SRI KRISHNA COLLEGE OF ENGINEERING AND TECHNOLOGY
An Autonomous Institution, Affiliated to Anna University
Coimbatore - 641 008

DEPARTMENT OF CIVIL ENGINEERING

CURRICULUM AND SYLLABI

BE CIVIL ENGINEERING

REGULATION 2022

(B: 2024-2028)

SRI KRISHNA COLLEGE OF ENGINEERING AND TECHNOLOGY

An Autonomous Institution affiliated to Anna University, Chennai

Kuniamuthur, Coimbatore - 641 008

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CHOICE BASED CREDIT SYSTEM

VISION AND MISSION OF THE DEPARTMENT

Our Vision

To be a center of excellence in Civil Engineering Education through full-fledged learningexperience along with research.

Our Mission

To accomplish our vision, we are committed to

M1: Faculty experts from all specialization of Civil Engineering to facilitate teaching learningprocess

M2: Excellent infrastructure facilities to apply Civil Engineering knowledge and perform societalbased research

M3: Exposure to latest technologies in Civil Engineering through industry-institute interaction andprofessional bodies

M4: Environs to develop their innovative thoughts, ethics, communication, inter- and intra-personal skills

M5: Enthusiasm towards self-learning, social responsibility and entrepreneurship

Program Outcomes (POs):-

At the time of their graduation students of Civil Engineering Program should be in possession of the following Program Outcomes

PO 1. **Engineering knowledge:** Apply the knowledge of mathematics, science and engineering fundamentals for the solution of complex Civil Engineering problems.

PO 2. **Problem analysis:** Identify, formulate and analyse complex Civil Engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences.

PO 3. **Design/development of solutions:** Design solutions for complex Civil Engineering problems and design system components with appropriate consideration for public health & safety, cultural, societal and environmental considerations.

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

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

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

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

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

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

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

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

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

Program Educational Objectives (PEOs):-

The following Program Educational Objectives are designed based on the department mission

1.	To apply knowledge of mathematics, science and engineering to solve existing problems in the area of Structural, Geotechnical, Water Resources, Environmental, Transportation, Urban Planning, Construction Materials and Management in Civil Engineering

2.	To analyze, design, construct Civil Engineering traditional and modern structures

3. To perform investigation on any complicated Civil Engineering problems by conducting research using modern equipment's and software tools

4. To communicate and develop strong inter- and intra- personal skills to prepare them for placement and higher studies

5. To be self-motivated towards lifelong learning and entrepreneurship

Mapping of POs to PEOs

Program Educational Objectives	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
PEO 1	3	2	3	2	2	3	2	2	3	3	3	2
PEO 2	3	3	2	2	3	2	2	2	2	2	2	3
PEO 3	3	3	3	2	3	3	2	2	2	3	2	3
PEO 4	3	3	2	2	3	2	2	2	2	2	2	3
PEO 5	3	3	3	2	3	3	2	2	2	3	2	3

1	Reasonably agreed	2	Moderately agreed	3	Strongly agreed

Program Specific Outcomes (PSOs):-

At the end of the Program, Graduate shall have

PSO 1	**Analytical Knowledge and Practical Skills**	The ability to analyse, design and interpret by applying the concepts of mathematics and physical sciences in the core areas of Civil Engineering.
PSO 2	**Civil Engineer and Sustainability**	The propensity to excel in portfolio of waste management, sanitation, housing and construction management for the sustainable environment.
PSO 3	**Environment and Social Commitment**	The ability to acquire and update knowledge continuously and offer engineering solutions to meet the environmental and societal needs.

B.E. CIVIL ENGINEERING
REGULATION 2022 (B: 2024-2028)
I – VIII SEMESTER CURRICULUM AND SYLLABI

SEMESTER I

SL. No.	Course Code	Course	L	T	P	Contact hrs./wk.	C	Ext / Int	Cat.
1	23CE101	Introduction to Civil Engineering	3	0	0	3	3	60/40	HSMC
2	23MA101	Mathematics I	3	1	0	4	4	60/40	BSC
3	23EE113	Fundamentals of Electrical and Electronics Engineering	2	1	0	3	3	60/40	ESC
4	23TA101	Heritage of Tamils	1	0	0	1	1	60/40	IKS
5	23EN101	Oral and Written Communication Skills	2	0	2	4	3	50/50	HSMC
6	23CS101	Problem solving using C++	1	0	4	5	3	50/50	ESC
7	23CE103	Design Thinking and Workshop Practices	1	0	3	4	2.5	50/50	ESC
8	23CE102	Engineering Graphics Laboratory	0	0	3	3	1.5	40/60	ESC
9	23EE115	Fundamentals of Electrical and Electronics Engineering Laboratory	0	0	2	2	1	40/60	ESC
10	23MC101	Induction Programme 3 - weeks (Mandatory Course -I)					0	0/100	MC
		Total	**13**	**2**	**14**	**29**	**22**	1000	

SEMESTER II

SL. No.	Course Code	Course	L	T	P	Contact hrs./wk.	C	Ext / Int	Cat.
1	23MA204	Calculus and Fourier Series	3	1	0	4	4	60/40	BSC
2	23CE206	Principles of Engineering Mechanics	3	1	0	4	4	60/40	BSC
3	23CE202	Construction Materials and Techniques	3	0	0	3	3	60/40	ESC
4	23PS101	Physical Sciences	4	0	0	4	4	60/40	BSC
5	23TA201	Tamils and Technology	1	0	0	1	1	60/40	IKS
6	23CE205	Architectural Design Principles and Drawing	3	0	2	5	4	50/50	ESC
7	23IT211	Introduction to Python Programming	1	0	4	5	3	50/50	ESC
8	23PS102	Physical Science Laboratory	0	0	4	4	2	40/60	BSC
		Total	**18**	**2**	**10**	**30**	**25**	800	

SEMESTER III

SL. No.	Course Code	Course	L	T	P	Contact hrs./wk.	C	Ext / Int	Cat.
1	23MA303	Numerical Methods	3	1	0	4	4	60/40	BSC
2	23CE301	Fluid Mechanics and Hydraulic Engineering	3	0	0	3	3	60/40	PCC
3	23CE302	Solid Mechanics	3	1	0	4	4	60/40	PCC
4	23CE303	Surveying and Geomatics	3	0	0	3	3	60/40	PCC
5	23GE301	Universal Human Values	3	0	0	3	3	60/40	HSMC
6	23CE304	Fluid Mechanics Laboratory	0	0	3	3	1.5	40/60	PCC
7	23CE305	Solid Mechanics Laboratory	0	0	3	3	1.5	40/60	PCC
8	23CE306	Surveying and Geomatics Laboratory	0	0	3	3	1.5	40/60	PCC
9	23MCxxx	Mandatory Course II	2	0	0	2	0	0/100	MC
		Total	**17**	**2**	**9**	**28**	**21.5**	**900**	

SEMESTER IV

SL. No.	Course Code	Course	L	T	P	Contact hrs./wk.	C	Ext / Int	Cat.
1	23CE401	Concrete Technology	3	0	0	3	3	60/40	PCC
2	23CE402	Environmental Engineering	3	0	0	3	3	60/40	PCC
3	23CE403	Structural Analysis	3	1	0	4	4	60/40	PCC
4	23CE404	Transportation Engineering	3	0	0	3	3	60/40	PCC
5	23xxyyy	Open Elective I	3 or 1 or 0	0 or 0 or 0	0 or 4 or 6	3 or 5 or 6	3	60/40 or 40/60	OEC
6	23CE405	Concrete and Highway Engineering Laboratory	0	0	4	4	2	40/60	PCC
7	23CE406	Environmental Engineering Laboratory	0	0	3	3	1.5	40/60	PCC
8	23CE407	Structural Analysis Laboratory	0	0	3	3	1.5	40/60	PCC
9	23EES101	Employability Enhancement Skills (Internship / Training – 2 weeks)	0	0	0	0	1	40/60	EES
10	23MCxxx	Mandatory Course III	2	0	0	2	0	0/100	MC
		Total	**17**	**1**	**10**	**28**	**22**	**1000**	

SEMESTER V

SL. No.	Course Code	Course	L	T	P	Contact hrs./wk.	C	Ext / Int	Cat.
1	23CE501	Design of Reinforced Concrete Elements	3	1	0	4	4	60/40	PCC
2	23CE502	Geotechnical Engineering	3	1	0	4	4	60/40	PCC
3	23CE503	Intelligent transportation system	3	0	0	3	3	60/40	PCC
4	23CExxx	Professional Elective I	3	0	0	3	3	60/40	PEC
5	23xxyyy	Open Elective II	3 or 1 or 0	0 or 0 or 0	0 or 4 or 6	3 or 5 or 6	3	60/40 or 40/60	OEC
6	23CE504	Design of RC Structures Laboratory	0	0	3	3	1.5	40/60	PCC
7	23CE505	Geotechnical Laboratory	0	0	3	3	1.5	40/60	PCC
8	23EES102	Employability Enhancement Skills (Internship / Training – 2 weeks)	0	0	0	0	1	40/60	EES
9	23MCxxx	Mandatory Course – IV	2	0	0	2	0	0/100	MC
		Total	**17**	**2**	**6**	**25**	**21**	**900**	

SEMESTER VI

SL. No.	Course Code	Course	L	T	P	Contact hrs./wk.	C	Ext / Int	Cat.
1	23CE601	Construction Planning and Management	3	0	0	3	3	60/40	PCC
2	23CE602	Design of Steel Structural Elements	3	1	0	4	4	60/40	PCC
3	23CE603	Foundation Engineering	3	0	0	3	3	60/40	PCC
4	23CExxx	Open Elective III	3	0	0	3	3	60/40	OEC
5	23Cexxx	Professional Elective II	3	0	0	3	3	60/40	PEC
6	23Cexxx	Professional Elective III	3	0	0	3	3	60/40	EEC
7	23CE604	Design of Steel Structures Laboratory	0	0	3	3	1.5	40/60	PCC
8	23CE605	Project Planning Laboratory	0	0	3	3	1.5	40/60	PCC
		Total	**18**	**1**	**6**	**25**	**22**	**800**	

SEMESTER VII

SL. No.	Course Code	Course	L	T	P	Contact hrs./wk.	C	Ext / Int	Cat.
1	23CE701	Construction Cost Estimation and Valuation	3	1	0	4	4	60/40	PCC
2	23CE702	Sustainable and Green Construction	3	0	0	3	3	60/40	PCC
3	23Cexxx	Open Elective IV	3	0	0	3	3	60/40	OEC
4	23Cexxx	Professional Elective IV	3	0	0	3	3	60/40	PEC
5	23Cexxx	Professional Elective V	3	0	0	3	3	60/40	PEC
6	23Cexxx	Professional Elective VI	3	0	0	3	3	60/40	PEC
7	23CE703	Construction Cost Estimation and Valuation Laboratory	0	0	3	3	1.5	40/60	PCC
8	23CE704	Design Comprehensive Project	0	0	4	4	2	40/60	PROJ
		Total	18	1	7	26	22.5	800	

SEMESTER VIII

SL. No.	Course Code	Course	L	T	P	Contact hrs./wk.	C	Ext / Int	Cat.
1.	23CE801	Project Work	0	0	24	24	12	40/60	PROJ
		Total	0	0	24	24	12	100	

L: Lecture   **T:** Tutorial   **P:** Practical   **C:** Credit   **Cat.:** Category

HSMC : Humanities and Social Sciences including Management
OEC : Open Elective Courses
EEC : Emerging Elective Courses
BSC : Basic Science Courses
IKS : Indian Knowledge System
ESC : Engineering Science Courses
PROJ : Project Work
PCC : Professional Core Courses
MC : Mandatory Course
PEC : Professional Elective Courses

Definition of Credit:
L – Lecture
T – Tutorial
P – Practical/Practice (Project and Industry based Courses)

1 Hr. Lecture (L) per week   1 credit
1 Hr. Tutorial (T) per week   1 credit
1 Hr. Practical (P) per week   0.5 credit

SEMESTER WISE CREDIT DISTRIBUTION: -

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	22	25	21.5	22	21	22	22.5	12	168

Total Credits: 168

SCHEME OF CREDIT DISTRIBUTION – SUMMARY

SL. No.	Stream	Credits/Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1.	Humanities & SocialSciences Including Management (HSMC)	6		3						9
2.	Basic Sciences (BSC)	4	14	4						22
3.	Engg. Sciences (ESC)	11	10							21
4.	Professional Core (PCC)			14.5	18	14	13	8.5		68
5.	Professional Electives (PEC)					3	6	9		18
6.	Multidisciplinary Open Electives Courses (OEC)				3	3	3	3		12
7.	Project Work (PROJ) / Employability Enhancement Skills (EES)				1	1		2	12	16
8.	Indian Knowledge System (IKS)	1	1							2
9.	Mandatory Course (MC)	0		0	0	0				0
	Total	**22**	**25**	**21.5**	**22**	**21**	**22**	**22.5**	**12**	**168**

STRUCTURE FOR UNDERGRADUATE ENGINEERING PROGRAMME

SL. No.	Course Work – Subject Area	AICTE Suggested Breakdown of Credits	Civil-SKCET Credits
1.	Humanities and Social Sciencesincluding Management courses	06	9
2.	Basic Science courses	24	22
3.	Engineering Science courses including Workshop, Drawing, Basics of Electrical / Mechanical / Computer etc.	20	21
4.	Professional core courses	62	68
5.	Professional Electives coursesrelevant to the chosen specialization / branch	26	18
6.	Multidisciplinary Open Electives Courses (OEC)	12	12
7.	Project Work, Seminar and / orInternship in Industry or elsewhere.	16	14
8.	Industrial Practice / Employability EnhancementSkills		2
9.	Indian Knowledge System	2	2
10.	Mandatory Courses	Non-credit	Non-credit
	Total	168	168

HUMANITIES & SOCIAL SCIENCES INCLUDING MANAGEMENT (9 Credits)

SL. NO	Course Code	Course	L	T	P	Contact hrs./Wk.	C	Cat.
1	23CE101	Introduction to Civil Engineering	3	0	0	3	3	HSMC
2	23EN101	Oral and Written Communication Skills	2	0	2	4	3	HSMC
3	23GE301	Universal Human Values	3	0	0	3	3	HSMC

BASIC SCIENCE COURSES (22 Credits)

SL. NO	Course Code	Course	L	T	P	Contact hrs./Wk.	C	Cat.
1	23MA101	Mathematics I	3	1	0	4	4	BSC
2	23PS101	Physical Sciences	4	0	0	4	4	BSC
3	23PS102	Physical Science Laboratory	0	0	4	4	2	BSC
4	23MA204	Calculus and Fourier Series	3	1	0	4	4	BSC
5	23CE206	Principles of Engineering Mechanics	3	1	0	4	4	BSC
6	23MA303	Numerical Methods	3	1	0	4	4	BSC

ENGINEERING SCIENCE COURSES (21 Credits)

SL. NO	Course Code	Course	L	T	P	Contact hrs./Wk.	C	Cat.
1	23EE113	Fundamentals of Electrical and Electronics Engineering	2	1	0	3	3	ESC
2	23CS101	Problem solving using C++	1	0	4	5	3	ESC
3	23EE115	Fundamentals of Electrical and Electronics Engineering Laboratory	0	0	2	2	1	ESC
4	23CE102	Engineering Graphics Laboratory	0	0	3	3	1.5	ESC
8	23CE103	Design Thinking and Workshop Practices	1	0	3	4	2.5	ESC
5	23CE202	Construction Materials and Techniques	3	0	0	3	3	ESC
6	23CE205	Architectural Design Principles and Drawing	3	0	2	5	4	ESC
7	23IT211	Introduction to Python Programming	1	0	4	5	3	ESC

INDIAN KNOWLEDGE SYSTEM (2 Credits)

SL. NO	Course Code	Course	L	T	P	Contact hrs./Wk.	C	Cat.
1.	23TA101	Heritage of Tamils	1	0	0	1	1	IKS
2.	23TA201	Tamils and Technology	1	0	0	1	1	IKS

PROFESSIONAL CORE COURSES (68 Credits)

