



AISSMS

COLLEGE OF ENGINEERING

ज्ञानम् सकलजनहिताय

An Autonomous Institute Affiliated with
Savitribai Phule Pune University

Accredited by NAAC with "A+" Grade | NBA - 7 UG Programmes



Savitribai Phule Pune University

All India Shri Shivaji Memorial Society's

COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)

Faculty of Science and Technology



National Education Policy (NEP) Compliant Curriculum

S.Y. B. Tech. Civil Engineering
(2025 Pattern)

(With effect from Academic Year 2026-27)

www.aissmscoe.com

Institute Vision & Mission

Vision:

- Service to society through quality education

Mission:

- Generation of national wealth through education and research
- Imparting quality technical education at the cost affordable to all strata of the society
- Enhancing the quality of life through sustainable development
- Carrying out high-quality intellectual work
- Achieving the distinction of the highest preferred engineering college in the eyes of the stakeholders

Department Vision & Mission

Vision:

- Nurture the talent in civil engineers to work as global leaders for development of society.

Mission:

- Provide quality education to develop competent civil engineers.
- Create the awareness among students for sustainable development.
- Cultivate the leadership qualities for becoming successful entrepreneurs.

Knowledge and Attitude Profile (WK)

Knowledge & Attitude	Description
WK1	A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.
WK2	Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline
WK3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline
WK4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
WK5	Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area
WK6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline
WK7	Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.
WK8	Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues
WK9	Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

Program Outcomes (POs)

Program Outcomes (POs)	Description
PO1	Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO3	Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO4	Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO5	Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO6	The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7	Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO8	Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO9	Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO10	Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Program Specific Outcomes (PSOs)

A Civil engineering graduate will be able to:

- **PSO1:** Exhibit technical knowledge in planning, analysis, design and management for infrastructural development.
- **PSO2:** Apply the innovative technologies to address Civil Engineering problems of the society.
- **PSO3:** Enhance professional abilities to meet industrial need.

Program Educational Objectives (PEOs)

- **PEO1:** To produce competent civil engineers who will be fully aware of the impact of their work in society, both nationally and globally.
- **PEO2:** Civil engineers shall achieve a high level of technical expertise to succeed in all positions in sustainable engineering practice and research.
- **PEO3:** To develop civil engineers who acquire professionalism, entrepreneurship, leadership and commitment to technological development through lifelong learning.

B.Tech. Degree Options as per NEP

(a) **B.Tech.** Degree with Multidisciplinary Minor (160-176 credits).

(b) **B.Tech. Honours Degree in chosen Major Engg./ Tech. Discipline with Multidisciplinary Minor (180-194 credits):**

- enables students to take up **five-six additional courses in the same Engg./ Tech.** discipline of 18 to 20 credits distributed over **semesters III to VIII.**
- The decision regarding the mechanism of distribution of these 18-20 credits over semesters III to VIII, which are **over and above the min.160-max.176 Credits** prescribed for Four Year Multidisciplinary Bachelor's Degree in Engg./ Tech., will be taken by Academic Authorities of University/ Autonomous Engineering Colleges.

(c) **B.Tech. Honours with Research Degree in chosen Major Engg./ Tech. Discipline with Multidisciplinary Minor (180-194 credits):**

- The students will work on **a research project or dissertation for 18 credits** in the fourth year in the respective Major Engg./ Tech. Discipline.
- The decision regarding the distribution of 18 credits for Research Project in **Semesters VII and VIII** of the Fourth Year will be taken by Academic Authorities of University/ Autonomous Engineering Colleges.
- **These 18 Credits will be over and above the min.160-max.176 Credits** prescribed for Four Year Multidisciplinary Bachelor's Degree in Engg./ Tech. Program.

(d) **B.Tech. Degree in chosen Major Engg./ Tech. Discipline with Double Minor (Multidisciplinary and Specialisation Minor, 180-194 credits):**

- Students would take **up five-six additional courses of 18 to 20 credits in another Engg./ Tech. discipline/ Emerging Areas** Specialization.
- Distributed over **semesters III to VIII.**
- The decision regarding the mechanism of distribution of these 18-20 credits over semesters III to VIII, which are **over and above the min.160-max.176 Credits** prescribed for Four Year Multidisciplinary Bachelor's Degree in Engg./Tech., will be taken by Academic Authorities of University/ Autonomous Engineering Colleges.

A. Definition of Credit:

1Hr.Lecture(L) per week	1credit
1Hr.Tutorial(T) per week	1credit
2 Hours Practical (Lab)/week	1credit

B. Range of credits:

A range of credits from 160 to 176 for a student to be eligible to get Undergraduate degree in Engineering. A student will be eligible to get Undergraduate degree with Honors 18 to 20 credits, Double Minor for 18 to 20 credits and/or Multidisciplinary Minors for 18 to 20credits, if he/she completes additional credits.

C. Exit:

A student will be eligible to get Diploma in VLSI Design and Technology after completing an internship of 8 Credit during summer vacation in relevant Discipline.

D. General Guidelines for Examination:

The examination shall be conducted in THREE parts viz. Continues Comprehensive Assessment (CCA), In Semester Examination (ISE) and End Semester Examination (ESE).

(i) Continuous Comprehensive Assessment (CCA): 20 Marks (Any TWO)

CCA focuses on continuously assessing a student's performance throughout the semester. Apart from classroom and laboratory learning, CCA activities can be undertaken to accelerate the attainment of the various outcomes in the course: The significance of CCA lies in its ability to provide a more accurate and all-round understanding of a student's abilities, skills, and knowledge. CCA promotes experiential learning, participatory learning, collaborative learning, active learning, self-learning, peer to peer learning, etc. As part of the CCA framework, students are required to undertake ANY TWO ACTIVITIES from the prescribed set Guidelines: To be evaluated based on rubrics.

(ii) In-semester Examination (ISE): 30 Marks

In-semester examination will be of 30 marks based on Unit I and II.

Course Content	Questions	Marks	Total Marks	Duration
Unit I	Q. 1 or Q.2	15	30	1 Hour
Unit II	Q. 3 or Q.4	15		

(iii) END Semester Examination (ESE): 50 Marks

Examination will be carried out on unit 3,4 and 5 carrying following marks weightage:

Course Content	Questions	Marks	Total Marks	Duration
Unit III	Q. 1 or Q.2	16	50	2 Hours
Unit IV	Q. 3 or Q.4	17		
Unit V	Q. 5 or Q.6	17		

S.Y.B. Tech. Civil (2025 Pattern)

ABBREVIATIONS

Abbreviation	Title	Abbreviation	Title
BSC	Basic Science courses	AEC	Ability Enhancement Course
ESC	Engineering Science courses	HSM	Humanities Social Science and Management
PCC	Programme Core Courses	IKS	Indian Knowledge System
PEC	Programme Elective courses	VEC	Value Education Course
MDM	Multidisciplinary Minor	ELC	Experiential Learning Courses
OEC	Open Elective other than particular Programme	CCC	Liberal Learning Courses
VSE	Vocational and Skill Enhancement Course		

B. Tech. Civil (2025 Pattern)
Distribution of Credits

Sr. No	Domains		Code	SEM-I	SEM-II	SEM-III	SEM-IV	SEM-V	SEM-VI	SEM-VII	SEM-VIII	Credits
1	Basic Science courses		BSC	8	8	0	0	0	0	0	0	16
2	Engineering Science courses		ESC	9	6	0	0	0	0	0	0	15
3	Programme Core Courses		PCC	0	3	12	12	8	8	8	0	51
4	Programme Elective courses		PEC	0	0	0	0	4	8	4	4	20
5	Multidisciplinary Minor	Multidisciplinary Courses	MDM	0	0	2	2	4	2	2	2	14
6	Open Elective other than particular Programme		OEC	0	0	2	2	2	0	0	0	6
7	Vocational and Skill Enhancement Course	Skill Courses	VSE	1	1	1	1	2	2	0	0	8
8	Humanities Social Science and Management	Ability Enhancement Course	AEC	2	0	0	2	0	0	0	0	4
		Entrepreneurship/Economics/Management courses	HSM	0	0	2	2	0	0	0	0	4
		Indian Knowledge System	IKS	0	2	0	0	0	0	0	0	2
		Value Education Course	VEC	0	0	2	1	0	0	0	0	3
9	Experiential Learning Courses	Research Methodology	ELC	0	0	0	0	0	0	4	0	4
		CEP		0	0	1	0	0	0	0	0	1
		Project		0	0	0	0	0	2	2	0	4
		Internship		0	0	0	0	0	0	0	12	12
10	Co-curricular Courses (CC)	Liberal Learning Courses	CCC	2	2	0	0	0	0	0	0	4
Total				22	22	22	22	20	22	20	18	168

MDM: Computer Engineering

Semester	Course Code	Course Name	Hrs/Week			Examination Scheme and Marks							Credits			
			L	P	T	CCA	ISE	ESE	PR	OR	TW*	Total	L	P	T	Total
SEM-3	25COMDM201A	Introduction to Data Science	2	-	-	20	30	50	-	-	-	100	2	-	-	02
SEM-4	25COMDM202A	Programming and Data Wrangling	2	-	-	20	30	50	-	-	-	100	2	-	-	02
SEM-5	25COMDM301A	Data Visualization and Exploratory Data Analysis	3	-	-	20	30	50	-	-	-	100	3	-	-	03
SEM-5	25COMDM301AL	Data Visualization and Exploratory Data Analysis Lab	-	2	-	-	-	-	25	-	-	25	-	1	-	01
SEM-6	25COMDM302A	Machine Learning	2	-	-	20	30	50	-	-	-	100	2	-	-	02
SEM-7	25COMDM401A	Internet of Things (IoT) and Cloud Computing	2	-	-	20	30	50	-	-	-	100	2	-	-	02
SEM-8	25COMDM402A	Emerging Computing Technologies	2	-	-	20	30	50	-	-	-	100	2	-	-	02
Total			13	2	0	120	180	300	25	0	0	625	13	1	0	14

Open Elective Baskets

BASKET	SEM-III	SEM-IV	SEM-V
Leadership, Management & Innovation	Principles of Management and Organizational Behaviour	Leadership and Team Dynamics	Supply Chain Management
Sustainability and Green Technologies	Circular Economy for Sustainable Development	Green Practices and ESG Frameworks	Sustainable Technologies and Carbon Management
Entrepreneurship & Business	Start-up Management and Venture Creation	Innovation and Business Strategy	Digital Marketing
Holistic Development & Well-Being	Health and Nutrition for Professionals	Stress Management and Mental Well-Being	Lifestyle Management and Preventive Healthcare
Global Languages	French Language Module – I	French Language Module – II	French Language Module – III
	German Language Module – I	German Language Module – II	German Language Module – III
	Japanese Language Module -I	Japanese Language Module -II	Japanese Language Module -III

Honors: Architecture & Town Planning

Semester	Course Code	Course Name	Hrs/Week			Examination Scheme and Marks							Credits			
			L	P	T	CCA	ISE	ESE	PR	OR	TW*	Total	L	P	T	Total
SEM-3	25CVHNR201-A	Urban Housing and Infrastructure Planning	3	-	-	20	30	50	-	-	-	100	3	-	-	03
SEM-3	25CVHNR201L-A	Urban Housing and Infrastructure Planning -PR/Lab	-	2	-	-	-	-	25	-	-	25	-	1	-	01
SEM-4	25CVHNR202-A	Sustainable Architecture and Landscape Design	3	-	-	20	30	50	-	-	-	100	3	-	-	03
SEM-4	25CVHNR202L-A	Sustainable Architecture and Landscape Design Lab	-	2	-	-	-	-	25	-	-	25	-	1	-	01
SEM-5	25CVHNR301-A	Traffic and Transportation Planning	3	-	-	20	30	50	-	-	-	100	3	-	-	03
SEM-5	25CVHNR301L-A	Traffic and Transportation Planning Lab	-	2	-	-	-	-	25	-	-	25	-	1	-	01
SEM-6	25CVHNR302-A	Land Use and Land Cover	3	-	-	20	30	50	-	-	-	100	3	-	-	03
SEM-6	25CVHNR302L-A	Land Use and Land Cover Lab	-	2	-	-	-	-	-	25	-	25	-	1	-	01
SEM-7	25CVHNR401-A	GIS and Remote Sensing for Urban Planning	2	-	-	20	30	50	-	-	-	100	2	-	-	02
Total			14	8	0	100	150	250	75	25	0	600	14	4	0	18

Honors: Metro Construction

Semester	Course Code	Course Name	Hrs/Week			Examination Scheme and Marks							Credits			
			L	P	T	CCA	ISE	ESE	PR	OR	TW*	Total	L	P	T	Total
SEM-3	25CVHNR201-B	Surveying in Metro construction	3	-	-	20	30	50	-	-	-	100	3	-	-	03
SEM-3	25CVHNR201L-B	Surveying in Metro Construction Lab	-	2	-	-	-	-	25	-	-	25	-	1	-	01
SEM-4	25CVHNR202-B	Planning and Quantity estimation for metro construction	3	-	-	20	30	50	-	-	-	100	3	-	-	03
SEM-4	25CVHNR202L-B	Planning and Quantity estimation for metro construction Lab	-	2	-	-	-	-	25	-	-	25	-	1	-	01
SEM-5	25CVHNR301-B	Work Method Statement Making	3	-	-	20	30	50	-	-	-	100	3	-	-	03
SEM-5	25CVHNR301L-B	Work Method Statement Making Lab	-	2	-	-	-	-	25	-	-	25	-	1	-	01
SEM-6	25CVHNR302-B	Tunnel Engineering	3	-	-	20	30	50	-	-	-	100	3	-	-	03
SEM-6	25CVHNR302L-B	Tunnel Engineering Lab	-	2	-	-	-	-	-	25	-	25	-	1	-	01
SEM-7	25CVHNR401-B	Advanced Metro Construction and Smart Transit Systems	2	-	-	20	30	50	-	-	-	100	2	-	-	02
Total			14	8	0	100	150	250	75	25	0	600	14	4	0	18

Double Minors offered by Each Department

Offering Department	Double Minor Offered	Sem-3	Sem-4	Sem-5	Sem-6	Sem-7
AI & ML Engineering	Blockchain Technology	Fundamentals of Blockchain Technology	Smart Contracts and Decentralized Applications	Blockchain Security and Cryptography	Decentralized AI and Web3 Technologies	Blockchain Applications and Emerging Trends
Chemical Engineering	Environmental Engineering	Air Pollution Control	Wastewater Treatment	Solid Waste Management	Climate Change and Sustainability	Mini Project
	Energy Engineering	Introduction of Energy	Bio-energy	Electrochemical Energy	Hydrogen Fuel	Mini Project
Civil Engineering	Infrastructure Engineering	Introduction to Infrastructure Engineering	Fundamentals of Infrastructure Engineering	Smart Transportation & Urban Infrastructure	Sustainable Resilient Infrastructure Systems	Emerging Technologies in Infrastructure Engineering
Computer Engineering	Cybersecurity Engineering	Introduction to Cybersecurity	Cryptography and Network Security	Ethical Hacking	Digital Forensics	Cryptography and Data Protection
Electrical Engineering	Renewable Energy systems	Renewable Energy Sources for Sustainable Development	Solar Photovoltaic Systems	Wind Energy Conversion Systems	Power Electronics and Control for RES	Renewable Energy: Policies, Planning & Audit
E&TC Engineering	Communication Engineering	Analog Communication	Digital Communication	Cellular Networks	Mobile Computing	Optical & Microwave Communication
VLSI D&T Engineering	Semiconductor IC Design	Digital Electronics	System Design using Verilog	Digital CMOS Design	Analog CMOS Design	AI for VLSI
Mechanical Engineering	Mechanical Systems Engineering	Fundamentals of Manufacturing	Fundamentals of Engineering metallurgy	Fundamentals of Thermal Engineering	Fundamentals of Machine Design	Sustainable and Solar Engineering
Mechanical Sandwich Engineering	Mechanical Systems Engineering	Fundamentals of Manufacturing	Fundamentals of Engineering metallurgy	Fundamentals of Thermal Engineering	Fundamentals of Machine Design	Sustainable and Solar Engineering
R&A Engineering	Robotics and Automation	Fundamentals of Robotics and Automation	Programming for Robotics	Sensors and Actuators in Robotic Systems	Introduction to Robot Kinematics	Robot Simulation and Application

Double Minor: Infrastructure Engineering

Semester	Course Code	Course Name	Hrs/Week			Examination Scheme and Marks							Credits			
			L	P	T	CCA	ISE	ESE	PR	OR	TW*	Total	L	P	T	Total
SEM-3	25CVMNR201	Introduction to Infrastructure Engineering	3	-	-	20	30	50	-	-	-	100	3	-	-	03
SEM-3	25CVMNR201L	Engineering Survey & Infrastructure Mapping Lab	-	2	-	-	-	-	25	-	-	25	-	1	-	01
SEM-4	25CVMNR202	Fundamentals of Infrastructure Engineering	3	-	-	20	30	50	-	-	-	100	3	-	-	03
SEM-4	25CVMNR202L	Infrastructure Survey & GIS Lab	-	2	-	-	-	-	25	-	-	25	-	1	-	01
SEM-5	25CVMNR301	Smart Transportation & Urban Infrastructure	3	-	-	20	30	50	-	-	-	100	3	-	-	03
SEM-5	25CVMNR301L	Transportation Planning & Simulation Lab	-	2	-	-	-	-	25	-	-	25	-	1	-	01
SEM-6	25CVMNR302	Sustainable & Resilient Infrastructure Systems	3	-	-	20	30	50	-	-	-	100	3	-	-	03
SEM-6	25CVMNR302L	Sustainability Assessment & Infrastructure Modeling Lab	-	2	-	-	-	-	-	25	-	25	-	1	-	01
SEM-7	25CVMNR401	Emerging Technologies in Infrastructure Engineering	2	-	-	20	30	50	-	-	-	100	2	-	-	02
Total			14	8	0	100	150	250	75	25	0	600	14	4	0	18

S.Y. B. Tech. Civil (2025 Pattern)
Curriculum Structure: Semester III

Course Category	Course Code	Course Name	Hrs/Week			Examination Scheme and Marks							Credits			
			L	P	T	CCA	ISE	ESE	PR	OR	TW*	Total	L	P	T	Total
Program Core Course	25CVPCC201	Mechanics of Materials	3	-	-	20	30	50	-	-	-	100	3	-	-	03
	25CVPCC202	Fluid Mechanics	3	-	-	20	30	50	-	-	-	100	3	-	-	03
	25CVPCC203	Building Planning and Construction	3	-	-	20	30	50	-	-	-	100	3	-	-	03
Multidisciplinary Minor	25COMDM201A	Multidisciplinary Minor-I	2	-	-	20	30	50	-	-	-	100	2	-	-	02
Open Elective Course	25OEC201	Open Elective Course-I	2	-	-	20	30	50	-	-	-	100	2	-	-	02
Program Core Course Lab	25CVPCC201L-A	Mechanics of Materials	-	2	-	-	-	-	-	25	-	25	-	1	-	01
Program Core Course Lab	25CVPCC202L	Fluid Mechanics	-	2	-	-	-	-	-	25	-	25	-	1	-	01
Program Core Course Lab	25CVPCC203L	Building Planning and Construction	-	2	-	-	-	-	-	-	25	25	-	1	-	01
Vocational and Skill Enhancement Course	25CVVSE201	Vocational and Skill Enhancement Course-I	-	2	-	-	-	-	-	25	-	25	-	1	-	01
Entrepreneurship/Economics/Management Courses	25HSM201	Entrepreneurship/Economics/Management Course-I	-	-	2	-	-	-	-	-	50	50	-	-	2	02
Value Education Course	25VEC201	Universal Human Values	-	-	2	-	-	-	-	-	50	50	-	-	2	02
Community Engagement Project	25CVELC201	Community Engagement Project	-	2	-	-	-	-	-	-	25	25	-	1	-	01
Total			13	10	04	100	150	250	0	75	150	725	13	05	04	22

L: Lecture, **P:** Practical, **T:** Tutorial, **CCA:** Continuous Comprehensive Assessment; **ISE:** In-semester Examination; **ESE:** End Semester Examination; **PR:** Practical Examination, **OR:** Oral Examination, **TW:** Term Work

Multidisciplinary Minor-I:

Sr. No.	Course Code	Course Name
1.	25COMDM201A	Introduction to Data Science

Open Elective-I

Sr. No.	Course Code	Course Name
1.	25OEC201A	Principles of Management and Organizational Behaviour
2.	25OEC201B	Circular Economy Sustainable Development
3.	25OEC201C	Start-up Management and Venture Creation
4.	25OEC201D	Health and Nutrition for Professionals
5.	25OEC201E	French Language Module-I
6.	25OEC201F	German Language Module-I
7.	25OEC201G	Japanese Language Module-I

Vocational and Skill Enhancement Course-I:

Sr. No.	Course Code	Course Name
1.	25CVVSE201	Computer-Aided Designing and Drawing

Entrepreneurship/Economics/Management Courses (HSSM)-I:

Sr. No.	Course Code	Course Name
1.	25HSM201A	Engineering Economics
2.	25HSM201B	Entrepreneurship Development and IPR
3.	25HSM201C	Project Management and Business Planning
4.	25HSM201D	Financial Management for Engineers

S.Y. B. Tech. Civil (2025 Pattern)

Curriculum Structure: Semester IV

Course Category	Course Code	Course Name	Hrs/Week			Examination Scheme and Marks							Credits			
			L	P	T	CCA	ISE	ESE	PR	OR	TW*	Total	L	P	T	Total
Program Core Course	25CVPCC204	Mathematical Methods for Civil Engineering	2	-	-	20	30	50	-	-	-	100	2	-	-	02
	25CVPCC205	Structural Analysis	2	-	1	20	30	50	-	-	25	125	2	-	1	03
	25CVPCC206	Surveying	2	-	-	20	30	50	-	-	-	100	2	-	-	02
	25CVPCC207	Hydrology & Water Resource Engineering	2	-	1	20	30	50	-	-	25	125	2	-	1	03
Multidisciplinary Minor	25COMDM202A	Multidisciplinary Minor-II	2	-	-	20	30	50	-	-	-	100	2	-	-	02
Open Elective Course	25OEC202	Open Elective Course-II	2	-	-	20	30	50	-	-	-	100	2	-	-	02
Program Core Course Lab	25CVPCC201L-B	Testing of Materials	-	2	-	-	-	-	-	25	-	25	-	1	-	01
Program Core Course Lab	25CVPCC206L	Surveying	-	2	-	-	-	-	25	-	-	25	-	1	-	01
Vocational and Skill Enhancement Course	25CVVSE202	Vocational and Skill Enhancement Course-II	-	2	-	-	-	-	-	25	-	25	-	1	-	01
Ability Enhancement Course	25AEC201	Modern Indian Language (MIL)	2	-	-	-	-	-	-	25	25	50	2	-	-	02
Entrepreneurship/Economics/Management Courses	25HSM202	Entrepreneurship/Economics/Management Course-II	-	-	2	-	-	-	-	-	50	50	-	-	2	02
Value Education Course	25VEC202	Indian constitution and governance	-	-	1	-	-	-	-	-	25	25	-	-	1	01
Total			14	6	5	120	180	300	25	75	150	850	14	3	5	22

L: Lecture, **P:** Practical, **T:** Tutorial, **CCA:** Continuous Comprehensive Assessment; **ISE:** In-semester Examination; **ESE:** End Semester Examination; **PR:** Practical Examination, **OR:** Oral Examination, **TW:** Term Work

Multidisciplinary Minor-II:

Sr. No.	Course Code	Course Name
1.	25COMDM202A	Programming and Data Wrangling

Open Elective-II:

Sr. No.	Course Code	Course Name
1.	25OEC202A	Leadership and Team Dynamics
2.	25OEC202B	Green Practices and ESG Frameworks
3.	25OEC202C	Innovation and Business Strategy
4.	25OEC202D	Stress Management and Mental Well-Being
5.	25OEC202E	French Language Module-II
6.	25OEC202F	German Language Module-II
7.	25OEC202G	Japanese Language Module-II

Vocational and Skill Enhancement Course-II:

Sr. No.	Course Code	Course Name
1.	25CVVSE202	Introduction to Civil Engineering Softwares

Entrepreneurship/Economics/Management Courses (HSSM)-II:

Sr. No.	Course Code	Course Name
1.	25HSM202A	Business Fundamentals for Entrepreneurs
2.	25HSM202B	Entrepreneurship and Start-ups
3.	25HSM202C	Fundamentals of Accounting and Finance
4.	25HSM202D	Business Intelligence and Analytics

Modern Indian Language (MIL):

Sr. No.	Course Code	Course Name
1.	25AEC201A	Marathi
2.	25AEC201B	Sanskrit

Course: Mechanics of Materials			Code: 25CVPCC201	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Lecture	03	03	CCA	20
			ISE	30
			ESE	50

- **Prerequisites:** Engineering Mechanics, Engineering Mathematics I and II, Engineering Physics, Building material, Construction Technology.

- **Course Objectives:** This course aims at enabling students,

1. To analyse simple stresses and strains and behavior of the material, elastic constant and their relations, thermal stresses in homogenous and composite material.
2. To construct and interpret of shear force, bending moment diagrams, loading diagram, slope and deflection in beams.
3. To Understand bending and shear stresses due to bending in beams.
4. To understand concrete fundamentals and apply mix design principles as per IS codes
5. To understand durability and sustainability in concrete, and explore advanced and special concretes.

- **Course Outcomes:** At the end of the course, students will be able to:

1. Understand stress-strain concept and materials behavior.
2. Analyze the determinant beams in terms of SFD, BMD, slope and deflection in determinant beams.
3. Evaluate bending stress, shear stress and torsional stress on the beam.
4. Analyze concrete ingredients and design concrete mixes as per IS 10262 guidelines.
5. Analyze concrete durability and evaluate modern developments in advanced concrete.

- **Course Contents:**

Unit I	Simple Stress and Strain	08 Hours
Simple Stresses & Strains: Concepts, Types, Stress-Strain Diagram (elastic, plastic, brittle materials), Concept of axial stresses (compression, tension), strains (linear, lateral, shear, volumetric), Elastic constants and their relations, Concept of axial rigidity and flexural rigidity, Stresses and strains due to change in temperature, deformations for homogeneous and composite sections under concentrated loads and temperature changes.		
Unit II	Shear Force, Bending Moment, Slope and deflection in Beams	10 Hours
Concept of shear force and bending moment diagram, Relationship between shear force, bending moment, and intensity of loading, Point of Contra Flexure, Shear force and bending moment diagrams for determinate beams under different loadings (concentrated, uniformly distributed, uniformly varying loads, and moment), development of loading diagram from the given SFD. Slope and deflection of determinate beams by Double integration method (Macaulay's method). Standard formulae for slope and deflection of the determinant beams for different type of loading (Point load, UDL, UVL, and moment).		
Unit III	Bending stresses, Shear Stresses, torsional stresses.	10 Hours
Bending Stresses in Beams: Theory of pure bending, Assumptions, Derivation of flexure formula, Bending stress distribution diagrams of beams for different loading case. Shear Stresses due to bending in Beams: Concept of shear, derivation of shear stress formula, Shear stress distribution for various cross-sections, maximum and average shear stress for circular and rectangular sections.		

