SNJB's
Late Sau. Kantabai Bhavarlalji Jain
College of Engineering

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

Shri Neminath Jain Brahmacharyashram (SNJB) (Jain Gurukul)

Neminagar, Chandwad - 423101, Dist. Nashik (MS, India).

Tele: (02556) 253750, Web: www.snjb.org, Email: principalcoe@snjb.org

ESTD - 1928

Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor

To be implemented for 2024-28 Batch

(With Effect from Academic Year 2025-26)

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)
Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor
To be implemented for 2024-28 Batch
(With Effect from Academic Year 2025-26)

Vision of the Institute

Transform young aspirant learners towards creativity and professionalism for societal growth through quality technical education.

Mission of the Institute

1. To transfer the suitable technology, particularly for rural development.
2. To enhance diverse career opportunities among students for building a nation.
3. To acquire the environment of learning to bridge the gap between industry and academics.
4. To share values, ideas, and beliefs by encouraging faculties and students for the welfare of society.

Vision of the Civil Engineering Department

To empower students to get knowledge and excellence in civil engineering and to cultivate a sense of commitment to society.

Mission of the Civil Engineering Department

1. To develop outstanding Civil Engineering graduates with Highest ethics.
2. To provide advanced skills of learning which helps to travel the journey from academics to industry.
3. To impart basic knowledge to serve the society.

Program Outcomes (POs) for an engineering graduate:

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

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)
Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor
To be implemented for 2024-28 Batch
(With Effect from Academic Year 2025-26)

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

1. To offer engineering services with professional and ethical responsibility.
2. To demonstrate knowledge in analysis, design, laboratory investigation with high proficiency in mathematics,science.
3. Interact with stakeholders effectively and execute quality construction work applying necessary tools.

Table 1: Abbreviations

Abbreviation	Meaning
CIE	Continuous Internal Evaluation
MSE	Mid Semester Examination
SEE	Semester End Examination
BSC	Basic Science Courses
ESC	Engineering Science Courses
VSEC/VSC	Vocational and Skill Enhancement Courses
VEC	Value Education Courses
AEC	Ability Enhancement Courses
PCC	Program Core Courses
PEC	Program Elective Courses
MDM	Multidisciplinary Minor
OE/OEC	Open Elective - other than a particular program
EEM	Entrepreneurship/Economics/ Management Courses (HSSM)
ELC	Research Methodology
	Community Engagement Project (CEP)/ Field Project (FP)
	Project
	Internship/ On Job Training (OJT)
IKS	Indian Knowledge System
CC/CCC	Co-Curricular Courses
HOC	Honor Courses
EXT	Exit Courses
DMC	Double Minor Courses
HRC	Honor with Research Courses
SIP	Student Induction Program
L	Lecture
T	Tutorial
P/PR	Practical
TH	Theory
Lab	Laboratory
TW	Term Work
OR	Oral
CE	Civil Engineering
CS	Computer Engineering
ME	Mechanical Engineering
AD	Artificial Intelligence and Data Science Engineering
ET	Electronics and Telecommunication Engineering

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)
Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor
To be implemented for 2024-28 Batch
(With Effect from Academic Year 2025-26)

GENERAL COURSE STRUCTURE

A. Definition of Credit:

Table 2: Credit Definition

1 Hour Lecture (L) per week	1 Credit
1 Hour Tutorial (T) per week	1 Credit
2 Hours Practical (P) per week	1 Credit

B. Range of Credits: (B.Tech. or Equivalent) in Tech. with Multidisciplinary Minor:

In the light of the fact that a typical NEP Compliant Model Four-year Undergraduate degree program in Technology has about 176 credits, the total number of credits proposed for the four-year B.Tech. in **Civil Engineering** with Multidisciplinary minor degree is kept as **172.**

Table 3: Range of Credits

Course Category		Credits As PER NEP Guidelines	Proposed Credits
Basic Science Course	BSC/ESC	14-18	15
Engineering Science Course		16-12	14
Programme Core Course (PCC)	Program Courses	44-56	47
Programme Elective Course (PEC)		20	20
Multidisciplinary Minor (MD M)	Multidisciplinary Courses	14	17
Open Elective (OE) Other than a particular program		8	8
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	8	8
Ability Enhancement Course (AEC)	Humanities Social Science and Management (HSSM)	4	6
Entrepreneurship/Economics/ Management Courses		2	4
Indian Knowledge System (IKS)		2	2
Value Education Course (VEC)		4	5
Research Methodology(RM)	Experiential Learning Courses	4	4
Community Engagement Project (CEP)/ Field Project (FP)		2	2
Project		4	5
Internship/ OJT		12	12
Co-curricular Courses (CC)	Liberal Learning Courses	4	3
Total Credits		**160-176**	**172**

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad

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

Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor

To be implemented for 2024-28 Batch

(With Effect from Academic Year 2025-26)

C.   Semester wise Credit Distribution Structure for Four Year B. Tech in Civil Engineering with Multidisciplinary Minor:

Table 4: Semester-wise Credit Distribution Structure

| Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science Course	BSC/ESC	8	7	-	-	-	-	-	-	15
Engineering Science Course		7	7	-	-	-	-	-	-	14
Programme Core Course (PCC)	Program Courses	-	3	11	8	9	4	9	3	47
Programme Elective Course (PEC)		-	-	-	-	6	5	6	3	20
Multidisciplinary Minor (MD M)	Multidisciplinary Courses	-	-	3	3	3	2	3	3	17
Open Elective (OE) Other than a particular program		-	-	-	3	2	3	-	-	8
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	2	2	-	2	-	2	-	-	8
Ability Enhancement Course (AEC)	Humanities Social Science and Management (HSSM)	1	-	1	2	2	-	-	-	6
Entrepreneurship/Economics/ Management Courses		-	-	2	2	-	-	-	-	4
Indian Knowledge System (IKS)		2	-	-	-	-	-	-	-	2
Value Education Course (VEC)		-	-	3	2	-	-	-	-	5
Research Methodology	Experiential Learning Courses	-	-	-	-	-	4	-	-	4
Community Engagement Project (CEP)/ Field Project (FP)		-	-	2	-	-	-	-	-	2
Project		-	-	-	-	-	2	3	-	5
Internship / OJT		-	-	-	-	-	-	-	12	12
Co-curricular Courses (CC)	Liberal Learning Courses	1	2	-	-	-	-	-	-	3
Total Credits (Major)		**21**	**21**	**22**	**22**	**22**	**22**	**21**	**21**	**172**

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)
Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor
To be implemented for 2024-28 Batch
(With Effect from Academic Year 2025-26)
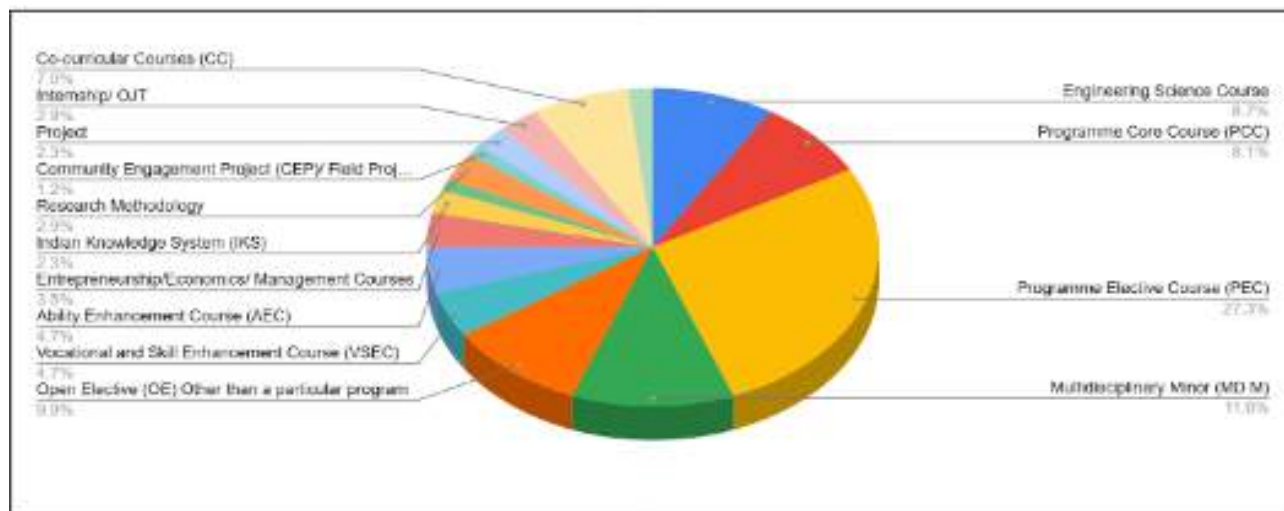
Students can opt for any of the following as per the rules and regulations given by the institute:

1. B. Tech with Multidisciplinary Minor = Total 172 Credits
2. B. Tech with Multidisciplinary Minor and Honor = Total 190 Credits
3. B. Tech with Multidisciplinary Minor and Honor by Research = Total 190 Credits
4. B. Tech with Multidisciplinary Minors (Double Minor) = Total 190 Credits

Students will have the flexibility to enter a program in odd semesters and exit a programme after the successful completion of even semesters as per their future career needs. **Students exiting will be awarded provided they secure additional EIGHT credits in skill-based vocational courses.**

The credit structure for different levels under the Four-year Bachelor's Multidisciplinary B. Tech Programme with multiple entries and multiple exit options are as given below**:**

Table 5: Credit Requirements

Level	Qualification Title	Credit Requirements	Semester	Year
4.5	One Year UG Certificate in Tech.	42	2	1
5.0	Two Years UG Diploma in Tech.	86	4	2
5.5	Three Years Bachelor's Degree in Vocation (B. Voc.) or B. Sc. (Tech.)	130	6	3
6.0	4-Years Bachelor's degree (B.Tech. or Equivalent) in Tech. with Multidisciplinary Minor	172	8	4

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)
Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor
To be implemented for 2024-28 Batch
(With Effect from Academic Year 2025-26)

D. Category-wise Courses

1. MULTIDISCIPLINARY MINOR (MD M)

- List of Multidisciplinary Minor Courses from other departments: Total 17 Credits
- The Minor courses may be from the different disciplines of the Engineering faculty, or they can be from different faculty altogether.
- Students have to choose the MD M in the Second Year and once opted then students can not change it throughout the semesters.