SL. NO	Course Code	Course	L	T	P	Contact hrs./Wk.	C	Cat.
1	23CE301	Fluid Mechanics and Hydraulic Engineering	3	0	0	3	3	PCC
2	23CE302	Solid Mechanics	3	1	0	4	4	PCC
3	23CE303	Surveying and Geomatics	3	0	0	3	3	PCC
4	23CE304	Fluid Mechanics Laboratory	0	0	3	3	1.5	PCC
5	23CE305	Solid Mechanics Laboratory	0	0	3	3	1.5	PCC
6	23CE306	Surveying and Geomatics Laboratory	0	0	3	3	1.5	PCC
7	23CE401	Concrete Technology	3	0	0	3	3	PCC
8	23CE402	Environmental Engineering	3	0	0	3	3	PCC
9	23CE403	Structural Analysis	3	1	0	4	4	PCC
10	23CE404	Transportation Engineering	3	0	0	3	3	PCC
11	23CE405	Concrete and Highway Engineering Laboratory	0	0	4	4	2	PCC
12	23CE406	Environmental Engineering Laboratory	0	0	3	3	1.5	PCC
13	23CE407	Structural Analysis Laboratory	0	0	3	3	1.5	PCC
14	23CE501	Design of Reinforced Concrete Elements	3	1	0	4	4	PCC
15	23CE502	Geotechnical Engineering	3	1	0	4	4	PCC
16	23CE503	Intelligent transportation system	3	0	0	3	3	PCC
17	23CE504	Design of RC Structures Laboratory	0	0	3	3	1.5	PCC
18	23CE505	Geotechnical Laboratory	0	0	3	3	1.5	PCC
19	23CE601	Construction Planning and Management	3	0	0	3	3	PCC
20	23CE602	Design of Steel Structural Elements	3	1	0	4	4	PCC
21	23CE603	Foundation Engineering	3	0	0	3	3	PCC
22	23CE604	Design of Steel Structures Laboratory	0	0	3	3	1.5	PCC
23	23CE605	Project Planning Laboratory	0	0	3	3	1.5	PCC
24	23CE701	Construction Cost Estimation and Valuation	3	1	0	4	4	PCC
25	23CE702	Sustainable and Green Construction	3	0	0	3	3	PCC
26	23CE703	Construction Cost Estimation and Valuation Laboratory	0	0	3	3	1.5	PCC

PROFESSIONAL ELECTIVE COURSES - VERTICALS

Vertical I Structural Engineering	Vertical II Geotechnical Engineering	Vertical III Construction Management	Vertical IV Environmental Engineering	Vertical V Infrastructures Engineering	Vertical VI Diversified Courses
Conditional Assessment and Rehabilitation of Structures	Soil Dynamics and Earthquake Engineering	Project Formulation and Implementation	Air and Noise Pollution	Computer Simulation Applications in Transportation Engineering	Plumbing (Water and Sanitation)
Design of RC Structures	Ground Improvement and Geosynthetics	Construction Personnel Management	Industrial Wastewater Treatment System	Smart City Planning and Development	Applications of Sensors and IoT in Civil Engineering
Finite Element Analysis	Environmental Geotechnics	Lean and Sustainable Construction	Rural Water Supply and Onsite Sanitation Systems	Metro Rail Engineering and Infrastructure	Building Services and Management
Pre-stressed Concrete Structures	Surface Water Hydrology	Construction Method and Equipment Management	Irrigation and water resources engineering	Remote Sensing and GIS for Civil Engineering	Valuation of Real Properties
Design of Steel Structures	Assessment of Contaminated Site and Remediation	Supply Chain Management and Logistics in Construction	Ground water and surface water pollution	Smart Construction Materials and Techniques	Nanotechnology in Civil Engineering
Prefabricated Structures	Design of Substructures	Risk and Reliability Analysis of Civil Infrastructure Systems	Solid and Hazardous Waste Management	Highway Pavement Design and Evaluation	Airport and Harbour Engineering
Advanced Structural Analysis	Seismic Design of Structures	Formwork Engineering	Environmental impact Assessment and Life Cycle Analysis	Coastal Engineering	Robotics and Automation in Civil Engineering

PROFESSIONAL ELECTIVE COURSES (18 Credits)

SL. No.	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	Cat.
Vertical I : Structural Engineering
1.	23CE901	Conditional Assessment and Rehabilitation of Structures	3/0/0	3	3	PEC
2.	23CE902	Design of RC Structures	3/0/0	3	3	PEC
3.	23CE903	Finite Element Analysis	3/0/0	3	3	PEC
4.	23CE904	Pre-stressed Concrete Structures	3/0/0	3	3	PEC
5.	23CE905	Design of Steel Structures	3/0/0	3	3	PEC
6.	23CE906	Prefabricated Structures	3/0/0	3	3	PEC
7.	23CE907	Advanced Structural Analysis	3/0/0	3	3	PEC
Vertical II: Geotechnical Engineering
8.	23CE908	Soil Dynamics and Earthquake Engineering	3/0/0	3	3	PEC
9.	23CE909	Ground Improvement and Geosynthetics	3/0/0	3	3	PEC
10.	23CE910	Environmental Geotechnics	3/0/0	3	3	PEC
11.	23CE911	Surface Water Hydrology	3/0/0	3	3	PEC
12.	23CE912	Assessment of Contaminated Site and Remediation	3/0/0	3	3	PEC
13.	23CE913	Design of Substructures	3/0/0	3	3	PEC
14.	23CE914	Seismic Design of Structures	3/0/0	3	3	PEC
Vertical III: Construction Management
15.	23CE915	Project Formulation and Implementation	3/0/0	3	3	PEC
16.	23CE916	Construction Personnel Management	3/0/0	3	3	PEC
17.	23CE917	Lean and Sustainable Construction	3/0/0	3	3	PEC
18.	23CE918	Construction Method and Equipment Management	3/0/0	3	3	PEC
19.	23CE919	Supply Chain Management and Logistics in Construction	3/0/0	3	3	PEC
20.	23CE920	Risk and Reliability Analysis of Civil Infrastructure Systems	3/0/0	3	3	PEC
21.	23CE921	Formwork Engineering	3/0/0	3	3	PEC
Vertical IV: Environmental Engineering
22.	23CE922	Air and Noise Pollution	3/0/0	3	3	PEC
23.	23CE923	Industrial Wastewater Treatment System	3/0/0	3	3	PEC
24.	23CE924	Rural Water Supply and Onsite Sanitation Systems	3/0/0	3	3	PEC
25.	23CE925	Irrigation and water resources engineering	3/0/0	3	3	PEC

26.	23CE926	Ground water and surface water pollution	3/0/0	3	3	PEC
27.	23CE927	Solid and Hazardous Waste Management	3/0/0	3	3	PEC
28.	23CE928	Environmental impact Assessment and Life Cycle Analysis	3/0/0	3	3	PEC
Vertical V :Infrastructures Engineering						
29.	23CE929	Computer Simulation Applications in Transportation Engineering	3/0/0	3	3	PEC
30.	23CE930	Smart City Planning and Development	3/0/0	3	3	PEC
31.	23CE931	Metro Rail Engineering and Infrastructure	3/0/0	3	3	PEC
32.	23CE932	Remote Sensing and GIS for Civil Engineering	3/0/0	3	3	PEC
33.	23CE933	Smart Construction Materials and Techniques	3/0/0	3	3	PEC
34.	23CE934	Highway Pavement Design and Evaluation	3/0/0	3	3	PEC
35.	23CE935	Coastal Engineering	3/0/0	3	3	PEC
Vertical VI : Diversified Courses						
36.	23CE936	Plumbing (Water and Sanitation)	3/0/0	3	3	PEC
37.	23CE937	Applications of Sensors and IoT in Civil Engineering	3/0/0	3	3	PEC
38.	23CE938	Building Services and Management	3/0/0	3	3	PEC
39.	23CE939	Valuation of Real Properties	3/0/0	3	3	PEC
40.	23CE940	Nanotechnology in Civil Engineering	3/0/0	3	3	PEC
41.	23CE941	Airport and Harbour Engineering	3/0/0	3	3	PEC
42.	23CE942	Robotics and Automation in Civil Engineering	3/0/0	3	3	PEC

PROJECT WORK (14 Credits)

SL. No.	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	Cat.
1.	23CE704	Design Comprehensive Project	0/0/4	4	2	PROJ
2.	23CE801	Project Work	0/0/24	24	12	PROJ

EMPLOYABILITY ENHANCEMENT SKILLS (2 Credits)

SL. No.	Course Code	Course Title	Duration	C	Cat.
1.	23EES101	Employability Enhancement Skills (Internship / Training)	2 Weeks	1	EES
2.	23EES102	Employability Enhancement Skills (Internship / Training)	2 Weeks	1	EES

MANDATORY COURSES (Non-credit)

SL. No.	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	Cat.
1.	23MC101	Induction Programme	3 WEEKS		0	MC
2.	23MC102	Environmental Sciences	2/0/0	2	0	MC
3.	23MC104	Management Organizational Behavior	2/0/0	2	0	MC
4.	23MC112	Civil Engineering – Societal & Global Impact	2/0/0	2	0	MC
5.	23MC113	Professional Practice, Law & Ethics	2/0/0	2	0	MC
6.	23MC114	Disaster Mitigation and Management	2/0/0	2	0	MC
7.	23MC115	Disability, Accessibility and Universal Design	2/0/0	2	0	MC

OPEN ELECTIVE COURSES (6 Credits)   [Offered to Other Branches]

SL. No.	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	Cat.
1.	23CE001	Disaster Management	3/0/0	3	3	OEC
2.	23CE002	Engineering Risk and Uncertainty	3/0/0	3	3	OEC
3.	23CE003	Environmental Pollution and Global issues	3/0/0	3	3	OEC
4.	23CE004	Project Management	3/0/0	3	3	OEC
5.	23CE005	Industrial Safety	3/0/0	3	3	OEC
6.	23CE006	Research Methodology and IPR	3/0/0	3	3	OEC

VALUE ADDED COURSES (Additional credit courses)

SL. No.	Course Code	Course Title	Course Credits
1.	23VA130	Effective Communication Skills	1
2.	23VA101	Building Functional Design using AutoCAD	1
3.	23VA102	Total Station and GPS Surveying	1
4.	23VA103	Arc GIS for Civil Engineers	1
5.	23VA104	Structural Analysis and Design Using STAAD.Pro	1
6.	23VA105	Project Management Using Primavera	1
7.	23VA106	3DBuilding Modeling Using Revit Architecture	1
8.	23VA107	Building Valuation	1

SEMESTER I

23CE101	INTRODUCTION TO CIVIL ENGINEERING	3/0/0/3

Nature of Course	Theory
Prerequisites	Nil

Course Objectives:

1	To understand about civil engineering structures and civil engineering materials
2	To illustrate the components of a building and impart knowledge on various aspects ofbuilding construction
3	To acquaint earth's structure and comprehend the significance of geology in civil engineering
4	To impart knowledge about the impacts of human activities in environment

Course Outcomes:
Upon completion of the course, students shall have the ability to

C101.1	Understand the scope of civil engineering and importance of civil engineering structures	[U]
C101.2	Identify building materials required for appropriate construction	[U]
C101.3	Recognizebuilding components and various aspects of building constructions	[AP]
C101.4	Classify the rock types and identify their uses	[U]
C101.5	Illustrate the geological structure and their relevance in civil engineering	[U]

Course Contents:

Module 1: Civil Engineering Structures and Materials   **15 Hrs**

Scope of civil engineering - functions of a civil engineer - relevance of civil engineering in overall infrastructure development of a country – civil engineering structures: buildings, bridges, dams, roads, railways, runways, tunnels, towers, chimneys, retaining walls, water tanks, cooling towers and silos - building materials: bricks, stones, aggregates, m-sand, cement, concrete, steel, plywood, aluminum, GI sheet, PVC – emerging construction materials

Module 2: Building Components and Construction   **15 Hrs**

Selection of site – building components – foundation, basement, wall: stone masonry, brick masonry, column, floor, beam, roof, reinforced concrete members, staircase, lintel, slab, truss and damp-proof course - design and construction sequences of a building - maintenance, repairs and rehabilitation – fundamentals of town planning and smart cities – building bye laws - green building –applications of software and IoT in civil engineering

Module 3: Geology and Environment   **15 Hrs**

Geology in civil engineering – branches of geology – structure of earth and its composition – tectonic plates – continental drift - earth's atmosphere - weathering of rocks - classification of rocks: igneous (granite, basalt), sedimentary (sandstone, limestone) and metamorphic (schist, gneiss, marble) – strike, dip - folds, faults and joints:relevance to civil engineering – human and environment – pollution: water, air, soil, noise

Total Hours	**45 Hrs.**

Text Books:	
1	Bhavikatti S.S., "Basic Civil Engineering", New Age International Publishers, 2018.
2	Parbinsingh Engineering and General Geology, S.K. Kataria& Sons Publications, New Delhi, 2019.
Reference Books:	
1	Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain, "Building constructions", Laxmi Publications (P) Ltd, 2016
2	Varghese P.C., "Engineering Geology for Civil Engineering", Prentice Hall of India Learning Private Limited, New Delhi, 2012.
3	Purushothama Raj P "Building Construction Materials and Techniques", Pearson Education India, 2017
Web References:	
1	https://civiconcepts.com/blog/components-of-building
2	https://theconstructor.org/building/types-of-building-materials-construction/699/
3	https://www.engineeringcivil.com/
4	https://www.constructionplacements.com/civil-engineering-software/
5	https://www.geologypage.com/2019/04/engineering-geology.html
6	https://seismo.gov.in/

Continuous Assessment				End Semester Examination	Total
Formative Assessment	Summative Assessment	Total	Total Continuous Assessment		
80	120	200	40	60	100

Assessment Methods & Levels (based on Blooms' Taxonomy)			
Formative Assessment based on Capstone Model			
Course Outcome	Bloom's Level	Assessment Component (Choose and mapcomponentsfromthelist-Quiz,Assignment, Casestudy, Seminar,GroupAssignment)	FA(16%) [80Marks]
C101.1	Understand	Quiz	20
C101.2	Apply	Assignment	20
C101.3	Analyze	Assignment	20
C101.4	Apply	Seminar	20
C101.5	Apply		

Assessment based on Summative and End Semester Examination

Bloom's Level	Summative Assessment(24%) [120Marks]		End Semester Examination (60%) [100Marks]
	CIA1:[60Marks]	CIA2:[60Marks]	
Remember	-	-	-
Understand	60	60	60
Apply	40	40	40
Analyze	-	-	-
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination

Continuous Assessment (40%) [200Marks]						End Semester Examination (60%) [100Marks]
CA1:100Marks			CA2:100Marks			
SA1 (60Marks)	FA1 (40Marks)		SA2 (60Marks)	FA2 (40Marks)		
	Component- I (20Marks)	Component - II (20 Marks)		Component-I (20 Marks)	Component - II (20 Marks)	

Mapping of Course Outcomes (CO) with Program Outcomes (PO) Program Specific Outcomes (PSO)

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	-	1	-	1	1	-	1	-	2	-	-	1	2	2
2	3	-	1	-	1	1	-	1	-	2	-	-	1	2	2
3	3	-	1	-	1	1	-	1	-	2	-	-	1	2	2
4	3	-	1	-	1	1	-	1	-	2	-	-	1	2	2
5	3	-	1	-	1	1	-	1	-	2	-	-	1	2	2
Avg.	3	-	1	-	1	1	-	1	-	2	-	-	1	2	2
1	Reasonably agreed			2	Moderately agreed			3		Strongly agreed					

23MA101	MATHEMATICS I (COMMON TO ALL BRANCHES)	3/1/0/4

Nature of Course	Problem Analytical
Pre requisites	-

Course Objectives:

1	To use logical notation to define the fundamental data types and structures used in computer algorithms and systems.
2	To use the concepts of graph theory in practical situations.
3	To acquire thorough knowledge of fundamental notions of proof's and its application in Cryptography.
4	To analyse data pertaining to discrete and continuous random variables to interpret the results.
5	To impart the knowledge of counting principles, to think critically and apply it in real world problems.

Course Outcomes(Theory)

Upon completion of the course, students shall have ability to

C101.1	Recall the basic concepts of logical laws, structures and probability.	[R]
C101.2	Understand the concepts of proof techniques, structures and random variables.	[U]
C101.3	Apply the logical and foundational structures of mathematics with an emphasis on writing proofs.	[AP]
C101.4	Apply the concepts of graph and number theory in cryptography.	[AP]
C101.5	Apply the probability concepts in transition from real problem to a probabilistic model.	[AP]

Course Contents:

MODULE I : LOGICAL PROOF'S& FUNCTIONS (20 Hrs)

Proofs: Definitions - Proof by cases - Proof by contradiction - Logical formulas - Propositions - Truth table - Logical operators - Tautologies and Contradictions – Contrapositive - Equivalences and implications - Predicates - Free and bound variables – Quantifiers - Universe of discourse - **Sets:** Basic sets - Operations on Sets – Law on Sets(without proof) - Cartesian product of sets. **Relations:**Binary relation-Types of relations and their properties - Relational matrix and graph of a relation - Equivalence relations - Partial ordering relation**Functions:** Classifications of functions – Induction - Ordinary induction and Strong induction - Recursive data types - Definition of recursive and structural induction.