Torsion of Circular Shafts: Theory of torsion, assumptions, derivation of torsion formula, Stresses and deformations in the shafts of solid and hollow sections under twisting moments. Principal Stresses and Strains: Concept of principal planes and principal stresses, Normal and shear stresses on an oblique plane, magnitude and orientation of principal stresses, maximum shear stress.		
Unit IV	Concrete Materials, Properties and Mix Design	06 Hours
Introduction to concrete and its importance. Cement: composition, hydration, and properties of cement. Aggregates: Types, properties. Water: Quality requirements and its role. Admixtures: Types, functions, and modern admixtures. Principles of mix design. Batching, mixing, transportation, placement, compaction, curing. IS 10262 method of concrete mix design for different grades of concrete.		
Unit V	Concrete Durability and Modern Materials	06 Hours
Importance of durability of concrete, Causes and mechanisms of deterioration, Sulphate attack, Chloride ingress, Alkali-silica reaction, Corrosion of reinforcement, Permeability, Porosity, High performance concrete, Self-compacting concrete, Fiber reinforced concrete, Lightweight concrete.		

Continuous Comprehensive Assessment (Any Two)		20 marks
CCA1	List of Course Activity (Unit 1,2 and 3)	10 marks
	Application Based Course Activities (any one) 1. Model Making - Prepare the model which shows different types of support system (material requirement wood, metal and plastic) 2. Beam Analysis - Analysis of beam using FEM based software or Excel sheet. 3. SFD, BMD and Deflection diagram - Chart preparation for the SFD , BMD and Deflection formulas for standard loading cases on simply supported beam	
CCA2	Case Study (any one) (Unit 4 and 5)	10 marks
	1. High-Performance Concrete in Infrastructure Projects - Study the use of High-Performance Concrete in bridges, metro projects, or high-rise buildings and evaluate its benefits and performance. 2. Sustainable and Green Concrete - Analyse the use of supplementary cementitious materials such as fly ash, GGBS, silica fume, and recycled aggregates in sustainable concrete construction. 3. Failure of Concrete Structures - Investigate a case of deterioration or failure of a concrete structure and identify the causes, effects, and remedial measures adopted. 4. Self-Compacting Concrete Applications - Study a construction project where Self-Compacting Concrete has been used and evaluate its advantages, limitations, and performance.	
CCA 3	Seminar	10 marks
	Any topic from unit 1 to 5	

Textbooks:

1. Strength of Materials by R. Subramanian, Oxford University Press, 4th Edition, 2012.

2. Strength of Materials by S. S. Ratan, Tata McGraw Hill. 2nd Edition, 2011.
3. Properties of Concrete - M. Neville
4. Concrete Technology - M. L. Gambhir

● **Reference Books:**

1. Elements of Strength of Materials by Timoshenko and Young, East-West Press Ltd. 5th Edition, 2013.
2. Mechanics of Materials by Beer and Johnston, McGraw Hill Publication. 7th Edition, 2017
3. Strength of Materials by F.L. Singer and Andrew Pytel, Harper and Row Publication.
4. Mechanics of Materials by Gere & Timoshenko, CBC publisher. 8th Edition, 2013
5. Introduction to Mechanics of Solids by E.P. Popov, Prantice Hall Publication. 2nd Edition, 2011
6. Elementary Structural Analysis by Norris, Wilbur and Utku, Tata McGraw Hill Publisher.
7. Concrete Technology – M. S. Shetty
8. Concrete Mix Design – A. P. Remedios

● **MOOC / NPTEL Courses:**

1. Strength of Material – IITM (https://onlinecourses.nptel.ac.in/noc23_me140/preview)
2. Advanced Concrete Technology – NPTEL - <https://nptel.ac.in/courses/105106176>
3. Design of Concrete Structures – NPTEL - <https://nptel.ac.in/courses/105105104>
4. Concrete Technology – NPTEL, IIT Delhi - <https://nptel.ac.in/courses/105102012>

Course: Fluid Mechanics			Code: 25CVPCC202	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Lecture	03	03	CCA	20
			ISE	30
			ESE	50

- **Prerequisites:** Engineering Mathematics and Engineering Mechanics

- **Course Objectives:** This course aims at enabling students,
 1. To study fluid properties, fluid statics.
 2. To study fluid Dynamics
 3. To study Flow Through Pipes and Boundary layer
 4. To study Hydraulic Turbines and Centrifugal Pumps.
 5. To study open channel flow with reference to energy-depth relationship and uniform flow

- **Course Outcomes:** At the end of the course, students will be able to:
 1. Understand fluid properties and concepts of fluid statics and solve problems based on practical applications.
 2. Understand fundamentals of fluid dynamics and apply it to solve fluid flow problems.
 3. Solve pipe flow problems.
 4. Design pump and turbine
 5. Apply the knowledge of uniform flow and depth-energy to solve problems on open channel flow

- **Course Contents:**

Unit I	Properties of Fluids and Fluid Statics	08 Hrs
Properties of fluids: basic definitions - fluid, fluid mechanics, ideal fluids, real fluids, mass density, specific weight, specific volume, specific gravity; viscosity- dynamic and kinematic, classification of fluids based on newton's law of viscosity (rheological diagram), surface tension, capillarity, vapour pressure, compressibility and elasticity. Fluid statics: pressure and its measurement, fluid pressure at a point, pascal's law, hydrostatic law; concept of atmospheric, absolute, gauge and negative pressure; pressure measuring devices. Total pressure, intensity of pressure, center of pressure. Pressure on horizontal, vertical, inclined and curved surfaces.		
Unit II	Fluid Dynamics	08 Hrs
Forces acting on fluid mass in motion, Euler's equation of motion along a streamline and its integration to get Bernoulli's equation and its limitations, Modified Bernoulli's equation, concept of HGL and TEL, Application of Bernoulli's equation: Venturi meter, Orifice meter, Rota-meter and Pitot tube. Eulerian and Lagrangian approach, velocity and acceleration, and their components in Cartesian co-ordinates, Classification of flows, streamline, stream tube, path line, streak line, control volume. Equation of continuity for 3-D flow in Cartesian coordinates, components of rotation, velocity potential, stream function, flow net and its use.		
Unit III	Flow Through Pipes and Boundary layer	08 Hrs
Characteristics of laminar flow, laminar flow through a circular pipe: Hagen Poiseuille equation, HazenWilliams formula. Characteristics of turbulent flow, Darcy-Weisbach Equation, Moody's diagram, Major and minor losses of energy in pipes, flow through pipes in simple and compound pipe, pipes in series, parallel, Dupit's equation, Introduction to pipe network and design: Hardy cross method. Introduction of Boundry layer: Ideal and real fluids, Boundary-Layer concept, Laminar boundary layer,		

turbulent boundary layer, Separation of boundary layer		
Unit IV	Hydraulic Turbines and Centrifugal Pumps	08 Hours
Classification of turbines Pelton wheel turbine: component parts and its working, work done and efficiencies, working proportions, design, multiple jet Pelton wheel (introduction). Francis turbine: component parts and its working, work done and efficiencies, working proportions. Component parts, working, types of centrifugal pumps, work done by impeller, head of pump, losses and efficiencies.		
Unit V	Open Channel Flow and Fluid flow around submerged objects	08 Hours
Introduction to Open channel flow: Classification of channels, channel flows and geometric elements of channel, Velocity distribution in open channel flow and hydraulic jump. Uniform flow in open channels: Uniform flow formulae: Chezy's and Manning's formulae; Factors affecting Manning's roughness coefficient. Most efficient channel sections: rectangular, trapezoidal. Depth-Energy Relationships in Open Channel Flow: Specific energy and Specific force diagram, Depth discharge Diagram, Critical depth, Conditions for occurrence of critical flow; Froude's number, flow classification based on it, Introduction to channel transition. Introduction on Fluid flow around submerged objects		

Continuous Comprehensive Assessment (Any Two)		20 marks
CCA1	List of Course Activity	10 marks
	Application Based Course Activities (any one) 1) Fluid Properties and Hydrostatic Force Analysis - Measure viscosity, specific gravity, and surface tension of given fluid samples using simple instruments. 2) Pipe Flow Analysis and Network Design - Analyze a given pipe system — compute major and minor head losses using Darcy-Weisbach equation and determine friction factor from Moody's diagram. 3) Design and Performance Analysis of Hydraulic Machinery - Study the component parts, working principle, and velocity triangles of a Pelton wheel turbine or Francis turbine with neat labelled diagrams.	
CCA2	Poster & Infographic	10 marks
	List of Poster & Infographic topics (any one) 1) Total pressure & centre of pressure on a submerged surface Explain hydrostatic pressure distribution, total pressure force, and location of centre of pressure on vertical / inclined plane. Include a numerical on a rectangular gate submerged in water. 2) Bernoulli's equation & Venturi meter Illustrate Bernoulli's theorem with HGL & TEL diagram. Show how a Venturi meter uses this principle for flow measurement. Include a numerical computing discharge for given differential head and Cd 3) Major & minor losses in pipe flow + Moody's diagram Show types of head losses in a pipe system with diagrams. Explain Darcy-Weisbach equation. Show how Moody's diagram is used to find friction factor. Include a numerical computing head loss for a given pipe system. 4) Centrifugal pump — working, components & efficiency Draw and label all components of a centrifugal pump. Explain working principle, work done by impeller, and types of efficiencies. Include a	

	numerical computing manometric head and manometric efficiency for given impeller data. 5) Specific energy diagram, critical depth & hydraulic jump Draw the specific energy vs depth curve. Mark critical depth, subcritical and supercritical zones. Explain hydraulic jump with a neat sketch showing depths before and after jump. Include a numerical computing critical depth and specific energy for a rectangular channel.	
CCA 3	Short Mini Project	10 marks
	Apply theoretical concepts of fluid mechanics to a real-world or design-based problem through independent study and analysis.	
● Textbooks: 1. A Text Book on Fluid Mechanics and Hydraulic Machines by Dr. R. K. Bansal Pub: Laxmi Publications (P),Ltd. New Delhi 2. A Text Book of Fluid Mechanics and Hydraulic Machines- by Dr. R K Rajput Pub: S Chand and Co Ltd. New Delhi 3. A Text Book on Fluid Mechanics and Hydraulic Machines by Sukumar Pati Pub: McGraw Hill, New Delhi		
● Reference Books: 1. Hydraulics and Fluid Mechanics including Hydraulic Machine by Dr P. N. Modi & S. M. Seth Pub: Standard book house, Delhi 2. Flow in Open Channels by K Subramanya, Tata McGraw Hill, New Delhi 3. Engineering Fluid Mechanics by R. J. Garde and A. J. Mirajgaonkar, SCITECH Publications (India) Pvt. Ltd, Chennai 4. Fluid Mechanics and its Applications, Vijay Gupta, Santosh K Gupta, New Age international pvt. Ltd, New Delhi, 5. Fluid Mechanics, Fundamentals and applications by Yunus. A Cengel and John. M Cimbala, McGraw Hill International, New Delhi. 6. Fluid Mechanics by Streeter, Wylie and Bedford, McGraw Hill International, New Delhi. 7. Open Channel Hydraulics by Ven Tee Chow, McGraw- Hill Book Company- Koga		
● MOOC / NPTEL Courses: 1. Fluid Mechanics https://nptel.ac.in/courses/112105171 2. NOC: Fluid Mechanics, IIT Guwahati https://nptel.ac.in/courses/105103192 3. Fluid Flow Operations https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_ch25 4. Surface and Ground Water Resources https://nptel.ac.in/courses/105105110 5. Fluid Machines https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_me55		

Course: Building Planning and Construction			Code: 25CVPCC203	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Lecture	03	03	CCA	20
			ISE	30
			ESE	50

Prerequisites: Basic knowledge of engineering drawing and graphical representation of buildings, Fundamental understanding of construction materials and their basic properties.

- **Course Objectives:** This course aims at enabling students,
 1. Explain the principles of building planning, building classification, and bye-laws for preparing functional building layouts.
 2. Examine the properties and performance of various building materials for appropriate construction use.
 3. Select suitable foundation systems and masonry techniques based on soil and structural requirements.
 4. Apply knowledge of superstructure components and construction practices in building design and execution.
 5. Evaluate building services and sustainable construction methods for effective building performance.

- **Course Outcomes:** At the end of the course, students will be able to:
 1. Explain building components, planning principles, and bye-laws for various building types.
 2. Identify and select suitable construction materials based on their properties and applications.
 3. Analyze foundation systems and masonry construction methods for structural stability.
 4. Apply knowledge of superstructure components and construction techniques in building design.
 5. Interpret building drawings and evaluate building services and sustainable practices.

● **Course Contents:**

Unit I	Building Planning and Functional Requirements	08 Hours
Definition and classification of buildings as per National Building Code, Principles of planning: aspect, prospect, orientation, privacy, grouping, circulation, roominess, sanitation, economy, Selection of site for building construction and site layout, Building bye-laws, regulations, setbacks, plot coverage, Floor Space Index (FSI), Transferable Development Rights (TDR), Norms for Ventilation, Lighting, Vertical Circulation, Sanitation, Green building concepts and sustainability considerations, Planning of residential buildings and functional requirements of various rooms.		
Unit II	Building Materials Used in Construction	08 Hours
Stones, bricks, tiles and timber – properties, classification, testing and uses, Cement, aggregates, concrete and steel – characteristics and applications, Paints, varnishes, distempers, glass, plastics, Plumbing Materials, Sanitary Wares, rubber and insulating materials, Composite and modern construction materials		
Unit III	Foundations and Masonry Construction	08 Hours
Functional requirements and classification of foundations, Types of shallow and deep foundations, Soil characteristics affecting foundation selection, Brick masonry and stone masonry – types, bonds and construction procedure, Arches and lintels – types and uses.		
Unit IV	Superstructure Components and Construction Techniques	08 Hours
Floors and flooring types, materials and construction, Roofs – flat and pitched roofs, roofing materials and coverings, Doors, windows and ventilators – types and functions, Staircases – requirements, types and planning, Formwork, scaffolding, shoring and underpinning techniques		

Unit V	Building Services, Planning Drawings and Modern Practices	08 Hours
Preparation of line plans, layout drawings and submission drawings, Water supply, sanitation, ventilation and lighting in buildings, Electrical fittings, thermal and sound insulation, Low-cost housing, repairs and rehabilitation, Introduction to sustainable construction practices, 3D printing in buildings, Automation in the Construction Sector, Modular Construction		

Continuous Comprehensive Assessment (Any Two)		20 marks
CCA1	List of Course Activity	10 marks
	Application Based Course Activities (any one) 1. Residential Building Planning and Layout Design - Prepare a line plan for a residential building on a given plot considering planning principles, setbacks, ventilation, lighting, and NBC provisions. 2. Building Materials Identification and Evaluation - Study conventional and modern building materials (bricks, AAC blocks, fly ash bricks, steel, timber, glass, composites) and prepare a comparative report on their properties, applications, and sustainability aspects. 3. Foundation Selection for Building Construction - Analyze soil conditions of a given site and recommend suitable shallow or deep foundation systems with justification. 4. Building Component Planning Project - Design and prepare drawings of staircases, doors, windows, ventilators, and roofing systems for a residential or public building.	
CCA2	Case Study	10 marks
	List of Case Studies 1. Green Building Certification Systems - Study GRIHA, LEED, or IGBC-certified buildings and evaluate sustainable features adopted. 2. Low-Cost Housing Technologies - Analyze innovative construction methods and materials used in affordable housing projects. 3. Modern Foundation Systems in High-Rise Buildings - Study the foundation systems adopted in a selected multistorey building project.	
CCA 3	Seminar	10 marks
	Any topic from unit 1 to 5	

● **Textbooks:**

1. Building Planning and Drawing – M.G. Shah, C.M. Kale & S.Y. Patki
2. Building Construction – S.P. Arora & S.P. Bindra
3. Building Construction – S.C. Rangwala
4. National Building Code of India 2016 – BIS

● **Reference Books:**

1. Arora and Bindra's Textbook of Building Construction

2. Building Materials – S.C. Rangwala
3. Building Construction Illustrated – Francis D.K. Ching
4. Sustainable Construction – Charles J. Kibert
5. Modern Construction Management – Harris & McCaffer

● **MOOC / NPTEL Courses:**

1. Building Materials and Construction - <https://nptel.ac.in/courses/105102088>
2. Principles and Applications of Building Science- https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_ar22
3. Basic construction materials- https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_ce07
4. Construction Methods And Equipment Management- https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_ce11
5. Sustainable Materials and Green Buildings- https://onlinecourses.nptel.ac.in/e-learning/preview/noc19_ce40

Course: Introduction to Data Science			Code: 25COMDM201A	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50

- **Prerequisites:** Basic knowledge of mathematics (mean, graphs, simple calculations), Basic understanding of civil engineering subjects (surveying, materials, etc.), Basic computer skills (Excel, file handling)

- **Course Objectives:** This course aims at enabling students to,
 1. Introduce students to the basic concepts of Data Science and its importance in civil engineering
 2. Develop understanding of data collection, cleaning, and visualization techniques
 3. Apply basic statistical methods for analyzing civil engineering data
 4. Provide an introduction to machine learning concepts and real-life applications in civil engineering

- **Course Outcomes:** At the end of the course, students will be able to:
 1. Understand basic concepts of data science and identify its applications in civil engineering
 2. Collect, clean, and organize data from different civil engineering sources
 3. Analyze data using basic statistical methods and interpret results
 4. Apply basic data visualization techniques to represent engineering data
 5. Explain fundamental concepts of machine learning and their applications in civil engineering

- **Course Contents:**

Unit I	Basics of Data Science and Civil Engineering Applications	08 Hours
Introduction to Data Science: meaning, importance, lifecycle, Types of data: structured and unstructured, Data sources in civil engineering (survey data, traffic data, environmental data, etc.), Role of data in decision-making in civil projects, Introduction to tools: Excel / basic Python, Case studies in civil engineering (smart cities, traffic management, water resources).		
Unit II	Data Collection, Cleaning, and Visualization	08 Hours
Methods of data collection (sensors, surveys, GIS, remote sensing), Data preprocessing: handling missing data, errors, outliers, Data organization and storage (tables, CSV files), Basic data visualization: charts, graphs, dashboards, Tools: Excel / Python (Pandas, Matplotlib – basic concepts), Interpretation of graphs for civil engineering problems.		
Unit III	Basic Data Analysis and Statistics	08 Hours
Descriptive statistics: mean, median, mode, standard deviation, Correlation and basic relationships between variables, Introduction to probability concepts, Simple regression analysis (linear regression), Applications in civil engineering (rainfall analysis, traffic flow, material testing data).		
Unit IV	Introduction to Machine Learning and Applications	08 Hours
Basics of Machine Learning: concept and types (supervised, unsupervised), Simple models: classification and regression, Introduction to tools (Python / simple ML platforms), Applications in civil engineering: Traffic prediction, Structural health monitoring, Construction cost estimation, Environmental data analysis		

Continuous Comprehensive Assessment (Any Two)	20 marks
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CCA1	Application-Based Activity / Mini Project	10 marks
	Any One of the Following: 1. Traffic Data Analysis • Collect traffic volume data at a nearby intersection. • Organize data in Excel. • Prepare graphs and identify peak-hour traffic trends. 2. Rainfall Data Analysis • Obtain rainfall data from IMD or local sources. • Calculate mean, median, mode, and standard deviation. • Interpret rainfall trends using charts. 3. Construction Material Testing Data Analysis • Analyze compressive strength data of concrete cubes. • Plot graphs and identify variation in strength. 4. Water Consumption Survey • Collect water usage data from households. • Organize and visualize data using Excel dashboards. 5. Campus Infrastructure Data Study • Analyze data related to parking, energy consumption, or waste generation. • Present findings using charts and dashboards.	
CCA2	Case Study	10 marks
	List of Case Studies • Data Science Applications in Smart Cities • Traffic Management using Data Analytics • Machine Learning in Structural Health Monitoring • Flood Prediction using Data Analytics • Data-Driven Water Resource Management • AI Applications in Construction Management • Building Information Modeling (BIM) and Data Analytics • Environmental Monitoring using Sensors and Data Science • Predictive Maintenance of Civil Infrastructure	
CCA 3	Seminar	10 marks
	Any topic from unit 1 to 4	

● **Textbooks:**

1. Data Science for Civil Engineering: A Beginner's Guide –Rakesh K. Jain, P. S. Dhotre, D. T. Mane, P. N. MahalleM. Neville – Properties of Concrete
2. Machine Learning for Civil and Environmental Engineers – M. Z. Naser

● **Reference Books:**

1. Data Science for Business
2. Python for Data Analysis
3. Introduction to Machine Learning with Python
4. Statistics for Engineers and Scientists

● **MOOC / NPTEL Courses:**

1. Data Science for Engineers - https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_cs69
2. Python for Data Science - https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_cs32

3. Foundation of Data Science - https://onlinecourses.swayam2.ac.in/e-learning/preview/imb23_mg64
4. Introduction to Machine Learning - <https://nptel.ac.in/courses/106105152>

Course: Principles of Management and Organizational Behaviour			Code: 25OEC201A	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50

Prerequisites:

- Basic knowledge of Engineering Mathematics
- Fundamentals of Economics and Accounting
- Analytical and quantitative reasoning skills

Course Objectives: The objectives of the course are -

1. To introduce the fundamental concepts, functions, and theories of management.
2. To develop an understanding of organizational behavior and individual dynamics at the workplace.
3. Evaluate leadership styles, communication processes, and team dynamics.
4. Apply decision-making, planning, organizing, and controlling techniques in practical scenarios.
5. Assess organizational culture, change management processes, and conflict resolution strategies.

Course Outcomes: At the end of the course, students will be able to:

- CO1: Explain core management functions and classical as well as modern management theories.
 CO2: Analyze individual behavior, personality, perception, and motivation in organizational settings.
 CO3: Apply capital budgeting methods for evaluating engineering investment decisions.
 CO4: Evaluate cost of capital and capital structure decisions.
 CO5: Apply working capital and financial planning concepts for engineering projects.

● Course Contents:

Unit I	Introduction to Management	6 Hours
Definition and nature of management; functions of management (planning, organizing, staffing, directing, controlling); levels of management; managerial roles and skills; evolution of management thought (classical, behavioural, modern approaches); principles of management		
Unit II	Planning and Organizing	6 Hours
Planning process; types of plans; decision-making process and techniques; organizing principles; organizational structure (line, functional, matrix); delegation, authority, and responsibility; centralization and decentralization.		
Unit III	Individual Behavior in Organizations	6 Hours
Foundations of organizational behavior; personality and attitudes; perception and attribution; learning theories; motivation theories (Maslow, Herzberg, McGregor, etc.); job satisfaction and employee engagement.		
Unit IV	Group Behavior and Leadership	6 Hours
Group dynamics; team development; communication process and barriers; leadership theories and styles; power and politics; conflict management; negotiation techniques; organizational culture.		
Unit V	Organizational Change and Development	6 Hours

Organizational change and resistance to change; change management models; organizational development; stress management; ethics and corporate social responsibility; contemporary issues in management; digital transformation and innovation in organizations

List of Course Activities for Continuous Comprehensive Assessment (Any Two):

1. **Case Study Analysis**
Students analyze a real organizational problem related to planning, leadership, motivation, or change management and present solutions.
2. **Group Discussion & Presentation**
Teams discuss management topics such as leadership styles, organizational culture, or conflict management and deliver presentations.
3. **Role Play / Management Simulation**
Students perform role plays on manager–employee communication, negotiation, decision-making, or team management scenarios.
4. **Mini Project on Organizational Study**
Students visit or study an organization/startup and prepare a report on management practices, hierarchy, communication, and work culture.
5. **Hands-on Activity using Planning & Decision Tools**
Students prepare organizational charts, decision trees, SWOT analysis, project planning schedules, or management process flowcharts using practical examples.

● **Textbooks:**

1. Robbins, S. P. & Coulter, M., Management, Pearson Education.
2. L. M. Prasad, Principles and Practice of Management, Sultan Chand & Sons.

● **Reference Books:**

1. Robbins, S. P. & Judge, T. A., Organizational Behavior, Pearson Education.
2. Koontz, H. & Weihrich, H., Essentials of Management, McGraw Hill.
3. K. Aswathappa, Organizational Behavior, Himalaya Publishing House.
4. Harold Koontz & Cyril O'Donnell, Principles of Management, McGraw Hill.
5. P. Subba Rao, Management and Organizational Behavior, Himalaya Publishing House.

● **NPTEL/MOOCs:**

1. NPTEL course on Principles of Management by Prof. Susmita Mukhopadhyay, Prof. S. Srinivasan, IIT Kharagpur: https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_mg88
2. NPTEL course on Organizational Behaviour by Prof. M. P. Ganesh, IIT Hyderabad: https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_mg51

Course: Circular Economy for Sustainable Development			Code: 25OEC201B	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50

● **Prerequisites:** Entrepreneurship, market survey, innovation

● **Course Objectives:** The objectives of the course are

1. Understand the fundamental principles of circular economy, sustainability, environmental systems, and resource cycles.
2. Apply sustainable development goals (SDGs), life-cycle thinking, and circular economy models in real-world contexts.
3. Develop the ability to assess materials, energy, and waste flows in businesses and communities to optimize resource use and reduce environmental impact.
4. Examine environmental governance, global sustainability policies, and circular strategies for industry and society.
5. Foster creative and practical solutions for sustainable consumption, production, and cleaner technologies.

● **Course Outcomes:** After successful completion course, students will be able to:

- CO1: Explain the fundamental principles of circular economy and sustainable development, and differentiate between linear and circular economic systems.
- CO2: Analyse global environmental challenges and evaluate the role of Sustainable Development Goals (SDGs) in addressing sustainability issues.
- CO3: Apply life cycle thinking, material flow analysis, and resource efficiency tools to assess environmental impacts of products and processes.
- CO4: Design and evaluate circular business models incorporating strategies such as reuse, recycling, remanufacturing, and extended producer responsibility.
- CO5: Assess sustainability policies, governance mechanisms, and technological interventions to propose practical solutions for sustainable development.

● **Course Contents:**

Unit I	Fundamentals of Circular Economy and Sustainable Development	6 Hours
Concept of sustainable development; evolution of sustainability; environmental, social and economic dimensions (Triple Bottom Line); limitations of the linear economy (take-make-dispose model); principles of circular economy; relationship between circular economy and sustainability; planetary boundaries; ecological footprint; overview of global sustainability challenges; introduction to Sustainable Development Goals (SDGs) and their relevance to industry and society.		
Unit II	Resource Efficiency and Life Cycle Approaches	6 Hours
Resource scarcity and resource efficiency; material flow analysis (MFA); life cycle thinking; Life Cycle Assessment (LCA) methodology and stages (goal and scope definition, inventory analysis, impact assessment, interpretation); carbon footprint and water footprint; eco-efficiency and resource productivity indicators; waste hierarchy (reduce, reuse, recycle, recover); strategies for decoupling economic growth from resource consumption		
Unit III	Circular Business Models and Industrial Applications	6 Hours
Circular business model innovation; product life extension strategies; reuse, repair, refurbishment and remanufacturing; recycling technologies; product-as-a-service (PaaS); sharing economy; eco-design and design for environment (DFE); reverse logistics and closed-loop supply chains; Extended Producer Responsibility (EPR); industrial symbiosis; sustainable manufacturing practices.		

