND PYTHON PROGRAMMING** **L T P C 3 0 2 4**

(Lab Embedded Theory Course)

OBJECTIVES

- To understand the basics of algorithmic problem solving.
- To learn the data types, expressions and the statements in python.
- To study the Python functions and function calls to solve problems.
- To learn python data structures-list, tuples, dictionaries to represent complex data.
- To understand the file modules and python packages.
- To practice various computational operations and develop solutions using python.

UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING 9

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocksofalgorithms(statements,state,controlflow,functions),notation(pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA TYPES, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points

UNIT III CONTROL FLOW, FUNCTIONS, STRINGS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else),chained conditional (if-elif-else);Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations

and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

UNIT V FILES, MODULES, PACKAGES & DATA VISUALIZATION 9

Files and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file - Importing Matplotlib – Introduction to plotting – visualizing errors – density and contour plots – Histograms.

TOTAL :45 PERIODS

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3. Scientific problems using Conditionals and Iterative loops.(Number series,Number Patterns, pyramid pattern)
4. Implementation of real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building – operations of list & tuples)
5. Implementation of real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
6. Implementation of programs using Functions.(Factorial,largest number in a list,area of shape)
7. Implementation of programs using Strings.(reverse, palindrome, character count,replacing characters)
8. Implemenation of programs using written modules and Python Standard Libraries(p and as, numpy. Matplotlib, scipy)
9. Implementation of real-time/technical applications using File handling.(copy from one file to another, word count, longest word)
10. Implementation of real-time/technical applications using Exception handling.(divide by zero error, voter's age validity, student mark range validation)

TOTAL: 45 +15 = 60 PERIODS

OUTCOMES

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

- Develop algorithmic solutions to solve simple computational problems.
- Develop python programs using expressions to solve the problem.
- Deploy functions and function calls to decompose python programs.
- Implement solutions using compound data in Python lists, tuples, dictionaries.
- Utilize file modules and python packages for developing applications
- Implement python programs for solving various computational problems

TEXTBOOKS

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.

E – RESOURCES

1. https://nptel.ac.in/courses/106104074(Introduction to Algorithms)
2. https://archive.nptel.ac.in/courses/106/106/106106182/ (Joy of Computing)

Mapping of Cos-Pos& PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	2	-	-	-	-	-	2	2	3	3	-
2	3	3	3	3	2	-	-	-	-	-	2	2	3	-	-
3	3	3	3	3	2	-	-	-	-	-	2	-	3	-	-
4	2	2	-	2	2	-	-	-	-	-	1	-	3	-	-
5	1	2	-	-	1	-	-	-	-	-	1	-	2	-	-
6	2	2	-	-	2	-	-	-	-	-	1	-	2	-	-
AVG	**2.33**	**2.5**	**1.5**	**1.83**	**1.83**	**-**	**-**	**-**	**-**	**-**	**1.5**	**0.66**	**2.66**	**0.5**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No correlation

MINOR DEGREE / HONOURS

CURRICULUM AND SYLLABI

FOR B.E./B.Tech. DEGREE PROGRAMMES

(MINOR/HONOURS DEGREE- CONSTRUCTION TECHNOLOGY)

B.E. - CIVIL ENGINEERING

Course Code	Name of the Subject	Category	Periods /Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23CECT01	Advanced Construction Materials	PC	3	0	0	3	40	60	100
23CECT02	Safety in Construction	PC	3	0	0	3	40	60	100
23CECT03	Sustainable Construction Engineering	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23CECE01	Advanced Techniques in Concrete Construction	PC	3	0	2	4	40	60	100
EMPLOYABILITY ENHANCEMENT COURSE									
23CECP01	Project Work	EEC	0	0	12	6	40	60	100
		TOTAL CREDITS	19						

PC : Professional Core
EEC : Employability Enhancement Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

23CECT01 ADVANCED CONSTRUCTION MATERIALS L T P C
3 0 0 3

OBJECTIVES

- To study about different construction materials.
- To know the role of ceramic materials in construction.
- To understand the use of polymer materials.
- To learn techniques involved in waterproofing course.
- To study the fundamentals of admixtures of concrete.

UNIT I CONSTRUCTION MATERIALS 9

Classification of construction materials - Selection criteria for construction materials - Green building materials - waste products - Reuse and recycling.

UNIT II CERAMIC MATERIALS 9

Classification - glass wool - Thermal and electrical properties - Fire resistant materials - Uses and applications.

UNIT III POLYMERIC MATERIALS 9

Rubber and plastics - Polymers in civil engineering polymers - types of fibers - Fiber reinforced plastic in sandwich panels.

UNIT IV WATERPROOFING MATERIALS 9

Waterproofing materials and compounds - flooring materials - required materials.