MODULE II : NUMBER THEORY & GRAPH THEORY (20 Hrs)

Number Theory: Divisibility - Greatest common divisor - Euclid's algorithm - Prime numbers- Fundamental theorem of arithmetic - Modular arithmetic - Remainder arithmetic - Multiplicative inverses and cancelling - Relatively prime - Euler's theorem.- Chinese Reminder Theorem**Graph Theory:**Vertices and Degrees - Types of graphs - Handshaking theorem - Adjacency matrices - Walks and paths -Connectivity -Isomorphism - Directed acyclic graphs and scheduling –Matchings - The Stable marriage problem –Forests and trees - Spanning trees - Minimum weight spanning trees –Prim's algorithm - Kruskal's algorithm.

MODULE III : COUNTING &PROBABILITY(20 Hrs)
Sums and Asymptotics-Sums of Powers-Harmonic Numbers-Asymptotic Notation-The Division Rule-Counting Subsets-Sequences with Repetitions-The Pigeonhole Principle-Events and Probability Spaces-The Four Step Method-Conditional Probability-The Four-Step Method for Conditional Probability-The Law of Total Probability-Baye'stheorem-Random Variables–Discrete and continuous random variables - Distribution Functions-Bernoulli Distribution-Uniform Distribution-Binomial Distribution-Great Expectations-Conditional Expectation-Linearity of Expectation-Infinite Sums-Expectations of Products

		Total Hours:	60

Text Books:

1	Tremblay J.P and Manohar R, "Discrete Mathematical Structures with applications to Computer Science", Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.
2	Koshy. T, "Elementary Number Theory with Applications", Elsevier Publications, New Delhi, Second Edition, 2007.
3	Eric Lehman, F.Thomson Leightonand Albert R.Meyer, "Mathematics for Computer Science", 14thEdition, MIT Open courseware, 2018.

Reference Books:

1	Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, "Discrete Mathematical Structures", sixth edition, Pearson Education Pvt Ltd., New Delhi, 2017
2	Kenneth H. Rosen, "Discrete Mathematics and its Applications", Eighth Edition, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, Eighth Edition, 2021.
3	Thomas Koshy, "Discrete Mathematics with Applications", Elsevier Publications, 2004.
4	P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Fifth Edition, Pearson Education Asia, New Delhi, Fifth Edition, 2019.

Web References:

1	https://onlinecourses.nptel.ac.in/noc23_cs109/preview
2	https://onlinecourses.nptel.ac.in/noc23_cs120/preview
3	https://onlinecourses.nptel.ac.in/noc23_ma77/preview
4	https://onlinecourses.nptel.ac.in/noc23_ma72/preview

Online Resources:

1	https://www.coursera.org/specializations/discrete-mathematics
2	https://www.cs.ucdavis.edu/~rogaway/classes/20/fall21/mit-book.pdf
3	https://mathworld.wolfram.com/topics/DiscreteMathematics.html
4	https://mathworld.wolfram.com/topics/NumberTheory.html

Assessment Methods & Levels (based on Blooms' Taxonomy)

Continuous Assessment				End Semester Examination	Total
Formative Assessment	Summative Assessment	Total	Total Continuous Assessment		
80	120	200	40	60	100

Assessment Methods & Levels (based on Blooms' Taxonomy)

Formative Assessment based on Capstone Model

Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list - Quiz, Assignment, Case study, Seminar, Group Assignment)	FA (16%) [80 Marks]
C101.1	Remember	Quiz	20
C101.2	Understand	Presentation	20
C101.3 – C101.5	Apply	Tutorial	20
C101.3 – C101.5	Apply	Assignment	20

Assessment based on Summative and End Semester Examination

Bloom's Level	Summative Assessment (24%) [120 Marks]		End Semester Examination (60%) [100 Marks]
	CIA1 : [60 Marks]	CIA2 : [60 Marks]	
Remember	20	20	20
Understand	30	30	30
Apply	50	50	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination

Continuous Assessment (40%) [200 Marks]						End Semester Examination (60%) [100 Marks]
CA 1: 100 Marks			CA 2: 100 Marks			
SA 1 (60 Marks)	FA 1 (40 Marks)		SA 2 (60 Marks)	FA 2 (40 Marks)		
	Component - I (20 Marks)	Component - II (20 Marks)		Component - I (20 Marks)	Component - II (20 Marks)	

Mapping of Course Outcomes (CO) with Programme Outcomes (PO) Programme Specific Outcomes (PSO)(Theory)															
COs	**POs**												**PSOs**		
	a	b	c	d	e	f	g	h	i	j	k	l	1	2	3
C101.1	1	1											1		
C101.2	2	2											1		
C101.3	3	3													
C101.4	3	3											1		
C101.5	3	3													
		3	Strongly agreed		2	Moderately agreed		1	Reasonably agreed						

23EE113	Fundamentals of Electrical and Electronics Engineering (Common to MECH and CIVIL)	2/1/0/3
Nature of Course	G (Theory analytical)	
Course Pre-requisites	Nil	

Course Objectives:

1	To import the students with a basic understanding of Electrical circuits.
2	To learn the working principle of static machine.
3	To understand the rotating Machines working principles and to have a knowledge on selection of machine for specific types of applications.
4	To give a comprehensive exposure to Electrical installations.

Course Outcomes:

Upon completion of the course, students shall have ability to

C113.1	Analyze the concepts in AC circuit and DC circuits.	[A]
C113.2	Examine the working principle of Static machines.	[A]
C113.3	Understand the working principle of Rotating machines.	[U]
C113.4	Utilize the basic components for Electrical installations.	[AP]
C113.5	Interpret the basic devices in Electronics and Instrumentation.	[A]

Course Contents:

Course Contents:

Module I: DC Circuits and AC Circuits 15 Hrs

DC Circuits - Electrical circuit elements (R, L and C) - Voltage and Current Sources - Kirchoff's current and voltage law - analysis of simple circuits with DC excitation - Mesh and Nodal Analysis. **AC Circuits** - Representation of sinusoidal waveforms, Peak and RMS values, Phasor representation, Real power, Reactive power, Apparent power, Power factor. Analysis of single phase ac circuits consisting of R, L, C, RL and RC. Three phase balanced circuits - Voltage and Current relations in star and delta connections.

Module II: Electrical Machines and Installations 15 Hrs

Static machines: BH characteristics, construction & working principle of single-phase and three phase transformers. Rotating machines: Generation of rotating magnetic fields, construction and working principle of DC machines, three-phase induction motor and synchronous motor. Components of LT Switchgear - Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Domestic wiring, Types of Wires and Cables, Earthing.

Module III: Fundamentals of Semiconductor Devices and Instrumentation 15 Hrs

Semiconductor - PN junction diode - Zener diode - Bipolar Junction Transistor Introduction - Field Effect Transistor Introduction - Construction and characteristics of JFETs - MOSFET - Depletion type MOSFET, Enhancement type MOSFET, Transfer characteristics. Sensors, Solenoids, Pneumatic controls with electrical actuator, Mechatronics, types of valves and its applications, Electro-Pneumatic systems, Proximity sensors, Limit switches.

	Total Hours	**45**

Text Books:

1	Fitzgerald. A.E., Charles Kingsely Jr, Stephen D.Umans, 'Electric Machinery', Tata McGraw Hill, 7th edition, 2020.

2	Vincent. Del. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 2nd edition, 2015.
3	E. Hughes, "Electrical and Electronics Technology", Pearson, 10th edition, 2011.
4	Donald .A. Neamen, Electronic Circuit Analysis and Design, 2nd Edition reprint, Tata Mc Graw Hill, 2013.

Reference Books:

1	Charles A.Gross, Thaddeus A.Roppel, "Fundamentals of Electrical Engineering", CRC press, 2012.
2	D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, Revised 1st edition 2017,
3	Theodore F. Bogart, Jeffery S. Beasley and Guilermo Rico, 'Electronic Devices and Circuits', Pearson Education, 6th edition, 2013.

Web References:

1	http://nptel.ac.in/course.php?disciplineId=108
2	https://ocw.mit.edu/courses/find-by topic/#cat=engineering&subcat=electricalengineering&spec=electricpower
3	https://nptel.ac.in/video.php?subjectId=117103063
4	https://onionesquereality.wordpress.com/.../more-video- lectures-iit-open
5	https://nptel.iitg.ernet.in/Elec_Comm_Engg/.../Video-ECE.pdf

Online Resources:

1	http://www.electrical-knowhow.com/
2	https://www.edx.org/course/electricity-magnetism-part-1-ricex-phys102-1x-1
3	https://www.mooc-list.com/course/fundamentals-electrical-engineering-coursera
4	https://nptel.ac.in/course.php

Continuous Assessment				End Semester Examination	Total
Formative Assessment	Summative Assessment	Total	Total Continuous Assessment		
80	120	200	40	60	100

Assessment Methods & Levels (based on Blooms' Taxonomy)			
Formative Assessment based on Capstone Model			
Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list - Quiz, Assignment, Case Study, Seminar, Group Assignment)	FA (16%) [80 Marks]
C113.1	Analyze	Assignment	20
C113.2	Analyze		
C113.3	Understand	Simulation	20
C113.4	Apply	Class Presentation	20
C113.5	Understand	Quiz	20

Assessment based on Summative and End Semester Examination			
Bloom's Level	**Summative Assessment (24%) [120 Marks]**		**End Semester Examination (60%) [100 Marks]**
	CIA1 : [60 Marks]	**CIA2 : [60 Marks]**	
Remember	20	20	20
Understand	30	30	30
Apply	20	20	20
Analyse	30	30	30
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination						
Continuous Assessment (40%) [200 Marks]						**End Semester Examination (60%) [100 Marks]**
CA 1 : 100 Marks			**CA 2 : 100 Marks**			
SA 1 (60 Marks)	**FA 1 (40 Marks)**		**SA 2 (60 Marks)**	**FA 2 (40 Marks)**		
	Component - I (20 Marks)	**Component - II (20 Marks)**		**Component - I (20 Marks)**	**Component - II (20 Marks)**	

No. of the CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
C113.1	3												1		
C113.2	3												1		
C113.3	3		1										1		
C113.4	3		1										1		
C113.5	3		1										1		
1	Reasonably Agreed		2		Moderately Agreed			3		Strongly Agreed					

23TA101	HERITAGE OF TAMILS / தமிழர்மரபு	1/0/0/1

Nature of Course:	C (Theory Concept)
Pre requisites:	NIL

Course Objectives:

1	To know various concepts of Tamil Language families.
2	To know about the essentialities of Heritage.
3	To understand the Aram concepts of Tamils and the cultural influence.

Course Outcomes:

Upon completion of the course, students shall have ability to

C101.1	Know about the language families in India, impact of religions and the contribution of Bharathiyar and Bharathidhasan.	[U]
C101.2	Observe the growth of sculpture, making of musical instruments and the role of temples in socio and economic lives.	[U]
C101.3	Understand the significance of folklore and martial arts.	[U]
C101.4	Learn the sangam literature, sangam age and overseas conquest of Cholas.	[U]
C101.5	Understand the contribution of Tamils to Indian Freedom Struggle, role of Siddha medicine and print history of Tamil Books.	[U]

Course Contents:

Language and Literature: 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.

Heritage - Rock Art Paintings to Modern Art – Sculpture: 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. **FolkAndMartialArts:** Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

Thinai ConceptOfTamils - 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. ContributionofTamilstoIndiannationalmovementandindianculture: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 Hours:	15

Text-cum-Reference Books:

1	தமிழகவரலாறு – மக்களும்பண்பாடும் – கே. கே. பிள்ளை(வெளியீடு: தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).
2	கணினித்தமிழ் – முனைவர்இல. சுந்தரம் . (விகடன்பிரசுரம்).
3	கீழடி – வைகைநதிக்கரையில்சங்ககாலநகரநாகரிகம் (தொல்லியல்துறைவெளியீடு)
4	பொருநை – ஆற்றங்கரைநாகரிகம். (தொல்லியல்துறைவெளியீடு)
5	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu)

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

Continuous Assessment				End Semester Examination	Total
Formative Assessment	Summative Assessment	Total	Total Continuous Assessment		
80	120	200	40	60	100

Assessment Methods & Levels (based on Blooms' Taxonomy)			
Formative Assessment based on Capstone Model			
Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list - Quiz, Assignment, Case Study, Seminar, Group Assignment)	FA (16%) [80 Marks]
C101.1	Understand	Quiz	20
C101.2	Understand	Seminar	20
C101.3	Understand	Seminar	20
C101.4	Understand	Quiz	20

Assessment based on Summative and End Semester Examination			
Bloom's Level	Summative Assessment (24%) [120 Marks]		End Semester Examination (60%) [100 Marks]
	CIA1: [60 Marks]	CIA2: [60 Marks]	
Remember	40	40	40
Understand	60	60	60
Apply	-	-	-
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination						
Continuous Assessment (40%) [200 Marks]						End Semester Examination (60%) [100 Marks]
CA 1 : 100 Marks			CA 2 : 100 Marks			
SA 1 (60 Marks)	FA 1 (40 Marks)		SA 2 (60 Marks)	FA 2 (40 Marks)		
	Component - I (20 Marks)	Component - II (20 Marks)		Component - I (20 Marks)	Component - II (20 Marks)	

Course Outcome (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C101.1									1			1			
C101.2								1	1			1			
C101.3								1	1			1			
C101.4									1						
C101.5								1	1						

23EN101	ORAL AND WRITTEN COMMUNICATION SKILLS (CSE/CSD/CY/IT/AI&DS - SEMESTER I) (ECE/EEE/MCT/MECH/CIVIL - SEMESTER II)	2/0/2/3

Nature of Course	Theory Skill Based
Pre requisites	Basics of English Language

Course Objectives:

1	To empower students to comprehend different aspects of communication using LSRW skills.
2	To highlight the essential aspects of effective oral and written communication necessary for professional success.
3	To expand the skills of the students in preparing job search artefacts and negotiating their use in GDs and interviews.
4	To enable students to communicate contextually in specific, personal and professional situations with courtesy.
5	To enrich students to carry out day-to-day communication at the workplace and facilitate efficient interpersonal communication.

Course Outcomes:
Upon completion of the course, students shall have ability to

C101.1	Remember and expand writing skills through guided activities.	R
C101.2	Apply communication skills in a corporate environment.	AP
C101.3	Analyse and collaborate better with colleagues, building stronger professional and personal relationships.	AN
C101.4	Apply technical writing skills to write letters, emails and prepare technical documents.	AP
C101.5	Analyze and communicate effectively in personal and professional situations.	AN

Course Contents:

Module I
Reading : Reading techniques -Skimming and scanning - Cloze reading - Reading and understanding technical articles – Reading for detailed comprehension: Email and letters - Reading advertisements - Table completion: Interpreting charts and graphs - Verbal reasoning – Comprehending reviews – Reading and responding to instant messages.

Module II
Writing : Formal letters (Sales letter, calling for quotations, seeking clarification, placing an order, complaint letter, inviting, accepting and declining letters) - Emails - Minutes of meeting - Professional report writing - Proposal writing - Resume / job application letter - Case study.

Module III
Listening : Situational listening - Listening about an experience - Listening about short extracts - Listening an interview - Conversational speaking. Speaking : Conversational speaking - Decipher the picture given and answer the question posed along with it - Decipher the mind map given and speak about it - Listen to the questions posed and answer them appropriately.

Lab Components			
1		Conversational listening	[U]
2		Speaking - Pictography	[AP]
3		Listening about an experience	[U]
4		Listening to short extracts	[U]
5		Writing - Resume Writing, Job application letter	[AP]
6		Mock interview	[AP]
		Total Hours:	60

Text Books:

1	Jay Sullivan, "Simply Said: Communicating Better at Work and Beyond", Wiley Publication, 2018.
2	Alred J Gerald, Brusaw T Charles,. Oliu E Walter, "Handbook of Technical Writing", Bedford/St. Martin's Boston publication,New York, 2012.
3	Liz Hamp-Lyons and Ben Heasly, "Study Writing :A Course in Written English for Academic Purposes", Updated Edition, Cambridge University Press, 2006.
4	Dr.Praveen Sam and K N Shoba - A Course in Technical English by Cambridge University press, 2020.