Unit IV	Policy, Governance and Sustainable Development Frameworks	6 Hours
Environmental governance and regulatory frameworks; national and international sustainability policies; climate change mitigation and adaptation strategies; green finance and sustainable investment; Environmental, Social and Governance (ESG) reporting; corporate social responsibility (CSR); sustainable procurement practices; role of government, private sector and civil society in promoting circular economy; global environmental agreements and initiatives		
Unit V	Tools, Technologies and Case Studies in Circular Economy	6 Hours
Emerging technologies enabling circular economy (IoT, Artificial Intelligence, blockchain for traceability); digitalization and smart resource management; sustainable supply chain management; urban circular systems and smart sustainable cities; waste-to-energy and waste-to-resource technologies; sectoral applications (manufacturing, agriculture, construction, energy); case studies of successful circular economy initiatives; challenges and future prospects of sustainable development.		
● List of Course Activities for Continuous Comprehensive Assessment (Any Two): 1. Waste Audit & Recycling Survey Students conduct a survey of waste generation in campus/home and suggest recycling or reuse strategies based on circular economy principles. 2. Life Cycle Assessment (LCA) Mini Study Analyze the life cycle of a product (plastic bottle, mobile phone, paper bag, etc.) and identify environmental impacts and sustainability improvements. 3. Case Study Presentation on Circular Economy Models Teams study companies practicing circular economy, green manufacturing, or sustainable business models and present findings. 4. Hands-on Eco-Design / Upcycling Activity Students create useful products from waste or redesign an existing product using eco-design and sustainability concepts. 5. Sustainability Policy & SDG Mapping Project Students map business/industrial activities with Sustainable Development Goals (SDGs) and prepare reports on sustainable practices.		
● Textbooks: 1. Kirchherr, J., Reike, D., & Hekkert, M. – Conceptualizing the Circular Economy: An overview (Journal/Book compendium) 2. Ellen MacArthur Foundation – Towards the Circular Economy (Vol. 1–3) 3. Pearce, D. & Turner, R. K. – Economics of Natural Resources and the Environment 4. Bruntland Commission Report – Our Common Future (UN document foundational to sustainability thought)		
● Reference Books: 1. Bocken, N. M. P., et al. – Product Design and Business Model Strategies for a Circular Economy 2. Geissdoerfer, M., et al. – The Circular Economy: A Critical Literature Review 3. McDonough, W. & Braungart, M. – Cradle to Cradle: Remaking the Way We Make Things 4. UNEP / UN Documents – Global Environmental Outlook Reports 5. Geyer, R., et al. – Industrial Ecology and Circularity		
● MOOC / NPTEL Courses: 1. Coursera : Sustainability and Circular Economy, Michael J. Readey, University of Colorado Boulder https://www.coursera.org/learn/sustainability-and-the-circular-economy 2. NPTEL2, Environment and Development, Prof. By Prof. Ngamjahao Kipgen, IIT Guwahati https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_hs83 3. NPTEL3, Education for Sustainable Development, By Prof. Atasi Mohanty, IIT Kharagpur		

https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_hs61

4. NPTEL4, Environmental Planning and Management, By Prof. Sonal K. Thengane, IIT Roorkee

https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_ge08

5. NPTEL5, Corporate social responsibility By Prof. Aradhna Malik, IIT Kharagpur

https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_mg54

Course: Start-up Management & Venture Creation			Code: 25OEC201C	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50

● **Prerequisites:** Entrepreneurship, market survey, innovation

● **Course Objectives:** The objectives of the course are

1. Understand the fundamentals of startup management and venture creation.
2. Develop the ability to identify, evaluate, and validate startup ideas.
3. Gain knowledge of business models, funding mechanisms, and startup operations.
4. Understand legal, ethical, and IPR aspects related to startups.
5. Build entrepreneurial skills, teamwork, leadership, and lifelong learning orientation.

● **Course Outcomes:** After successful completion course, students will be able to:

- CO1. Explain concepts, types, and lifecycle stages of start-ups and new ventures.
- CO2. Identify and analyze start up opportunities using market and customer discovery tools.
- CO3. Develop suitable business models and assess technical and financial feasibility of ventures.
- CO4. Apply knowledge of funding, legal, IPR, and government policies for startup creation.
- CO5. Prepare and present a startup business plan demonstrating teamwork, communication, ethics, and lifelong learning.

● **Course Contents:**

Unit I	Introduction to Startups & Venture Creation	6 Hours
Startup: Definition, characteristics, and types, Startup vs MSME vs traditional business, Startup lifecycle and growth stages, Role of startups in innovation and economic development Case studies of successful startups (Indian & global).		
Unit II	Idea Generation, Opportunity & Market Validation	6 Hours
Entrepreneurial mindset and ideation techniques, Problem identification and solution fit, Design Thinking and Lean Startup approach, Customer discovery and validation, Market analysis and value proposition development.		
Unit III	Business Models & Feasibility Analysis	6 Hours
Business Model Canvas and Lean Canvas, Technical, market, and financial feasibility, Cost structures, revenue models, and break-even analysis, Risk analysis and mitigation strategies, Sustainability and ethical considerations in startups		

Unit IV	Startup Ecosystem, Funding & Legal Aspects	6 Hours
Startup ecosystem in India and globally, Government initiatives: Startup India, MSME, SIDBI, DPIIT, Sources of funding: bootstrapping, angel investors, venture capital, crowdfunding, Legal aspects: company registration, compliance, Intellectual Property Rights (IPR): patents, trademarks, copyrights		
Unit V	Startup Operations, Scaling & Business Plan	6 Hours
Team formation, leadership, and culture, Operations and scaling strategies, Marketing, branding, and customer acquisition Business plan preparation and pitch deck, Future trends, failure analysis, and lifelong learning for entrepreneurs		
● List of Course Activities for Continuous Comprehensive Assessment (Any Two): 1. Startup Idea Pitching Activity Students develop and present innovative startup ideas addressing real-world problems using value proposition concepts. 2. Business Model Canvas Workshop Hands-on preparation of Business Model Canvas (BMC) for a startup including customer segments, revenue streams, and value proposition. 3. Market Survey & Customer Validation Students conduct field/online surveys to identify customer needs, validate startup ideas, and analyze market opportunities. 4. Prototype / Product Demonstration Teams create a basic prototype, mock-up, or digital model of a product/service and demonstrate its functionality and usefulness. 5. Startup Business Plan Preparation Students prepare a practical business plan including funding requirements, marketing strategy, operational plan, and financial feasibility analysis.		
● Textbooks: 1. S. S. Khanka – Entrepreneurial Development, S. Chand & Company. 2. Vasant Desai – Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House.		
● Reference Books: 1. Steve Blank & Bob Dorf – The Startup Owner’s Manual, Wiley. 2. Alexander Osterwalder & Yves Pigneur – Business Model Generation, Wiley. 3. Barringer & Ireland – Entrepreneurship: Successfully Launching New Ventures, Pearson. 4. Peter F. Drucker – Innovation and Entrepreneurship, Harper Business. 5. Steve Blank & Bob Dorf – The Startup Owner’s Manual, Wiley.		
● MOOC / NPTEL Courses: 1. NPTEL1, Entrepreneurship, By Prof. C Bhaktavatsala Rao, IIT Madras https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_mg70 2. NPTEL2, Entrepreneurship Essentials By Prof. Manoj Kumar Mondal, IIT Kharagpur https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_ge08 3. NPTEL3, Innovation, Business Models and Entrepreneurship, By Prof. Vinay Sharma, Prof. Rajat Agrawal, IIT Roorkee: https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_mg95 4. NPTEL4, Entrepreneurship Essentials, By Prof. Manoj Kumar Mondal, IIT Kharagpur: https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_ge03 5. Coursera : Technology & Entrepreneurship Specialization, Brent Sebold, Arizona State University https://www.coursera.org/specializations/technology-and-entrepreneurship		

Course: Health and Nutrition for Professionals			Code: 25OEC201D	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50

● **Course Objectives:**

1. To understand the importance of nutrition and healthy lifestyle for professionals.
2. To create awareness about balanced diet and nutritional requirements.
3. To understand lifestyle diseases and their prevention.
4. To develop healthy habits for stress management and productivity.

● **Course Outcomes:** At the end of the course, students will be able to:

- CO1: Explain the basic concepts of health and nutrition.
CO2: Understand nutritional requirements and balanced diet.
CO3: Identify lifestyle diseases and preventive measures.
CO4: Apply principles of healthy living and stress management.
CO5: Analyze the role of nutrition in improving professional productivity

● **Course Contents:**

Unit I	Introduction to Health and Nutrition	6 Hours
Concept of health and wellness, Dimensions of health (physical, mental, social), Importance of nutrition for professionals, Nutrients and their functions, Macronutrients and micronutrients		
Unit II	Balanced Diet and Nutritional Requirements	6 Hours
Concept of balanced diet, Dietary guidelines, recommended dietary allowance (RDA), Nutritional needs during childhood, adolescence, adulthood and old age, Special Nutritional needs for working professionals Vegetarian vs non-vegetarian diets, Food pyramid and healthy eating habits		
Unit III	Lifestyle Diseases	6 Hours
Causes of lifestyle diseases, Obesity, diabetes, hypertension, heart disease, Role of diet in prevention of diseases, Importance of physical activity, Nutritional management of common diseases, Prevention through healthy diets and lifestyle		
Unit IV	Health Management for Professionals	6 Hours
Work-life balance, Stress and its management, Role of exercise and yoga, Sleep and mental health, Ergonomics and workplace health		
Unit V	Food Safety and Healthy Lifestyle	6 Hours
Food hygiene and sanitation, Food adulteration, Safe food handling practices, Sustainable and healthy eating habits, Nutrition for long-term health and productivity, Importance of hydration, Healthy snacking options at work		
● List of Course Activities for Continuous Comprehensive Assessment (Any Two): 1. Balanced Diet Planning Activity Students prepare a daily/weekly balanced diet chart for different age groups or working professionals based on nutritional requirements. 2. Nutritional Analysis Survey Conduct a survey on eating habits, junk food consumption, hydration, or lifestyle diseases and analyze the collected data.		

3. Healthy Recipe Preparation / Demonstration Students prepare and present nutritious, low-cost, and healthy food recipes promoting balanced nutrition and food safety. 4. Fitness, Yoga & Stress Management Activity Practical sessions on yoga, exercise routines, meditation, posture correction, and stress management techniques for healthy living. 5. Food Safety & Awareness Campaign Students create posters, presentations, or awareness drives on food hygiene, adulteration detection, healthy snacking, and lifestyle disease prevention.
● Textbooks: 1. Srilakshmi, B., Human Nutrition, New Age International (P) Ltd., Publishers, New Delhi. 2. Joshi, Shubhangini A., Nutrition and Dietetics: With Indian Case Studies, 5th Edition, McGraw Hill Education (India) Pvt. Ltd., New Delhi, 2021.
● Reference Books: 1. Swaminathan, M., Food and Nutrition, Bangalore Printing & Publishing Co. Ltd., Bangalore. 2. Swami Nathan, M., Essentials of Food and Nutrition, Vol. I & II, Ganesh & Co., Madras (Chennai), 1974. 3. Dietary Guidelines for Indians. A manual by National Institute of Nutrition, ICMR 4. Safety and Health for Engineers, Roger L. Brauer, John Wiley & Sons.
● MOOC / NPTEL Courses /Online Resources: 1. Adolescent Health and Well-Being: A Holistic Approach by By Prof. Sumana Samanta, Prof. Parmeshwar Satpathy, IIT Kharagpur: https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_ge102 2. Diet Management in Health and Disease by By Dr. Vipparti Vijaya Lakshmi, The English and Foreign Languages University: https://onlinecourses.swayam2.ac.in/e-learning/preview/cec25_hc01 3. Food and Nutrition by By Dr. Asna Urooj, University of Mysore: https://onlinecourses.swayam2.ac.in/e-learning/preview/cec19_ag02

Course: French Language Module-I			Code: 25OEC201E	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50
● Prerequisites: No prerequisite required.				
● Course Objectives: 1. To identify basic French vocabulary and pronunciation. 2. To develop elementary listening and speaking skills in French. 3. To construct simple French sentences using basic grammar. 4. To apply French language skills in everyday communication. 5. To build a foundation for further learning of the French language.				
● Course Outcomes: At the end of the course, students will be able to - CO 1. Identify basic French vocabulary and pronunciation. - CO 2. Use simple French expressions for self-introduction and basic interactions. - CO 3. Read and write simple French sentences. - CO 4. Communicate in familiar everyday situations using basic French. - CO 5. Demonstrate awareness of French culture and etiquette.				
● Course Contents:				
Unit I	Introduction au français (Introduction to French)			6 Hours
French alphabet and pronunciation , Greetings and introductions , Numbers (1-100), days and months Classroom expressions				
Unit II	Parler de ses loisirs et de sa famille (Talking about his hobbies and his family)			6 Hours
Talking about a hobby, (Vocab: Activities, expressions + Aimer) , Family and friends , (Grammar: Subject pronouns, ER ending verbs, Family relations)				
Unit III	La France (France)			6 Hours
Reading about French city, Asking simple questions about France, Writing a post card (Vocab: Information on France and it's cities, interrogative words.)				
Unit IV	Au café! (At the cafe!)			6 Hours
Ordering in French, Fruits and vegetables , Quantities , Expressions of politeness				
Unit V	Faire une invitation (Make an invitation)			6 Hours
Letter writing , Organising a party , Accepting / refusing an invitation , Role play activities				
● List of Course Activities for Continuous Comprehensive Assessment (Any Two): 1. Self-introduction in French: Students introduce themselves using simple French sentences. 2. Greetings and Classroom Conversation: Students practice basic greetings and classroom expressions in French. 3. Listening Comprehension Exercise: Students listen to short French audio clips and answer simple questions. 4. Picture Description in French: Students describe a given picture using basic French vocabulary. 5. French Culture Presentation: Students give a short presentation on French culture, food, or festivals.				

● Text Books: 1. Alter Ego A1 – Hachette (Goyal Publishers) 2. Latitude 1 – Didier (Goyal Publishers)
● Reference Books: 1. Myrna Bell Rochester, “Easy French Step-By-Step: Master High-Frequency Grammar for French Proficiency—Fast”, McGraw Hill, ISBN-13 : 978-0071453875 2. Eugene Jackson, Antonio Rubio, Julien J. Lafontant, Pamela Haze, “French Made Simple”, Crown Publication, ISBN-13 : 978-0767918596 3. Claire Miquel, “Communication Progressive du Français A1”, Cle International, Atlantic Publishers and Distributors (P) Ltd., 7/22, Ansari Road, Darya Ganj, New Delhi – 110002 4. Ranjit, Mahita & Singh, Monica, Apprenons le français', Part 1, Saraswati House Pvt. Ltd., New Delhi. Second Revised Edition, 2007 5. Ranjit, Mahita & Singh, Monica, Cahier d'exercices', (Apprenons le français) 1., Saraswati House Pvt. Ltd., New Delhi. Second Revised Edition, 2007
● MOOC / NPTEL Courses /Online Resources Online Resources: 1. https://www.elearningfrench.com/ 2. https://www.laits.utexas.edu/fi/index.html 3. https://blog.rosettastone.com/french-accent-marks/ 4. https://www.frenchcircles.ca/online-free-french-resources/ 5. Proficiency course in French By Prof. Nirupama Rastogi (Retd): https://onlinecourses.swayam2.ac.in/e-learning/preview/cec19_lg04 6. Foundations of French by Ramya Jagannathan: https://onlinecourses.swayam2.ac.in/e-learning/preview/imb26_mg73 7. The Complete French Course : Learn French – Beginners : https://www.udemy.com/course/french-for-beginners-a1/?couponCode=PMNVD2025 8. Complete French Course: Learn French for Beginners : https://www.udemy.com/course/complete-french-course/?couponCode=PMNVD2025

Course: German Language Module-I			Code: 25OEC201F	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50
● Prerequisites: No prerequisite required.				
● Course Objectives: 1. To identify basic German vocabulary and pronunciation. 2. To develop elementary communication skills in German. 3. To construct simple German sentences using basic grammar. 4. To apply German language skills in everyday communication. 5. To develop awareness of German culture and traditions.				
● Course Outcomes: At the end of the course, students will be able to - CO1. Identify basic German vocabulary and pronunciation. - CO2. Use simple German expressions for basic communication. - CO3. Read and write elementary German sentences. - CO4. Apply common German phrases in everyday situations. - CO5. Demonstrate awareness of German culture and traditions.				
● Course Contents:				
Unit I	Willkommen! (Welcome!)			6 Hours
Topics and Vocabulary: Greetings, Introductions, Numbers, Countries & languages				
Grammar: Alphabet, Pronunciation, Personal pronouns				
Skills • Speaking: self-introduction • Listening: simple conversations • Reading: name cards, dialogues • Writing: short introduction paragraph				
Unit II	Familie, Freunde und ich (Family, Friends and I)			6 Hours
Topics and Vocabulary: Family members, Hobby and work				
Grammar: Nominative case, Articles- der, die, das, Regular verb conjugation				
Skills • Speaking: describe family, ask about profession, introduce others • Reading: small paragraphs about nuclear and joint families				
Activity Family tree presentation				
Unit III	Orte und Dinge (Places and things)			6 Hours
Grammar: Sentence structure , Definite articles- der, die, das, Indefinite articles- ein, eine, ein,				

Negative markers- kein, keine, kein, nicht Skills • Speaking: describing surroundings and objects • Reading: simple descriptive passages and labels • Writing: short descriptions using simple sentences Activities • Vocabulary Hunt • Mystery Object Game Picture Description		
Unit IV	Studentenleben & Alltag (Student life & everyday life)	6 Hours
Topics and Vocabulary: Daily routine , University life , Subjects , Time expressions Grammar: Time, Nominative case- personal pronouns, Nominative case- possessive Pronouns Skills: Speaking and Writing: daily routine discussion Listening: schedules at university and at the work place		
Unit V	Revision & Mini Project	6 Hours
Integrated Skills : Students prepare: self-introduction , poster , dialogue , simple presentation Suggested Project My dream study trip to Germany/ Cultural connectivity between Germany and India/ Any other topic related to German language and culture.		
Assessment • Speaking viva • Listening test • Vocabulary quiz • Listening exercises • Pronunciation practice • Role play activities		
• List of Course Activities for Continuous Comprehensive Assessment (Any Two): 1. Self-introduction in German: Students introduce themselves using simple German sentences. 2. Greetings and Basic Conversation: Students practice greetings and everyday expressions in German. 3. Listening Comprehension Exercise: Students listen to short German audio clips and answer questions. 4. Picture Description in German: Students describe simple pictures using basic German vocabulary. 5. German Culture Presentation: Students present topics related to German culture, food, or festivals.		

- **Text Books:**

1. Stefanie Dengler, “Netzwerk A1 (Textbook + Workbook + Glossar)”, Hachette , ISBN: 9788183077033, (Goyal Publishers)
2. Monika Reimann Daniela Niebisch , Sylvette Penning-Hiemstra , Angela Pude , Franz Specht , Monika Bovermann, “ Schritte international Neu 1: Deutsch als Fremdsprache / Kursbuch + Arbeitsbuch mit Audios online”, Hueber Publications, GOYAL Publishers & Distributors Pvt. Ltd, ISBN-13 : 978-3193610829

- **Reference Books:**

1. Deepak Kushwaha, “German Made Easy Part 1 + German Made Easy Part 2 with Answer”, Goyal Publishers
2. Arnold Leitner, “German Made Simple”, Crown Publications, Penguin Random House India Pvt Ltd
3. Kurs Und Übungsbuch, “Studio-D A1 - Combo of 3 (German)”, Goyal Publishers & Distributors
4. Funk and Kuhn, “Studio D A1 Deutsch Buch “, Cornelsen Verlag (Goyal Publishers India)

- **MOOC / NPTEL Courses /Online Resources Online Resources:**

1. Learn German Language: Complete German Course – Beginners (Udemy)
2. Complete German Course: Learn German for Beginners : <https://www.udemy.com/course/complete-german-course-learn-german-for-beginners/?couponCode=PMNVD2025>
3. German A1 - German For Complete Beginners! : <https://www.udemy.com/course/german-for-complete-beginners/?couponCode=PMNVD2025>
4. DW Learn German: <https://learngerman.dw.com/en/learn-german/s-9528>
5. Practise German for free (Goethe-Institut Resources) : <https://www.goethe.de/en/spr/ueb.html>
6. Duolingo German : <https://www.duolingo.com/course/de/en/Learn-German>

Course: Japanese Language Module-I			Code: 25OEC201G	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50
● Prerequisites: No prerequisite required.				
● Course Objectives: The objectives of the course are- 1. To identify basic Japanese pronunciation, scripts, and vocabulary. 2. To develop elementary listening and speaking skills in Japanese. 3. To construct simple Japanese sentences using basic grammar. 4. To apply simple Japanese expressions in everyday communication. 5. To develop awareness of Japanese culture and etiquette.				
● Course Outcomes: At the end of the course, students will be able to CO1. Identify basic Japanese pronunciation, scripts, and vocabulary. CO2. Use simple Japanese expressions for basic communication. CO3. Read and write basic Japanese characters and sentences. CO4. Participate in elementary conversations using simple Japanese expressions. CO5. Demonstrate awareness of Japanese culture and etiquette.				
● Course Contents:				
Unit I	Nihongo nyūmon (Introduction to Japanese)			6 Hours
Hiragana and Katakana , Greetings and introductions , Numbers and dates , Pronunciation practice				
Unit II	Kihon-tekina bunpō to goi (Basic Grammar and Vocabulary)			6 Hours
Sentence patterns, Particles , Basic verbs , Pronouns and nouns				
Unit III	Nichijō no komyunikēshon (Everyday Communication)			6 Hours
Self-introduction , Family and hobbies , Daily activities , Asking simple questions , Kanji –Lesson 1 (Textbook 1)				
Unit IV	Dokkairiyoku to sakubun nōryoku (Reading and Writing Skills)			6 Hours
Reading simple scripts, Vocabulary exercises , Writing practice , Sentence construction , Kanji –Lesson 2 (Textbook 1)				
Unit V	Risuningu to supīkingu no renshū (Listening and Speaking Practice)			6 Hours
Listening exercises , Pronunciation practice , Role play activities , Guided communication Kanji –Lesson 3 (Textbook 1)				
● List of Course Activities for Continuous Comprehensive Assessment (Any Two): 1. Self-introduction in Japanese: Students introduce themselves using simple Japanese expressions.				

Greetings and Classroom Conversation: Students practice basic greetings and classroom communication in Japanese. Listening Comprehension Exercise: Students listen to short Japanese audio clips and answer simple questions. Picture Description in Japanese: Students describe pictures using simple Japanese vocabulary. Japanese Culture Presentation: Students present topics related to Japanese culture, food, or festivals.
Text Books: 3A Corporation, “Minna No Nihongo 1-1,1-2,2-1,2.2 Main Textbook elementary”, ISBN-13: 9789388141147, Goyal Publishers & Distributors Pvt. Ltd, India - Eri Banno, Yoko Ikeda, Yutaka Ohno, Chikako Shinagawa, Kyoko Tokashiki, “Genki 1 Textbook: An Integrated Course in Elementary Japanese”, ISBN-13 : 978-4789014403
Reference Books: - The Japan Foundation, “Marugoto: Japanese Language and Culture Starter A1 Coursebook for Communicative Language Activities”, Goyal Publishers - The Japan Foundation, “Marugoto Starter (A1) Rikai - Course Book For Communicative Language Competences”, Goyal Publishers, ISBN-13: 9788183078047 - The Japan Foundation, “Marugoto Starter (A1) Katsudoo”, Goyal Publishers “Japanese for Busy People,3rd edition”, Association for Japanese Language Teaching, Kodansha Tokyo Japan Kodansha International, November, 2011., - Tae Kim, “A Guide to Japanese Grammar: A Japanese Approach to Learning Japanese Grammar”, Createspace Independent Pub, ISBN-13 : 978-1495238963, Bookswagon, 2/13 Ansari Road, Daryaganj, New Delhi 110002 - Nyumon Nihongo- ALC Press, U.K - Nihongo Soomatome N5, ASK Publishing, Tokyo
MOOC / NPTEL Courses /Online Resources Online Resources: - Learn German Language: Complete German Course – Beginners (Udemy): https://www.udemy.com/course/complete-german-course-learn-german-for-beginners/ - German A1 - German For Complete Beginners! : https://www.udemy.com/course/german-for-complete-beginners/?couponCode=PMNVD2025 - DW Learn German: https://learngerman.dw.com/en/learn-german/s-9528 - Practise German for free (Goethe-Institut Resources) : https://www.goethe.de/en/spr/ueb.html - Duolingo German : https://www.duolingo.com/course/de/en/Learn-German

Course: Mechanics of Materials Lab			Code: 25CVPCC201L-A	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Practical	02	01	Oral	25

● **Prerequisites:**

Building material, Construction Technology

● **Course Objectives:** This course aims at enabling students,

1. To familiarize students with laboratory testing procedures for cement, aggregates, and concrete.
2. To develop practical skills in determining physical and mechanical properties of Concrete raw materials.
3. To understand the concrete mix design process as per IS codes and perform casting of concrete specimens.
4. To study the behaviour of fresh and hardened concrete through standard laboratory tests.
5. To introduce students to durability tests and non-destructive testing methods used for evaluating concrete quality.

● **Course Outcomes:** At the end of the course, students will be able to:

1. Perform laboratory tests on cement and aggregates and interpret the results as per IS standards.
2. Conduct concrete mix design and prepare concrete specimens for laboratory testing.
3. Evaluate properties of fresh and hardened concrete using standard testing methods.
4. Assess the durability and quality of concrete using permeability and rapid chloride penetration tests.
5. Apply non-destructive testing techniques such as rebound hammer and ultrasonic pulse velocity for assessing in-situ concrete quality.

List of Experiments

1. Tests on cement
Determination of fineness, standard consistency, initial and final setting time and Compressive strength of cement
2. Tests on aggregates
Determination of specific gravity, water absorption, and sieve analysis of fine and coarse aggregates. Combined grading of fine and coarse aggregates.
3. Concrete mix design by IS code method and casting of Blocks as per Mix Design.
4. Tests on concrete
 - a) Fresh concrete
Slump cone, compaction factor, Vee-Bee test for standard concrete
 - b) Hardened concrete
Compressive strength or Core strength test, in-direct tensile strength and flexural strength of concrete.
 - c) Durability tests on concrete
Rapid chloride penetration test, water permeability test.
 - d) Non-destructive tests on concrete
Rebound hammer test, ultrasonic pulse velocity test.
5. Technical visits
Visit to one or more of the following: (a) Cement manufacturing plant, (b) Ready-mix concrete (RMC) plant, (c) Construction site involving advanced concreting practices, (d) Technical exhibitions (related to materials or construction).