UNIT V ADMIXTURES 9

Use of waste product and industrial by product:-Fly ash – silica - GGBS and other mineral products – Geo-textile and Geo-synthetics applications in civil engineering.

TOTAL: 45 PERIODS

OUTCOMES

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

- Illustrate the suitable construction materials.
- Apply the knowledge in ceramic materials.
- Establish the polymer materials for various construction applications.
- Understand the water proofing material importance.
- Classify the admixture in fresh and hardened concrete.

TEXT BOOKS

1. Shetty M.S., Concrete Technology, S.Chand and Company Ltd., 8th Edition, 2019.
2. Krishnaraju N., Advanced Concrete Technology, CBS Publishers, 4th Edition, 2018.

REFERENCES

1. Gambir, M.L. "Concrete Technology", Tata McGraw Hill, Publishing Co,Ltd, 6th Edition, 2017.
2. Santhakumar, A.R., "Concrete Technology", Oxford University Press, 10th Edition, 2018.

E–RESOURCES

1. https://nptel.ac.in/courses/105/102/105102012/ (Concrete Technology)
2. https://nptel.ac.in/courses/105/106/105106176/ (Advanced Concrete Technology)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	2	-	1	2	-	2	2	2	3	2	2	1
2	2	2	1	2	-	1	2	-	2	2	2	3	2	2	1
3	1	2	1	2	-	1	2	-	2	2	2	3	2	2	1
4	1	2	1	2	-	1	2	-	2	2	3	3	2	2	1
5	1	2	2	2	-	1	2	-	2	2	3	3	2	2	1
AVG	**1.6**	**2**	**1.2**	**2.0**	**-**	**1**	**2**	**-**	**2**	**2**	**2.4**	**3**	**2**	**2**	**1**

1-Low 2-Medium 3-High '-' – No Correlation

23CECT02 **SAFETY IN CONSTRUCTION** **L T P C**
3 0 0 3

OBJECTIVES

- To understand the importance of safety in the construction.
- To study the causes and remedies of construction accidents.
- To know site safety precautionary measures to avoid accidents.
- To understand awareness about safety during construction, alteration, demolition works.
- To learn safe operating procedures in the construction.

UNIT I INTRODUCTION **9**

Basic terminology in safety, safety standards and signs, signals in construction, role of stakeholders in construction safety.

UNIT II ACCIDENTS IN CONSTRUCTION **9**

Accident patterns, theories of accident-causation, cost of injury vs investment in safety, types of injuries, safety program accident / incident investigation, safety pyramid, PPE in construction, a case study on construction safety.

UNIT III SAFETY PRECAUTIONS **9**

Introduction to OSHA regulations; Role of stakeholders in safety Site safety programs - Job hazard analysis, HIRA(Hazard identification and risk assessment),accident investigation & accident indices-violation, Penalty.

UNIT IV SAFETY MEASURES IN CONSTRUCTION **9**

Safety during construction, alteration, demolition works - Earthwork, steel construction, temporary structures, masonry & concrete construction, cutting & welding.

UNIT V SAFETY OPERATIONS **9**

SoPs (Safe Operating Procedures) - Construction equipment, materials handling-disposal & hand tools, other hazards - fire, confined spaces, electrical safety; BIM & safety.

TOTAL: 45 PERIODS

OUTCOMES

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

- Explain the role of safety standards and signs in construction.
- Identify the accidents in construction by investigating the accident patterns.
- Understand the role of stakeholders in safety Site safety programs.
- Analyze safety measures in construction, alteration, demolition works
- Evaluate the safety operating procedures.

TEXT BOOKS

1. Haupt T.C, J. Hinze, " The Management of Construction Safety and Health", Taylor & Francis, 2020.
2. Charles D. Reese, James Vernon Eidson, "Handbook of OSHA construction safety and health", Taylor & Francis, 2018.

REFERENCES

1. IS 9457:1980, "Code of practice for safety colors and safety signs" BIS.
2. IS 13415:1992, "Protective barriers in and around building – code of safety" BIS.

E–RESOURCES

1. https://nptel.ac.in/courses/105102206/ (Safety in Construction)
2. https://nptel.ac.in/courses/110105094/ (Industrial Safety Engineering)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	2	2	1	1	-	-	-	-	1	3	3	2
2	3	3	2	2	1	1	1	-	-	-	-	1	3	2	1
3	3	3	3	2	2	1	1	-	-	-	-	1	3	3	2
4	3	3	2	2	1	1	1	-	-	-	-	1	3	2	1
5	3	3	3	2	1	1	1	-	-	-	-	1	3	3	1
AVG	**3.0**	**3.0**	**2.6**	**2.0**	**1.4**	**1.0**	**1.0**	**-**	**-**	**-**	**-**	**1.0**	**3.0**	**2.6**	**1.4**

1-Low 2-Medium 3-High '-' – No Correlation

23CECT03 SUSTAINABLE CONSTRUCTION ENGINEERING L T P C
3 0 0 3

OBJECTIVES

- To understand comprehensive overview of materials used for sustainable buildings
- To study about engineering practices in sustainable construction.
- To know the role of assessment in sustainable construction.
- To learn the innovative sustainable materials.
- To understand the fundamentals of life cycle assessment.