Reference Books:

1	Rutherfoord J Andrea, " Basic Communication Skills for Technology", Upper Saddle River, N.J. : Prentice Hall, 2001.
2	Singh Hardeep (Author), Kothari (Author), "Written & Oral Technical Communication Skills For Engineers/Scientists" - LAMBERT Publications, 2019.

Web References:

1	http://www.academiccourses.com/Courses/English/Business-English
2	https://www.liveworksheets.com/worksheets/en/English_as_a_Second_Language_(ESL)/Technical_English

Online Resources:

1	https://www.coursera.org/specializations/business-english
2	https://www.businessenglishresources.com/learn-english-for-business/student-section/practice-exercises-new/

Assessment									End Semester Examinatio n Continuou s n	Total
Theory				Practical			Total (A+B)	Total Continuou s Assessme nt		
Formative Assessme nt	Summative Assessmen t	Tota l	Tota l (A)	Formative Assessment	Summativ e Assessme nt	Total (B)				
80	120	200	100	75	25	100	200	50	50	100

Formative Assessment based on Capstone Model - Theory			
Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list - Quiz, Assignment, Case Study, Seminar, Group Assignment)	FA (10%) [80 Marks]
C101.1 C101.2	Understand	Listening to Short Extracts	20
C101.3	Apply	Speaking - Pictography	20
C101.4	Apply	Mock Interview	20
C101.5	Apply	Assignment	20

Assessment based on Summative and End Semester Examination - Theory			
Bloom's Level	Summative Assessment (15%) [120 Marks]		End Semester Examination (25%) [100 Marks]
	CIA1: (60 Marks)	CIA2: (60 Marks)	
Remember	20	20	20
Understand	40	40	40
Apply	40	40	40
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination - Practical			
Bloom's Level	Continuous Assessment (25%) [100 Marks]		End Semester Examination (25%) [100 Marks]
	FA: (75 Marks)	SA: (25 Marks)	
Remember	20	20	20
Understand	30	30	30
Apply	50	50	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-

Course Outcomes (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C101.1										3					
C101.2								2		3					
C101.3								2		3	2				
C101.4										3					
C101.5										3		3			

23CS101	PROBLEM SOLVING USING C++	1/0/4/3
Nature of Course	K (Problem Programming)	
Pre requisites	NIL	

Course Objectives:

1	To learn the fundamental programming concepts and methodologies which are essential to build good C++ programs.
2	To gain knowledge on control structures and functions in C++.
3	To provide the basic object-oriented programming concepts and apply them in problem solving.
4	To introduce file streams and operations for storing data permanently.
5	To know generic programming paradigm.

Course Outcomes:
Upon completion of the course, students shall have ability to

C101.1	Illustrate the fundamental concepts and methodologies required to develop a program for given problems.	[U]
C101.2	Develop a program for real-time problems with pointers and objects.	[AP]
C101.3	Apply the Constructors, destructors, and Overloading concepts to solve the solve.	[AP]
C101.4	Develop C++ programs with Interfaces, Exception and File processing	[AP]
C101.5	Implement the concepts on file streams, I/O and Lambda Expression.	[AP]

Course Contents:

Module I C++ Programming Fundamentals **15 Hours**
C vs C++, Basic of OOPS, the main () function, Header files, Basic Input and Output (I/O) using cin and cout, Variable, Constant. **Operators:** Arithmetic Operators, Assignment Operators, Relational Operators, Logical Operators, Bitwise Operators, Other Operators, Operator Precedence. Control Statements: if, if...else and Nested if...else, switch case, break and continue, Loops - for loop, while loop, do while loop, goto. **Arrays and Strings:** 1D array, 2D array, Strings, String functions. **Function:** Basics, call by value, call by reference & return by reference, Inline function, overloading Functions, inline Functions, Recursive Functions. **Pointers:** Pointer, Dynamic Memory Allocation.

Module II Object Oriented Concepts **15 Hours**
Classes and Objects, public, private, protected. **Constructors and destructors**: Overloaded Constructor, Copy Constructor, Shallow Copying Deep Copying. **Overloading:** this' Pointer, structs vs Classes, Friends of a class, Operator Overloading, Inheritance, Overloading vs Overriding, Polymorphism, Virtual Functions, Pure Virtual Functions and Abstract Classes.

Module III Files and Generic Programming **15 Hours**
Abstract Classes as Interfaces, Exception, Files, Streams and I/O, STL, Generic Programming, Lambda Expression.

	Total Hours (Theory)	**45 Hours**

Lab Component

S.No.	Lab Exercise
1.	Practice of C Programming using Branching and Iterative constructs.
2.	Programs using arrays and strings.
3.	Programs using Functions.
4.	Programs using Structures and Pointers.
5.	Programs using classes and objects.
6.	Programs using constructor and destructor.
7.	Programs using method overloading, operator overloading and polymorphism concepts.
8.	Programs using friend class.

9.	Programs using virtual functions and abstract class.
10.	Programs using inheritance concepts.
11.	Programs using exception handling concept.
12.	Programs using Files.
13.	Mini project

| | Total Hours (Lab) | 30 Hours |
| | Total Hours(45+30) | 75 Hours |

Text Books:

1.	E Balagurusamy,"Object Oriented Programming With C++", 4th Edition, Tata McGraw-Hill Education, 2008.
2.	YashavantP. Kanetkar, "Let us C++", BPB Publications, 2020.
3.	M. Sprankle, "Problem Solving and Programming Concepts", 9th Edition, Pearson Education, New Delhi, 2011.

Reference Books:

| 1. | Herbert Schildt, "The Complete Reference C++", 4th edition,MH, 2015. |
| 2. | John Hubbard, "Schaum's Outline of Programming with C++", MH, 2016. |

Web References:

| 1. | https://www.geeksforgeeks.org/c-plus-plus/ |
| 2. | http://web.stanford.edu/class/cs106l/ |

Online Resources:

1.	https://nptel.ac.in/courses/106101208
2.	https://www.hackerrank.com/domains/cpp
3.	https://codeforces.com/blog/entry/74684
4.	https://www.hackerearth.com/practice/notes/tricky-and-fun-programming-in-c/

Continuous Assessment									End Semester Practical Examination	Total
Theory				Practical			Total (A+B)	Total Continuous Assessment		
Formative Assessment	Summative Assessment	Total	Total (A)	Formative Assessment	Summative Assessment	Total (B)				
80	120	200	100	75	25	100	200	50	50	100

Formative Assessment based on Capstone Model - Theory			
Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list - Quiz, Assignment,Case Study, Seminar, Group Assignment)	FA (10%) [80 Marks]
C101.1	Understand	Quiz	20
C101.2 & C101.3	Apply	Assignment	20
C101.4	Apply	Group Assignment	20
C101.5	Apply	Case Study	20

Assessment based on Summative Assessment - Theory

Bloom's Level	Summative Assessment (15%) [120 Marks]	
	CIA1: (60 Marks)	CIA2: (60 Marks)
Remember	20	20
Understand	40	30
Apply	40	50
Analyse	-	-
Evaluate	-	-
Create	-	-

Assessment based on Continuous and End Semester Examination - Practical

Bloom's Level	Continuous Assessment (25%) [100 Marks]		End Semester Practical Examination (50%) [100 Marks]
	FA: (75 Marks)	SA: (25 Marks)	
Remember	10	20	20
Understand	30	20	20
Apply	50	50	50
Analyse	10	10	10
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Practical Examination

Continuous Assessment (50%)							End Semester Practical Examination (50%)
CA 1 (100 Marks)			CA 2 (100 Marks)			Practical Exam (100 Marks)	
	FA 1			FA 2			
SA 1 (60M)	Component-I (20 Marks)	Component-II (20 Marks)	SA 2 (60M)	Component-I (20 Marks)	Component-II (20 Marks)	FA (75M)	SA (25M)

Course Outcome (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C101.1	3	3											3		
C101.2	3	3	3	2	2				2	1		3	3	2	1
C101.3	3	3	3	2	3				2	1		3	3	2	1
C101.4	3	3	3	3	3				3	2		3	3	2	2
C101.5	3	3	3	3	3				2	2		2	3	2	1
C101	**3**	**3**	**3**	**3**	**3**				**3**	**2**		**2**	**3**	**2**	**2**

3	Strongly agreed	2	Moderately agreed	1	Reasonably agreed

23CE103	DESIGN THINKING AND WORKSHOP PRACTICES	1/0/3/2.5
Nature of Course	Theory and Practical	
Pre requisites	Nil	

Course Objectives:

1	To provide the new ways of creative thinking and learn the innovation cycle of design thinking process for developing innovative products
2	To provide exposure to the students with hands on experience on various basic engineering practices in Civil and Mechanical Engineering.
3	To have a study and hands-on-exercise on plumbing and carpentry components.
4	To gain hands on experience in sheet metal welding

Course Outcomes:

Upon completion of the course, students shall have ability to

C103.1	Develop new ways of creative thinking and learn the innovation cycle of design thinking process for developing innovative products	[AP]
C103.2	Propose real-time innovative engineering product designs and choose appropriate frame works, strategies, techniques during prototype development	[AN]
C103.3	Prepare the basic connections involved in plumbing	[AP]
C103.4	Make wooden joints using carpentry tools	[AP]
C103.5	Make simple metal component using sheet metal and welding work	[AP]

Course Contents: Theory

Module 1:Basics of Design Thinking	**5 Hrs**
Definition of Design Thinking, Need for Design Thinking, Objective of Design Thinking, Concepts & Brainstorming, Stages of Design Thinking Process (explain with examples) – Empathize, Define, Ideate, Prototype, Test	

Module 2:Process of Product Design	**5 Hrs**
Process of Engineering Product Design, Design Thinking Approach, Stages of Product Design, Examples of best product designs and functions, Assignment – Engineering Product Design, Prototyping & Testing	

Module 3:Design Thinking & Customer Centricity	**5 Hrs**
Practical Examples of Customer Challenges, Use of Design Thinking to Enhance Customer Experience, Parameters of Product experience, Alignment of Customer Expectations with Product Design, Feedback	

	Total Hours	**15 Hrs**

Course Contents: Practical

WORKSHOP PRACTICES

S. No.	List of Experiments (Group A: Civil)	CO Mapping	RBT
1	Prepare a mockup model of a bridge using given materials	C103.1	AP
2	Construct empathy map for a given case study	C103.1	AP
3	Construct a customer journey map (CJM) for a given case study	C103.1	AP

4	Design service blueprint and identify touch points from CJM for the case study	C103.2	AP
5	Develop a 3D prototype of any interior design component using Tinker CAD	C103.2	AP
6	Identify the necessary components to establish a company and analyze possible scenarios using what if tool	C103.2	AP
S. No.	**List of Experiments (Group B: Mechanical)**	**CO Mapping**	**RBT**
1	Connections of pipelines and joints involved in water tank to wash basin, water heater and washing machine	C103.3	AP
2	Preparation of plumbing line sketches for water supply and sewage works.	C103.3	AP
3	Preparation of Tee-halving joint from the given wood piece to the required shape	C103.4	AP
4	Preparation of dove-tail joint from the given wood piece	C103.4	AP
5	Preparation of lap and butt joint from the given metal piece to the required shape	C103.5	AP
6	Making rectangular tray from the given sheet metal to the required shape	C103.5	AP
		Total hours (Lab)	**45**
		Total hours	**60**

Text Books:

1	E Balaguruswamy (2022), Developing Thinking Skills (The way to Success), Khanna Book Publishing Company.
2	Balasubramanyam N, Prasanthi G." A Text Manual of Engineering Workshop Technology", Hamburg, Anchor Academic Publishing 2016.
3	AICTE Prescribed Textbook: Workshop Manufacturing Practices (with Lab Manual), Veeran D.K., Khanna Book Publishing Co., New Delhi, 2023.

Reference Books:

1	Gowri P. Hariharan and A. Suresh Babu," Manufacturing Technology – I" Pearson Education, 2008.
2	M.K. Pant, "Laboratory manual for civil engineering students", S.K. Kataria Publishers., 2016.
3	Hajra Choudhury, "Elements of Workshop Technology", Vol. I & II, Media Promotors Pvt Ltd., 2014.

Web References:

1	https://www.udemy.com/topic/design-thinking/
2	http://mmcoep.vlabs.ac.in/LaserSpotWelding/Theory.html?domain=Mechanical%20Engineering&lab=Welcome%20to%20Micromachining%20laboratory
3	http://fabcoep.vlabs.ac.in/exp7/Theory.html?domain=Mechanical%20Engineering&lab=Welcome%20to%20FAB%20laboratory

Online Resources:

1	https://onlinecourses.nptel.ac.in/noc19_mg60/preview
2	https://ms-nitk.vlabs.ac.in/exp/time-of-cement/

Continuous Assessment									Total Continuous Assessment	End Semester Practical Examination	Total
Theory				Practical				Total (A+B)			
Formative Assessment	Summative Assessment	Total	Total (A)	Formative Assessment	Summative Assessment	Total (B)					
80	120	200	100	75	25	100		200	50	50	100

Assessment Methods & Levels (based on Blooms' Taxonomy)			
Formative Assessment based on Capstone Model			
Course Outcome	**Bloom's Level**	**Assessment Component (Choose and map components from the list - Quiz, Assignment, Case study, Seminar, Group Assignment)**	**FA (16%) [80 Marks]**
C103.1	Apply	Online Quiz	20
C103.1	Apply	Assignment	20
C103.2	Analyze	Seminar presentation	20
C103.2	Analyze	Online Quiz	20

Assessment based on Summative Assessment - Theory		
Bloom's Level	**Summative Assessment (15%) [120 Marks]**	
	CIA1: (60 Marks)	**CIA2: (60 Marks)**
Remember	10	10
Understand	20	20
Apply	40	30
Analyse	30	40
Evaluate	-	-
Create	-	-

Assessment based on Continuous and End Semester Examination - Practical			
Bloom's Level	**Continuous Assessment (25%) [100 Marks]**		**End Semester Practical Examination (50%) [100 Marks]**
	FA: (75 Marks)	**SA: (25 Marks)**	
Remember	10	10	10
Understand	10	10	10
Apply	40	40	40
Analyse	20	20	20
Evaluate	10	10	10
Create	10	10	10

Assessment based on Continuous and End Semester Practical Examination									
Continuous Assessment (50%)								Practical Exam (100 Marks)	End Semester Practical Examination (50%)
CA 1 (100 Marks)			CA 2 (100 Marks)						
SA 1 (60M)	FA 1		SA 2 (60M)	FA 2		FA (75M)	SA (25M)		
	Component-I (20 Marks)	Component-II (20 Marks)		Component-I (20 Marks)	Component-II (20 Marks)				

Mapping of Course Outcomes (CO) with Programme Outcomes (PO) Programme Specific Outcomes (PSO)															
Cos	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	-	-	2	2	-	3	2	2	2	1	2	3	2	2
2	3	-	-	2	2	-	3	2	2	2	1	2	3	2	2
3	3	3	2	2	2	-	-	2	-	-	-	2	3	-	2
4	3	3	2	2	2	-	-	2	-	-	-	2	3	-	2
5	3	3	2	2	2	-	-	2	-	-	-	2	3	-	2
Avg.	3	3	2	2	2	-	3	2	2	2	1	2	3	2	2
1	Reasonably agreed				2	Moderately agreed			3	Strongly agreed					

23CE102	ENGINEERING GRAPHICS LABORATORY	0/0/3/1.5
Nature of Course	Practical application	
Pre requisites	Nil	

Course Objectives:

1	To learn the construction of conic curves used in engineering applications.
2	To develop an understanding of Isometric to orthographic projections.
3	To learn the projection of lines, planes and solids objects.
4	To know development of lateral surfaces and building drawings.