Course: Fluid Mechanics Lab			Code: 25CVPCC202L	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Practical	02	01	Oral	25

- **Prerequisites:** Engineering Mathematics and Engineering Mechanics

- **Course Objectives:** This course aims at enabling students,

1. To impart practical information for calculating fluid characteristics, calculating energy loss, and drawing flow nets.
2. To understand the process of calibrating flow measurement instruments.
3. To demonstrate the performance of open channel flow.

- **Course Outcomes:** At the end of the course, students will be able to:

1. Determine fluid properties,
2. Calibrate flow measuring instrument
3. Calculate flow characteristics in open channel flow

List of Experiments

A) Any five experiments from Sr. No. 1- 8 and any three experiments from Sr. No. 9-12.

1. Measurement of viscosity of fluid by using Viscometer.
2. Drawing flow net by Electrical Analogy method / Study of flow pattern using Heleshaw's apparatus.
3. Experimental verification of Bernoulli's theorem with reference to loss of energy.
4. Calibration of Venturimeter / Orificemeter.
5. Determination of Darcy-Weisbach friction factor (f) for a given pipe and study of variation off with Reynolds Number (Re).
6. Study of Uniform Flow Formulae for Open channel.
7. Velocity Distribution in Open Channel Flow.
8. Calibration of Rectangular / Triangular Notch.
9. Measurement of Pressure using different Pressure Measuring Devices (including pressure transducers).
10. Determination of Minor Losses in pipes.
11. Study of pressure distribution around Aerofoil / Cylinder by wind tunnel.
12. Determination of Stability of Floating Bodies using Ship Model.
13. Study of hydraulic jump as energy dissipator.

B) Assignments:

Analysis of pipe network using Hardy Cross Method (minimum two loops) – both by hand calculations and using any Computer Language / Software Solution.

C) Site visit to any Hydraulic Structures / Flow Measuring Devices/ Hydraulic Research center.

Virtual Laboratories:

1. Experimental verification of Bernoulli's theorem with reference to loss of energy.
2. Calibration of Venturimeter / Orificemeter.
3. Calibration of Rectangular / Triangular Notch.

Course: Building Planning and Construction Lab			Code: 25CVPCC203L	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Practical	02	01	TW	25

- **Prerequisites:** Basic knowledge of engineering drawing and graphical representation of buildings, Fundamental understanding of construction materials and their basic properties.
- **Course Objectives:** This course aims at enabling students,
 1. To understand and illustrate basic building components such as masonry, brick bonds, arches, lintels, doors and windows through sketches and drawings.
 2. To apply principles of building planning and provisions of National Building Code of India 2016 in preparing residential building plans.
 3. To develop basic drafting skills using computer-aided design tools such as AutoCAD, SketchUp, or FreeCAD for building drawings.
 4. To observe and analyze construction practices and modern materials through site visits and case studies of building projects.
- **Course Outcomes:** At the end of the course, students will be able to:
 1. Describe types of masonry, doors, windows, arches and lintel.
 2. Plan effectively various types of Residential Building forms according to their utility, functions with reference to National Building Code.
 3. Plan effectively various types of Public Buildings according to their utility functions with reference to National Building Code.
 4. Make use of Principles of Planning and Understand different services and safety aspects.

List of Laboratory Assignments

1. Students shall prepare drawings of at least four types of masonry and Brick bonds.
 2. Students shall prepare drawings showing details of at least two types of lintels or arches.
 3. Draw sketches using computer software of at least two types of doors.
 4. Draw sketches using computer software of at least two types of windows.
 5. Floor Plan/ Typical floor plan with construction notes, schedule of openings, of any type of building, Plan, Elevation and Section (Full Imperial sheet)
 6. Develop typical floor plan drawing exercise as completed in assignment number 5 using computer software and Printout of the same.
 7. Site Visit: Green Building, Salient features like materials used/technology, etc. benefits, planning concepts of Green Building (site selection, orientation, sun path and wind diagram etc.)
- OR
8. Site Visit: Any on-going Construction Site (visit report should contain: details of the project, stage of construction, sketches of components with cross section & dimensions, materials used and site plan, etc.)
 9. Collection of advertisements of modern construction materials and tools used in construction and prepare report on the same.

Note: These are the following computer software list which can be used for assignments no. 3,4 and 6 : LibreCAD, FreeCAD, SketchUp or AutoCAD.

Course: Computer-Aided Designing and Drawing			Code: 25CVVSE201	
Teaching Scheme(Hrs./Week)		Credit	Evaluation Scheme	
Practical	02	01	Oral	25

- **Prerequisites:** Basic knowledge of engineering drawing, Basic computer operation skills, Understanding of geometrical drawing and graphical representation

- **Course Objectives:** This course aims at enabling students,
 1. To introduce students to computer-aided drafting tools used in civil engineering drawings.
 2. To develop skills in preparing 2D engineering drawings using CAD software.
 3. To apply CAD tools for preparing building plans, sections and elevations.
 4. To familiarize students with modern digital drafting techniques used in construction industry.

- **Course Outcomes:** At the end of the course, students will be able to:
 1. Identify and use basic CAD commands for drafting and editing engineering drawings.
 2. Prepare 2D drawings of civil engineering components using CAD software.
 3. Develop building drawings such as plans, elevations and sections using CAD tools.
 4. Apply CAD techniques for dimensioning, layering, and plotting professional drawings.

List of Experiments

1. Introduction to CAD interface: coordinate system, drawing limits, units, and basic commands (Line, Circle, Arc, Rectangle).
2. Practice drawing using editing commands: erase, copy, mirror, move, rotate, trim, extend, scale and offset.
3. Drawing using layers, object snaps, grid and snap settings.
4. Dimensioning and annotation of engineering drawings.
5. Drawing of basic civil engineering components such as:
 - Brick wall section
 - Footing layout
6. Preparation of door and window details using CAD.
7. Drawing of staircase plan and section.
8. Preparation of floor plan of a residential building.
9. Preparation of elevation and sectional view of building.
10. Plotting and printing of drawings using layout and scale settings.

Virtual Laboratories:

1. Engineering Graphics Lab - <https://eg-dei.vlabs.ac.in/>

Course: Engineering Economics (HSSM)			Code: 25HSM201A	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Tutorial	02	02	TW	50

● Prerequisites: Basic Mathematics, Basic Economics, General Engineering Knowledge		
● Course Objectives: The objectives of the course are- 1. To develop a comprehensive understanding of the principles of engineering economics among students. 2. To equip students with analytical skills and knowledge required for evaluating engineering projects. 3. To build a fundamental understanding of accounting principles, financial analysis, and various funding strategies. 4. To enable students to understand market structures, pricing strategies, and the impact of government policies and economic factors. 5. To examine the role of engineers in industrialization and economic development.		
● Course Outcomes: At the end of the course, students will be able to: CO1: Apply engineering economic concepts such as cost analysis, time value of money, break-even analysis, and investment evaluation. CO2: Use cost estimation techniques, evaluate asset depreciation, perform capital budgeting, and carry out replacement analysis. CO3: Interpret financial statements, analyse financial ratios, evaluate different sources of finance, manage working capital, and perform project appraisal. CO4: Analyze various market structures and pricing strategies, and assess the impact of government policies, taxation, and inflation on engineering projects. CO5: Analyze emerging trends such as circular economy concepts and Industry 4.0 from an economic perspective.		
● Course Contents:		
Unit I	Introduction to Engineering Economics	6 Hours
Basic Concepts: Definition and importance of engineering economics, principles and applications in decision making, cost estimation, investment analysis, profitability assessment, resource optimization, risk management, comparison with traditional economics, and overview of microeconomics and macroeconomics. Cost Concepts: Fixed, variable, marginal, sunk, and opportunity costs. Time Value of Money: Present worth, future worth, annuities, and compounding techniques. Break-even Analysis: Cost–volume–profit (CVP) analysis and contribution margin.		
Unit II	Cost Estimation and Capital Budgeting	6 Hours
Cost Estimation Techniques: Direct and Indirect Costs, Overheads Depreciation Methods: Straight Line, Declining Balance, and Sum of Years' Digits Capital Budgeting: Payback Period, Net Present Value (NPV), Internal Rate of Return (IRR), Profitability Index Replacement Analysis: Economic Life and Useful Life of Equipment		
Unit III	Financial Management and Accounting	6 Hours
Basic Accounting Principles: Balance Sheet, Profit and Loss Statement, Cash Flow Financial Ratios: Liquidity, Profitability, and Solvency Ratios Sources of Finance: Equity, Debt, Venture Capital, Working Capital Management Project Appraisal: Feasibility Studies, Risk Analysis in Investment Decisions		
Unit IV	Market Structures and Economic Decision Making	6 Hours

Market Structures: Perfect competition, monopoly, oligopoly, and monopolistic competition. Pricing Strategies: Cost-based pricing, market-based pricing, penetration pricing, and skimming pricing. Government Policies and Taxation: GST, income tax, corporate tax, and industrial incentives. Inflation: Concept of inflation and its impact on engineering projects		
Unit V	Industrial Economics and Engineering Ethics	6 Hours
Industrialization and Economic Development: Role of engineers in economic growth. Public and Private Sector Enterprises: Comparison of public sector and private sector enterprises. Engineering Ethics and Professionalism: Corporate social responsibility (CSR) and sustainable development. Emerging Trends: Green economics, circular economy, Industry 4.0, and their economic impacts.		
● Course activities for term work evaluation: 1. Cost Estimation and Budgeting Exercise Students prepare detailed cost estimates for a simple engineering product or project including material, labour, overhead, and profit calculations using practical data. 2. Case Study on Engineering Economic Decisions Students analyse real-life engineering projects related to investment decisions, cost control, depreciation, or resource allocation and present economic solutions. 3. Capital Budgeting and Financial Analysis Activity Students perform Payback Period, NPV, and IRR calculations for different investment alternatives using spreadsheets and interpret the results. 4. Market Survey and Pricing Strategy Analysis Students conduct a survey on pricing methods, market competition, and consumer demand for engineering products and prepare an analytical report. 5. Mini Project on Industrial Economics and Sustainability Students study an industry or startup and prepare a report on production systems, financial planning, CSR activities, green economics, or Industry 4.0 practices.		
● Textbooks: 1. Engineering Economics by R. Panneerselvam Publisher- PHI learning private limited 2. Engineering Economy (16th Edition) by William G. Sullivan & Elin M. Wicks 3. Fundamentals of Engineering Economics (2nd Edition) by Chan S. Park 4. Principles of Engineering Economic Analysis by John A. White, Kenneth E. Case, and David B. Pratt		
● Reference Books: 1. Principles of Engineering Economy by Eugene L. Grant 2. Engineering Economy: Analysis of Capital Expenditures by Gerald W. Smith 3. Applied Economic Analysis for Technologists, Engineers, and Managers by Michael S. Bowman 4. Engineering Economics for Capital Investment Analysis by Tung Au and Thomas P. Au 5. Schaum's Outline of Engineering Economics by Jose A. Sepulveda and William E. Souder		
● MOOC / NPTEL Courses: 1. Engineering Economic Analysis – NPTEL (IIT Roorkee) by Prof. Pradeep K. Jha: https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_me98 2. Project Management for Managers by By Prof. Mukesh Kumar Barua, IIT Roorkee: https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_mg71 3. Financial Accounting By Prof. Puran Singh, IIT Mandi : https://onlinecourses.nptel.ac.in/e-learning/preview/noc23_mg65 4. Introduction to Market Structures By Prof. Amarjyoti Mahanta, IIT Guwahati: https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_hs84 5. Ethics in Engineering Practice By Prof. Susmita Mukhopadhyay, IIT Kharagpur: https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_mg42		

Course: Entrepreneurship Development and IPR			Code: 25HSM201B	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Tutorial	02	02	TW	50

● **Prerequisites:** Market study, break even analysis, profit loss, accounting

● **Course Objectives:** The objectives of the Course are

1. Understand the concepts, role, and importance of entrepreneurship and innovation in economic and social development.
2. Identify and evaluate business opportunities, especially technology-based and sustainable ventures.
3. Develop entrepreneurial mindset, creativity, and problem-solving ability.
4. Understand startup ecosystem, government policies, IPR, funding, and incubation support.
5. Prepare a basic business plan incorporating ethical, financial, and sustainability considerations.

● **Course Outcomes:** At the end of the course, students will be able to:

- CO1: Explain concepts of entrepreneurship, innovation, and their role in economic and societal development.
- CO2: Identify entrepreneurial opportunities using creativity, design thinking, and market analysis tools.
- CO3: Analyse feasibility of a business idea considering technical, financial, legal, and social aspects.
- CO4: Apply knowledge of startup ecosystem, IPR, funding, and government initiatives to venture creation.
- CO5: Develop and present a basic business plan demonstrating teamwork, communication, ethics, and lifelong learning attitude.

● **Course Contents:**

Unit I	Introduction to Entrepreneurship	6 Hours
Entrepreneurship: Definition, types, and characteristics, Entrepreneur vs Manager, Role of entrepreneurship in economic development, Innovation: Types and sources, Case studies of successful entrepreneurs (Indian & global)		
Unit II	Creativity, Innovation & Opportunity Identification	6 Hours
Entrepreneurial mindset and creativity, Design Thinking for innovation, Idea generation techniques, Opportunity identification and screening, Market research and customer validation, Technology-based entrepreneurship		
Unit III	Feasibility Analysis & Business Models	6 Hours
Technical, market, and financial feasibility, Business Model Canvas (BMC), Costing, pricing, and break-even analysis, Risk analysis and mitigation, Ethics and sustainability in entrepreneurship		
Unit IV	Startup Ecosystem, IPR & Funding	6 Hours
Startup India initiative and government schemes (MSME, SIDBI, DPIIT), Incubation centers, accelerators, and angel networks, Basics of Intellectual Property Rights (Patents, Copyrights, Trademarks), Sources of funding: Bootstrapping, venture capital, crowdfunding, Legal aspects of starting a venture		
Unit V	Business Plan Development & Entrepreneurial Skills	6 Hours
Business plan preparation and structure, Team building and leadership, Communication and pitching skills Social entrepreneurship and sustainable startups, Future trends and lifelong learning for entrepreneurs		

● **Course activities for term work evaluation:**

1. **Business Idea Identification and Opportunity Analysis**

Students identify innovative business ideas, analyze market opportunities, customer needs, and prepare a brief opportunity assessment report.

2. **Case Study on Successful Entrepreneurs and Startups**

Students study successful entrepreneurs or startups and analyze their business models, innovation strategies, challenges, and growth factors.

3. **Business Model Canvas (BMC) Activity**

Students prepare a Business Model Canvas for a startup idea covering value proposition, customer segments, revenue streams, and key resources.

4. **Mini Project on Startup Ecosystem and IPR**

Students explore startup support systems such as MSME, Startup India, incubation centers, patents, trademarks, and funding schemes and prepare a report.

5. **Business Plan Presentation and Pitching Activity**

Students develop and present a basic business plan including marketing, financial planning, costing, break-even analysis, and sustainability considerations.

● **Textbooks:**

1. Vasant Desai – Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House.
2. S. S. Khanka – Entrepreneurial Development, S. Chand & Company.
3. Donald F. Kuratko – Entrepreneurship: Theory, Process and Practice, Cengage Learning.
4. Peter F. Drucker – Innovation and Entrepreneurship, Harper Business.

● **Reference Books:**

1. Osterwalder & Pigneur – Business Model Generation, Wiley.
2. Barringer & Ireland – Entrepreneurship: Successfully Launching New Ventures, Pearson.
3. Robert Hisrich et al. – Entrepreneurship, McGraw-Hill.

● **MOOC / NPTEL Courses/Online Resources:**

1. NPTEL1, Entrepreneurship, By Prof. C Bhaktavatsala Rao, IIT Madras : https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_mg70
2. NPTEL2, Entrepreneurship Essentials By Prof. Manoj Kumar Mondal, IIT Kharagpur https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_ge08
3. NPTEL3, Innovation, Business Models and Entrepreneurship, By Prof. Rajat Agrawal, Prof. Vinay Sharma, IIT Roorkee : https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_mg63
4. NPTEL4, Patent Drafting for Beginners, By Prof. Feroz Ali IIT Madras : https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_hs04
5. NPTEL5, Intellectual Property Rights and Competition Law, By Prof. KD Raju, Prof. Niharika Sahoo Bhattacharya, IIT Kharagpur: https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_mg96

Course: Project Management & Business Planning			Code: 25HSM201C	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Tutorial	02	02	TW	50

● Prerequisites: Basic understanding of management principles, Fundamental knowledge of engineering project work, Basic knowledge of economics and finance, Familiarity with planning and organizational concepts		
● Course Objectives: The objectives of the course are 1. To introduce the concepts and methodologies of project management in engineering and business sectors. 2. To develop skills for project planning, scheduling, monitoring, and control. 3. To understand financial and risk aspects associated with project management. 4. To provide knowledge about entrepreneurship and business planning. 5. To enable students to prepare and evaluate comprehensive business plans.		
● Course Outcomes: After successful completion of course, students will be able to: CO1: Explain the fundamentals, life cycle, and organizational aspects of project management. CO2: Apply project planning and scheduling techniques such as WBS, CPM, and PERT. CO3: Analyze project costs, budgeting methods, and risk management strategies. CO4: Identify business opportunities and develop feasible business models. CO5: Prepare and evaluate a complete business plan for new ventures or engineering projects.		
● Course Contents:		
Unit I	Introduction to Project Management	6 Hours
Definition and characteristics of a project, Concept and importance of project management, Types of projects (engineering, infrastructure, IT, industrial), Project life cycle: initiation, planning, execution, monitoring, and closure, Project stakeholders and their roles, Project management knowledge areas, Role and responsibilities of a project manager, Organizational structures for project management (functional, matrix, projectized), Overview of project management tools and techniques.		
Unit II	Project Planning and Scheduling	6 Hours
Project planning process, Work Breakdown Structure (WBS) and task identification, Activity sequencing and dependency relationships, Project scheduling techniques, Gantt charts and milestone charts, Network diagrams and project network analysis, Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), Resource allocation and resource levelling, Project scheduling software tools overview		
Unit III	Project Cost & Risk Management	6 Hours
Project cost estimation techniques, Budget preparation and financial planning, Project financing and funding sources, Cost control and cost performance monitoring, Earned Value Management (EVM) concept, Risk identification and classification, Risk assessment and analysis methods, Risk mitigation and contingency planning, Quality management in projects, Project monitoring, evaluation, and control techniques		
Unit IV	Business Planning and Entrepreneurship	6 Hours
Introduction to entrepreneurship and innovation, Characteristics of successful entrepreneurs, Identification of business opportunities, Business idea generation and screening, Feasibility analysis (technical, economic, market feasibility), Market research and demand analysis, Product and service planning, Business model development, Legal requirements and regulatory framework for starting a business		
Unit V	Business Plan Preparation and Evaluation	6 Hours
Structure and components of a business plan, Executive summary preparation, Marketing plan and competitive analysis, Operations and production planning, financial planning (cost, revenue, profit projections), Break-even analysis and financial feasibility, Funding sources and venture capital, Business		

plan presentation and pitching, Evaluation of business proposals, Case studies of successful startups and business ventures

- **Course activities for term work evaluation:**

1. **Project Planning and Scheduling Activity**

Students prepare a Work Breakdown Structure (WBS), Gantt chart, network diagram, and project schedule for a small engineering or business project using practical examples.

2. **Case Study on Project Management and Risk Analysis**

Students analyze real-life engineering or business projects focusing on project planning, cost estimation, risk management, delays, and corrective actions.

3. **Hands-on Activity using Project Management Tools**

Students use project planning tools/software to perform CPM, PERT, resource allocation, scheduling, and project tracking activities.

4. **Business Plan Development and Presentation**

Students prepare and present a business plan including market analysis, feasibility study, budgeting, marketing strategy, and financial projections.

5. **Mini Project on Entrepreneurship and Business Feasibility**

Students identify a startup/business idea and conduct feasibility analysis covering technical, economic, operational, and financial aspects.

- **Textbooks:**

1. Project Management: A Managerial Approach – Jack R. Meredith, Samuel J. Mantel Jr., Scott M. Shafer, John Wiley & Sons, 9th / 10th / 11th Edition,
2. Project Management in Practice – Jack R. Meredith, Samuel J. Mantel Jr., Scott M. Shafer, Margaret M. Sutton, John Wiley & Sons, 6th / 7th Edition, Year: 2020

- **Reference Books:**

1. Project Management: A Systems Approach to Planning, Scheduling, and Controlling –: Harold Kerzner
Publisher: John Wiley & Sons, 12th Edition, 2017.
2. Operations Management – William J. Stevenson, Publisher: McGraw-Hill Education, Edition: 13th Edition.
3. Business Plan Preparation: Entrepreneurship Development –, S. S. Khanka Publisher: S. Chand Publishing.
4. Entrepreneurship Development and Small Business Enterprises –: Poornima M. Charantimath
Publisher: Pearson Education.

- **MOOC / NPTEL Courses/Online Resources:**

1. Introduction to Project Management: Principles & Practices By Dr. Nimisha Singh, Quality Council of India: https://onlinecourses.swayam2.ac.in/e-learning/preview/imb25_mg80
2. Business Planning and Project Management by Dr. Ravi Ahuja, SPPU, Pune: https://onlinecourses.swayam2.ac.in/e-learning/preview/cec23_mg06
3. Project Management By Prof. Ramesh Anbanandam, IIT Roorkee: https://onlinecourses.nptel.ac.in/e-learning/preview/noc24_mg01
4. Project Management: Planning, Execution, Evaluation and Control by Prof. Sanjib Chowdhury, IIT Kharagpur: https://onlinecourses.nptel.ac.in/e-learning/preview/noc24_mg78
5. Project Planning & Control, By Prof. Koshy Varghese, IIT Madras: https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_ce91

Course: Financial Management for Engineers			Code: 25HSM201D	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Tutorial	02	02	TW	50

● Prerequisites: Basic knowledge of Engineering Mathematics, Fundamentals of Economics and Accounting, Analytical and quantitative reasoning skills		
● Course Objectives: The objectives of the course are 1. To introduce the principles and scope of financial management for engineering professionals 2. To enable students to interpret and analyze financial statements. 3. To develop ability to evaluate engineering investments using capital budgeting techniques. 4. To understand cost of capital and financing decisions in organizations. 5. To apply financial tools for techno-economic evaluation of engineering projects.		
● Course Outcomes: At the end of the course, students will be able to: CO1: Understand fundamental concepts of financial management and its role in engineering organizations. CO2: Analyze financial statements and evaluate financial performance. CO3: Apply capital budgeting methods for evaluating engineering investment decisions. CO4: Evaluate cost of capital and capital structure decisions. CO5: Apply working capital and financial planning concepts for engineering projects.		
● Course Contents:		
Unit I	Introduction to Financial Management	6 Hours
Role and scope of financial management in engineering organizations, Financial environment, financial markets and institutions, Time value of money: present value, future value, annuity concepts Financial statements: balance sheet, income statement and cash flow statement, Ratio analysis and financial performance indicators		
Unit II	Cost of Capital and Capital Structure	6 Hours
Concept and importance of cost of capital, Cost of debt, equity and preference capital, Weighted average cost of capital (WACC), Capital structure theories: Net income approach, Net operating income approach, Modigliani–Miller theory, Leverage analysis: operating leverage, financial leverage and combined leverage		
Unit III	Capital Budgeting	6 Hours
Nature and significance of capital budgeting, Cash flow estimation for engineering projects, Investment evaluation methods: Payback period, accounting rate of return, Discounted cash flow methods: Net present value (NPV), Internal rate of return (IRR), Profitability index, Risk and uncertainty in capital budgeting		
Unit IV	Working Capital Management	6 Hours
Concept and importance of working capital, Operating cycle and cash conversion cycle, Management of cash, receivables and inventory, Short term financing sources, Working capital policies and risk–return trade-off		
Unit V	Financial Decision Making in Engineering Projects	6 Hours
Techno-economic feasibility analysis, Project financing and financial planning, Budgeting and cost control techniques, Break-even analysis and sensitivity analysis, Introduction to financial modelling using spreadsheets		
● Course activities for term work evaluation: 1. Financial Statement Analysis Activity Students analyze balance sheets, income statements, and cash flow statements of companies and interpret financial performance using ratio analysis. 2. Case Study on Capital Budgeting Decisions		

Students evaluate engineering investment projects using Payback Period, NPV, IRR, and Profitability Index methods and recommend suitable decisions. 3. Hands-on Activity using Financial Spreadsheet Tools Students perform budgeting, break-even analysis, sensitivity analysis, and financial modelling using spreadsheet software. 4. Mini Project on Working Capital Management Students study working capital practices of an industry or business and prepare a report on inventory, receivables, cash management, and short-term financing. 5. Presentation on Financial Decision Making in Engineering Projects Students prepare and present techno-economic feasibility analysis, project financing methods, cost control strategies, and risk-return evaluation for engineering projects.
● Textbooks: 1. Prasanna Chandra – Financial Management: Theory and Practice, McGraw Hill. 2. I. M. Pandey – Financial Management, Vikas Publishing. 3. Eugene F. Brigham and Michael C. Ehrhardt – Financial Management: Theory & Practice, Cengage Learning.
● Reference Books: 1. Brealey, Myers and Allen – Principles of Corporate Finance, McGraw Hill. 2. Van Horne & Wachowicz – Fundamentals of Financial Management, Pearson. 3. Jonathan Berk and Peter DeMarzo – Corporate Finance, Pearson. 4. Ross, Westerfield and Jordan – Fundamentals of Corporate Finance, McGraw Hill.
● MOOC / NPTEL Courses/Online Resources: 1. Financial Management for Managers by Prof. Anil K. Sharma, IIT Roorkee : https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_mg31 2. Corporate Finance by Prof. Abhijeet Chandra, IIT Kharagpur: https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_mg93 3. Foundations of Accounting & Finance By Prof. Arun Kumar Gopalaswamy, IIT Madras: https://onlinecourses.nptel.ac.in/e-learning/preview/noc24_ec01 4. Working Capital Management By Prof. Anil K. Sharma, IIT Roorkee: https://onlinecourses.nptel.ac.in/e-learning/preview/noc19_mg40 5. Engineering Economic Analysis By Prof. Pradeep Kumar Jha, IIT Roorkee: https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_me98

Course: Universal Human Values			Code: 25VEC201	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Tutorial	02	02	TW	50
● Prerequisites: The course requires openness to self-reflection and willingness to understand ethical and value-based perspectives in personal and professional life.				
● Course Objectives: 1. To help students understand the importance of human values in personal and professional life. 2. To develop ethical awareness and responsible decision-making. 3. To create harmony between individual, society, and nature. 4. To encourage engineers to contribute towards sustainable and value-based development.				
● Course Outcomes: At the end of the course, students will be able to - CO1: Explain the concept of human values and self-exploration, and recognize their importance in personal life, professional life, and the role of engineers in society. - CO2: Understand the importance of sustainable development, environmental responsibility, and ecological balance, and evaluate the impact of technology on society and nature. - CO3: Apply values such as trust, respect, empathy, and responsibility to maintain harmony in family and society and practice ethical behavior in social interactions. - CO4: Demonstrate professional ethics, value-based decision making, leadership, and teamwork in engineering practice for the welfare of society. - CO5: Understand the relationship between self and body, differentiate their needs, and develop self-awareness and balanced lifestyle practices for personal well-being.				
● Course Contents:				
Unit I	Introduction to Human Values			6 Hours
Meaning and importance of human values, Basic needs of values, need for value based education in Engineering, Types of Human Values, Importance of human values to full fill happy and successful life, Values in personal life and professional life,, Factors affecting human values- Cultural, societal factors, personal factors , experiences, Concept of self-exploration, How to cultivate both values and skill in person’s life that navigate him to face life’s challenges and opportunities, Role of Engineer in society. Technology and values.				
Unit II	Harmony in Nature			6 Hours
Understanding of harmony in Nature, Four orders of nature, Physical, Bio, Animal, Human order, interconnectedness and mutual fulfilment among four orders. Basic characteristic of nature, perseverance, bravery, Generosity, recyclability and self-regulation in nature, Holistic perception of harmony at all levels of existence, human being as a cause of imbalance in nature-pollution, depletion of resources, and role of technology in nature. Understanding existence of human being as a co-existence of mutually interacting units -in all pervasive space. Sustainable development, Environmental responsibility, Resource conservation, Ecological balance, Technology and its impact on society.				
Unit III	Harmony in Family and Society			6 Hours
Family as the basic unit of society: role of family in developing values, mutual understanding, and responsibility. Values in relationships: trust, respect, affection, care, guidance, and gratitude in maintaining harmony in family and society. Ethical behaviour in society: honesty, responsibility, empathy, cooperation, and respect for diversity in social interactions.				
Social harmony and responsible citizenship: duties and responsibilities of individuals towards society and community. Professional ethics and social responsibility: role of engineers and professionals in promoting ethical practices and sustainable development. Role of values in building a harmonious society: importance of value-based decision making in personal, social, and professional life.				