UNIT I INTRODUCTION 9

Introduction to Sustainable Building Materials – Qualities - Uses - Examples - Natural building materials.

UNIT II SUSTAINABLE CONSTRUCTION ENGINEERING 9

Fundamentals of Sustainable Construction Engineering- Sustainability and resources, need, present practices at national and international level, The Sustainability Quadrant- challenges & Issues, Government initiatives.

UNIT III SUSTAINABILITY ASSESSMENT 9

Sustainability assessment using standard approaches- LEED/GRIHA rating evaluation process. Socio - economic feasibility of sustainable construction products.

UNIT IV SUSTAINABLE PRODUCT DESIGN 9

Innovative & customized sustainable product design based on social constraints, tools & aids available forsustainable construction products.

UNIT V SUSTAINABLE LIFE CYCLE 9

Life Cycle Assessment and Costing-Various aspects related to construction cost, present value analysis, life cycle stages.

TOTAL: 45 PERIODS

OUTCOMES

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

- Understand the concept of sustainable materials in construction.
- Apply the knowledge in Sustainable Construction Engineering.
- Analyze the role of LEED/GRIHA in construction.
- Design the innovative product in sustainable construction.
- Understand the importance of sustainable life cycle assessment.

TEXT BOOKS

1. Yates J K, "Sustainability in Engineering Design and Construction", CRC Press, 2018.
2. Edmundas Kazimieras Z avadskas, "Sustainability in Construction Engineering", MDPI AG, 2018.

REFERENCES

1. Abhinandan R. Gupta, S.K Deshmukh, "Sustainable Construction Engineering & Management", Abhinandan Gupta Publications, 2020.
2. Liv Haselbach, "Sustainable Construction for Engineers", McGraw-Hill Education, 2017.

E–RESOURCES

1. https://nptel.ac.in/courses/105102195 / (Sustainable Materials and Green Buildings)
2. https://nptel.ac.in/courses/124107011 / (Sustainable Architecture)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	1	1	2	-	-	-	1	1	3	2	1
2	3	2	2	2	1	1	1	-	-	-	1	1	3	2	1
3	2	2	2	1	1	1	2	-	-	-	1	1	3	3	1
4	2	2	2	2	1	2	1	-	-	-	1	1	3	2	1
5	3	1	2	2	1	2	2	-	-	-	1	1	2	2	1
AVG	**2.6**	**1.8**	**2.0**	**1.8**	**1.0**	**1.4**	**1.6**	**-**	**-**	**-**	**1.0**	**1.0**	**2.8**	**2.2**	**1.0**

1-Low 2-Medium 3-High '-' – No Correlation

23CECE01 ADVANCED TECHNIQUES IN CONCRETE CONSTRUCTION L T P C
(Lab Embedded Theory Course) **3 0 2 4**

OBJECTIVES

- To learn systematic knowledge of concrete constituents.
- To study the concrete mix design principles.
- To understand the basic concepts of special concrete.
- To know the techniques involved in properties of concrete.
- To understand the fundamentals of concreting testing and their qualities.
- To study advanced NDT techniques for determining the quality of concrete.

UNIT I FUNDAMENTALS OF CONCRETE 9

Features of Recent Advances in Concrete, Types of Concrete to be dealt; Terminologies, Ingredients, Properties of Fresh & Hardened concrete, related tests, Production and use of concrete.

UNIT II MIX DESIGN PRINCIPLES 9

Concrete mix design, Basic considerations and choice a mix proportions, various methods of mix designs including IS Code method. Quality control and quality assurance of concrete, Acceptance criteria. High workability concrete/Self compacting concrete, Fiber reinforced concrete, Polymer-concrete composites.

UNIT III ADVANCES IN CONCRETE 9

Special Concretes: Definition & Introduction, General properties, Advantages, Disadvantages, Applications, Concreting practices, Guidelines for Mix design and use of following concretes: High density concrete, Shrinkage compensating concrete, Mass concrete, Roller compacted concrete.

UNIT IV PROPERTIES OF CONCRETE 9

Durability of Concrete: Definitions, Deterioration processes– Physical, Chemical, Environmental & Biological; Measures for ensuring durability, Corrosion of reinforcing steel, protective measures.