Course Outcomes:
Upon completion of the course, students shall have ability to

C102.1	Understand the construction of conic curves and its applications.	[U]
C102.2	Apply the knowledge of drafting skills in the orthographic projections.	[AP]
C102.3	Construct the projection of lines, plane surfaces and solids using the drafting package.	[AP]
C102.4	Develop the lateral surface of the solids and perspective projections.	[AP]
C102.5	Develop the plan, section and elevation of the simple building using drafting package.	[AP]

Course Contents:

Laboratory Component:

S. No	List of Experiments	CO Mapping	BT
1	Construction of conic curves (Ellipse, Parabola and Hyperbola)	C102.1	[AP]
2	Hands on experience of the drafting package.	C102.2	[AP]
3	Drawing the orthographic projections from isometric projections manually and using drafting package.	C102.2	[AP]
4	Projection of lines inclined to anyone of the principal planes using drafting package.	C102.3	[AP]
5	Projection of plane surfaces inclined to anyone of the principal planes.	C102.3	[AP]
6	Projection of solids (Prism and Pyramid) inclined to HP using drafting package.	C102.3	[AP]
7	Projection of solids (Cone and Cylinder) inclined to VP using drafting package.	C102.3	[AP]
8	Development of lateral surfaces (Prism and Pyramid) using drafting package.	C102.4	[AP]
9	Development of lateral surfaces (Cone and Cylinder) using drafting package.	C102.4	[AP]

10	Hands on overview to Perspective Projections.	C102.4	[AP]
11	Drafting the plan, section and elevation of a single room building using drafting package.	C102.5	[AP]
12	Drafting the plan and section of a simple residential building using drafting package.	C102.5	[AP]
	TOTAL HOURS		**60 Hrs.**

Reference Books:

1	Bhatt, N.D., and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2014.
2	Natarajan K. V., "A text Book of Engineering Graphics", Dhanalakshmi Publishers, 2018.
3	Gopalakrishna K. R., "Engineering Drawing" Vol. I & II, Subhas Stores, Bangalore, 2011.
4	VenugopalK., and Prabhu Raja V., "Engineering Graphics", New Age International Pvt. Ltd., 2013.

Web References:

1	https://onlinecourses.nptel.ac.in/noc21_me128/preview
2	https://www.autodesk.com/training

Continuous Assessment				End Semester Examination	Total
Formative Assessment	Summative Assessment	Total	Total Continuous Assessment		
75	25	100	60	40	100

Assessment based on Continuous and End Semester Examination			
Bloom's Level	Continuous Assessment (60%) [100 Marks]		End Semester Practical Examination (40%) [100 Marks]
	FA (75 Marks)	SA (25 Marks)	
Remember	10	10	10
Understand	10	10	10
Apply	40	40	40
Analyse	20	20	20
Evaluate	10	10	10
Create	10	10	10

Cos	Pos												PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	2	2	2	3	-	-	1	1	1	-	2	2	-	2
2	3	2	2	2	3	-	-	1	1	1	-	2	2	-	2
3	3	2	2	2	3	-	-	1	1	1	-	2	2	-	2
4	3	2	2	2	3	-	-	1	1	1	-	2	2	-	2
5	3	2	2	2	3	-	-	1	1	1	-	2	2	-	2
Avg.	3.0	2.0	2.0	2.0	3.0	-	-	1.0	1.0	1.0	-	2.0	2.0	-	2.0
1	Reasonably agreed					2	Moderately agreed				3	Strongly agreed			

Mapping of Course Outcomes (CO) with Programme Outcomes (PO) Programme Specific Outcomes (PSO)

23EE115	Fundamentals of Electrical and Electronics Engineering Laboratory (Common to MECH and CIVIL)	0/0/2/1

Nature of Course	: M (Practical application)
Pre-requisites	: Nil

Course Objectives:

1	To learn the safety precautions and troubleshooting in using Electricity.
2	To estimate the current flow and voltage across the circuit elements under different loading conditions.
3	To understand the basic components for electrical installations.

Course Outcomes:

Upon completion of the course, students shall have ability to

C115.1	Illustrate Electrical and Electronic components and its specifications.	[U]
C115.2	Verify the current flow and voltage across the circuit elements using different analysis method.	[A]
C115.3	Measure power and power factor of single and three phase AC circuits.	[AP]
C115.4	Comprehend the cut-out sections of DC Motor and Induction Motor.	[U]
C115.5	Utilize the basic components for electrical installations.	[AP]

Course Contents:

S.No	List of Experiments	CO Mapping	RBT
1	Demonstration of meters, electrical and electronic components with specification.	C115.1	[U]
2	Safety precautions with electrical components.	C115.1	[U]
3	Troubleshooting of electrical equipment.	C115.1	[A]
4	Testing of CRO and Electronic components using Multimeter.	C115.2	[A]
5	Determination of mesh current by Mesh Analysis.	C115.2	[A]
6	Estimation of Voltage and Current in star and delta connections.	C115.2	[A]
7	Measurement of power and energy.	C115.3	[A]
8	Soldering practice - Components devices and Circuits using general purpose PCB.	C115.5	[A]
9	Residential house wiring.	C115.4	[A]
10	Demonstration of cut-out sections of DC Motor and Induction Motor.	C115.3	[U]
11	Demonstration of components of LT Switch Gears.	C115.5	[U]
12	Familiarization of digital basic gate ICs.	C115.5	[U]
	Total Hours	**30**	

Text Books:

1	Fitzgerald. A.E., Charles Kingsely Jr, Stephen D.Umans, 'Electric Machinery', Tata McGraw Hill, 7th edition, 2020.
2	Vincent. Del. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 2nd edition, 2015.
3	E. Hughes, "Electrical and Electronics Technology", Pearson, 10th edition, 2011.

4	Donald .A. Neamen, Electronic Circuit Analysis and Design, 2nd Edition reprint, Tata Mc Graw Hill, 2013.
Reference Books:	
1	Charles A.Gross, Thaddeus A.Roppel, "Fundamentals of Electrical Engineering", CRC press, 2012.
2	D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, Revised 1st edition 2017,
3	Theodore F. Bogart, Jeffery S. Beasley and Guilermo Rico, 'Electronic Devices and Circuits', Pearson Education, 6th edition, 2013.
Web References:	
1	http://nptel.ac.in/course.php?disciplineId=108
2	https://ocw.mit.edu/courses/find-by topic/#cat=engineering&subcat=electricalengineering&spec=electricpower
3	https://nptel.ac.in/video.php?subjectId=117103063

Continuous Assessment				End Semester Examination	Total
Formative Assessment	**Summative Assessment**	**Total**	**Total Continuous Assessment**		
75	25	100	60	40	100

Assessment based on Continuous and End Semester Examination			
Bloom's Level	**Continuous Assessment (60%) [100 Marks]**		**End Semester Practical Examination (40%) [100 Marks]**
	FA (75 Marks)	**SA (25 Marks)**	
Remember	0	0	0
Understand	30	30	30
Apply	30	30	30
Analyse	40	40	40
Evaluate	0	0	0
Create	0	0	0

No. of the CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
C115.1	3	1											3		
C115.2	3	1													
C115.3	3	1													
C115.4	3	2													
C115.5	3	1													
1	**Reasonably Agreed**			**2**	**Moderately Agreed**				**3**	**Strongly Agreed**					

SEMESTER II

23MA204	CALCULUS AND FOURIER SERIES (COMMON TO MECH, CIVIL)	3/1/0/4
Nature of Course	J (Problem analytical)	
Pre requisites	-	

Course Objectives:

1	To gain knowledge in integrals, which are needed in engineering applications.
2	To develop logical thinking and analytical skills in evaluating multiple integrals.
3	To familiarize the concepts of differential and Integral calculus which are applicable in many branches of engineering.
4	To familiarize with the concepts of vector calculus needed for problems in all engineering disciplines.
5	To understand the different possible forms of Fourier series.

Course Outcomes: (Theory)
Upon completion of the course, students shall have ability to

C204.1	Determine the area and volume by applying the techniques of double and triple integrals.	[R]
C204.2	Develop the understanding of integration techniques needed for problems in engineering disciplines.	[U]
C204.3	Apply multiple integral ideas in solving areas, volumes and other practical problems.	[AP]
C204.4	Differentiate and integrate a vector-valued functions to solve real world applications.	[AP]
C204.5	Apply Fourier series solutions to the engineering problems	[AP]

Course Contents

MODULE I - DIFFERENTIAL AND INTEGRAL CALCULUS **(20 Hrs)**

Curvature, Centre, Radius and Circle of curvature in Cartesian co-ordinates – Evolutes – Envelopes – Evolute as envelope of normals. Definite integrals: Evaluation of definite integrals using Bernoulli's formula - Double integration in Cartesian coordinates – Area as double integral – Triple integration in Cartesian coordinates –Volume as triple integral

MODULE II - VECTOR CALCULUS **(20 Hrs)**

Vector differential operator – Gradient and Directional derivatives – Angle between the surfaces – Divergence and Curl – Scalar potential – Equation of the tangent plane and normal line – Irrotational and Solenoidal vector fields –Vector integration: Green's theorem in a plane, Gauss divergence theorem and Stoke's theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelepipeds.

MODULE III – FORIER SERIES **(20 Hrs)**

Fourier series: Dirichlet's conditions - General Fourier Series : Problems under $(0,2\pi)$- Problems under $(0,2l)$ - Odd and Even Functions : Problems under $(-\pi,\pi)$ - Problems under $(-l,l)$ - Half range sine series and cosine series - Parseval's Identity.

	Total hours	**60**

Text Books:

1.	G.B.Thomas and R.L.Finney, Calculus and Analytic Geometry, 14thEdition, Pearson, Reprint,2018.
2.	Kreyszig. E, "Advanced Engineering Mathematics" Tenth Edition, John Wiley and Sons (Asia) Limited, Singapore 2020.
3.	Grewal. B.S, "Higher Engineering Mathematics", 44th edition, Khanna Publications, Delhi, 2021.

Reference Books:	
1.	Veerarajan. T, "Engineering Mathematics II",Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2018.
2.	Glyn James, Advanced Modern Engineering Mathematics, Pearson Education, 5th edition, 2018.
3.	N.P.Bali and Dr.ManishGoyal,"A Text book of Engineering Mathematics" 10th edition, Laxmi publications ltd, 2020.
Web References:	
1.	https://ocw.mit.edu/courses/18-02sc-multivariable-calculus-fall-2010/
2.	https://archive.nptel.ac.in/courses/111/107/111107108/
3.	https://www.youtube.com/watch?v=jNC0jxb0OxE
Online Resources:	
1.	https://www.coursera.org/learn/integration-calculus
2.	https://www.coursera.org/learn/vector-calculus-engineers
3.	https://www.coursera.org/learn/differential-equations-engineers

Summative assessment based on Continuous and End Semester Examination						
Continuous Assessment (40%)						**End Semester Examination (60 %)**
CA 1 (20 Marks)			**CA2 (20 Marks)**			**Theory Examination (60 Marks)**
SA 1 (12 Marks)	**FA 1**		**SA 2 (12 marks)**	**FA 2**		
	Component -I (4 marks)	**Component –II (4 marks)**		**Component -I (4 marks)**	**Component -II (4 marks)**	

Assessment Methods & Levels (based on Blooms' Taxonomy)			
Formative Assessment based on Capstone Model (16%)			
Course Outcome	**Bloom's Level**	**Assessment Component**	**Marks**
C204.1	Remember	Quiz	4
C204.2	Understand	Assignment	4
C204.3	Apply	Case study	4
C204.4	Apply	Tutorial	4
C204.5	Apply		

Summative assessment based on Continuous and End Semester Examination			
Bloom's Level	**Continuous Assessment (24%)**		**End Semester Examination (60%) [60 Marks]**
	CIA1 [12 Marks]	**CIA2 [12 Marks]**	
Remember	20	20	20
Understand	30	30	30
Apply	50	50	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-

Course Outcomes (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C204.1	1	1	1										1		
C204.2	1	2	1										2		
C204.3	3	3	2										2		
C204.4	1	1	2										1		
C204.5	2	1	2										2		

23CE206	PRINCIPLES OF ENGINEERING MECHANICS	3/1/0/4
Nature of Course	Concepts and Analytical	
Pre-Requisites	Fundamentals of basic mathematics and physics	

Course Objectives:

1	To make the students understand the vector and scalar representation of forces and moments and the static equilibrium of particles and rigid bodies.
2	To make the students understand the properties of surfaces, prediction of behaviour of particles and rigid bodies.
3	To understand the effect of friction on equilibrium, laws of motion.
4	To analyze the bodies which are in motion using the basics of kinetics and kinematics.

Course Outcomes:

Upon completion of the course, students shall have ability to

C206.1	Compute the resultant force for various force systems using laws of mechanics	[U]
C206.2	Apply the equations of statics to determine the unknown reactions and draw shear force and bending moment diagram	[AP]
C206.3	Evaluate the geometrical properties of two dimensional objects	[AN]
C206.4	Compute the unknown frictional forces using free body diagram of rigid bodies for Impending Motion	[AP]
C206.5	Apply the equations of dynamics to determine the unknown quantities in kinetics and kinematics	[AP]

Course Contents:

Module 1: Equilibrium of Particles and Rigid Bodies   21 Hrs.

Force Systems – Basic concepts, Laws of Mechanics, System of Forces, Coplanar Concurrent Forces, Resolution and resultant of several concurrent forces - Lami's theorem; Equilibrium of particles in 2D. Statics of Rigid bodies in two dimensions - Varignon's theorem; Couples and moment, Equations of equilibrium of rigid bodies in 2D. Beams - types of supports, loads and reactions – Shear force and bending moment diagram for determinate beams (cantilever, simply supported) under single load condition - Point of contra flexure.

Module 2: Centre of Gravity, Moment of Inertia and Friction   21 Hrs.

Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia - Definition, Moment of inertia of plane sections from first principles, Parallel Axis theorem, Moment of inertia of standard sections and composite sections - Friction: Types of friction, Limiting friction, Laws of friction – Static Friction - simple contact friction in blocks under impending motion.

Module 3: Dynamics of Particles   18 Hrs.

Kinematics of Particles: Displacements, Velocity and acceleration – Rectilinear motion with uniform and variable acceleration their relationship in linear motion - Introduction to Curvilinear motion (Principles Only) - Kinetics of Particles: D'Alembert's principle and its applications.

	Total Hours:	**60 Hrs.**

Text Books:		
1	Beer F.P, and Johnston ER, Vector Mechanics for Engineers – Statics and Dynamics, McGraw Hill Education, New Delhi, 2017.	
2	Dhiman A.K, Dhiman P, Kulshreshtha D.C, Engineering Mechanics-Statics and Dynamics, McGraw Hill Education, 2017.	
3	Kottiswaran N, Engineering Mechanics - Statics and Dynamics, Sri Balaji Publications- 2018.	
Reference Books:		
1	Bhavikatti S.S, Engineering Mechanics , New Age International Publishers - 2022.	
2	Meriam JL and Craige, "Engineering Mechanics statics and dynamics", John Willey and Son's publication, 9th edition.2021	
3	Sanju Unadkat, "Engineering Mechanics", Tech-Neo Publications-2020.	
Web References:		
1	http://nptel.ac.in/courses/122104015/	
2	http://nptel.ac.in/courses/112103109/	
Online Resources:		
1	https://ocw.mit.edu/courses	

Continuous Assessment				End Semester Examination	Total
Formative Assessment	**Summative Assessment**	**Total**	**Total Continuous Assessment**		
80	120	200	40	60	100

Assessment Methods & Levels (based on Blooms' Taxonomy)			
Formative Assessment based on Capstone Model			
Course Outcome	**Bloom's Level**	**Assessment Component (Choose and map components from the list - Quiz, Assignment, Case study, Seminar, Group Assignment)**	**FA (16%) [80 Marks]**
C206.1	Understand	Online Quiz	20
C206.2	Apply	Assignment	20
C206.3	Analyse	Assignment	20
C206.4	Apply		
C206.5	Apply	Online Quiz	20

Assessment based on Summative and End Semester Examination			
Bloom's Level	**Summative Assessment (24%) [120 Marks]**		**End Semester Examination (60%) [100 Marks]**
	CIA1 : [60 Marks]	**CIA2 : [60 Marks]**	
Remember	10	10	10
Understand	10	20	20
Apply	40	40	40
Analyse	40	30	30
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination					
Continuous Assessment (40%) [200 Marks]					End Semester Examination (60%) [100 Marks]
CA 1 : 100 Marks			CA 2 : 100 Marks		
SA 1 (60 Marks)	FA 1 (40 Marks)		SA 2 (60 Marks)	FA 2 (40 Marks)	
	Component - I (20 Marks)	Component - II (20 Marks)		Component - I (20 Marks)	Component - II (20 Marks)	

Mapping of Course Outcomes (CO) with Program Outcomes (PO) Program Specific Outcomes (PSO)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	2	1									3	1	
2	3	3	2	1									3	1	
3	3	3	2	1									3	1	
4	3	3	2	1									3	1	
5	3	3	2	1									3	1	
Avg.	3	3	2	1									3	1	
1	Reasonably agreed				2		Moderately agreed			3		Strongly agreed			

23CE202		**CONSTRUCTION MATERIALS AND TECHNIQUES**	3/0/0/3
Nature of Course		Theory	
Pre requisites		Introduction to Civil Engineering	
Course Objectives:			
1		To have a clear knowledge of construction materials and their properties.	
2		To know the market forms of special and alternate building materials.	
3		To learn various testing methods for assessing the strength and quality of materials.	
4		To be familiar with the several advanced construction techniques and practices.	