Unit IV	Holistic Development and Professional Ethics	6 Hours
Holistic approach to life and education: integration of intellectual, emotional, ethical, and social development for balanced personal and professional growth. Human values and ethical principles: understanding honesty, integrity, empathy, responsibility, and respect in personal and social life. Professional ethics: ethical conduct in professional practice, integrity in work, accountability, and commitment to societal welfare. Ethical decision making: identifying ethical dilemmas and applying value-based reasoning in professional situations. Social and environmental responsibility of professionals: contribution of engineers and professionals towards sustainable development and societal well-being. Role of values in leadership and teamwork: importance of trust, cooperation, and ethical behaviour in professional environments.		
Unit V	Harmony Between Self and Body	6 Hours
Understanding the Self and the Body: distinction between the conscious self (I) and the physical body. Self-body coexistence: relationship between the self as the experiencer and the body as the instrument of action. Needs of the self and the body: physical needs (food, rest, health) and psychological needs (happiness, values, purpose). Harmony in the individual: maintaining balance between mental well-being and physical health through responsible living. Role of self-awareness and self-regulation: understanding thoughts, emotions, and behaviour for a balanced life. Importance of healthy lifestyle: discipline, proper habits, and value-based living for overall well-being.		
● Textbooks: 1. R. R. Gaur, R. Sangal, and G. P. Bagaria, A Foundation Course in Human Values and Professional Ethics, Excel Books, New Delhi. 2. R. R. Gaur, R. Sangal, and G. P. Bagaria, Universal Human Values – Understanding Harmony AICTE / Excel Books.		
● Reference Books: 1. Mike W. Martin and Roland Schinzinger, Ethics in Engineering McGraw Hill. 2. Charles B. Fleddermann, Engineering Ethics Pearson.		
● MOOC / NPTEL Courses: 1. Exploring Human Values – Visions of Happiness and Perfect Society by Prof. A. K. Sharma, IIT Kanpur: https://nptel.ac.in/courses/109104068 2. Moral Thinking – An Introduction to Values and Ethics by Prof. Vineet Sahu, IIT Kanpur: https://onlinecourses.nptel.ac.in/e-learning/preview/noc24_hs169 3. Human Values and Professional Ethics By Dr. Kounsar Jan, Deptt of education University of Kashmir: https://onlinecourses.swayam2.ac.in/e-learning/preview/imb26_mg125 4. Universal Human Values by Reliance Foundation Skilling Academy: https://www.skillindiadigital.gov.in/courses/detail/d7db86f0-d2d8-42aa-a8c0-502467563b5a		
● Activities for term work Evaluation: 1. Group Discussion on Human Values and Ethics 2. Case Study Analysis on Ethical Issues in Society and Profession 3. Reflective Journal Writing on Self-Development and Values 4. Role Play / Skit on Social Responsibility and Moral Values		

5. Debate on Contemporary Ethical and Social Issues
6. Community Service / Social Outreach Activity Report
7. Seminar / Presentation on Professional Ethics and Leadership
8. Essay Writing on Family Values, Harmony, and Responsibility
9. Participation in Workshops, Expert Talks, and Value-Based Activities

Course: Community Engagement Project			Code: 25CVELC201	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Practical	02	01	TW	25

Prerequisites: Basic knowledge of civil engineering and environmental issues, Understanding of community infrastructure and public utilities, Interest in field-based learning and social engagement

- **Course Objectives:** This course aims at enabling students,
 1. Develop understanding of community needs related to civil infrastructure and environmental management.
 2. Enable students to conduct field surveys and collect engineering-related data from local communities.
 3. Apply civil engineering principles to identify, analyze, and propose practical solutions for local problems.
 4. Promote social responsibility, teamwork, communication, and leadership skills.
 5. Evaluate the effectiveness of proposed interventions and suggest sustainable development measures.

- **Course Outcomes:** At the end of the course, students will be able to:
 1. Identify and analyze community infrastructure needs through field investigations and stakeholder interaction.
 2. Conduct engineering surveys, collect and interpret field data, and prepare technical reports.
 3. Propose feasible and sustainable solutions for community problems using civil engineering principles.
 4. Demonstrate teamwork, communication, and community engagement skills.
 5. Evaluate project outcomes and recommend improvements for long-term community development.

- **Guidelines:**
 1. Students shall work individually or in groups of 3–4.
 2. Each group shall be allotted a village, municipal ward, educational campus, or nearby community.
 3. A faculty mentor shall guide the project.
 4. Students shall maintain a field diary and survey records.
 5. The project shall involve at least one field activity.
 6. Final report and presentation are mandatory.

Suggested Community Engagement Activities:

Module 1: Community Need Assessment and Field Survey

- Reconnaissance survey of village/urban area
- Stakeholder interaction and problem identification
- Preparation of base map and location map
- Household survey and infrastructure inventory
- Questionnaire design and data collection

Field Survey Components:

- Water supply survey
- Sanitation and drainage survey
- Road condition survey
- Traffic volume survey
- Solid waste management survey

- Public building condition survey
- Rainwater harvesting potential survey

Module 2: Infrastructure and Environmental Assessment

- Assessment of drinking water facilities
- Survey of drainage and wastewater disposal systems
- Identification of waterlogging and flooding locations
- Study of solid waste generation and disposal methods
- Environmental cleanliness assessment

Module 3: Civil Engineering Intervention Projects

Any one of the following:

- Rainwater harvesting awareness and feasibility study
- Campus water audit
- Road safety audit near schools and colleges
- Drainage improvement study
- Solid waste segregation campaign
- Tree plantation and green campus development
- Accessible infrastructure assessment for elderly and disabled persons
- Rural road condition assessment
- Village infrastructure mapping
- Pond/lake rejuvenation feasibility study

Module 4: Data Analysis and Solution Development

- Preparation of survey database
- Mapping using GIS/Google Maps
- Statistical analysis of collected data
- Identification of engineering solutions
- Cost estimation of proposed interventions

Module 5: Reporting and Community Awareness

- Preparation of technical report
- Community awareness campaign
- Poster presentation
- Project outcome assessment
- Feedback collection and recommendations
- Assessment Scheme (25 Marks)

Field Survey and Data Collection – 08 Marks

Community Interaction and Participation – 05 Marks

Technical Report – 07 Marks

Presentation and Viva – 05 Marks

● **Textbooks:**

1. Beckman, M. and Long, J. F., Community-Based Research: Teaching for Community Impact, Stylus Publishing.
2. K. N. Duggal, Elements of Environmental Engineering, S. Chand Publications.
3. B. C. Punmia, Ashok Jain and Arun Jain, Environmental Engineering, Laxmi Publications.

● **Reference Books:**

1. Service-Learning: A Guide to Planning, Implementing, and Assessing Student Projects – Waterman A.
2. Community-Based Research: Teaching for Community Impact – Beckman and Long.
3. Rural Development and Planning – Government of India Publications.
4. Environmental Engineering and Community Health – Relevant Civil Engineering References.

● **MOOC / NPTEL Courses:**

1. Exploring Human Values – Visions of Happiness and Perfect Society – <https://nptel.ac.in/courses/109104068>
2. Moral Thinking: An Introduction to Values and Ethics - <https://onlinecourses.nptel.ac.in>
3. Ecology and Society - https://onlinecourses.nptel.ac.in/noc20_hs77
4. UNESCO – Education for Sustainable Development

SEMESTER-IV

Course: Mathematical Methods for Civil Engineering			Code: 25CVCC204	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50

- **Prerequisites:** Basic knowledge of differential equations, matrices, and calculus from Engineering Mathematics I & II.

- **Course Objectives:**

1. To equip civil engineering students with essential mathematical tools required for modelling and solving real-world engineering problems.
2. To focus on differential equations, Laplace transforms, probability and statistics, numerical methods, and partial differential equations, emphasizing their applications in structural analysis, fluid mechanics, and other civil engineering domains.

- **Course Outcomes:** At the end of the course, students will be able to:

1. Solve higher-order differential equations and apply them to structural and fluid flow problems.
2. Use Laplace transform techniques to analyze dynamic systems and structural responses.
3. Apply probability and statistical methods for data analysis in civil engineering applications.
4. Implement numerical methods to obtain approximate solutions for complex engineering problems.
5. Model and solve physical phenomena such as heat transfer and wave propagation using partial differential equations.

- **Course Contents:**

Unit I	Linear Differential Equations	06 Hours
Higher order linear differential equations with constant coefficients, Method of variation of parameters, Cauchy differential equations, Applications to: Beam deflection problems, Structural vibration (basic models), Fluid flow problems.		
Unit II	Laplace Transform	06 Hours
Laplace transforms of standard functions, Properties of Laplace transforms, Inverse Laplace transforms, Solution of linear differential equations using Laplace transform, Applications to: Structural response, Mechanical and damping systems.		
Unit III	Probability & Statistics	06 Hours
Random variables, Probability distributions (Binomial, Poisson, Normal), Mean and variance, Correlation and regression, Basic reliability concepts, Applications to: Rainfall modelling, Load analysis, Quality control.		
Unit IV	Numerical Methods	06 Hours
Solution of algebraic equations (Gauss Seidal, Gauss Jordan), Numerical Integration, Numerical solution of		

ODE (Euler / Runge–Kutta method), Application in Engineering.		
Unit V	Applications of Partial Differential Equations	06 Hours
Applications of PDE to: One-dimensional wave equation, Heat conduction, Laplace equation.		

Continuous Comprehensive Assessment (Any Two)		20 marks
CCA1	List of Course Activity	10 marks
	Application Based Course Activities (any one) Analysis of Beam Deflection Using Differential Equations - Model simply supported and cantilever beams under different loading conditions. Vibration Analysis of a Single Degree of Freedom Structural System - Mathematical modelling using second-order differential equations and Laplace transforms. Rainfall Data Analysis Using Probability Distributions - Fit Normal, Poisson, or Binomial distributions to rainfall records and interpret results. Numerical Solution of Open Channel Flow Problems - Apply Euler or Runge-Kutta methods to solve governing differential equations. Temperature Distribution in a Concrete Wall - Study one-dimensional heat conduction using partial differential equations.	
CCA2	Case Study	10 marks
	List of Case Studies Failure of a Beam Due to Excessive Deflection - Mathematical analysis of beam deformation and design implications. Structural Response of Buildings During Earthquakes - Application of differential equations and damping models in vibration analysis. Flood Frequency Analysis of a River Basin - Use probability and statistics for estimating return periods of extreme rainfall events. Numerical Analysis in the Design of Water Distribution Networks - Application of iterative numerical methods for solving engineering equations. Heat Transfer in Massive Concrete Structures - Mathematical modelling of temperature gradients and cracking prevention.	
CCA 3	Seminar	10 marks
	Role of Laplace Transform in Civil Engineering Systems - Applications in structural dynamics and control systems. Modern Applications of Numerical Methods in Civil Engineering - FEM, CFD, and computer-aided engineering analysis. Probability-Based Design and Reliability of Structures - Reliability concepts and risk assessment in structural engineering. Applications of Partial Differential Equations in Infrastructure Engineering - Heat transfer, groundwater flow, and vibration problems. Mathematical Modelling in Smart and Sustainable Civil Engineering - Use of mathematical tools for sustainable infrastructure planning.	

● **Textbooks:**

1. B. S. Grewal – Higher Engineering Mathematics
2. Erwin Kreyszig – Advanced Engineering Mathematics
3. S. S. Sastry – Introductory Methods of Numerical Analysis

● **Reference Books:**

1. S. C. Chapra & R. Canale – *Numerical Methods for Engineers*
2. R. K. Jain & S. R. K. Iyengar – Advanced Engineering Mathematics
3. Sheldon M. Ross – Introduction to Probability and Statistics for Engineers and Scientists
4. M. D. Raisinghania – Ordinary and Partial Differential Equations

● **MOOC / NPTEL Courses:**

1. Advanced Engineering Mathematics, IIT Roorkee - <https://nptel.ac.in/courses/111107119>
2. Probability and Statistics, IIT Kharagpur - https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_ma74
3. Laplace Transform - https://onlinecourses.nptel.ac.in/e-learning/preview/noc23_ma54
4. Numerical methods - https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_ma45

Course: Structural Analysis			Code: 25CVPPCC205	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50
Tutorial	01	01	TW	25

- **Prerequisites:** Fundamentals of Physics, Mathematics, Engineering Mechanics and Mechanics of Structures

- **Course Objectives:** This course aims at enabling students,
 1. This subject will build on the concepts from Engineering Mechanics and Mechanics of Structures.
 2. This will create a foundation for analyzing real life structures by imparting knowledge about various methods involved in the analysis of indeterminate structures.

Course Outcomes: At the end of the course, students will be able to:

1. Understand the basic concept of static and kinematic indeterminacy and analysis of indeterminate beams.
2. Analyze redundant trusses and able to perform approximate analysis of multi-story multi-bay frames.
3. Implement application of the deflection methods to beams and portal frames.
4. Analyze beams and portal frames using moment distribution method.

- **Course Contents:**

Unit I	Fundamentals of structure and analysis of redundant beams.	08 Hours
Types and classification of structures based on structural forms, concept of indeterminacy: static and kinematic indeterminacy. Analysis of propped cantilever, fixed beam and continuous beams within determinacy up to second degree by consistent deformation method.		
Unit II	Analysis of Redundant Frames	08 Hours
Analysis of redundant trusses by unit load method for external loading, lack of fit, sinking of support and temperature changes (indeterminacy up to second degree). Approximate methods of analysis of upto two-storied two-bay, 2-D rigid jointed frames by Cantilever and Portal method		
Unit III	Displacement Methods	08 Hours
a) Slope Deflection method: Slope-deflection equations, equilibrium equation of slope-deflection method, application of slope deflection method to beams with and without joint translation and rotation, yielding of support, application to non-sway rigid jointed rectangular portal frames. Sway analysis of rigid jointed portal frames (Involving not more than three unknowns). b) Stiffness method: Fundamental concepts of matrix methods: flexibility and stiffness. Stiffness method of analysis: Structure approach & Member approach. Application to beams by structure approach (Involving not more than two unknowns).		
Unit IV	Moment Distribution Method	08 Hours

Stiffness factor, carry over factor, distribution factor, application of moment distribution method to beams with and without joint translation and yielding of support. Application to non-sway rigid jointed rectangular portal frames.

Sway analysis of rigid jointed portal frames (Involving not more than three unknowns).

Continuous Comprehensive Assessment (CCA1 compulsory and any one from CCA2 & CCA3)		20 marks
CCA1	❖ Analysis of sway frame problem from unit 3 or unit 4 manually Note: Every student shall have different problem	10 marks
CCA2	❖ Validate the above problem by any of the software	10 marks
CCA 3	Presentation on any of the software available for the analysis. Prepare a small model of truss and frame and analyze it	10 marks

● **Textbooks:**

1. Theory of Structures by S. Ramamrutham and R. Narayan, Dhanpat Rai Publishing Company (P) Ltd.
2. Structural Analysis-I & II by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd.
3. Structural Analysis: A Matrix Approach by G.S.Pandit and S. P. Gupta, Tata McGraw Hill Education Pvt. Limited.

● **Reference Books:**

1. Intermediate Structural Analysis by C. K. Wang, Tata McGraw Hill Education Pvt. Ltd.
2. Mechanics of Structures Vol. II (Theory and Analysis of Structures) by Dr. H. J. Shah and S.B. Junnarkar, Charotar Publishing House Pvt. Ltd.
3. Basic Structural Analysis by C. S. Reddy, Tata McGraw Hill Education Pvt. Ltd.
4. Structural Analysis by R. C. Hibbler, Pearson Education.
5. The Plastic Methods of Structural Analysis by B. G. Neal, Chapman & Hall.
6. Structural Analysis by Aslam Kassimali, Cengage Learning India Private Limited
7. Matrix Analysis of Framed Structures by William Weaver Jr. and James M. Gere, Springer US.

● **MOOC / NPTEL Courses:**

1. Structural Analysis I - <https://nptel.ac.in/courses/105101085>
2. Structural Analysis II - <https://nptel.ac.in/courses/105101086>
3. Matrix method of Structural Analysis - <https://nptel.ac.in/courses/105105180>

Course: Structural Analysis Tutorial:

The Term work shall consist of the following

1. Every student should solve at least five problems on each unit covering all the topics listed in syllabus.
2. Students should solve a minimum of five problems on Plastic Modulus of Section, Plastic Moment, and Shape Factor.

Course: Surveying			Code: 25CVPCC206	
Teaching Scheme(Hrs./Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50

● **Prerequisites:** Basics of Physics and Mathematics

● **Course Objectives:** This course aims at enabling students,

1. Understand the basics of plane and geodetic surveying, including principles like working from "whole to part".
2. Utilize, set up, and calibrate instruments such as tapes, chains, compasses, levels, theodolites, and total stations.
3. Apply surveying data to set out centerlines for construction, such as roads, railways, and pipelines.
4. Measure horizontal distances, vertical elevations, and angles to compute areas, volumes, and coordinates.

● **Course Outcomes:** At the end of the course, students will be able to:

1. Explain surveying principles and operation of Prismatic Compass, Plane table.
2. Describe the leveling operations and basics of contouring.
3. Implement setting out curves, centerline of bridges, foundation for buildings, transferring surface levels underground.
4. Explain working of modern surveying instruments like total station and GPS.

● **Course Contents:**

Unit I	Fundamentals of Conventional Surveying	08 Hours
Definition – Classifications – Basic principles – Equipment and accessories for ranging and chaining– Methods of ranging – Well conditioned triangles – Chain traversing – Compass – Basic principles– Types – Bearing – System and conversions – Sources of errors and Local attraction – Magnetic declination – Dip – compass traversing – Level line – Horizontal line – Datum – Benchmarks – Levels and staves – Temporary and permanent adjustments – Curvature and refraction Correction		
Unit II	Theodolite Surveying	08 Hours
Horizontal and vertical angle measurements – Temporary and permanent adjustments – Heights and distances – Tacheometric surveying – Stadia Tacheometry – Tangential Tacheometry –Trigonometric leveling – Tacheometric Contouring		
Unit III	Curves, Construction Survey And Earthwork Measurement	08 Hours
Curves – Simple, Compound, Reverse, Transition and Vertical Curves : Elements, methods, setting out curves; Setting out of buildings, Setting out of a bridge-Determination of the length of central line and location of the piers, Setting out of a tunnel- Surface setting out and transferring the alignment underground; Measurement of areas, volumes, Quantity computations		
Unit IV	Modern Surveying	08 Hours
Total Station: Digital Theodolite, EDM, Electronic field book – Advantages – Parts and accessories– Working principle – Observables – Errors – COGO functions – Field procedure and applications.GPS: Advantages – System components – Signal structure – Selective availability and anti-spoofing receiver components and antenna – Planning and data acquisition – Data processing – Errors in GPS – Field procedure and applications		

Continuous Comprehensive Assessment (Any 2)		20 marks
CCA 1	List of Course activity (Any two)	10 marks
	Application based course activities (Any One) 1. Automating survey data processing and generating digital elevation models (DEM) from raw site data 2. To generate high-precision, AI-optimized contour maps and 3D terrain models from raw field survey data, reducing manual plotting time and enhancing accuracy. 3. To generate terrain models, align roads, and calculate cut-and-fill volumes 4. Utilize AI tools to analyse 3D model and orthomosaic map.	
CCA 2	Case Study	10 marks
	List of Case Studies (Any One) 1. Mapping heavily vegetated river bank for Civil Engineering design. 2. Engineering survey for highway alignment 3. Detailed topographic survey of dam site and create a contour map to visualize land surfaces.	
CCA 3	Seminar	10 marks
	Any topic from Unit 1 to 4	

● **Textbooks:**

1. Dr. B. C. Punmia, Ashok K. Jain and Arun K Jain, Surveying Vol. I & II, Lakshmi Publications Pvt. Ltd. New Delhi 16th edition, 2016.
2. T. P. Kanetkar and S. V. Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Pune 2008.

● **Reference Books:**

1. R. Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
2. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, McGraw hill 2001.
3. Bannister and S. Raymond, Surveying, Seventh Edition, Longman 2004.
4. S. K. Roy, Fundamentals of Surveying, Second Edition, Prentice Hall of India 2010.
5. K. R. Arora, Surveying Vol I & II, Standard Book house, Twelfth Edition 2013.
6. C. Venkatramaiah, Textbook of Surveying, Universities Press, Second Edition, 2011.

● **MOOC / NPTEL Courses:**

1. Introduction to surveying - <https://nptel.ac.in/courses/105107122>
2. Surveying - <https://nptel.ac.in/courses/105104101>
3. GPS Surveying - https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_ce51
4. Digital Land Surveying And Mapping (DLS&M) - https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_ce18

Course: Hydrology and Water Resource Engineering			Code: 25CVPPCC207	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50
Tutorial	01	01	TW	25

Prerequisites: Fundamentals of Fluid Mechanics

● **Course Objectives:**

1. To introduce students to different government organizations and make them aware about precipitation, runoff, runoff hydrographs and streams gauging.
2. To introduce the concept of reservoir planning, capacity of reservoir, economics of reservoir, floods, hydrologic routing and use of Q-GIS software in hydrology.
3. To impart knowledge of irrigation, crop water requirement, canal distribution network, piped distribution network, revenue collection, ground water hydrology, water logging, and drainage and water management.

● **Course Outcomes:** At the end of the course, students will be able to:

1. Understand government organizations, apply & analyze precipitation & its abstractions.
2. Understand, apply & analyze runoff, runoff hydrographs and floods, hydrologic routing
3. Understand, apply & analyze reservoir planning, capacity of reservoir & reservoir economics.
4. Understand water logging & water management, apply & analyze ground water hydrology, irrigation, piped distribution network.

● **Course Contents:**

Unit I	Introduction to Hydrology	08 Hours
Introduction: Hydrological cycle, applications of hydrology, brief introduction of government organizations like IMD, CWPRS, MERI, CDO, Hydrology Project Division, NIH, CWC. Precipitation: Types & forms of precipitation, precipitation measurement, rain gauge network, introduction to real time data transmission weather station and climate change. Consistency test, presentation of rainfall data, mass rainfall curves, hyetograph, point rainfall, mean precipitation over an area, arithmetic mean method, Thiessen's polygon, isohyetal method, concepts of depth-area-duration analysis, frequency analysis, frequency of point rainfall, intensity-duration curves, maximum intensity-duration. Abstractions of precipitation: interception, depression storage, evaporation- elementary concepts, factors affecting, measurement of evaporation, transpiration, evapotranspiration, modified Penman method,- process and measurement, infiltration: introduction, infiltration capacity, infiltrometer, Horton's method and infiltration indices.		
Unit II	Runoff & Floods	08 Hours
Introduction, factors affecting runoff, rainfall-runoff relationships and empirical techniques to determine runoff, Runoff hydrograph: Introduction, factors affecting flood hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph theory, S-curve hydrograph, uses and limitations of unit hydrograph, synthetic hydrograph (no numerical on synthetic hydrograph). Floods: Estimation of peak flow, rational formula and other methods, flood frequency analysis, design floods, brief introduction of hydrologic design of culverts and bridges. Hydrologic flood routing: Muskingum method, Q-GIS software application in hydrology (watershed delineation).		
Unit III	Reservoir Planning	08 Hours

Introduction, term related to reservoir planning (yield, reservoir planning and operation curves, reservoir storage, reservoir clearance), investigation for reservoir planning, significance of mass curve and demand curves, applications of mass curve and demand curves, fixation of reservoir capacity from annual inflow and outflow, fixation of reservoir capacity using elevation capacity curve and dependable yield, reservoir losses, reservoir sedimentation- Phenomenon, measures to control reservoir sedimentation, density currents Significance of trap efficiency, useful life of reservoir, costs of reservoir, apportionment of total cost, use of facilities method, equal apportionment method, alternative justifiable expenditure method. (no numerical on cost-economics).		
Unit IV	Ground Water Hydrology & Introduction to Irrigation	08 Hours
Occurrence and distribution of ground water, specific yield of aquifers, movement of ground water, Darcy's law, permeability, safe yield of basin, hydraulics of wells under steady flow condition in confined and unconfined aquifers, specific capacity of well, tube wells, open wells and their construction. Definition, functions, advantages and necessity, methods of irrigation, surface irrigation, subsurface irrigation, micro-irrigation, Water requirements of crops: Soil moisture and crop water relationship, consumptive use of water, principal Indian crops, crop seasons, crop water requirement: crop planning, agricultural practices, calculations of canal and reservoir capacities – duty, delta, irrigation efficiency, Piped distribution network for irrigation (PDN), Introduction, advantages and disadvantages of PDN over conventional canal distribution network and its application.		