UNIT V TESTING AND QUALITY OF CONCRETE 9

Testing and Quality Control of Concrete: Classification of test methods, In-situ, Non-Destructive & Partially–Destructive tests for fresh concrete, hardened concrete and durability of concrete. Problems on the in-situ testing results and compared with Laboratory results.

LIST OF PRACTICALS

1. Study of IS code related to mix design.
2. Determine Compressive strength of High grade concrete by using different admixtures.
3. Study and performance on Rebound Hammer.
4. Study and performance on Ultrasonic Pulse Velocity.
5. Study and performance on Profometer.
6. Study and performance on Crack scope.
7. Study of Self Compacting Concrete.

TOTAL: 45+15 = 60 PERIODS

OUTCOMES

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

- Understand the properties of the constituent materials of concrete.
- Design concrete mixes and apply statistical quality control techniques
- Establish the special concrete technologies.
- Understand the durability of concrete
- Illustrate the importance on properties of fresh and hardened concrete.
- Determine the compressive strength of concrete with admixtures.

TEXT BOOKS

1. Shetty M.S., "Concrete Technology", S.Chand and Company Ltd., 8 th Edition, 2019.
2. Krishnaraju N., "Advanced Concrete Technology", CBS Publishers, 4 th Edition, 2018.

REFERENCES

1. Gambir M.L., "Concrete Technology", Tata McGraw Hill, Publishing Co,Ltd, 6 th Edition, 2017.
2. Santhakumar A.R., "Concrete Technology", Oxford University Press, 10 th Edition, 2018.

E–RESOURCES

1. https://nptel.ac.in/courses/105/102/105102012/ (Concrete Technology)
2. https://nptel.ac.in/courses/105/106/105106176/ (Advanced Concrete Technology)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	**3**	1	-	-	-	-	1	1	1	3	1	1
2	3	3	2	2	1	-	-	-	-	1	1	1	3	2	1
3	3	3	2	3	1	-	-	-	-	1	1	1	3	2	1
4	3	3	2	2	1	-	-	-	-	1	1	1	3	1	1
5	3	3	1	3	1	-	-	-	-	1	1	1	3	1	1
6	2	2	1	1	1	**-**	**-**	**-**	**-**	1	1	1	2	1	1
AVG	**2.83**	**2.83**	**1.67**	**2.33**	**1.0**	**-**	**-**	**-**	**-**	**1.0**	**1.0**	**1.0**	**2.83**	**1.33**	**1.0**

1-Low 2-Medium 3-High '-' – No Correlation

23CECP01 **PROJECT WORK** **L T P C**
0 0 12 6

OBJECTIVES

- To understand skills to formulate a technical project.
- To know the ability to solve specific problem.
- To study the use of new tools, algorithms and techniques required to carry out the projects.
- To learn guidance on the various procedures for validation of the product and analyze the cost effectiveness.
- To study the guidelines to prepare technical report of the project.

GUIDELINES

The students in a group of 3, works on a specific topic approved by faculty member who is familiar in this area of interest. The student can select any topic which is relevant to his/her specialization of the programme. The topic may be experimental or analytical or case studies. At the end of the semester, after completing the work to the satisfaction of the supervisor and review committee, a detailed report should be prepared and submitted to the head of the department. The students will be evaluated through a viva–voce examination by a panel of examiners including one external examiner.

TOTAL: 180 PERIODS

OUTCOMES

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

- Identify the requirement and develop the design solutions.
- Observe the strategies and methodologies.
- Illustrate the prototype and analysis the cost effectiveness.
- Develop the oral presentations.
- Apply the practical problem in the field of engineering and find better solutions to it.

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	1	**3**	-	2	-	-	2	1	1	3	3	3	3
2	3	3	1	3	-	2	-	-	2	1	1	3	3	3	3
3	2	2	2	3	-	2	-	-	2	1	1	3	1	1	1
4	3	1	1	**3**	-	2	-	-	2	1	1	3	3	3	3
5	3	3	1	3	-	2	-	-	2	1	1	1	3	1	1
AVG	**2.8**	**2.0**	**1.20**	**3.0**	**-**	**2.0**	**-**	**-**	**3.0**	**2.60**	**1.0**	**2.60**	**2.60**	**2.20**	**2.20**

1-Low 2-Medium 3-High '-' – No Correlation

CURRICULUM AND SYLLABI

FORB.E./B.Tech. DEGREE PROGRAMMES

(MINOR/HONOURS DEGREE-CONSTRUCTION TECHNOLOGY)

CREDIT SUMMARY

B.E. - CIVIL ENGINEERING

Category	Credits Per Semester								Credit Total
	I	II	III	IV	V	VI	VII	VIII	
PC	-	-	3	3	3	4	-	-	13
EEC	-	-	-	-	-	-	6	-	6
Total	-	-	3	3	3	4	6	-	19