Course Outcomes:
Upon completion of the course, students shall have ability to

C202.1	Demonstrate the manufacturing process of building materials and their appropriate suitability for a given scenario.	[AP]
C202.2	Illustrate the characteristics and application of alternate and decorative construction materials.	[AP]
C202.3	Illustrate the characteristics and applications of protective and special materials.	[AP]
C202.4	Identify and describe the significance of modern machineries and technology for construction activities.	[AP]
C202.5	Select appropriate techniques and tools for construction activities.	[AP]

Course Contents: Theory

Module 1: Construction Materials 15 Hrs.

Bricks and Blocks: Classifications, Manufacturing and Test – Steel: Composition, Types, Manufacturing, Properties and Applications – Aggregates: Natural and Artificial Aggregates, Recycled Aggregates, Grading, Bulking of Fine Aggregates – Cement: Ingredients, Manufacturing, types, grades, properties – Cement mortar – Hydration of Cement.

Module 2: Alternative, Decorative, Protective and Special Materials 15 Hrs.

Alternate Materials: Engineering wood, Bamboo, Sustainable particle boards, Veneer, Foam, Eco-friendly materials – Decorative Materials: Panels of laminates, paints, varnishes, distempers, glass, ceramics, plaster, fabric paper – Protective Materials: Sealants for joints, fibre glass reinforced plastic, carbon fiber, thermal insulation – Special Materials: Composite materials and types, Applications of laminar composites.

Module 3: Construction Machineries and Techniques 15 Hrs.

Machineries for earthmoving – dewatering – concrete mixing – transporting & placing of materials, plastering pre-stressing jacks and grouting equipment, pile driving, lifting (Cranes, Hoists) –

Equipment Productivities – Use of drones for spread out sites – Use of robots for repetitive activities and for modern construction material use and manufacturing of materials – 3D printing – Innovative modern construction tools, accessories and equipment's – Special construction methods: Scaffolding, shoring, underpinning, piling – Conventional construction methods vs Mechanized methods and advantages of latter.

		Total Hours	45 Hrs

Text Books:

1	Varghese P. C., Building Materials, PHI Learning Pvt. Ltd., New Delhi, 2016.
2	Sahu G. C., Jayagopal Jena, Building Materials and Construction, McGraw Hill Education Pvt. Ltd., New Delhi, 2017.
3	Rangwala S. C., Engineering Materials, Charotar Publishing House, New Delhi, 2019.

Suggested Readings:

1	Rajput R. K., Engineering Materials, S. Chand & Company Ltd., 2014.
2	Duggal S, K., Building Materials, New Age International (P) Ltd. Publishers, 2019.
3	Carlos Balaguer, Robotics and Automation in Construction, Springer Ed., 2008.
4	Arora S, P., Bindra S, P., Building Construction, Planning Techniques and Method of Construction, Dhanpat Rai and Sons, 2013.

Web References:

1	https://aquicore.com/blog/10-new-materials-changing-commercial-construction/
2	https://www.thenbs.com/knowledge /drones-in-construction

Online Resources:

1	https://nptel.ac.in/courses/105/106/105106053/
2	https://onlinecourses.nptel.ac.in/noc20_ar04/preview
3	https://www.futurelearn.com/courses/modern-building-design

Continuous Assessment				End Semester Examination	Total
Formative Assessment	**Summative Assessment**	**Total**	**Total Continuous Assessment**		
80	120	200	40	60	100

Assessment Methods & Levels (based on Blooms 'Taxonomy – Theory
Formative assessment based on Capstone Model (80 Marks)

Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list – Quiz,	Marks
C202.1	Apply	Assignment	20
C202.2	Apply	Technical Quiz - 1	20
C202.3 & C202.4	Apply	Case Study	20
C202.5	Apply	Technical Quiz – 2	20

Summative assessment based on Continuous and End Semester Examination

Bloom's Level	Continuous Assessment (120 Marks)		End Semester Examination [60 marks]
	CIA 1 [60 Marks]	CIA 2 [60 Marks]	
Remember	20	20	20
Understand	30	30	30
Apply	50	50	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination

Continuous Assessment (40%) [200 Marks]						End Semester Examination (60%) [100 Marks]
CA 1: 100 Marks			CA 2: 100 Marks			
SA 1 (60 Marks)	FA 1 (40 Marks)		SA 2 (60 Marks)	FA 2 (40 Marks)		
	Component –I (20 Marks)	Component – II (20 Marks)		Component –I (20 marks)	Component – II (20 Marks)	

Mapping of Course Outcomes (CO) with Program Outcomes (PO) Program Specific Outcomes (PSO)

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	1	-	-	2	2	-	-	-	-	2	3	2	1
2	3	2	1	-	-	2	2	-	-	-	-	2	3	2	1
3	3	2	1	-	-	2	2	-	-	-	-	2	3	2	1
4	3	2	1	-	-	2	2	-	-	-	-	2	3	2	1
5	3	2	1	-	-	2	2	-	-	-	-	2	3	2	1
Avg	3	2	1	-	-	2	2	-	-	-	-	2	3	2	1

1	Reasonably agreed		2	Moderately agreed	3	Strongly agreed

23PS101	PHYSICAL SCIENCE (Common to I Year B.E. – CIVIL &MECH)	L/T/P/C
		4/0/0/4

Nature of Course	: E (Theory based)
Pre requisites	: Fundamental knowledge in applied sciences

Course Objectives:

1	To learn the fundamental concepts of physics and apply this knowledge to both scientific and engineering problems.
2	To make the students enrich basic knowledge in various fields such as Oscillation, Laser, electromagnetism and crystallography.
3	To understand the principles and applications of electrochemistry and learning electroanalytical methods.
4	To learn the effect of corrosion in materials and the methods for prevention of corrosion, and explore the knowledge of various energy sources and storage devices.
5	To understand the concepts of photophysical and photochemical processes in spectroscopy.

Course Outcomes:

Upon completion of the course, students shall have ability to

C101.1	Understand the basic concepts of oscillation, laser and Electromagnetic waves.	[U]
C101.2	Interrelate electric and magnetic fields, and predict the behaviour of electromagnetic waves	[AP]
C101.3	Estimate the Atomic packing, acquire the basic knowledge about Crystal Lattice and Unit cell.	[U]
C101.4	Understand the principle and working of reference electrodes, andacquire the knowledge of corrosion control technique and energy sources.	[U]
C101.5	Interpret the principle and working of analytical techniques.	[AP]

Course Contents:

Harmonic oscillations, Laser and Electromagnetic waves:periodic motion – Simple harmonic motion: characteristics of simple harmonic motion – Simple spring-mass system – Resonance

Laser: Characteristics of laser – Principle of spontaneous emission and stimulated emission – Population inversion – Pumping – Different types of lasers: CO_2– Qualitative industrial applications of lasers: welding, drilling and cutting.

Electromagnetic waves: Concept of Del operator, gradient, divergence and curl operators - Gauss divergence theorem, Stokes theorem.Gauss law of electricity, Gauss law of magnetism, Biot-Savart law and its application: Magnetic field due to Line charge – Ampere's law and its application: magnetic field due to a solenoid, Faraday' law of electromagnetic induction. **15***Hours*

Crystallography and Electrochemistry: crystal system – lattice –Bravais lattice, calculation of atomic packing factor for simple cubic, body centered cubic, face centered cubic and hexagonal close packed lattice – Miller indices – Crystal imperfections – Point and line imperfections.

Electrochemistry: Electrochemical cells-electrolytic cell-reversible and irreversible cells - Free energy and emf series, cell potentials, Nernst equation and applications. Oxidation and

reduction potentials-standard hydrogen electrode, saturated calomel electrode, glass electrode-pH-measurement. **15 Hours**

Corrosion and *Energy sources, Spectroscopic techniques:* Introduction-types–mechanism of dry and wet corrosion-protective coatings-electroplating of gold-electroless plating of nickel. Energy Sources-Fuel cells (H_2-O_2). Storage Devices-Batteries-Alkaline, Lead acid, Nickel cadmium and Lithium-ion batteries.
Spectroscopic techniques: Spectroscopy-Beer Lambert's law, principle, instrumentation, and applications of electronic spectroscopy (UV-visible), Vibrational and rotational spectroscopy (IR) and Flame emission spectroscopy (FES). **15 Hours**

		Total Hours:	45

Text Books:

1	Rajendran, V "Engineering Physics" Mc Graw Hill Publications ltd, New Delhi, 2017.
2	David Halliday, Robert Resnick, Jearl Walker "Fundamentals of Physics", 11th edition, Wiley, 2018.
3	Gaur, R.K. and Gupta, S.L., "Engineering Physics", DhanpatRai Publishers, 2017.
4	Bhattacharya, D.K. and Poonam, T., "Engineering Physics", Oxford University Press, 2017.
5	Dara S.S, Umare S.S, "Engineering Chemistry", First revised Edition by S. Chand & Company Ltd., New Delhi 2015.
6	Jain P. C. & Monica Jain., "Engineering Chemistry", 17th Edition, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2020.
7	Fundamentals of Molecular Spectroscopy, 4th Edition by C. N. Banwell Publishing McGraw-Hill Book Company (P) Ltd, England, 2001.
8	Physical Chemistry, 11th Edition by P. W. Atkins Publishing Oxford University Press (P) Ltd, United Kingdom, 2018.

Reference Books:

1	William T. Silfvast "Laser Fundamentals" Cambridge University Press, 2013
2	R. Wolfson, "Essential University Physics", Volume 1 & 2. Pearson, 2020.
3	William D CallisterJr, "Materials Science and Engineering-An Introduction", John Wiley and Sons Inc., NewYork, tenth edition, 2018.
4	S.O. Kasap, "Principles of Electronic Materials and Devices", McGraw Hill Education, 2017.
5	David Griffiths 'Introduction to Electrodynamics' 4th Edition, Cambridge University Press 2017.
6	Avadhanulu M.N., Kshirshagar P.G., Arun Murthy TVS "A Text Book of Engineering Physics"S.Chand& Co Ltd, 2018.
7	Richard P. Feynman. Robert B. Leighton, Matthew Sands "The Feynman Lectures on Physics Vol. II": The New Millennium Edition.2015.
8	Donald Neamen, "Semiconductor Physics And Devices: Basic Principles" McGraw-Hill Education, 2011
9	Perez, Nestor, "Electrochemistry and Corrosion Science", Springer, 2016.
10	Shikha Agarwal., "Engineering Chemistry and Applications", Cambridge University press, 2016.
11	Ghazi A.Karim. "Fuels, Energy and the Environment", CRC Press, Taylor and Francis group, 2012.

Web References:

1	https://www.eatm.in/upload/srit__unit_i_laser.pdf

2	http://hyperphysics.phy-astr.gsu.edu/hbase/index.html
3	https://physics.info/
4	https://nptel.ac.in/courses/115101005
5	https://archive.nptel.ac.in/courses/115/106/115106122/
6	https://archive.nptel.ac.in/courses/112/106/112106293/
7	https://www.kth.se/.../electrochem/welcome-to-the-division-of-applied-electrochemistry
8	www.corrosionsource.com/
9	https://www.sciencedirect.com/book/9780750646253/battery
10	http://www.rnlkwc.ac.in/pdf/study-material/chemistry/Spectroscopy
11	https://ocw.mit.edu/courses/chemistry
12	nptel.ac.in/courses/105106112/1_introduction/5_corrosion.pdf
13.	https://ocw.mit.edu/courses/chemistry

Continuous Assessment				End Semester Examination	Total
Formative Assessment	Summative Assessment	Total	Total Continuous Assessment		
80	120	200	40	60	100

Assessment Methods & Levels (based on Blooms'Taxonomy)			
Formative Assessment based on Capstone Model			
Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list - Quiz, Assignment, Case Study, Seminar, Group Assignment)	FA (16%) [80 Marks]
C101.1	Understand	Assignment - I	20
C101.2	Apply	Quiz – I	20
C101.3	Understand	Assignment - II	20
C101.4	Understand	Quiz - II	20
C101.5	Apply		

Assessment based on Summative and End Semester Examination			
Bloom's Level	Summative Assessment (24%) [120 Marks]		End Semester Examination (60%) [100 Marks]
	CIA1 : [60 Marks]	CIA2 : [60 Marks]	
Remember	30	30	30
Understand	50	50	50
Apply	20	20	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination						
Continuous Assessment (40%) [200 Marks]						End Semester Examination (60%) [100 Marks]
CA 1 : 100 Marks			CA 2 : 100 Marks			
SA 1 (60 Marks)	FA 1 (40 Marks)		SA 2 (60 Marks)	FA 2 (40 Marks)		
	Component - I (20Marks)	Component - II (20 Marks)		Component - I (20Marks)	Component - II (20Marks)	

Course Outcomes (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C101.1	3	2	2		1							1			
C101.2	3	2	2		1							1			
C101.3	3	2	2	1	1							1			
C101.4	3	2	2		1							1			
C101.5	3	2	2	1	1							1			

23TA201	TAMILS AND TECHNOLOGY / தமிழரும்தொழில்நுட்பமும்	1/0/0/1

Nature of Course:	C (Theory Concept)
Pre requisites:	NIL

Course Objectives:

1	To know about weaving, ceramic, design and construction technologies in sangam age.
2	To know the significance of technologies such as manufacturing, agriculture and irrigation.
3	To understand the development of Scientific Tamils and Tamil Computing.

Course Outcomes:

Upon completion of the course, students shall have ability to

C201.1	Describe about the weaving industry in sangam age and ceramic technology.	[U]
C201.2	Observe the design of houses, sculptures and construction of temples.	[U]
C201.3	Relate the various manufacturing materials and stone types in Silappathikaram.	[U]
C201.4	Understand the significance of agriculture and irrigation technology in ancient period.	[U]
C201.5	Explain the growth of scientific Tamil, Tamil computing and digitization of Tamil books.	[U]

Course Contents:

Weaving and Ceramic Technology: Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries. **Design and Construction Technology:** 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.

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

Scientific Tamil & Tamil Computing: 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 Hours:	**15**

Text-cum-Reference Books:

1	தமிழகவரலாறு – மக்களும்பண்பாடும் – கே.கே.பிள்ளை(வெளியீடு: தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).
2	கணினித்தமிழ் – முனைவர்இல. சுந்தரம். (விகடன்பிரசுரம்).
3	கீழடி – வைகைநதிக்கரையில்சங்ககாலநகரநாகரிகம் (தொல்லியல்துறைவெளியீடு)
4	பொருநை – ஆற்றங்கரைநாகரிகம். (தொல்லியல்துறைவெளியீடு)
5	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

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

Continuous Assessment				End Semester Examination	Total
Formative Assessment	Summative Assessment	Total	Total Continuous Assessment		
80	120	200	40	60	100

Assessment Methods & Levels (based on Blooms' Taxonomy)

Formative Assessment based on Capstone Model

Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list - Quiz, Assignment, Case Study, Seminar, Group Assignment)	FA (16%) [80 Marks]
C201.1	Understand	Seminar	20
C201.2	Understand	Quiz	20
C201.3	Understand	Quiz	20
C201.4 C201.5	Understand	Seminar	20

Assessment based on Summative and End Semester Examination

Bloom's Level	Summative Assessment (24%) [120 Marks]		End Semester Examination (60%) [100 Marks]
	CIA1 : [60 Marks]	CIA2 : [60 Marks]	
Remember	40	40	40
Understand	60	60	60
Apply	-	-	-
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination

Continuous Assessment (40%) [200 Marks]						End Semester Examination (60%) [100 Marks]
CA 1 : 100 Marks			CA 2 : 100 Marks			
SA 1 (60 Marks)	FA 1 (40 Marks)		SA 2 (60 Marks)	FA 2 (40 Marks)		
	Component - I (20 Marks)	Component - II (20 Marks)		Component - I (20 Marks)	Component - II (20 Marks)	

Course Outcome (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C201.1										1		1			
C201.2										1		1			
C201.3										1		1			
C201.4										1		1			
C201.5										1		1			

23CE205	ARCHITECTURAL DESIGN PRINCIPLES AND DRAWING	3/0/2/4

Nature of Course	Theory and Practical
Pre requisites	Nil

Course Objectives:

1	To summarize the various facets of architectural design for a holistic understanding of the discipline.
2	To illustrate the various elements and principles of architecture.
3	To analyse the different design approach of various building types with specific reference to site and climate.
4.	To interpret and apply the building rules, Bye laws and Building Information Modelling concepts (BIM).