Continuous Comprehensive Assessment (Any Two)		20 marks
CCA1	List of Course Activity: (any one)	10 marks
	1. Analysis of Average Annual Rainfall - Study the average annual rainfall of India through map. Prepare the detailed tabulated comparison on the basis of State, Union Territories, NCR. Compare the last 05-year data of average rainfall through any software. 2. Overview of Toposheet - Demarcation and Measurement of Catchment Area & Watershed Area on Toposheet. (any 04 Dam Location) by use of Digital Planimeter or any relevant tool. 3. Analysis of Rainfall Data through Mahrain Portal or WRIS Portal - Graphical comparison of Maharashtra State region for Metrological parameters like Rainfall, Runoff, Ground water etc 4. Mini Project Report - Mini Project by use of any software on Digital Delineation & Hydrologic Design of an Automated Watershed Management System for any G+2 residential building.	
CCA2	Case Study based Report Writing: (any one)	10 marks
	Topic 1: Diagnostic Analysis of a Historical Urban Flash Flood Event - Students analyze a famous, high-intensity urban flooding event (e.g., The 2005 Mumbai Floods, The 2015 Chennai Floods or a recent major storm event in your region) Topic 2: Reservoir Capacity Optimization & Operation Policy Under Drought - Focus on a major multi-purpose reservoir facing competing water demands (e.g., The Koyna Dam, The Jayakwadi Dam) Topic 3: Groundwater Depletion & Artificial Recharge Well Network Design - Study a heavily exploited unconfined or confined aquifer system facing severe water table drop (e.g., The Indo-Gangetic Basin)	

	Topic 4: Flood Routing and Emergency Spillway Design Assessment Analyze a river basin highly prone to seasonal flooding where a dam's structural integrity or downstream communities are at risk (e.g., The Upper Krishna River Basin & Koyna Dam)	
CCA 3	Presentation/Seminar (Any topic from Unit 1 to Unit 5)	10 marks

● **Textbooks:**

1. Engineering Hydrology, K. Subramanyam, Tata McGraw Hill.
2. Hydrology and Water Resources Engineering, Vol-1, S. K. Garg, Khanna Publishers, New Delhi
3. Irrigation Engineering & Hydraulic Structures, Vol-2, S. K. Garg, Khanna Publishers, New Delhi

● **Reference Books:**

1. A Textbook of Hydrology, Dr. P. Jaya Rami Reddy, USP Publisher.
2. Irrigation, Water Resources and Water Power Engineering, P. N. Modi, Standard Book House.
3. Irrigation and Water power Engineering, Dr. Punmia and Dr. Pande, Standard Publisher
4. Irrigation Engineering, Bharat Singh, Nem Chand & Bros., India
5. Irrigation Engineering, H. M. Raghunath, Wiley
6. Q-GIS for Hydrological Applications: Recipes for Catchment Hydrology and Water Management, Hans Van Der Kwast, Kurt Menke-Locate Press

● **MOOC / NPTEL Courses:**

1. Swayam NPTEL – Engineering Hydrology: https://onlinecourses.nptel.ac.in/e-learning/preview/noc23_ce44
2. Swayam NPTEL – Surface Water Hydrology: https://onlinecourses.nptel.ac.in/e-learning/preview/noc24_ce34
3. Swayam NPTEL – Watershed Hydrology: https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_ag10
4. Swayam NPTEL - Micro Irrigation Engineering - https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_ag11

● **Course: Hydrology and Water Resource Engineering Tutorial**

Term work consists of a journal containing details of assignments and visit report. Term work marks will be based on continuous assessment.

1. Analysis of rainfall data (double mass curve technique/missing rainfall data).
2. Marking catchment area on a topo-sheet and working out average annual precipitation and determining yield by various methods.
3. Video demonstration of suitable software used in water resources department.
4. Frequency analysis (return period, hydrologic event)
5. Determination of peak flood discharge in a basin using unit hydrograph technique.
6. Determination of storage capacity of a reservoir using mass curve of inflow and outflow.
7. Application of open-source GIS software for delineation of catchment/watershed.
8. Measurement of / video demonstration of evaporation by pan evaporimeter
9. Measurement of / video demonstration of infiltration by infiltrometer.
10. Site visit to meteorological station

Course: Programming and Data Wrangling			Code: 25COMDM202A	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50

- **Prerequisites:** Basic knowledge of mathematics (simple calculations, graphs), Basic computer skills (file handling, MS Excel)

- **Course Objectives:** This course aims at enabling students,
 1. Introduce students to Python programming fundamentals.
 2. Develop skills in data handling and data wrangling using Python.
 3. Apply programming concepts to solve civil engineering problems.
 4. Enable students to analyze and visualize data effectively.

- **Course Outcomes:** At the end of the course, students will be able to:
 1. Understand basic Python programming concepts and write simple programs.
 2. Use data structures (lists, dictionaries, etc.) and functions for problem-solving.
 3. Perform data cleaning and manipulation using Python (Pandas).
 4. Analyze and visualize data using basic statistical and graphical methods.
 5. Apply Python-based data analysis to real civil engineering datasets.

- **Course Contents:**

Unit I	Introduction to Python Programming	08 Hours
Introduction to programming and Python basics, Installing Python / using Jupyter Notebook or Google Colab, Variables, data types, and operators, Input and output functions, Control statements: if, if-else, loops (for, while), Basic programs related to civil engineering (area, volume, unit conversions).		
Unit II	Data Structures and Functions	08 Hours
Lists, tuples, sets, and dictionaries, String operations, Functions: definition, arguments, return values, Basic file handling (read/write CSV, text files), Simple programs using civil engineering data (material properties, survey data).		
Unit III	Data Wrangling using Python	08 Hours
Introduction to data wrangling and its importance, Working with datasets (CSV, Excel files), Data cleaning: handling missing values, duplicates, errors, Data transformation and filtering, Introduction to Pandas library, Basic data visualization using Matplotlib, Applications in civil engineering datasets. Basic data visualization using Matplotlib, Applications in civil engineering datasets.		
Unit IV	Data Analysis and Applications in Civil Engineering	08 Hours
Basic data analysis using Pandas, Descriptive statistics (mean, median, etc.), Grouping and summarizing data, Simple visualization (bar chart, line graph, histogram), Case studies in civil engineering: Traffic data analysis Rainfall and hydrology data, Construction cost data, Mini project using real dataset		

Continuous Comprehensive Assessment (Any Two)		20 marks
CCA1	Python Programming Assignment	10 marks

	Title: Development of Basic Python Programs for Civil Engineering Applications Activities (Any One) 1. Area and volume calculations for civil engineering structures. 2. Unit conversion calculator (m–ft., m³–litres, etc.). 3. Concrete mix quantity calculator. 4. Survey data processing using lists and dictionaries.	
CCA2	Data Wrangling and Visualization Project	10 marks
	Title: Analysis of Civil Engineering Dataset using Pandas and Matplotlib Activities (Any One) 1. Rainfall data cleaning and visualization. 2. Traffic volume data analysis. 3. Construction material test data analysis. 4. Water consumption data analysis. Tasks: • Import CSV/Excel data. • Handle missing values and duplicates. • Calculate descriptive statistics. • Create charts (Bar, Line, Histogram).	
CCA 3	Case Study / Seminar Presentation	10 marks
	Title: Applications of Python and Data Analytics in Civil Engineering Suggested Topics: • Data Analytics in Smart Cities • Traffic Data Analysis using Python • Python Applications in Water Resources Engineering • Data Science in Construction Management • Structural Health Monitoring using Data Analytics • BIM and Data Analytics • AI and Machine Learning in Civil Engineering • Digital Twin Technology	

● **Textbooks:**

1. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Jupyter – Wes McKinney
2. Data Wrangling with Python – Jacqueline Kazil & Katharine Jarmul
3. Data Wrangling with Python – Tirthajyoti Sarkar

● **Reference Books:**

1. A Byte of Python – C.H. Swaroop
2. Python Crash Course – Eric Matthes
3. Python Data Science Handbook – Jake VanderPlas
4. Practical Statistics for Data Scientists – Peter Bruce
5. Applied Statistics and Probability for Engineers – Montgomery & Runger

● **MOOC / NPTEL Courses:**

1. Python for Data Science – IIT Madras (NPTEL)
2. Data Analytics with Python – https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_cs45
3. Programming, Data Structures And Algorithms Using Python -
https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cs79
4. Getting Started with Competitive Programming - https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_cs99
5. Business Analytics and Text Mining using Python – <https://nptel.ac.in/courses/110107129>

Course: Leadership and Team Dynamics			Code: 25OEC202A	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50
● Prerequisites: Basic communication and interpersonal skills				
● Course Objectives: The objectives of the course are-				
1. Introduce concepts of leadership, organizational behavior, and group dynamics.				
2. Develop communication, interpersonal, and collaborative leadership skills.				
3. Explain leadership styles, motivation theories, and team processes.				
4. Enhance conflict resolution, negotiation, and decision-making abilities.				
5. Prepare students for leadership roles in multicultural and multidisciplinary organizations				
● Course Outcomes: At the end of the course, students will be able to				
CO 1. Explain leadership theories, organizational behavior, and group dynamics concepts.				
CO 2. Apply communication and interpersonal skills in team environments.				
CO 3. Analyze leadership styles, group processes, and motivational approaches.				
CO 4. Evaluate team effectiveness, conflict management, ethics, and leadership challenges.				
CO 5. Develop leadership strategies for professional and global organizational environments.				
● Course Contents:				
Unit I	Foundations of Leadership and Organizational Behaviour		6 Hours	
Introduction to leadership and team management, Leadership versus management , Leadership myths and leadership development , Organizational behavior fundamentals , Groups and types of groups , Stages of group development , Emotional intelligence and self-awareness				
Unit II	Leadership Theories and Leadership Development		6 Hours	
Trait and behavioural leadership theories , Situational and contingency leadership models, Path-goal theory and Leader-Member Exchange (LMX) theory , Transformational and transactional leadership , Power, influence, and persuasion , Leadership ethics, values, and credibility				
Unit III	Communication, Motivation, and Interpersonal Behaviour		6 Hours	
Communication process and barriers, Verbal and non-verbal communication , Social networks, rumors, and grapevine , Motivation theories and leadership , Transactional analysis and JOHARI Window , Coaching, mentoring, and feedback mechanisms				
Unit IV	Team Dynamics and Conflict Management		6 Hours	
Group dynamics and team processes , Team formation and team effectiveness , Cooperation, competition, and cohesiveness , Delegation and empowerment , Conflict management and negotiation , Virtual and multicultural teams				
Unit V	Organizational Ethics and High-Performance Leadership		6 Hours	
Organizational justice and ethical behavior , Corporate Social Responsibility (CSR) , Positive organizational scholarship , Building trust and credibility in teams , High-performance team development , Global leadership and leadership challenges in modern organizations				

● **List of Course Activities for Continuous Comprehensive Assessment (Any Two):**

1. **Leadership Style Role Play**
Students perform role plays demonstrating different leadership styles, communication approaches, and conflict management situations.
2. **Team Building & Group Dynamics Activity**
Practical activities/games to study teamwork, cooperation, delegation, trust-building, and group decision-making.
3. **Case Study Analysis on Organizational Behaviour**
Analyze real-life organizational situations related to motivation, leadership challenges, ethics, or team conflicts and present solutions.
4. **Communication & Negotiation Workshop**
Hands-on practice sessions on verbal/non-verbal communication, negotiation skills, feedback mechanisms, and interpersonal behaviour.
5. **Self-Assessment & Leadership Development Report**
Students prepare a report based on personality tests, emotional intelligence assessment, JOHARI window, or leadership skill evaluation with improvement plans.

● **Text Books:**

1. Hughes, R.L., Ginnett, R.C., & Curphy, G.J., Leadership: Enhancing the Lessons of Experience, 9th Edition, McGraw Hill Education, 2019.

● **Reference Books:**

1. Robbins, S.P., Judge, T.A. & Vohra, N., Organizational Behavior, 18th Edition, Pearson Education, 2019.
2. Parek, U. & Khanna, S., Understanding Organizational Behavior, 4th Edition, Oxford University Press, 2018.
3. Greenberg, J. & Baron, R., Behavior in Organizations, 10th Edition, Pearson-Prentice Hall, 2009.
4. Luthans, F., Organizational Behavior, 10th Edition, McGraw-Hill, 2004.
5. Cameron, K.S. & Spreitzer, G.M., The Oxford Handbook of Positive Organizational Scholarship, Oxford University Press, 2012.
6. Baron, R.A. & Byrne, D., Social Psychology, 10th Edition, Pearson Education, 2004.

● **MOOC / NPTEL Courses /Online Resources Online Resources:**

1. Organizational Behaviour: Individual Dynamics in Organization by Prof. Abraham Cyril Issac: https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_mg20
2. Leadership and Team Effectiveness by Prof. Santosh Rangnekar: https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_mg39
3. Leadership & Management : https://swayam-plus.swayam2.ac.in/courses/course-details?id=F_WADHW_26
4. Harvard Business Review Leadership Resources : <https://hbr.org/topic/subject/leadership-and-managing-people>
5. <https://www.edx.org/learn/leadership>

Course: Green Practices & ESG Frameworks			Code: 25OEC202B	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50

- **Prerequisites:** Basic knowledge of environmental science and sustainability, Understanding of industrial processes and resource utilization, Basic awareness of corporate management and ethics

- **Course Objectives:** The Objectives of the Course are

1. To introduce the principles of sustainability and green practices in engineering and industry.
2. To understand Environmental, Social, and Governance (ESG) frameworks used in modern organizations.
3. To analyse environmental impacts and promote sustainable resource management.
4. To study social responsibility and governance practices for sustainable development.
5. To apply ESG reporting standards and sustainability assessment tools in organizations.

- **Course Outcomes:** After successful completion of the course, students will be able to:

CO1: Explain the concepts of sustainability, green practices, and ESG frameworks.

CO2: Analyse environmental impacts and adopt green technologies for sustainable development.

CO3: Evaluate social responsibility and stakeholder engagement practices in organizations.

CO4: Understand governance principles, ethical leadership, and regulatory frameworks.

CO5: Apply ESG reporting standards and sustainability assessment methods in industries.

- **Course Contents:**

Unit I	Fundamentals of Sustainability and Green Practices	6 Hours
Concept of sustainability and sustainable development, Environmental challenges: climate change, global warming, biodiversity loss, resource depletion, Principles of green practices and environmental responsibility, Green economy and circular economy concepts, Sustainable Development Goals (SDGs) and global sustainability initiatives, Sustainable consumption and production patterns, Role of engineering and technology in sustainable development, Importance of green practices in industrial and organizational activities.		
Unit II	Environmental Sustainability and Green Technologies	6 Hours
Environmental sustainability and environmental protection strategies, Environmental Impact Assessment (EIA) and its importance, Carbon footprint analysis and greenhouse gas emissions, Carbon management strategies and carbon neutrality initiatives, Renewable energy technologies: solar, wind, hydro, biomass, Energy efficiency and energy conservation methods, Waste management techniques: reduce, reuse, recycle (3R concept), Water resource management and pollution control, Green manufacturing, eco-friendly materials, and cleaner production technologies		
Unit III	Social Responsibility and Sustainable Development	6 Hours
Concept and importance of Corporate Social Responsibility (CSR), Employee welfare, workplace health, and safety standards, Labour rights and fair working conditions, Diversity, equity, and inclusion in organizations,		

Stakeholder engagement and community development initiatives, Social impact assessment and community sustainability programs, Ethical business conduct and responsible supply chain management, Role of organizations in social and economic development		
Unit IV	Governance and Ethical Business Practices	6 Hours
Concept and principles of corporate governance, Governance structures and roles of board of directors, Transparency, accountability, and ethical leadership, Risk management and compliance mechanisms, Business ethics and anti-corruption policies, Legal and regulatory frameworks related to corporate governance, Sustainability governance and corporate responsibility policies, Governance practices for long-term organizational sustainability.		
Unit V	ESG Reporting, Assessment, and Implementation	6 Hours
Introduction to ESG metrics and sustainability performance indicators, ESG reporting frameworks and standards, Global Reporting Initiative (GRI) guidelines, Integrated reporting and sustainability disclosure practices, ESG ratings, benchmarking, and performance evaluation, Green finance, sustainable investments, and climate finance, Implementation of ESG strategies in organizations, Challenges in ESG adoption and reporting, Case studies of ESG implementation in industries and multinational companies.		
● List of Course Activities for Continuous Comprehensive Assessment (Any Two): Campus Green Audit & Waste Segregation Study Students conduct a sustainability audit of the campus/department by analysing waste generation, segregation practices, energy usage, and water consumption. Submit findings with improvement recommendations. Carbon Footprint Calculation Project Students calculate the carbon footprint of a household, classroom, or small organization using standard carbon calculators and prepare a report suggesting carbon reduction strategies. ESG Reporting Case Analysis Students select a company and study its ESG or sustainability report (based on GRI/SDG framework). Prepare a presentation evaluating environmental, social, and governance practices. Sustainable Product / Process Design Activity Teams design an eco-friendly product, packaging solution, or green operational process applying principles of reduce–reuse–recycle and resource efficiency. Community Awareness & Social Responsibility Campaign Organize and document an awareness activity such as tree plantation, plastic-free drive, energy conservation campaign, or social impact survey, followed by submission of outcomes and reflections.		
● Textbooks: - Understanding Sustainability Principles and ESG Policies: Colin Read, Springer Nature, Year: 2023 - The ESG and Sustainability Deskbook for Business, Kristyn Noeth, Springer, 2024		
● Reference Books: - Values at Work: Sustainable Investing and ESG Reporting, Daniel C. Esty, Todd Cort, Palgrave Macmillan, Year: 2020 - Business Responsibility and Sustainability in India, Bimal Arora, Pawan Budhwar, Divya Jyoti Publisher: Palgrave Macmillan, Year: 2019 - Looking at and Beyond Corporate Governance in India, Authors: Seema Joshi, Ruchi Kansil Publisher: Springer / Palgrave Macmillan Year: 2023 - Dharmanomics: An Indigenous and Sustainable Economic Model, Author: Sriram Balasubramanian Publisher: Bloomsbury India, Year: 2024		

● **MOOC / NPTEL Courses /Online Resources Online Resources:**

1. Sustainability through Green Manufacturing Systems An applied approach, By Prof. Deepu Philip and Prof. Amandeep Singh, IIT Kanpur:
https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_mg85
2. Sustainable Energy Technology By Prof. Sayak Banerjee, IIT Hyderabad:
https://onlinecourses.nptel.ac.in/e-learning/preview/noc23_me138
3. Corporate social responsibility By Prof. Aradhna Malik, IIT Kharagpur :
https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_mg54
4. Implementing ESG and Sustainability in Business By Dr. Aditya Gupta, Indian Institute of Management, Bangalore: https://onlinecourses.swayam2.ac.in/e-learning/preview/imb25_mg77
5. Business Ethics and Corporate Governance By Dr. Sweta Banerjee, Dr. Leena Dam, Sri Balaji University, Pune: https://onlinecourses.swayam2.ac.in/e-learning/preview/imb25_mg62

Course: Innovation and Business Strategy			Code: 25OEC202C	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Tutorial	02	02	CCA	20
			ISE	30
			ESE	50
● Prerequisites: Basic understanding of technology, creativity, and problem-solving concepts.				
● Course Objectives: The objectives of the course are- 1. Introduce concepts of innovation, creativity, and business strategy. 2. Develop strategic thinking and innovation management skills. 3. Explain business models, entrepreneurship, and technology innovation processes. 4. Familiarize students with sustainability, intellectual property rights, and innovation ecosystems. 5. Prepare students for innovation-driven business and entrepreneurial environments				
● Course Outcomes: At the end of the course, students will be able to - CO 1. Explain concepts of innovation, creativity, and business strategy. - CO 2. Apply innovation management and strategic thinking tools for business problem-solving. - CO 3. Analyze business models, technology innovation, and entrepreneurial strategies. - CO 4. Evaluate sustainability, intellectual property, and innovation management practices. - CO 5. Develop innovative business solutions and strategic growth approaches.				
● Course Contents:				
Unit I	Foundations of Innovation and Creativity			6 Hours
Innovation and creativity: concepts and importance, Innovation in the current business environment , Types of innovation , Schools of innovation , Challenges of innovation , Divergent and convergent thinking				
Unit II	Innovation Management and Design Thinking			6 Hours
Innovation management process, Idea management systems, Design thinking and entrepreneurship Experimentation and prototyping , Co-creation and idea championship , Incubation and entrepreneurship ecosystems				
Unit III	Business Models and Strategic Innovation			6 Hours
Business models and value proposition , Entrepreneurship and social entrepreneurship , Blue Ocean Strategy , Strategic positioning and competitive advantage , Business model failure: reasons and remedies , Innovation-driven business growth				
Unit IV	Technology Innovation and Intellectual Property Rights			6 Hours
Technology innovation process , Technology forecasting and planning , Technological innovation management strategies , Management of innovation , Intellectual Property Rights (IPR) Patents, copyrights, and patents in India				
Unit V	Sustainable Innovation and Future Business Trends			6 Hours
Sustainability innovation and entrepreneurship, Innovation for sustainable development , SME involvement in sustainability , Material efficiency and sustainable business models , Managing investors for innovation , Future markets and innovation opportunities for India				
● List of Course Activities for Continuous Comprehensive Assessment (Any Two): 1. Innovation Idea Pitch Presentation Students identify a real-world problem and present an innovative product, service, or business solution using creativity and design thinking tools.				

2. Business Model Canvas Workshop Teams prepare a Business Model Canvas for a startup or sustainable business idea, explaining value proposition, customer segments, revenue streams, and competitive advantage. 3. Prototype Development & Demonstration Students create a basic prototype/mock-up of an innovative product or digital solution and demonstrate its functionality and market relevance. 4. Case Study Analysis on Successful Innovations Analyze companies known for innovation and strategy (e.g., startups or technology firms) and present factors behind their success, business strategy, and innovation practices. 5. IPR & Patent Search Activity Students perform a patent/trademark search related to a chosen innovation area and prepare a short report on intellectual property protection and commercialization opportunities.
● Text Books: 1. Krishnan, R.T. & Dabholkar, V., 8 Steps to Innovation: Going from Jugaad to Excellence, Harper Collins India.
● Reference Books: 1. Drucker, Peter F., Innovation and Entrepreneurship, Routledge. 2. Harvard Business Review Series, Innovation and Entrepreneurship, Harvard Business School Publishing. 3. Osterwalder, A. & Pigneur, Y., Business Model Generation, Wiley. 4. Kim, W. Chan & Mauborgne, Renée, Blue Ocean Strategy, Harvard Business Review Press. 5. Tidd, J. & Bessant, J., Managing Innovation, Wiley Publications.
● MOOC / NPTEL Courses /Online Resources Online Resources: 1. Innovation Business Models and Entrepreneurship by Prof. Vinay Sharma, Prof. Rajat Agrawal : https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_mg95 2. Entrepreneurship & IP strategy by Prof. Gouri Gargate : https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_hs213 3. Managing Innovation by Rishikesh T Krishnan and Vinay Dabholkar: https://onlinecourses.swayam2.ac.in/e-learning/preview/imb19_mg05 4. Business Strategy Specialization by University of Virginia: https://www.coursera.org/specializations/business-strategy 5. Design Thinking for Beginners: Develop Innovative Ideas (Udemy): https://www.udemy.com/course/design-thinking-for-beginners/?couponCode=PMNVD2025 6. Strategic Management Resources : https://www.hbsp.harvard.edu/catalog/collections/strategic-management-resources 7. https://www.edx.org/learn/innovation

Course: Stress Management and Mental Well Being			Code: 25OEC202D	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50

- **Prerequisites:** Basic awareness about personal health, emotions, and daily life challenges.

- **Course Objectives:**

1. To introduce the concept of stress, mental health, and wellbeing.
2. To help students identify stressors in academic and professional life.
3. To develop effective coping strategies and stress management skills.
4. To promote emotional intelligence and resilience.
5. To encourage healthy lifestyle habits for long-term wellbeing.

- **Course Outcomes:** At the end of the course, students will be able to:

- CO1: Explain the concepts of stress, mental health, and wellbeing
CO2: Identify sources of stress and analyse their impact
CO3: Apply stress management techniques
CO4: Demonstrate emotional intelligence and coping strategies
CO5: Design a personal wellbeing and stress management plan

- **Course Contents:**

Unit I	Fundamentals of Stress and Mental Health	6 Hours
Concept and definition of stress and mental wellbeing, Types of stress: Eustress and Distress, Stress response and General Adaptation Syndrome (GAS), Causes and symptoms of stress, Mind–body relationship, Impact of stress on academic performance and productivity. Difference between stress, anxiety, and depression.		
Unit II	Sources of Stress and Emotional Awareness	6 Hours
Academic, professional, social, and personal stressors; Personality types and stress (Type A and Type B personality); Emotional intelligence: Self-awareness, Self-regulation, Motivation, Empathy, Social skills; Identifying negative thinking patterns		
Unit III	Stress Management Techniques	6 Hours
Relaxation techniques: Deep breathing, Progressive muscle relaxation; Meditation and mindfulness, Yoga and physical exercises for stress reduction, Time management and goal setting, Positive thinking and cognitive restructuring		
Unit IV	Mental Wellbeing and Healthy Lifestyle	6 Hours
Importance of sleep, nutrition, and physical activity, managing emotions: anxiety, anger, frustration, Building resilience and self-confidence, Work–life balance, Digital wellbeing and social media stress		
Unit V	Personal Development and Coping Strategies	6 Hours
Interpersonal communication and relationship management, Coping strategies for change and uncertainty, Conflict management and emotional regulation, Developing a personal wellbeing plan, Case studies on stress management in student and workplace environments.		
● List of Course Activities for Continuous Comprehensive Assessment (Any Two): 1. Stress Diary & Self-Assessment Activity Students maintain a weekly stress journal to identify stress triggers, emotional responses, and coping methods, followed by a reflective analysis report.		

2. Mindfulness and Relaxation Practice Session Conduct guided activities such as meditation, deep breathing, yoga, or progressive muscle relaxation and submit observations on stress reduction outcomes. 3. Case Study Analysis on Mental Wellbeing Analyze real-life or workplace/student stress management cases and suggest coping strategies, emotional intelligence techniques, and wellbeing solutions. 4. Work–Life Balance & Digital Wellness Survey Students design and conduct a survey on stress, screen time, sleep, or work–life balance among peers, then present findings with recommendations. 5. Personal Wellbeing and Stress Management Plan Prepare an individual wellness plan including fitness, sleep, nutrition, time management, and emotional wellbeing strategies for long-term mental health improvement.
● Textbooks: 1. Leahy, Robert L. The Worry Cure. Three Rivers Press, 2006. 2. Carnegie, Dale. How to Stop Worrying and Start Living. Simon & Schuster, 1948. 3. Johnstone, Matthew. I Had a Black Dog. Robinson Publishing, 2005.
● Reference Books: 1. Goleman, Daniel. Emotional Intelligence: Why It Can Matter More Than IQ. Bantam Books, 1995. 2. Kabat-Zinn, Jon. Wherever You Go, There You Are: Mindfulness Meditation in Everyday Life. Hyperion, 1994. 3. Covey, Stephen R. The 7 Habits of Highly Effective People. Free Press, 1989.
● MOOC / NPTEL Courses /Online Resources Online Resources: 1. NPTEL course on Stress Management by Prof. Rajlakshmi Guha, IIT Kharagpur: https://onlinecourses.nptel.ac.in/e-learning/preview/noc24_hs163 2. NPTEL course on Psychology of Stress, Health and Well-being by Prof. Dilwar Hussain, IIT Guwahati: https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_hs29

Course: French Language Module-II			Code: 25OEC202E	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50
● Prerequisites: French Language Module-I				
● Course Objectives: The objectives of the course are- 1. To strengthen basic communication skills in French. 2. To develop listening, reading, and writing skills in French. 3. To enhance confidence in practical conversations. 4. To apply French vocabulary and expressions in travel and public communication contexts. 5. To prepare students for DELF A1 level competency.				
● Course Outcomes: At the end of the course, students will be able to CO1. Use basic French expressions confidently in familiar situations. CO2. Interpret simple dialogues and instructions in French. CO3. Read and write short paragraphs on familiar topics. CO4. Participate in guided conversations using appropriate French expressions. CO5. Apply French language skills in practical and everyday situations.				
● Course Contents:				
Unit I	Voyages (Travel)			6 Hours
Talking about one’s dream travel destination, The near future tense , Prepositions , Giving a reason (parce que / car)				
Unit II	Au magasin... au restaurant (At the store... at the restaurant)			6 Hours
Clothes and accessories , Shopping dialogues , French cuisine and some famous dishes , Restaurant communication				
Unit III	La vie quotidienne (Daily life)			6 Hours
Pronominal verbs , Talk about one’s routine , Talk about one’s favourite outings , Conversation to plan outings				
Unit IV	Quand j’étais petite ...(When I was little...)			6 Hours
Past tense (Le passé compose), Talk about some activities in the past, Past continuous (L’imparfait) Talk about one’s childhood				
Unit V	La francophonie (The French-speaking world)			6 Hours
Francophone countries , Talking about seasons and climate , Expressing emotions, Conversations				
● List of Course Activities for Continuous Comprehensive Assessment (Any Two): 1. Shopping Role Play: Students perform shopping conversations using French vocabulary and expressions. 2. Restaurant Communication Activity: Students practice ordering food and interacting in French. 3. Travel Conversation Simulation: Students perform dialogues related to travel and directions.				

4. **Travel Conversation Simulation:** Students perform dialogues related to travel and directions.
5. **Paragraph Writing in French:** Students write short paragraphs on daily routines or hobbies.
6. **French Culture Presentation:** Students present information on French-speaking countries or traditions.

- **Text Books:**

1. Véronique M Kizirian, Emmanuelle Daill, Annie Berthet, Catherine Hugot, “Alter Ego+ (A1)”, Hachette , ISBN: 9782011558107, (Goyal Publishers)
2. Nathalie Hirschsprung, Tony Tricot, “Cosmopolite 1-A1”, Textbook +Workbook (2 Book Set) (Goyal Publishers), ISBN: 9788194434108

- **Reference Books:**

1. Annie Heminway, “Practice Makes Perfect: Complete French Grammar”, McGraw-Hill Education, ISBN-13 : 978-1259642371
2. Claire Miquel, “Vocabulaire progressif du français - Niveau debutant (A1)”, Cle International, ISBN-13 : 978-2090380170, Bookswagon, 2/13 Ansari Road, Daryaganj, New Delhi 110002
3. Evelyne Siréjols, “Communication En Dialogues”, CLE international, ISBN: 9782090380637 (Goyal Publishers)
4. Myrna Bell Rochester, “Easy French Step-By-Step: Master High-Frequency Grammar for French Proficiency—Fast”, McGraw Hill, ISBN-13 : 978-0071453875
5. Claire Miquel, “Communication Progressive du Français A1”, CLE International, Atlantic Publishers and Distributors (P) Ltd., 7/22, Ansari Road, Darya Ganj, New Delhi – 110002
6. Ranjit, Mahita & Singh, Monica, Apprenons le français', Part 2, Saraswati House Pvt. Ltd., New Delhi. Second Revised Edition, 2007
7. Ranjit, Mahita & Singh, Monica, Cahier d'exercices', (Apprenons le français) Part 2., Saraswati House Pvt. Ltd., New Delhi. Second Revised Edition, 2007

- **MOOC / NPTEL Courses /Online Resources Online Resources:**

1. The Complete French Course : Learn French – Beginners :
<https://www.udemy.com/course/french-for-beginners-a1/?couponCode=PMNVD2025>
2. Francés Introductorio: <https://www.coursera.org/learn/frances-introductorio>
3. Français Débutant A1 : <https://www.coursera.org/learn/french-beginner>
4. The Complete French Course : Learn French - Low Intermediate :
<https://www.udemy.com/course/the-complete-french-course-learn-french-low-intermediate/?couponCode=PMNVD2025>
5. Complete French Course: Learn French for Beginners :
<https://www.udemy.com/course/complete-french-course/?couponCode=PMNVD2025>

Course: German Language Module-II			Code: 25OEC202F	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50
● Prerequisites: German Language Module-I				
● Course Objectives: The objectives of the course are- 1. To strengthen basic communication skills in German. 2. To develop listening, reading, and writing skills in German. 3. To enhance confidence in practical conversations. 4. To apply German vocabulary and expressions in travel and public communication contexts. 5. To prepare students for Goethe A1 level competency.				
● Course Outcomes: At the end of the course, students will be able to - CO1. Use basic German expressions confidently in familiar situations. - CO2. Interpret simple dialogues and instructions in German. - CO3. Read and write short passages on familiar topics. - CO4. Participate in practical conversations using appropriate German expressions. - CO5. Apply German language skills in everyday situations.				
● Course Contents:				
Unit I	Wohnen und Leben (Housing and life)			6 Hours
Topics and Vocabulary: house (different types of houses and things inside a house), furniture , renting Grammar: Accusative case, Definite, Indefinite articles in accusative case, Accusative case – Personal Pronouns, Accusative case – Possessive Pronouns Skills: Speaking: describe room/home, Reading: advertisements , Writing: a message to friends to invite for celebration				
Unit II	Stadt und Orientierung (City and Orientation)			6 Hours
Topics and Vocabulary: Places in city , Means of transport , Directions , Travel , Planning and hotel booking Grammar: Types of sentences and formation- statement, interrogative sentence, imperative sentence, Past tense formation- haben, sein Skills : Speaking: asking/giving directions, Listening: friends planning a trip, Writing: My last trip, Reading: trip blogs and experiences Activity: Navigation task				
Unit III	Essen und Trinken (Food and Drink)			6 Hours
Topics and Vocabulary: Food, Beverages, Restaurant expressions, Shopping and cooking Grammar: Perfekt tense introduction - haben/sein, Adjectives Skills: Reading and writing: food blogs, Speaking: ordering food, expressing likes/dislikes Activity: café role-play				

Unit IV	Gesundheit und Körper (Health and body)	6 Hours
Topics and Vocabulary: Body parts , Symptoms , Medicine , Grammar: Conjunctions, Modal auxiliary- function, usage, structure Skills: Email writing/ message writing- unable to attend an event because of illness, Reading- health related small text, Activity: doctor-patient conversations		
Unit V	Intercultural Communication (Intercultural Communication)	6 Hours
Topics: German etiquette, punctuality, university culture, workplace culture Skills: intercultural awareness , formal communication		
● List of Course Activities for Continuous Comprehensive Assessment (Any Two): 1. Shopping Role Play: Students perform shopping conversations using German vocabulary and expressions. 2. Restaurant Communication Activity: Students practice food ordering conversations in German. 3. Travel Conversation Simulation: Students perform dialogues related to travel situations and directions. 4. Paragraph Writing in German: Students write short paragraphs on familiar topics in German. 5. German Culture Presentation: Students present information about German-speaking countries and traditions.		
● Text Books: 1. Stefanie Dengler, “Netzwerk A1 (Textbook + Workbook + Glossar)”, Hachette , ISBN: 9788183077033, (Goyal Publishers) 2. Kurs Und Übungsbuch, “Studio-D A1 - Combo of 3 (German)”, Goyal Publishers & Distributors		
● Reference Books: 1. Martin Durrell, “Hammer's German Grammar and Usage”, Fifth Edition: Volume 1, Hodder Education 2. Harriette Lanzer, Anne Lise Gordon, “German Vocabulary Builder”, OUP Oxford 3. Funk and Kuhn, “Studio D A1 Deutsch Buch “, Cornelsen Verlag (Goyal Publishers India)		
● MOOC / NPTEL Courses /Online Resources Online Resources: 1. DW Learn German: https://learngerman.dw.com/en/learn-german/s-9528 2. Practise German for free (Goethe-Institut Resources) : https://www.goethe.de/en/spr/ueb.html 3. Learn German Easily: https://learn-german-easily.com/ 4. BBC Languages German: https://www.bbc.co.uk/languages/german/ 5. Gothe Exam A1 practice material : https://www.goethe.de/ins/mm/en/spr/prf/gzsd1/ueb.html 6. Best Way to Learn German Language: Full Beginner (A1.1): https://www.udemy.com/course/best-way-to-learn-german-full-beginner-starter-kit/?couponCode=PMNVD2025 7. Best Way to Learn German Language: Beginner Level 2 (A1.2) : https://www.udemy.com/course/learn-german-for-the-advancing-beginner-a1-a2/?couponCode=PMNVD2025		

Course: Japanese Language Module-II			Code: 25OEC202G	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Lecture	02	02	CCA	20
			ISE	30
			ESE	50
● Prerequisites: Japanese Language Module-I				
● Course Objectives: 1. To strengthen basic communication skills in Japanese. 2. To develop reading and writing skills in Japanese. 3. To enhance confidence in practical conversations. 4. To apply Japanese vocabulary and expressions in travel and public communication contexts. 5. To prepare students for JLPT N5 level competency.				
● Course Outcomes: At the end of the course, students will be able to - CO1. Use beginner-level Japanese expressions for effective communication. - CO2. Interpret short dialogues and passages in Japanese. - CO3. Read and write basic Japanese sentences. - CO4. Participate in practical conversations using appropriate Japanese expressions. - CO5. Apply Japanese language skills in everyday situations.M				
● Course Contents:				
Unit I	Kihon bunpō (tsudzuki) (Basic Grammar Continuation)			6 Hours
Verb forms, Adjectives, Particle usage, Question and negative forms				
Unit II	Jissen-tekina komyunikēshon (Practical Communication)			6 Hours
Shopping conversations, Travel communication, Restaurant communication , Asking directions Communication with Doctor, Kanji –Lesson 4 (Textbook 1 &2)				
Unit III	Risuningu to supīkingu no sukiru (Listening and Speaking Skills)			6 Hours
Pronunciation improvement, Listening comprehension, Dialogue practice , Group conversation Kanji –Lesson 5 (Textbook 1 &2)				
Unit IV	Yomikaki (Reading and Writing)			6 Hours
Reading short passages , Writing paragraphs , Vocabulary enhancement , Translation practice , Kanji – Lesson 6 (Textbook 1 &2)				
Unit V	Bunka-teki oyobi shakai-teki komyunikēshon (Cultural and Social Communication)			6 Hours
Japanese culture and etiquette, Social conversations, Telephone communication, Presentation activities Kanji –Lesson 7 (Textbook 1 &2)				
● List of Course Activities for Continuous Comprehensive Assessment (Any Two): 1. Shopping Role Play: Students perform shopping conversations using Japanese vocabulary and expressions.				

2. **Restaurant Communication Activity:** Students practice ordering food and basic interaction in Japanese.
3. **Travel Conversation Simulation:** Students perform dialogues related to travel and directions in Japanese.
4. **Paragraph Writing in Japanese:** Students write short paragraphs on daily routines or hobbies.
5. **Japanese Culture Presentation:** Students present information about Japanese traditions or festivals.

● **Text Books:**

1. 3A Corporation, “Minna No Nihongo 1-1,1-2,2-1,2.2 Main Textbook elementary”, ISBN-13: 9789388141147, Goyal Publishers & Distributors Pvt. Ltd, India
2. Banno Eri, “Genki: An Integrated Course in Elementary Japanese II Textbook [third Edition]”, ISBN-13 : 978-4789017329, Japan Times

● **Reference Books:**

1. The Japan Foundation, “Marugoto: Japanese Language and Culture Starter A1 Coursebook for Communicative Language Activities”, Goyal Publishers
2. The Japan Foundation, “Marugoto Starter (A1) Rikai - Course Book For Communicative Language Competences”, Goyal Publishers, ISBN-13: 9788183078047
3. The Japan Foundation, “Marugoto Starter (A1) Katsudoo”, Goyal Publishers
4. “Japanese for Busy People,3rd edition”, Association for Japanese Language Teaching, Kodansha Tokyo Japan Kodansha International, November, 2011.,
5. Tae Kim, “A Guide to Japanese Grammar: A Japanese Approach to Learning Japanese Grammar”, Createspace Independent Pub, ISBN-13 : 978-1495238963, Bookswagon, 2/13 Ansari Road, Daryaganj, New Delhi 110002
6. Timothy G. Stout , Kaori Hakone, “Japanese Kanji for Beginners: (JLPT Levels N5 & N4) First Steps to Learn the Basic Japanese Characters”, Tuttle Publishing UK, Verseas Press India Pvt Ltd.

● **MOOC / NPTEL Courses /Online Resources Online Resources:**

1. Online Japanese Beginner Course (Udemy): <https://www.udemy.com/course/online-japanese-beginner-course>
2. JF-Japanese e-learning : <https://minato-jf.jp/>
3. Introduction to Japanese Language : Prof Vatsala Misra (NPTEL) : https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_hs83
4. Learn Japanese Language: Free Online Courses: <https://www.busuu.com/en/course/learn-japanese-online>
5. Marugoto Online : <https://www.marugoto-online.jp/info/>
6. JLPT N5 Practice Material: <https://www.jlpt.jp/e/samples/sampleindex.html>

Course: Testing of Materials Lab			Code:25CVPCC201L-B	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Practical	02	01	Oral	25

● Prerequisites: Concept of Stress and Strain, Torsion
● Course Objectives: This course aims at enabling students, 1. To execute the theoretical knowledge for assessment of material properties and elastic constant for the metals. 2. To measure the capacity of timber in terms of bending and compressive strength 3. To test and rate of flooring / roofing material and bricks
● Course Outcomes: At the end of the course, students will be able to: 1. Assess the material properties and elastic constant for the metals 2. Measure the timber bending strength and compressive strength 3. Test and rate the flooring/roofing tiles and bricks
List of Experiments
All experiments are compulsory 1. Tension test on mild steel and tor Steel 2. Shear test on the steel bar of different dimeters. 3. Impact test (Izod and Charpy) on the material. 4. Compression test on the timber 5. Bending test on the timber 6. Flexural Strength of flooring tiles /Mangalore tiles 7. Abrasion test on flooring tiles 8. Compressive strength on clay bricks /cement bricks
Virtual Laboratories: Students have to perform the compulsory experiment in the virtual laboratory 1.Torsion Test on Material

Course: Surveying Lab			Code: 25CVPCC206L	
Teaching Scheme(Hrs./Week)		Credit	Evaluation Scheme	
Practical	02	01	Practical	25

- **Prerequisites:** Basic knowledge of surveying principles, basic mathematics, and familiarity with instruments like chains, tapes, compasses, and levels

- **Course Objectives:**

1. Properly operate and calibrate surveying equipment, including chains, tapes, compasses, Dumpy/tilting levels, theodolites, and total stations.
2. Collect, record, and interpret field data to calculate angles, distances, areas, and volumes, as well as plot contours.
3. Create accurate topographical maps and transfer designs from paper to the ground (setting out works) for construction projects.

- **Course Outcomes:** At the end of the course, students will be able to:

1. Explain the procedure to set up and operate instruments such as Chain, Compass, Dumpy Level, Theodolite, and Total Station.
2. Implement chain traversing, compass traversing, plane table surveying, and differential leveling
3. Create contour maps and topographical maps from field data.
4. Execute field procedures for setting out building centerlines, road alignments, and curves.

List of Experiments

Perform any eight (08)

1. Measure Fore Bearing and back bearing of a closed traverse of 5 to 6 sides and correct the bearings and included angles.
2. Measure Horizontal angle and vertical angle by using Transit Theodolite.
3. Profile leveling and cross-sectioning for a road length of 300 m with cross-section at 20 m interval.
4. Prepare Contour Plan/map using Block Contouring for the area of 40m x 40m to draw its contour plan.
5. Determine the reservoir capacity from a given contour map of reservoir.
6. Study and use of Total Station with special functions like REM and RDM.
7. Plotting contour map using Radial contouring method with an instrument station taking radius equal to 60 m.
8. Illustration of Permanent adjustment of Dumpy Level and theodolite.
9. Determine area of a land parcel using total station.
10. Stake out points using total station.
11. Determine horizontal distance, vertical distance, gradient, difference of height between two inaccessible points using total station.

Virtual Laboratories:

1. <https://sl-iitr.vlabs.ac.in/>

Course: Introduction to Civil Engineering Softwares			Code: 25CVVSE202	
Teaching Scheme(Hrs./Week)		Credit	Evaluation Scheme	
Practical	02	01	Oral	25

Prerequisites: Basic knowledge of engineering drawing and civil engineering fundamentals, Basic computer literacy and familiarity with operating systems, Basic understanding of construction drawings and measurements.

● **Course Objectives:**

1. To introduce students to commonly used civil engineering software tools.
2. To develop basic skills in computer-aided drafting and modelling.
3. To understand the applications of software in planning, structural analysis and project management.
4. To familiarize students with digital tools used in modern civil engineering practice.

● **Course Outcomes:** At the end of the course, students will be able to:

1. Identify different civil engineering software tools and their applications.
2. Prepare simple engineering drawings using CAD software.
3. Apply basic structural modelling and analysis concepts using structural software.
4. Use project management software for planning and scheduling civil engineering projects.

List of Experiments

Any 5 experiments

1. Introduction to Civil Engineering Software - Overview of commonly used civil engineering software and their applications.
2. Basic Drafting Using CAD Software - Preparation of simple geometric drawings using AutoCAD commands.
3. Preparation of Basic Building Plan - Creation of a simple residential building plan using CAD tools.
4. Introduction to 3D Modelling - Basic 3D model creation using SketchUp.
5. Introduction to Structural Analysis Software - Introduction to interface and modelling basics in STAAD.Pro or ETABS or SAP2000.
6. Simple Structural Model - Creation of a simple beam or frame model and viewing analysis results.
7. Introduction to Project Management Software - Basic scheduling using MS Project – task creation and Gantt chart.
8. Introduction to EPANET, ETP & WTP for design of water distribution network & treatment units.
9. Introduction to PLAXIS & GEO5 for geotechnical problem analysis.
10. Mini Exercise - Preparation of a simple project schedule or small structural model and report.

Course: Modern Indian Language (Marathi)			Code: 25AEC201A	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Lecture	02	02	TW	25
			OR	25

- **Prerequisites:** No prerequisite is required.

- **Course Objectives:**

अभ्यासक्रमाची उद्दिष्ट्ये :

१. प्रगत भाषिक कौशल्यांची क्षमता विकसित करणे.
२. प्रसारमाध्यमातील संज्ञापनातील स्वरूप आणि स्थान स्पष्ट करणे.
३. व्यक्तिमत्त्व विकास आणि भाषा यांच्यातील सहसंबंध स्पष्ट करणे
४. लोकशाहीतील जीवनव्यवहार आणि प्रसारमाध्यमे यांचे परस्पर संबंध स्पष्ट करणे.
५. प्रसारमाध्यमांची लेखनक्षमता विकसित करणे.

- **Course Outcomes:**

हा अभ्यासक्रम पूर्ण केल्यानंतर विद्यार्थी पुढील बाबी साध्य करू शकतील :

- CO१. मराठी भाषेतील प्रगत भाषिक कौशल्यांचा प्रभावीपणे वापर करून संवाद साधू शकतील.
- CO२. प्रसारमाध्यमांतील संज्ञापनाचे विविध प्रकार, स्वरूप व समाजातील त्यांचे स्थान स्पष्ट करू शकतील.
- CO३. व्यक्तिमत्त्व विकासामध्ये भाषेचे महत्त्व ओळखून प्रभावी संवादकौशल्य विकसित करू शकतील.
- CO४. लोकशाहीतील जीवनव्यवहार आणि प्रसारमाध्यमे यांतील परस्परसंबंधांचे विश्लेषण करू शकतील.
- CO५. प्रसारमाध्यमांसाठी विविध प्रकारचे लेखन कौशल्य आत्मसात करून प्रभावी लेखन करू शकतील.

- **Course Contents:**

Unit I	घटक १	६ तास
● मराठी भाषेची आविष्कार रूपे ● भाषा आणि व्यक्तिमत्त्व विकास: सहसंबंध ● लोकशाहीतील जीवनव्यवहार आणि प्रसारमाध्यमे		
Unit II	घटक २	६ तास
● वृत्तपत्रासाठी बातमीलेखन आणि मुद्रितशोधन ● आकाशवाणीसाठी भाषणाची संहितालेखन		

- दूरचित्रवाणीसाठी माहितीपटासाठी संहितालेखन - समीक्षणात्मक लेखन: पुस्तक समीक्षण, चित्रपट समीक्षण		
Unit III	घटक ३	६ तास
- भाषा, जीवन व्यवहार आणि नवमाध्यमे, समाजमाध्यमे - नवमाध्यमे आणि समाजमाध्यमांचे प्रकार: ब्लॉग, फेसबुक, ट्विटर - नवमाध्यमे आणि समाजमाध्यमांविषयक साक्षरता, दक्षता, वापर, परिणाम		
Unit IV	घटक ४	६ तास
- वेबसाईट आणि ब्लॉग, ट्विटरसाठी लेखन, ई-मेल - व्यावहारिक लेखन कौशल्य : अर्जलेखन व पत्रलेखन		
Unit V	घटक ५	६ तास
- अनुवाद कौशल्य (Translation): इंग्रजी किंवा इतर भाषांमधून मराठीत अनुवाद करणे. - कथा/कादंबरी/संवाद लेखन: सर्जनशील साहित्याची निर्मिती, पटकथा आणि संवाद लेखन.		

● **Textbooks:**

- सायबर संस्कृती : डॉ. रमेश वरखडे
- व्यावहारिक मराठी: डॉ. ल. रा. नसिराबादकर, फडके प्रकाशन, कोल्हापूर
- उपयोजित मराठी : संपादक डॉ. केतकी मोडक, संतोष शेणई, सुजाता शेणई
- आधुनिक माहिती तंत्रज्ञानाच्या विश्वात , दीपक शिक्रापूरकर, उज्ज्वल मराठे, उत्कर्ष प्रकाशन, पुणे
- व्यावहारिक मराठी, पुणे विद्यापीठ प्रकाशन, पुणे
- प्रसारमाध्यमांसाठी लेखन कौशल्य, यशवंतराव चव्हाण मुक्त विद्यापीठ, नाशिक

Course Activities for Term Work Evaluation:

1. सारांश लेखन (Summary Writing)

विद्यार्थ्यांनी उतारा वाचून स्वतःच्या शब्दात एक संक्षिप्त सारांश लिहावा. (Students read a passage and write a **short summary** in their own words.)

2. भाषांतर (Translation Assignment) (Students translate text from English to Marathi.)

विद्यार्थ्यांनी इंग्रजी भाषेतील मजकूर मराठीमध्ये भाषांतरित करावा.

Example

- Short technical paragraph translation
- Daily communication sentences

3. पत्र लेखन (Letter Writing)

विद्यार्थ्यांनी वेगवेगळ्या प्रकारची औपचारिक व अनौपचारिक पत्रे लिहावी

Types

- औपचारिक पत्र (Formal Letter)
- अनौपचारिक पत्र (Informal Letter)
- अर्ज लेखन

4. गटक्रिया (Group Activity)

विद्यार्थ्यांनी खालीलपैकी एक गट क्रियाकलाप करावा.

Example

- रोड शो
- स्किट प्ले
- एकांकिका

5. सादरीकरण (Presentation Assignment)

विद्यार्थ्यांनी तंत्रज्ञान, पर्यावरण, सामाजिक इ . कोणत्याही एका विषयावर सादरीकरण करावे.

Students present a topic in Marathi.

Examples

- तंत्रज्ञानातील नवीन शोध
- पर्यावरण विषयक सादरीकरण

6. गटचर्चा (Group Discussion)

विद्यार्थ्यांनी गटांमध्ये एखाद्या विषयावर चर्चा करावी.

Students discuss a topic in groups.

Example Topics

- सोशल मीडियाचा प्रभाव
- ऑनलाइन शिक्षणाचे फायदे व तोटे

7. मराठी ब्लॉग लिहणे

विद्यार्थ्यांनी त्यांच्या अभ्यासाच्या क्षेत्रातील विकासावर २०० शब्दांपर्यंत ब्लॉग लिहून पोस्ट लिहून सोशल मीडियावर पोस्ट कराव्या.

Write blogs and posts on social media up to 200 words on recent development in their field of study.

8. पुस्तक परीक्षण (Book Review)

विद्यार्थ्यांना मराठी पुस्तक किंवा लेख वाचावे आणि त्यावर समीक्षा लिहावी.

Students read a Marathi book or article and write a **review**.

9. चित्रपट परीक्षण (Marathi film Review)

विद्यार्थ्यांनी उपलब्ध असलेला सामाजिक मराठी चित्रपट पाहवा आणि त्यावर समीक्षा लिहून, ती त्यांच्या आवडीच्या सोशल मीडियावर पोस्ट करावी.

Social Marathi movie available and write a review on post it on social media of their choice.

10. स्पर्धामध्ये सहभाग (Participation in Competition)

पुरुषोत्तम, फिरोदिया, दाजीकाका गाडगीळ करंडक, आणि श्रीटेज करंडक या स्पर्धामध्ये सहभाग नोंदवावा. Participation in Purushottam karandam, Firodia karandak, Dajikaka Gadgil Karandak and Shreetej Karandak.

Course: Modern Indian Language (Sanskrit)			Code: 25AEC201B	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Lecture	2	2	OR	25
			TW	25

Prerequisites: Basic ability to read Devanagari script is helpful but not mandatory.

● **Course Objectives:**

1. To introduce engineering students to the basic structure of the Sanskrit language.
2. To highlight the relevance of Sanskrit in modern fields such as Computational Linguistics and Artificial Intelligence.
3. To encourage appreciation of Indian Knowledge Systems and their applications in modern engineering and research.