Course Outcomes:

Upon completion of the course, students shall have ability to

C205.1	Apply the components and elements of an architectural design.	U
C205.2	Relate spatial relationship and spatial organization principles.	AP
C205.3	Incorporate principles of architecture and circulation in the design.	AP
C205.4	Perform climate responsive designs and its various components – passive design strategy.	AP
C205.5	Design service layout in accordance with building Bye laws, National Building Code and discuss Building Information Modelling.	AP

Course Contents: Theory

Course Contents:

Module 1: Introduction and Elements of Architecture　　　　　　　15 Hrs

Definitions of Architecture – architecture as a discipline – context for architecture as satisfying human needs: functional, aesthetic and psychological- outline of components and aspects of architectural form. Building typologies: Residential, institutional, commercial and Industrial types – Anthropometry and space standards- Functional relationships -Understanding fundamental elements such as point, line, plane, form and space, shape, pattern, light, color, surface and texture. Understanding perceptual effects of geometric forms such as sphere, cube, pyramid, cylinder and cone. Understanding perceptual effects of configuration of architectural spaces – Spatial relationship and its types, Spatial organization and its types – built form and open space relationships.

Module 2: Principles of Architecture and Climate responsive design　　15 Hrs

Understanding fundamental principles such as proportion, scale, balance, symmetry/asymmetry, rhythm, axis, hierarchy, datum, unity, harmony, dominance, and climax. Movement with reference to the architectural form and space – relationship between architectural form and circulation – Types of circulation. Site analysis and climate responsive design **-** Site Surveys - Site analysis of natural, cultural and aesthetic factors – topography, hydrology, soils, vegetation, macro/micro climate, surface drainage, accessibility, size and shape, infrastructures available - Site level planning and organization of open, semi-open and built spaces. Man, Climate and Shelter - Factors that determine climate – Characteristics of climate types – Design for various climate types – Passive and active energy controls - Simple passive design considerations.

Module 3: Building Bye laws & Building Information Modelling　　　　15 Hrs

Building Rules and Bye-laws - Overview to National Building Code (NBC) -Overview to

Development Control Regulation (DCR) - Guidelines -Floor Space Index (FSI)- Floor Area Ratio (FAR)- Setbacks-Open space reservation (OSR) - Industries - Fire safety regulations-Building services-Building Approval Process -Plan Requirements- Real estate regulatory authority (RERA)- Building Information Modelling –Concepts -Advantages - Drawing based process vs BIM process- 3D Simulations- 4D Scheduling- 5D Costing- 6D Sustainability-7D Facility and Asset Management- Design Coordination - BIM softwares -Case studies.

	Total Hours	45 Hrs.

Laboratory Course Content:

S. No.	List of Experiments	CO Mapping	BT
1.	Planning and drafting the plan, section, elevation of a single storied residential building.	C 205.1 – C 205 .3	AP
2.	Planning and drafting the plan, section, elevation of a multi - storied hospital building.	C 205.1 – C 205 .3	AP
3.	Planning, drafting the plan, section and elevation of a multi storied school building.	C 205.1 – C 205 .3	AP
4.	Planning and drafting the section elevation of a multi-storeyed commercial complex / office building.	C 205.1 – C 205 .3	AP
5.	Planning and drafting the plan, section, elevation of a factory building with steel roof system.	C 205.1 – C 205 .3	AP
6	3D Modeling of a single storied residential building.	C 205.4	AP
7.	3D Modeling of a factory building with steel roof system.	C 205.4	AP
8.	3D Modeling of a multi storied commercial building	C 205.4	AP
9.	Layout Preparation for Water Supply and Drainage for Residential Building and commercial building.	C 205.5	AP
10.	Preparation of Electrical Plan for Residential Building and commercial building.	C 205.5	AP
11.	Fire Protection Systems – Design of Emergency Exits and Emergency Vehicle routes with fire protection symbols.	C 205.5	AP
12.	Preparation of Interior Design Drawings for Residential and commercial Buildings.	C 205.5	AP
		Total Hours (Lab)	30
		Total Hours (45 +30)	75

Text Books:

1.	Simon Unwin, "Analyzing Architecture", Routledge; 4th edition, 3024
2.	Koenigsberger O.H. et.al, "Manual of Tropical Housing and Building" – Part I - Climate design, Orient Longman, Madras, India, 3020.
3.	Kale C.M, Patki S.Y. "Building Drawing with an Integrated to Built Environment" Mc-Graw Hill Education, fifth reprint edition 3023.

Reference Book:

1.	Julius Panero, Martin Zelnik, "Human Dimension and Interior Space: A Source Book of Design Reference Standards", 3022.
2.	Arvind Krishnan, Nick Baker, Simos Yannas and Szokolay.S.V., "Climate Responsive Architecture"., A Design Hand Book for Energy Efficient Building, Tata McGraw Hill Publishing Company Ltd., New Delhi, 3027
3.	Ricard Hyde, "Climate Responsive Design: A Study of Buildings in Moderate and Hot Humid Climates" Taylor & Francis; 1 edition, 3025

Web References:

1.	http://www.civilengineeringx.com/building-design-and-construction-handbook
2.	https://www.thebalancesmb.com/designing-climate-responsive-architecture-3157812
3.	http://char.txa.cornell.edu/language/principl/principl.htm
4.	https://www.open.edu.au/sitecore/content/Alchemy/Home/degrees/master-of-urban-and-regional-planning-curtin-university-cur-urp-mas

Online Resources:

1.	https://onlinecourses.nptel.ac.in/noc19_ar14/preview
2.	https://www.coursera.org/learn/making-architecture
3.	https://www.edx.org/learn/sustainable-development/massachusetts-institute-of-technology-sustainable-building-design
4.	https://www.edx.org/learn/architecture/harvard-university-the-architectural-imagination

Continuous Assessment									End Semester Examination	Total
Theory				Practical			Total (A+B)	Total Continuous Assessment		
Formative Assessment	Summative Assessment	Total	Total (A)	Formative Assessment	Summative Assessment	Total (B)				
80	120	200	100	75	25	100	200	50	50	100

Formative assessment based on Capstone Model – Theory				
Course Outcome	Bloom's Level	Assessment Component		FA (10%) (80 Marks)
C205.1	Understand	Component – I	Quiz	20
C205.2 & C205.3	Apply	Component – II	Assignment	20
C205.4	Apply	Component – III	Outside Classroom Learning Experience	20
C205.5	Apply			
C302.5	Apply	Component – IV	Quiz	20

Assessment based on Summative and End Semester Examination - Theory			
Bloom's Level	**Summative Assessment (15 %)** 120 Marks		**End Semester Examination (25 %) [100 marks]**
	CIA 1: (60 Marks)	**CIA 1: (60 Marks)**	
Remember	30	30	20
Understand	50	40	50
Apply	20	30	30
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Assessment based on Summative and End Semester Examination - Practical			
Bloom's Level	**Continuous Assessment (25 %)** 100 Marks		**End Semester Examination (25%) [100 marks]**
	FA: (75 Marks)	**SA:(25 Marks)**	
Remember	20	20	**20**
Understand	30	30	**30**
Apply	50	50	**50**
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-

Assessment based on continuous and end semester examination						
Continuous Assessment (50%)						End Semester Exam (50%)
CA 1			CA 2		Practical Exam (100 Marks)	Theory Exam (25%) Practical Exam (25%)
SA1 (60 M)	FA 1		SA2 (60 M)	FA 2		
	Component I (20 Marks)	Component II (20 Marks)		Component I (20 Marks)	Component II (20 Marks)	SA2 (75 M)	FA 2 (25 M)	

Assessment based on continuous and end semester examination								
Continuous Assessment (50%)								End Semester Exam (50%)
CA 1			CA 2			Practical Exam (100 Marks)		Theory Exam (25%) Practical Exam (25%)
SA1 (60 M)	FA 1		SA2 (60 M)	FA 2		SA2 (75 M)	FA 2 (25 M)	
	Component I (20 Marks)	Component II (20 Marks)		Component I (20 Marks)	Component II (20 Marks)			

Mapping of Course Outcomes (CO) with Programme Outcomes (PO)Programme Specific Outcomes (PSO)

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	1							1		1	2	2	1
2	3	2	1							1		1	2	2	1
3	3	2	1							1		1	2	2	1
4	3	2	1				3			1		1	2	2	1
5	3	2	1							1		1	2	2	1
Avg	3	2	1				3			1		1	2	2	1

23IT211		INTRODUCTION TO PYTHON PROGRAMMING	1/0/4/3
Nature of Course		F (Theory Programming)	
Prerequisites		Nil	

Course Objectives:

1.	To understand and execute Python script using types and expressions.
2.	To understand the difference between expressions & statements and to understand the concept of assignment semantics.
3.	To utilize high level data types such as lists and dictionaries.
4.	To import and utilize a module and to perform read & write operations on files.

Course Outcomes

Upon completion of the course, students shall have ability to

C211.1	Demonstrate programs using simple python statements and expressions.	[U]
C211.2	Build control flow and string concept in python for solving problems.	[AP]
C211.3	Develop python programs using functions.	[AP]
C211.4	Analyze compound data using python lists, tuples and dictionaries.	[A]
C211.5	Apply python programs using files, exception, modules and packages.	[AP]

COURSE CONTENTS:
DATA, EXPRESSIONS, STATEMENTS: **(15 Hours)**
Data Types, Variables and Identifiers, Operators and Expression, Conditional Branching Statements, Iterative statements- Nested Loops, Break, Continue, Pass statements, Function - definition and function call, arguments, return statements, Lambda Function and Recursive Function.

STRING, LISTS, FUNCTIONS: **(15 Hours)**
Strings – Concatenation, Append, Comparing Strings, Iterating Strings, Strings Modules and Functions, Modules – NumPy, Math, List: Operations, Nested list, Cloning, Methods, Looping, Tuple: Operations, Nested Tuple, Tuple assignments, Checking the index, Dictionary: Operations, looping over and Nested Dictionary, Built in functions and Methods.

FILES, INHERITANCE: **(15 Hours)**
Classes and Objects, Inheritance, Polymorphism, File Handling and Exception Handling.

	Total Hours	45

Laboratory Component:

S. No	List of Experiments
1.	Compute the GCD of two numbers.
2.	Find the square root of a number (Newton's method).
3.	Exponentiation (power of a number).
4.	Find the maximum of a list of numbers.
5.	Linear search and Binary search.
6.	Selection sort, Insertion sort.
7.	Merge sort.
8.	First n prime numbers.
9.	Multiply matrices.
10.	Programs that take command line arguments (word count).
11.	Plotting datasets.
12.	File handling and plotting.

	Total Hours: 30 hours

Text Books:

1.	Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016.(http://greenteapress.com/wp/think-python/).
2.	Tony Gaddis, "Starting out with Python", 4th Edition, Addison Wesley, Pearson,2017.

Reference Books:

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.
3.	John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", 3rd Edition, MIT Press, 2021.

Web References:

1.	http://nptel.ac.in/courses/106106145/
2.	https://www.codecademy.com/learn/learn-python
3.	https://www.coursera.org/learn/python-data-analysis#syllabus

Online Resources:

1.	https://www.programiz.com/python-programming
2.	https://www.fullstackpython.com/best-python-resources
3.	https://www.udemy.com/course/easy-way-to-learn-python-for-beginners-2021/
4.	https://stackify.com/learn-python-tutorials/

Continuous Assessment									End Semester Practical Examination	Total
Theory				**Practical**			Total (A+ B)	Total Continuous Assessment		
Formative Assessment	Summative Assessment	Total	Total (A)	Formative Assessment	Summative Assessment	Total (B)				
80	120	200	100	75	25	100	200	50	50	100

Formative Assessment based on Capstone Model - Theory			
Course Outcome	Bloom's Level	Assessment Component	FA (10%) [80 Marks]
C211.1	Understand	Assignment - 1	20
C211.2	Apply	Quiz	20
C211.3	Apply	Assignment - 2	20
C211.4	Analyze	Case Study	20
C211.5	Apply		

Assessment based on Summative Assessment – Theory

Bloom's Level	Summative Assessment (15%) [120 Marks]	
	CIA1: (60 Marks)	CIA2: (60 Marks)
Remember	10	10
Understand	40	40
Apply	40	40
Analyse	10	10
Evaluate	-	-
Create	-	-

Assessment based on Continuous and End Semester Examination - Practical

Bloom's Level	Continuous Assessment (25%) [100 Marks]		End Semester Examination (50%) [100 Marks]
	FA: (75 Marks)	SA: (25 Marks)	
Remember	10	10	10
Understand	30	30	30
Apply	40	40	40
Analyse	20	20	20
Evaluate	-	-	-
Create	-	-	-

Assessment based on Continuous and End Semester Examination

Continuous Assessment (50%)								End Semester Practical Examination (50%)
CA 1 (100 Marks)			CA 2 (100 Marks)			Practical Exam (100 Marks)		
SA 1 (60 M)	FA 1		SA 2 (60 M)	FA 2		FA (75M)	SA (25 M)	
	Component-I (20 Marks)	Component-II (20 Marks)		Component-I (20 Marks)	Component-II (20 Marks)			

Course Outcomes (CO)	Programme Outcomes (PO)												Programme Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C211.1	1	2	1	1								2			
C211.2	3	3	3	3	2							2			
C211.3	3	3	3	3								2			
C211.4	3	3	3	3	3							2			
C211.5	3	2	3	3	3							1			

23PS102	PHYSICAL SCIENCE LABORATORY (Common to I Year B.E. – CIVIL&MECH)	L/T/P/C
		0/0/4/2

Nature of Course	: E (Skill based)
Pre requisites	: Basic Applied Science laboratory skills

Course Objectives:

1	Providing a hands-on learning experience in measuring the basic parameters of laser and determine the frequency of oscillation.
2	To carry out experiments to understand the basic laws of magnetism.
3	To provide hands on training to measure the time constant of RC circuit and lattice constant of cubic crystal structure
4	To understand the principles and applications of electrochemistry and learning electro-analytical methods, and explore the knowledge of various energy sources and storage devices.
5	To understand the concepts of photo-physical and photochemical processes in spectroscopy.

Course Outcomes:

Upon completion of the course, students shall have ability to

C102.1	To determine the frequency of oscillation and laser parameters using melde's apparatus and diode laser	[E]
C102.2	To determine the magnetic field around a current carrying conductor	[E]
C102.3	To determine the time constant of RC circuit and lattice constant of cubic crystal structure	[E]
C102.4	To determine the pH,single electrode potential using reference electrodes and Electroplating process based on electrolytic cell.	[E]
C102.5	Interpret the principle and working of Spectroscopic technique.	[E]

Lab Components:		
1	Determination of frequency of transverse and longitudinal wave modes – Melde's experiment and characteristics of Simple harmonic motion – Simulation lab.	[E]
2	Determination of wavelength, particle size and angle of divergence using diode laser source.	[E]
3	Determination of Magnetic field along the axis of current carrying coil-Stewart and Gee method.	[E]
4	Determination of characteristics of RC circuit to find the time constant	[E]
5	Determination of lattice constant of cubic crystal structure.	[E]
6	Determination of strength of strong acid by pH metry.	[E]
7	Estimation of dissolved oxygen in waste water using Winkler's method.	[E]
8	Determination of single electrode potential of Zinc and Copper by Potentiometric method.	[E]
9	Determination of cathode efficiency of Nickel using electroplating process.	[E]
10	Spectrophotometry-Estimation of iron in sample water.	[E]
	Total Hours:	**30**

Text Book:		
1	Anoop Sing Yadav "Applied Physics Lab Manual" Vayu Education of India Publisher, 2018.	
2	P. Kulkarni,Manual for Experiments in Engineering Physics,2015	
3	C. S. Robinson, Dr. Ruby Das, "A text book of Engineering practical physics", Laxmi Publications Pvt. Ltd., 2016.	
4	S.L.Gupta and V Kumar "Practical Physics Volume -II", Pragati Prakashan ., 2023.	
5	Method of Sampling and Test (Physical and Chemical) for Water and Wastewater- Iron, 2003, Part-53; First Revision.	
6	Method of Sampling and Test (Physical and Chemical) for Water and Wastewater: pH Value (2001; Part-50; Coagulation Test).	
7	Method of Sampling and Test (Physical and Chemical) for Water and Wastewater, Chemical Oxygen Demand, 2012, Part-58.	
8	Science and Technology Laboratory Manual. E-Book. NIOS, 2012.	
References:		
1	Dr. Ruby Das and Prashant Kumar Sahu,A Textbook of Engineering Physics Practical , 2016,2nd Edition	
2	S.L.Gupta and Dr.V.Kumar, "Practical physics with viva voice", Pragati Prakashan Publishers, Revised Edition, 2009.	
3	M.N.Avadhanulu, A.A.Dani and Pokely P.M, "Experiments in Engineering Physics", S.Chand&Co,2008.	
4	Sawyer, C. N., McCarty, P. L., and Parkin, G. F. 2017. Chemistry for Environmental Engineering. Fifth Edition, McGraw-Hill, Inc., New York.	
5	American Public Health Association et al, Standard Methods for the Examinations of Water and Waste Water, APHA. 2017.	
6	AWWA, WEF, APHA, 2017, Standard Methods for the Examination of Water and Wastewater (Method: 5210B, BOD).	
Web References:		
1	https://vlab.amrita.edu/	
2	https://bop-iitk.vlabs.ac.in/basics-of-physics/	
3	http://vlabs.iitb.ac.in/	
4	https://www.iitg.ac.in/	
5	https://ee1-nitk.vlabs.ac.in/exp/determination-of-ph/simulation.html	
6	https://ee1-nitk.vlabs.ac.in/exp/determination-of-biological-oxygen/simulation.html	
7	https://www.youtube.com/watch?v=pORJQyP-2j8	
8	https://ee1-nitk.vlabs.ac.in/exp/determination-of-ph/simulation.html	
9	https://ee1-nitk.vlabs.ac.in/exp/determination-of-ph/simulation.html	

Continuous Assessment				End Semester Examination	Total
Formative Assessment	Summative Assessment	Total	Total Continuous Assessment		
7 5	2 5	100	60	40	100

Assessment based on Continuous and End Semester Examination			
Bloom'sLevel	Continuous Assessment (60%) [100Marks]		End Semester Practical Examination(40 %) [100Marks]
	FA (75Marks)	SA (25Marks)	
Remember	0	0	0
Understand	10	10	10
Apply	30	30	30
Analyse	30	30	30
Evaluate	30	30	30
Create	0	0	0

Mapping of Course Outcomes (CO) with Programme Outcomes (PO) Programme Specific Outcomes(PSO)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C102.1	3	2	1	2					2			1	1		
C102.2	3	2	1	2					2			1	1		
C102.3	3	2	1	2					2			1	1		
C102.4	3	2	1	2					2			1	1		
C102.5	3	2	1	2					2			1	1		
	3	Stronglyagreed		2	Moderatelyagreed		1	Reasonablyagreed							

Mandatory Courses

23MC101	**INDUCTION PROGRAMME** (Common to all B.E / B.TECH/M.TECH)	1/0/0/0

Nature of Course	Induction Programme
Pre requisites	Nil

Course Objectives:

1	To have broad understanding of society and relationships
2	To nurture the character and 135abelin one's responsibility as an engineer, a citizen and a human being
3	To incorporate meta skills and values

Course Outcomes:

Upon completion of the course, students shall have ability to

C101.1	Explore academic interest and activities	[AP]
C101.2	Work for excellence	[AP]
C101.3	Promote bonding and give a broader view of life and character	[AP]

Course Contents: Theory

PHYSICAL ACTIVITY: Research over the past years has shown Yoga to have stress-relieving powers on students, paving the way for improved academic performance with the practice of asanas, meditation and breathing exercises. To prove these words Yoga classes has been planned in this module.(CO mapping: C101.1, C101.2, C101.3)

CREATIVE ARTS (students can select any one of their choice): Cultural development supports students to understand, feel comfortable with, value and appreciate the potential enrichment of cultural diversity. They should challenge discrimination, whether based on cultural or racial difference. Students should experience cultural traditions embedded in arts, crafts, language, literature, theatre, song, music, dance, sport, Science, technology and travel. Students should develop an appreciation of beauty both in experiencing artistic expression and by exploring their own creative powers. To inculcate those skills they are given a chance to exhibit their talents through painting, sculpture, pottery, music, dance, craft making and so on. .(CO mapping: C101.1, C101.2, C101.3)

UNIVERSAL HUMAN VALUES: Moral development involves supporting students to make considered choices around their behaviour and the values that provide a framework for how they choose to live. Moral development is also learning about society's values, understanding the reasons for them, how they are derived and change; and how disagreements are resolved. Students must consider the consequences of personal and societal decisions on the wider community – local and global- and on the environment and future generations. To acquire this the students are exposed to training to enhance their soft skills. .(CO mapping: C101.1, C101.2, C101.3)

LITERARY AND PROFICIENCY MODULES: Social development helps students to work effectively together, developing the inter-personal skills required to relate positively with their peers and people of all ages. Students must also understand how to participate productively in a diverse and plural society and learn about, and how to effectively engage

with societal institutions and processes. They should understand that a person may have different roles and responsibilities within society. To reach this the following aspects are given in the form of Reading, writing, speaking – debate, role play etc. Communication and computer skills. (CO mapping: C101.1, C101.2, C101.3)

LECTURES BY EMINENT PEOPLE: Teaching with Lectures. ... It is essential to see lectures as a means of helping students learn to think about the key concepts of a particular subject, rather than primarily as a means of transferring knowledge from instructor to student. During the induction period students will attend to Guest lectures by subject experts.(CO mapping: C101.1, C101.2, C101.3)

VISIT TO LOCAL AREAS: Traveling is in fact a way of learning to learn. You are out of your comfort zone and so you must learn to be able to adapt to a new learning environment in a very short time. It also helps in your overall learning as well. In the induction period students will be taken to different places near college to learn new things. Eg.Meditation centre/orphanage/Hospital.(CO mapping: C101.1, C101.2, C101.3)

FAMILIARIZATION TO DEPARTMENT/BRANCH INNOVATION: Hod's of different branches will present about their department followed by department visit to view various facilities available at their department, new innovations from students and faculties etc. .(CO mapping: C101.1, C101.2, C101.3)

	Total Hours	**30 Hrs.**

Mapping of Course Outcomes (CO) with Programme Outcomes (PO)Programme Specific Outcomes (PSO)

Cos	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1						3	3	3	3	3	3	3			1
2						3	3	3	3	3	3	3			1
3						3	3	3	3	3	3	3			1
Avg						3.0	3.0	3.0	3.0	3.0	3.0	3.0			1.0
1	Reasonably agreed				2		Moderately agreed			3		Strongly agreed			

23MC102	ENVIRONMENTAL SCIENCES	2 /0 /0 /0

Nature of Course	Theory Concept
Pre requisites	Basics in Environmental Studies

Course Objectives:

1	To learn the integrated themes on various natural resources.
2	To gain knowledge on the type of pollution and its control methods.
3	To have an awareness about the current environmental issues and thesocial problems.

Course Outcomes:

Upon completion of the course, students shall have ability to

C102.1	Recall and play an important role in transferring a healthy environment for future generation.	[R]
C102.2	Illustrate the importance of natural resources and conservation of biodiversity.	[U]
C102.3	Interpret and analyze the impact of engineering solutions ina global and societal context.	[U]
C102.4	Apply the gained knowledge to overcome pollution problems.	[AP]
C102.5	Apply the gained knowledge in various environmentalissues and sustainable development.	[AP]

Course Contents: Theory

Natural Resources:

Introduction-Forest resources: Use and abuse, case study-Major activities in forest-Water resources-over utilization of water, dams-benefits and problems. Mineral resources-Use and exploitation, environmental effects of mining- case study–Food resources- World food problems, case study. Energy resources -Renewable and non-renewable energy sources Land resources- Soil erosion and desertification – Role of an individual in conservation of natural resources.

Environmental Pollutions:

Definition – causes, effects and control measures of: a. Air pollution - Acid rain - Greenhouse effect-Global warming- Ozone layer depletion – case study- Bhopal gas tragedy. Water pollution c. Soil pollution - Solid waste management-Recycling of plastics-Pyrolysis method- causes, effects and control measures of municipal solid wastes d. Noise pollution. e. Nuclear hazards-case study-Chernobyl nuclear disaster-Role of an individual in prevention of pollution.

Social issues and the Environment:

Sustainable development-water conservation, rain water harvesting, E-Waste Management – Environmental ethics: 12 Principles of green chemistry-Scheme of labelling of environmental friendly products (Eco mark) – Emission standards – ISO14001 standard.

	Total Hours	**30 Hrs.**

Text Books:

| 1 | Anubha Kaushik and C P Kaushik "Perspectives in Environmental Studies"4th Edition, New age International (P) Limited, Publisher Reprint 2014. New Delhi |
| 2 | Rajagopalan, R, "Environmental Studies-From Crisis to Cure", OxfordUniversity Press 2015. |

Reference Books:

1	Tyler Miller, Jr., "Environmental Science", Brooks/Cole a part of Cengage Learning, 2014.
2	William Cunningham and Mary Cunningham, "Environmental Science", 13thEdition, McGraw Hill,2015.
3	Gilbert M. Masters, "Introduction to Environmental Engineering and Science",Third Edition, Pearson Education, 2014.

Web References:

1	http://nptel.ac.in/courses/104103020/20
2	http://nptel.ac.in/courses/120108002
3	http://nptel.ac.in/courses/122106030
4	http://nptel.ac.in/courses/120108004/
5	http://nptel.ac.in/courses/122102006/20

Online Resources:

| 1 | https://www.edx.org/course/subject/environmental-studies |
| 2 | www.environmentalscience.org |

Assessment Methods & Levels (based on Bloom's Taxonomy)

Formative assessment based on Capstone Model (Max. Marks:50)

Course Outcome	Bloom's Level	Assessment Component	Marks
C102.1	Remember	Quiz	10
C102.2	Understand	Case study based on environmental aspect	20
C102.3	Understand	Class presentation	10
C102.4 & C102.5	Apply	Assignment	10

Summative assessment based on Continuous Assessment

Bloom's Level	Continuous Assessment		
	CIA-I [0 marks]	CIA-II [0 marks]	Term End Assessment [50 marks]
Remember	-	-	30
Understand	-	-	40
Apply	-	-	30
Analyze	-	-	-
Evaluate	-	-	-
Create	-	-	-

Mapping of Course Outcomes (CO) with Programme Outcomes (PO)Programme Specific Outcomes (PSO)

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	1	1	1	1		1							2	2
2	2	1	1	1	1		1							2	2
3	3	2	1	1	1		1							2	2
4	3	2	1	1	1		1							2	2
5	2	1	1	1	1		1							2	2
Avg	2.5	1.5	1	1	1		1							**2**	**2**

1	Reasonably agreed	2	Moderately agreed	3	Strongly agreed

23MC104	**MANAGEMENT ORGANIZATIONAL BEHAVIOUR**	**2/0/0/0**
Nature of Course	Theory Concept	
Pre requisites	Nil	

Course Objectives:

1	The objective of the course is to provide basic knowledge about management to familiarize the students with the management principles and organizational behavior.
2	The course is designed to enable the students to adapt & apply theoretical concepts in business
3	To know about the role of manager in the area of management.
4	To create and implement team building strategies for organization building.

Course Outcomes:
Upon completion of the course, students shall have ability to

C104.1	Identify and understand different management principles techniques in business environment.	[AP]
C104.2	Apply management fundamentals and planning to solve organization problems and make effective decisions.	[AP]
C104.3	Understand and analyze the changes within an individual will change the group as well as the organization	[AN]
C104.4	Understand and analyze the leadership style and organization theories to create a productive environment to workforce.	[AN]
C104.5	Analyze the organizational climate and change management strategies and tactics	[AP]

Course Contents: Theory

Module 1: Fundamentals of Management, Planning and Decision Making   10 Hrs.

Introduction to Management- Concept and functions- Thought Managerial roles and styles- Principles of Management - Levels of Management- Theories of Management - Classical, Scientific, Administrative, Behavioral, Management Sciences Theories. Organizational planning - Vision, Mission and goals, Types of plans, steps in planning process, Approaches to planning, Planning in Dynamic Environment. Decision making process, types of decisions, decision makingstyles, Behavioral influences on decision making

Module 2: Individual, interpersonal and group behavior   10 Hrs.

Definition, need and importance of Organizational behavior Learning-Nature -Importance of Learning- Introduction and theories Motivation: Content and process theories-Leadership: Styles and Theories - Perception-Personality Attitudes- Definition, need and importance -Nature and scope-Importance of Groups and Teams- Role relationships and conflict-Group dynamics- Work values. Organization-Theories: Maslow's needs hierarchy theory ,two factor theory of motivation ,McGregor's theory, ERG theory ,MCClelland's needs theory, Valance theory

Module 3: Organizational Development   10Hrs.

Organizational culture: Elements - Organizational climate   Factors affecting organizational climate-Organizational Commitment, Organizational change- Importance- Stability Vs Change- Proactive Vs Reaction change- Change process Resistance   to   change-   Managing changes- Managing International- Workforce Productivity-Alternative change management approaches and cultural contingencies - power to manage effectively; Empowerment and Participation strategies and tactics.

Total Hours	**30 Hrs.**

Text Books:	
1	Nelson, Quick, Khandelwal, —Organizational Behaviorǁ, 2nd edition, Cengage Learning, 2016.
2	Williams, Tripathy, —Principles of Management, Cengage Learning, 2016.
3	Aswathappa, K, —Organizational Behavior, 12th Edition, Himalaya Publication, 2016.
4	Stephen Robbins, Timothy A. Judge, —Organizational Behavior, 16th edition, Prentice Hall India Pvt. Ltd, 2014
Reference Books:	
1	Chandrani Singh, Aditi Khatri, —Principles and Practices of Management and Organizational Behavior ǁ, Sage Publications, 2016
2	Richard L. Daft, —Understanding the Theory and Design of Organizationsǁ, 11th edition, Cengage Learning, 2013.
3	John M Ivancevich and Robert Konopaske, —Organizational Behavior and Managementǁ, McGraw-Hill Education, 2013
Web References:	
1	https://iedunote.com/fundamental-concepts-of-organizational-behavior
2	https://nscpolteksby.ac.id/ebook/
3	https://ebooks.lpude.in/management/mba/term_1/DMGT402_MANAGEMENT PRACTICES_AND_ORGANIZATIONAL_BEHAVIOUR.pdf
4	https://www.studocu.com/in/document/vellore-institute-of-technology/organizational - behaviour/lecture-notes/ob-notes/3208134/view
Online Resources:	
1	https://nptel.ac.in/syllabus/110105034/
2	https://nptel.ac.in/courses/110/105/110105033/

Assessment Methods & Levels (based on Blooms 'Taxonomy - Theory

Formative assessment based on Capstone Model (50 Marks)

Course Outcome	Bloom's Level	Assessment Component (Choose and map components from the list – Quiz,	Marks
C104.1	Apply	Online Quiz	20
C104.2	Apply	Online course	20
C104.3 & C104.4	Analyze		
C104.5	Apply	Assignment	10

Summative assessment based on Continuous and End Semester Examination			
Bloom's Level	**Continuous Assessment**		**Term End Assessment [50 marks]**
	CIA 1 [0 Marks]	**CIA 2 [0 Marks]**	
Remember	-	-	-
Understand	-	-	10
Apply	-	-	20
Analyse	-	-	20
Evaluate	-	-	-
Create	-	-	-

Mapping of Course Outcomes (CO) with Program Outcomes (PO) Program Specific Outcomes (PSO)

COs	POs												PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1					1	3		3	3	3	3	1			2
2					2	2		3	3	3	3	2			3
3					3	3		3	3	2	3	1			2
4					3	2		3	3	3	3	2			3
5					3	3		3	3	2	3	2			2
Avg					2.4	2.6		3.0	3.0	2.6	3.0	1.6			2.4
1	Reasonably agreed					2		Moderately agreed			3		Strongly agreed		