● **Course Outcomes:** At the end of the course, students will be able to:

- CO1: Understand the basic structure, phonetics, and grammar of the Sanskrit language.
CO2: Construct simple Sanskrit sentences using basic grammatical rules.
CO3: Interpret selected Sanskrit verses related to science, mathematics, and philosophy.
CO4: Recognize the contributions of ancient Indian scholars to science and engineering.
CO5: Appreciate the relevance of Sanskrit in modern fields such as computational linguistics, knowledge

● **Course Contents:**

Unit I	Introduction to Sanskrit Language	6 Hours
Importance and historical development of Sanskrit, Characteristics of Sanskrit as a scientific language, Sanskrit alphabet (Varnamala): vowels and consonants, Pronunciation rules and phonetics, Basic introduction to Sanskrit grammar		
• पठित अवबोधनम् गद्यान्श अपेक्षित कार्य : प्रश्नोत्तरामी तथा निर्देशानुसार कृतयः • पठित अवबोधनम् पद्यान्श		
Unit II	Basic Sanskrit Grammar	6 Hours
Introduction to nouns (Subanta), Gender and number (Vachana), Case system (Vibhakti), Introduction to verbs (Dhatu), Present tense forms, Formation of simple sentences सन्धिकार्यम् समास प्रत्ययाः त्यकार अव्ययाः समय लेखनम् - अनुप्रयुक्त-व्याकरणम्		
Unit III	Reading and Interpretation of Sanskrit Texts	6 Hours
Reading simple Sanskrit shlokas, Vocabulary building for scientific and technical terms, Translation of selected Sanskrit passages, Interpretation of verses related to logic, mathematics, and nature, Practice exercises in sentence construction and translation		
Unit IV	Reading and Interpretation of Sanskrit Texts	6 Hours
Translation of selected Sanskrit passages, Interpretation of verses related to logic, mathematics, and nature Practice exercises in sentence construction and translation, लेखनकौशलम् वृत्तान्तलेखनम्, चित्रपटवर्णनम्, निबन्धलेखनम्		

Unit V	Sanskrit and Modern Science & Technology	6 Hours
Sanskrit and computational linguistics Logic and knowledge representation in Sanskrit texts References to engineering concepts in ancient texts Sanskrit terminology used in mathematics, astronomy, and architecture. Mathematical problems from Lilavati by Bhaskara II Structure of Sanskrit grammar and its relevance to computer science Applications of Sanskrit in modern research Overview of Sanskrit influence on Artificial Intelligence and language processing		

● Textbooks: 1. सरस्वती - मणिका संस्कृत व्याकरणम् 2. नवम तथा दशम कक्षा 'मणिका' पुस्तकम् 3. संस्कृत आल्हादः - दादशी कक्षा तथा निभन्धसोपनः
Reference Books: 1. Panini Ashtadhyayi – Panini Selected Sanskrit texts related to science and mathematics.
Term Work Evaluation 1. Summary Writing: Students read a passage and write a short summary in their own words. 2. Translation Assignment: Students translate text from English to Sanskrit. 3. Short technical paragraph translation 4. Daily communication sentences 5. Letter Writing 6. Group Discussion 7. Book Review 8. Film review 9. Blog writing 10. Participation in a Competition

Course: Business Fundamentals for Entrepreneurs			Code: 25HSM202A	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Tutorial	02	02	TW	50

● Prerequisites: Basic understanding of economics and management principles, Analytical thinking and problem-solving skills, Awareness of technological innovations and industry trends		
● Course Objectives: The objectives of the course are- 1. To introduce engineering students to fundamental concepts of entrepreneurship and business management. 2. To develop the ability to identify and evaluate entrepreneurial opportunities in technology-driven markets. 3. To provide knowledge of basic marketing, financial, and operational aspects required to start and manage a business. 4. To enable students to understand business models, startup ecosystems, and funding mechanisms. 5. To develop the capability to prepare a structured business plan for a technology-based venture.		
● Course Outcomes: At the end of the course, students will be able to: CO1: Explain the role of entrepreneurship in economic and technological development. CO2: Identify and analyze business opportunities using systematic tools and techniques. CO3: Apply marketing and financial fundamentals for planning entrepreneurial ventures. CO4: Design sustainable business models and evaluate startup feasibility. CO5: Develop and present a comprehensive business plan for a technology-based enterprise.		
● Course Contents:		
Unit I	Introduction to Entrepreneurship	6 Hours
Concept and evolution of entrepreneurship, Entrepreneur vs manager, Types of entrepreneurs: techno-entrepreneurs, social entrepreneurs, women entrepreneurs, intrapreneurs. Characteristics of successful entrepreneurs. Role of entrepreneurship in economic development. Entrepreneurial ecosystem in India – Startup India, Make in India, atmanirbhar Bharat initiatives.		
Unit II	Opportunity Identification and Business Environment	6 Hours
Creativity and innovation in entrepreneurship, Idea generation techniques – brainstorming, design thinking, TRIZ basics, Opportunity recognition and feasibility analysis, Environmental scanning – PESTLE analysis. Industry and market analysis, Legal forms of business organizations: sole proprietorship, partnership, LLP, private limited company.		
Unit III	Marketing Fundamentals for Entrepreneurs	6 Hours
Introduction to marketing management, Market research and customer discovery, Market segmentation, targeting and positioning (STP), Product development and product life cycle, Pricing strategies for startups. Digital marketing tools and social media marketing for new ventures		
Unit IV	Financial Fundamentals for Startups	6 Hours
Introduction to accounting and financial statements, Cost concepts and break-even analysis, Financial planning and budgeting, Sources of startup funding – angel investors, venture capital, bank loans, incubators, crowdfunding, Government schemes supporting startups in India, Basics of financial risk management.		
Unit V	Business Planning and Startup Management	6 Hours
Business models and Business Model Canvas, Preparation of a business plan – structure and components. Operations management for start-ups, Intellectual Property Rights (IPR) and regulatory compliance. Startup growth strategies and scaling, Sustainability and ethical practices in entrepreneurship.		

● Course activities for term work evaluation: 1. Business Opportunity Identification Activity Students identify innovative startup ideas, analyze market needs, customer problems, and prepare an opportunity assessment report. 2. Case Study on Successful Startups and Entrepreneurs Students study successful startups or entrepreneurs and analyze their business models, innovation strategies, marketing approaches, and growth factors. 3. Hands-on Activity using Business Planning Tools Students prepare SWOT analysis, Business Model Canvas (BMC), customer segmentation, and basic market analysis using practical examples. 4. Mini Project on Startup Ecosystem and Funding Students explore startup support systems such as Startup India, incubators, venture capital, crowdfunding, and government schemes and prepare a report. 5. Business Plan Development and Pitch Presentation Students develop and present a business plan including product idea, marketing strategy, financial planning, pricing, budgeting, and startup feasibility analysis.
● Textbooks: 1. Hisrich, R. D., Peters, M. P., & Shepherd, D. A., Entrepreneurship, McGraw Hill Education. 2. Barringer, B. R., & Ireland, R. D., Entrepreneurship: Successfully Launching New Ventures, Pearson Education. 3. Kuratko, D. F., Entrepreneurship: Theory, Process and Practice, Cengage Learning.
● Reference Books: 1. Drucker, P., Innovation and Entrepreneurship, Harper Business. 2. Ries, E., The Lean Startup, Crown Publishing. 3. Desai, V., Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House. 4. Blank, S., & Dorf, B., The Startup Owner's Manual, K & S Ranch Press. 5. Timmons, J. A., & Spinelli, S., New Venture Creation, McGraw Hill.
● MOOC / NPTEL Courses/Online Resources: 1. NPTEL Course on Entrepreneurship, By Prof. C Bhaktavatsala Rao, IIT Madras : https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_mg70 2. NPTEL course on Business Fundamentals for Entrepreneurs by Prof. Devdip Purkayastha, IIT Bombay: https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_mg11 3. NPTEL Course on Entrepreneurship and Start-ups, By Dr. P. Jakulin Divya Mary, National Institute of Technical Teachers' Training and Research, Chennai: https://onlinecourses.swayam2.ac.in/e-learning/preview/ntr25_ed60 4. NPTEL Course on Business Development: From Start to Scale Prof. C Bhaktavatsala Rao, IIT Madras : https://onlinecourses.nptel.ac.in/e-learning/preview/noc23_mg61

Course: Entrepreneurship and Start-ups			Code: 25HSM202B	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Tutorial	02	02	TW	50

● Prerequisites: Market study, break even analysis, profit loss, accounting		
● Course Objectives: The objectives of the course are: 1. Understand the concepts, role, and importance of entrepreneurship and innovation in economic and social development. 2. Identify and evaluate business opportunities, especially technology-based and sustainable ventures. 3. Develop entrepreneurial mindset, creativity, and problem-solving ability. 4. Understand startup ecosystem, government policies, IPR, funding, and incubation support. 5. Prepare a basic business plan incorporating ethical, financial, and sustainability considerations.		
● Course Outcomes: At the end of the course, students will be able to: CO1: Explain concepts of entrepreneurship, innovation, and their role in economic and societal development. CO2: Identify entrepreneurial opportunities using creativity, design thinking, and market analysis tools. CO3: Analyze feasibility of a business idea considering technical, financial, legal, and social aspects. CO4: Apply knowledge of start-up ecosystem, IPR, funding, and government initiatives to venture creation. CO5: Develop and present a basic business plan demonstrating teamwork, communication, ethics, and lifelong learning attitude.		
● Course Contents:		
Unit I	Introduction to Entrepreneurship	6 Hours
Entrepreneurship: Definition, types, and characteristics, Entrepreneur vs Manager, Role of entrepreneurship in economic development, Innovation: Types and sources, Case studies of successful entrepreneurs (Indian & global)		
Unit II	Creativity, Innovation & Opportunity Identification	6Hours
Entrepreneurial mind-set and creativity, Design Thinking for innovation, Idea generation techniques, Opportunity identification and screening, Market research and customer validation, Technology-based entrepreneurship		
Unit III	Feasibility Analysis & Business Models	6 Hours
Technical, market, and financial feasibility, Business Model Canvas (BMC), Costing, pricing, and break-even analysis, Risk analysis and mitigation, Ethics and sustainability in entrepreneurship		
Unit IV	Startup Ecosystem, IPR & Funding	6 Hours
Startup India initiative and government schemes (MSME, SIDBI, DPIIT), Incubation centres, accelerators, and angel networks, Basics of Intellectual Property Rights (Patents, Copyrights, Trademarks), Sources of funding: Bootstrapping, venture capital, crowdfunding, Legal aspects of starting a venture		
Unit V	Business Plan Development & Entrepreneurial Skills	6 Hours
Business plan preparation and structure, Team building and leadership, Communication and pitching skills, Social entrepreneurship and sustainable start-ups, Future trends and lifelong learning for entrepreneurs		
● Course activities for term work evaluation: 1. Business Opportunity Identification Activity Students identify innovative start-up ideas, analyse market needs, customer problems, and prepare an opportunity assessment report. 2. Case Study on Successful Startups and Entrepreneurs		

Students study successful startups or entrepreneurs and analyze their business models, innovation strategies, marketing approaches, and growth factors. 3. Hands-on Activity using Business Planning Tools Students prepare SWOT analysis, Business Model Canvas (BMC), customer segmentation, and basic market analysis using practical examples. 4. Mini Project on Startup Ecosystem and Funding Students explore startup support systems such as Startup India, incubators, venture capital, crowdfunding, and government schemes and prepare a report. 5. Business Plan Development and Pitch Presentation Students develop and present a business plan including product idea, marketing strategy, financial planning, pricing, budgeting, and startup feasibility analysis.
● Textbooks: 1. Hisrich, R. D., Peters, M. P., & Shepherd, D. A., Entrepreneurship, McGraw Hill Education. 2. Barringer, B. R., & Ireland, R. D., Entrepreneurship: Successfully Launching New Ventures, Pearson Education. 3. Kuratko, D. F., Entrepreneurship: Theory, Process and Practice, Cengage Learning.
● Reference Books: 1. Drucker, P., Innovation and Entrepreneurship, Harper Business. 2. Ries, E., The Lean Startup, Crown Publishing. 3. Desai, V., Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House. 4. Blank, S., & Dorf, B., The Startup Owner's Manual, K & S Ranch Press. 5. Timmons, J. A., & Spinelli, S., New Venture Creation, McGraw Hill.
● MOOC / NPTEL Courses/Online Resources: 1. NPTEL course on Entrepreneurship and Start-ups by Dr. P. Jakulin Divya Mary, National Institute of Technical Teachers' Training: https://onlinecourses.swayam2.ac.in/e-learning/preview/ntr25_ed60 2. NPTEL Course on Entrepreneurship, By Prof. C Bhaktavatsala Rao, IIT Madras : https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_mg70 3. NPTEL Course on Business Development: From Start to Scale Prof. C Bhaktavatsala Rao, IIT Madras: https://onlinecourses.nptel.ac.in/e-learning/preview/noc23_mg61 4. Government Schemes for Start-ups: https://www.startupindia.gov.in/content/sih/en/government-schemes.html

Course: Fundamentals of Finance and Accounting			Code: 25HSM202C	
Teaching Scheme (Hrs./Week)		Credit	Evaluation Scheme	
Tutorial	02	02	TW	50

● Prerequisites: Basic knowledge of arithmetic and percentages, along with the ability to interpret simple numerical data and tables.		
● Course Objectives: The objectives of the course are 1. This course introduces basic concepts of financial accounting and corporate finance to engineering students. 2. It helps students understand financial statements. 3. Apply accounting principles, and use financial tools for decision-making.		
● Course Outcomes: At the end of the course, students will be able to: CO1: Apply key accounting principles in business contexts. CO2: Interpret financial statements and reports. CO3: Understand working capital and its components. CO4: Evaluate capital budgeting decisions. CO5: Gain awareness of financial markets and financing options.		
● Course Contents:		
Unit I	Introduction to Accounting	6 Hours
Meaning and purpose of accounting, Users of accounting information, Accounting principles, concepts and conventions, Types of accounts and rules of debit and credit, Journal, Ledger and Trial Balance Preparation of Final Accounts (simple adjustments)		
Unit II	Financial Statements and Analysis	6 Hours
Introduction to Financial Statements, Balance Sheet: Classification of assets and liabilities, Profit and Loss Statement, Cash Flow Statement – Format and Components, Financial Ratio Analysis – Concept and Uses Computation of Liquidity and Profitability Ratios		
Unit III	Cost Concepts and Working Capital	6 Hours
Meaning and classification of costs, Fixed vs Variable costs, Break-even analysis – concept and formula, Importance of working capital, Working capital cycle, Techniques for managing working capital		
Unit IV	Introduction to Finance and Time Value of Money	6 Hours
Meaning and scope of finance, Financial goals and functions, Time Value of Money – Concept, Present value and future value, Simple and compound interest, Annuities and perpetuities		
Unit V	Capital Budgeting and Financial Markets	6 Hours
Introduction to capital budgeting, Payback period, Net Present Value (NPV), Internal Rate of Return (IRR) Overview of financial markets, Financing options – Equity and Debt		
● Course activities for term work evaluation: 1. Accounting Principles and Journal Preparation Activity Students prepare journal entries, ledgers, and trial balances for simple business transactions to understand the fundamentals of accounting practices. 2. Financial Statement Analysis Case Study Students analyse balance sheets, profit and loss statements, and cash flow statements of companies to evaluate financial performance and decision-making. 3. Cost Analysis and Break-even Calculation Exercise Students perform cost classification, break-even analysis, and working capital calculations using		

numerical examples and practical business scenarios.

4. **Time Value of Money and Investment Analysis Activity**

Students solve problems related to simple and compound interest, annuities, present value, future value, NPV, and IRR for financial decision-making.

5. **Mini Project on Capital Budgeting and Financial Markets**

Students study capital budgeting techniques, financing options, equity and debt markets, and prepare a report on investment and financing decisions.

● **Textbooks:**

1. S. A. Siddiqui & A. S. Siddiqui – Fundamentals of Financial Accounting – PHI Learning
2. Paul D. Kimmel, Jerry J. Weygandt, Donald E. Kieso – Financial Accounting: Tools for Business Decision Making – Wiley
3. Mike Piper – Accounting Made Simple – CreateSpace

● **Reference Books:**

1. Prasanna Chandra – Financial Management: Theory & Practice – McGraw-Hill
2. Stephen A. Ross, Randolph W. Westerfield & Jeffrey Jaffe – Corporate Finance – McGraw-Hill
3. Ray H. Garrison, Eric W. Noreen & Peter C. Brewer – Managerial Accounting – McGraw-Hill
4. Jerry J. Weygandt, Paul D. Kimmel, Donald E. Kieso – Accounting Principles – Wiley

● **NPTEL/MOOCs:**

1. NPTEL course on Foundations of Accounting & Finance by Prof. Arun Kumar Gopalaswamy, IIT Madras: https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_ec10
2. NPTEL Course on Financial Markets, Institutions and Financial Services By Prof. Divya Verma, Guru Gobind Singh Indraprastha University, Delhi: https://onlinecourses.swayam2.ac.in/e-learning/preview/cec26_mg12
3. NPTEL Course on Working Capital Management by Prof. Anil K. Sharma, IIT Roorkee: https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_mg61
4. Time value of money- Concepts and Calculations
<http://digimat.in/nptel/courses/video/109107115/109107115.html>

Course: Business Intelligence and Analytics			Code: 25HSM202D	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Tutorial	02	02	TW	50

● Prerequisites: Basic knowledge of computer applications, spreadsheet tools, elementary statistics, and database management concepts.		
● Course Objectives: 1. To introduce the concepts of Business Intelligence (BI) and Business Analytics (BA) in modern organizations. 2. To understand the role of Decision Support Systems and Data Warehousing in business decision-making. 3. To learn techniques of data analysis, reporting, and visualization used in BI tools. 4. To develop knowledge of data preparation, predictive analytics, and machine learning applications in business.		
● Course Outcomes: At the end of the course, students will be able to: CO1: Understand the concepts of Decision Support Systems, Business Intelligence, and Business Analytics. CO2: Understand the architecture of Data Warehouses and OLAP systems used in business intelligence. CO3: Apply data preparation, reporting, and visualization techniques to analyze business data. CO4: Analyze the impact of predictive analytics, machine learning, and analytics applications CO5: Apply Machine Learning in BI		
● Course Contents:		
Unit I	Introduction to Data-Driven Business Intelligence and Analytics	6 Hours
Decision Support Systems (DSS): Definition of system, representation of decision-making process, evolution of information systems, Decision Support System, development of DSS, Simon’s four stages of decision-making process, strategies and approaches of decision makers. Business Intelligence (BI): Definition of BI, components of BI, BI architecture, data–information–knowledge concepts, setting up data for BI, role of mathematical models, business intelligence architectures, ethics in business intelligence. Business Analytics (BA): Definition of business analytics, types of analytics – descriptive, diagnostic, predictive and prescriptive analytics, concept of insights, business analytics in practice, importance of data in business analytics, types of data, data quality, 5Vs of big data, data sources and collection methods, data privacy, security and ethical considerations.		
Unit II	Analytical Decision-Making and Architecture of DW & BI	6 Hours
Analytical decision-making process, characteristics, framing business problems into analytical questions, skills of a business analyst. Data exploration and visualization (Excel, Tableau, Power BI), concept of statistical analysis and hypothesis testing. Data visualization, exploratory data analysis (EDA), data cleaning and inspection. BI and DW architecture, relation between BI and DW, role of DSS, EIS, MIS, digital dashboards, need for BI. OLAP concepts, OLAP vs OLTP, cubes, drill-down, roll-up, slice-and-dice, ROLAP vs MOLAP, schemas: star, snowflake, fact constellation.		
Unit III	Predictive, Prescriptive Analytics and Reporting Authoring	6 Hours
Text analytics and web analytics, report authoring (relational & multidimensional models), types of reports (list, crosstab, statistics, charts, maps, financial), report features (grouping, sorting, filtering, calculations, conditional formatting, summary lines, drill-up, drill-down, drill-through), report scheduling and output formats (PDF, Excel, CSV, XML).		
Unit IV	Business Analytics in Marketing and Finance	6 Hours
Marketing Analytics, Customer segmentation, targeting, and positioning, Campaign management and ROI measurement, Data-driven marketing strategies. Financial Analytics - Risk management and credit scoring		

financial forecasting and planning, Case studies: Financial performance improvement through analytics (Non-Statistical - Conceptual Treatment only).		
Unit V	Business Analytics Applications and Machine Learning in BI	6 Hours
Impact of machine learning in BI: classification problems, evaluation of classification models, Bayesian methods, logistic regression. Clustering methods: partition and hierarchical methods, evaluation of clustering models. Association rule mining: structure of association rules and Apriori algorithm.		
● Course activities for term work evaluation: 1. Business Intelligence Case Study Analysis Students analyse real-world business cases to understand the role of Business Intelligence (BI), Decision Support Systems (DSS), and data-driven decision-making in organizations. 2. Data Visualization and Dashboard Development Activity Students create charts, dashboards, and analytical reports using tools such as Excel, Tableau, or Power BI to present business insights effectively. 3. Hands-on Activity on Data Analysis and Reporting Students perform data cleaning, exploratory analysis, report generation, and visualization using business datasets to identify trends and patterns. 4. Marketing and Financial Analytics Mini Project Students analyse customer segmentation, campaign performance, sales trends, and financial data using analytical techniques and prepare a business analytics report. 5. Machine Learning Applications in Business Activity Students explore classification, clustering, association rule mining, and predictive analytics techniques using sample datasets and present their findings and business implications.		
● Textbooks: 1. Camm, Cochran, Fry, Ohlmann, Anderson, Sweeney, Williams - Essentials of Business Analytics, Cengage Learning.		
● Reference Books: 1. Data Mining: Concepts and Techniques, Jiawei Han and Micheline Kamber 2. James Evans, Business Analytics, Pearson. 3. Albright Winston, Business Analytics - Data Analysis - Data Analysis and Decision Making, Cengage Learning, Reprint 4. Sahil Raj, Business Analytics, Cengage Learning. 5. Knaflitz, C. N. (2015). Storytelling with data: A data visualization guide for business professionals. Wiley. 6. Siegel, E. (2016). Predictive analytics: The power to predict who will click, buy, lie, or die. Wiley.		
● e-Books: 1. https://www.knime.com/sites/default/files/inline-images/KNIME_quickstart.pdf 2. www.cs.ccsu.edu/~markov/weka-tutorial.pdf 3. http://www.biomedicahelp.altervista.org/Magistrare/Clinics/BIC_PrimoAnno/IdentificazioneModelliDataMining/Business%20Intelligence%20-%20Carlo%20Vercellis.pdf 4. https://download.e-bookshelf.de/download/0000/5791/06/L-G-0000579106-0002359656.pdf		
● MOOC / NPTEL Courses: 1. Business Analytics for management decision By Prof. Rudra P Pradhan, IIT Kharagpur : https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_mg11 2. Business analytics and data mining modeling using R By Prof. Gaurav Dixit, IIT Roorkee : https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_mg24 3. Business Analysis for Engineers : http://www.digimat.in/nptel/courses/video/110106050/110106050.html 4. Business Intelligence & Analytics By Prof. Saji K Mathew, IIT Madras: https://onlinecourses.nptel.ac.in/e-learning/preview/noc24_cs65		

Course: Indian Constitution and Governance			Code: 25VEC202	
Teaching Scheme (Hrs/Week)		Credit	Evaluation Scheme	
Tutorial	1	1	TW	25

- **Prerequisites:** Basic awareness of Indian history, civic studies at school level, and general understanding of social and political systems.

- **Course Objectives: The objectives of the course are**

1. To introduce students to the philosophy, features, and framework of the Indian Constitution.
2. To understand the structure, powers, and functions of the Union and State governments.
3. To explain Fundamental Rights, Duties, and Directive Principles and their role in democracy.
4. To familiarize students with constitutional bodies and governance mechanisms in India.
5. To develop awareness of contemporary issues related to constitutional values, governance, and citizenship.

Course Outcomes: At the end of the course, students will be able to:

- CO1. Explain the historical background, features, and structure of the Indian Constitution.
CO2. Describe Fundamental Rights, Directive Principles, and Fundamental Duties and their significance
CO3. Apply constitutional provisions to analyze the functioning of Union and State governments.
CO4. Analyze the role of constitutional and statutory bodies in Indian governance
CO5. Evaluate contemporary governance issues with reference to constitutional values and ethics.

- **Course Contents:**

Unit I	Introduction to Indian Constitution	3 Hours
Meaning and importance of Constitution Historical background and making of the Indian Constitution Salient features of the Indian Constitution Preamble: objectives and significance Citizenship – provisions and amendments		
Unit II	Fundamental Rights, Duties, and Directive Principles Fundamental Rights	3 Hours
Types, scope and limitations Right to Equality, Freedom, Religion, Constitutional Remedies Directive Principles of State Policy – objectives and classification Fundamental Duties and their relevance Relationship between Fundamental Rights and DPSPs		
Unit III	Union and State Government Structure Union Government	3 Hours
President, Vice-President, Prime Minister, Council of Ministers Powers and functions of Parliament State Government: Governor, Chief Minister, State Legislature Center–State relations: legislative, administrative, and financial		
Unit IV	Constitutional and Statutory Bodies Election Commission of India	3 Hours
Composition, powers, and functions Union Public Service Commission (UPSC) and State Public Service Commissions (SPSC): roles and responsibilities Comptroller and Auditor General (CAG) of India: duties and significance in financial accountability Finance Commission: composition, functions, and role in centre–state financial relations Judiciary in India: structure, jurisdiction, and role of the Supreme Court and High Courts		
Unit V	Governance, Democracy and Contemporary Issues Concept of democracy and good governance Local self-government	3 Hours
Panchayati Raj and Urban Local Bodies Constitutional amendments and landmark judgments Ethical governance and citizen participation Current issues related to Indian Constitution and governance		
● Textbooks: 1. M. V. Pylee, An Introduction to the Constitution of India, Vikas Publishing 2. D. D. Basu, Introduction to the Constitution of India, LexisNexis		

● **Reference Books:**

1. Granville Austin, The Indian Constitution: Cornerstone of a Nation, Oxford University Press
2. Subhash Kashyap, Our Constitution: An Introduction to India's Constitution and Constitutional Law, National Book Trust

● **MOOC / NPTEL Courses:**

1. NPTEL1, Introduction to Indian Constitution, By Prof. Priyanca Mathur, Dr. Amrita Purkayastha, Dr. Sneha Yadav, JAIN (Deemed to be University), Bangalore : https://onlinecourses.swayam2.ac.in/e-learning/preview/imb26_mg151
2. NPTEL2, Constitution Law and Public Administration in India, By Prof. Sairam Bhat, National Law School of India University: https://onlinecourses.nptel.ac.in/e-learning/preview/noc24_lw05
3. NPTEL3, Constitutional Studies, By Prof. Sudhir Krishnaswamy, National Law School of India University: https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_lw03
4. NPTEL4, Public Policy and Governance, By Dr. A. Sridhar Raj, Institute of Public Enterprise: https://onlinecourses.swayam2.ac.in/e-learning/preview/cec24_hs38

● **Activities for Term Work Evaluation:**

1. Group Discussion on Fundamental Rights and Duties
2. Debate on Constitutional and Contemporary Governance Issues
3. Case Study Analysis on Indian Judiciary and Landmark Judgments
4. Seminar / Presentation on Indian Constitution and Democratic Values
5. Poster Making on Fundamental Rights, Duties, and Good Governance
6. Essay Writing on Role of Citizens in Democracy and Nation Building
7. Mock Parliament / Mock Election Activity
8. Assignment on Constitutional Bodies and Their Functions
9. Field Visit / Report on Local Self-Government Institutions
10. Quiz / Awareness Activity on Indian Constitution and Governance Systems



Dr P B Nangare

Chairman, BoS (Civil Engineering)



Dr D Y Dhande

Dean (Academics)



Dr D S Bormane

Principal