Table 6: Multidisciplinary Minors

Multidisciplinary Minor Baskets (UG)					
MDM Offered by Department	**To be Opted By Department**	**Sr No**	**Course Code**	**Course Name**	**Semester**
Civil Engineering	**Students other than Civil department**	1	24-MDM-CE-2-01	Fundamentals of Green Technology	III
			24-MDM-CE-2-02	Fundamentals of Green Technology Lab	
		2	24-MDM-CE-2-03	Green Building Rating System	IV
		3	24-MDM-CE-3-01	Water and Land Management	V
			24-MDM-CE-3-02	Water and Land Management Lab	
		4	24-MDM-CE-3-03	Socio-economic Management	VI
		5	24-MDM-CE-4-01	Urban Policy Framework	VII
			24-MDM-CE-4-02	Urban Policy Framework Lab	
		6	24-MDM-CE-4-03	Life Cycle Assessment	VIII
Computer Engineering & Artificial Intelligence and Data Science	**Students other than the Computer and AIDS department**	1	24-MDM-CS-2-01	Data Structure	III
			24-MDM-CS-2-02	Data Structure Lab	
		2	24-MDM-CS-2-03	Database Management System	IV
		3	24-MDM-CS-3-01	Object Oriented Programming in Java	V
			24-MDM-CS-3-02	Java Programming Lab	
		4	24-MDM-CS-3-03	Cloud Computing	VI
		5	24-MDM-CS-4-01	Data Science and Machine Learning	VII
			24-MDM-CS-4-02	Data Science and Machine Learning Lab	
		6	24-MDM-CS-4-03	Blockchain Technologies	VIII
Electronics & Telecommunication	**Students other than E&TC department**	1	24-MDM-ET-2-01A	Internet of Things	III
			24-MDM-ET-2-02A	Internet of Things Laboratory	
		2	24-MDM-ET-2-03A	Digital Electronics and Microprocessor	IV

Engineering		3	24-MDM-ET-3-01A	Drone Technology	V
			24-MDM-ET-3-02A	Drone Technology Laboratory	
		4	24-MDM-ET-3-03A	Robotics	VI
		5	24-MDM-ET-4-01A	Mobile Computing	VII
			24-MDM-ET-4-02A	Mobile Computing Laboratory	
		6	24-MDM-ET-4-03A	Wireless Sensor Networks	VIII
Electronics & Telecommunication Engineering	**Students other than E&TC department**	1	24-MDM-ET-2-01B	Lean Systems Fundamentals	III
		2	24-MDM-ET-2-02B	Industry 4.0 Concepts and Technologies	IV
		3	24-MDM-ET-3-01B	Advanced Lean Practices	V
			24-MDM-ET-3-02B	Lean Simulation and Automation Lab	
		4	24-MDM-ET-3-03B	Smart Manufacturing Systems and Digital Transformation	VI
		5	24-MDM-ET-4-01B	Robotics and Automation for Smart Manufacturing	VII
			24-MDM-ET-4-02B	Robotics and AI Implementation Lab	
		6	24-MDM-ET-4-03B	Lean Industry 4.0	VIII
Mechanical Engineering	**Students other than Mechanical department**	1	24-MDM-ME-2-01	Engineering Materials and Safety	III
			24-MDM-ME-2-02	Engineering Materials and Safety Lab	
		2	24-MDM-ME-2-03	Sustainable Energy Technology	IV
		3	24-MDM-ME-3-01	Remote Sensing and GIS	V
			24-MDM-ME-3-02	Remote Sensing and GIS Lab	
		4	24-MDM-ME-3-03	Project Planning & Management	VI
		5	24-MDM-ME-4-01	Estimation and Costing	VII
			24-MDM-ME-4-02	Estimation and Costing Lab	
		6	24-MDM-ME-4-03	System Approach in Engineering	VIII

#Note: You can refer syllabus of all SEM III and SEM IV MDM Courses from

https://snjb.org/engineering/uploads/media/2025/03/SY2025-26-MDM-2024-28.pdf

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)
Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor
To be implemented for 2024-28 Batch
(With Effect from Academic Year 2025-26)

2. OPEN ELECTIVES

- A Student can opt for any one course out of available institute-wide courses defined in the following list as Open Elective – provided he/she has not taken that particular course in his/her Programme core, Programme elective, Multidisciplinary Minor, other Open elective, and Vocational and Skill Enhancement courses, etc. throughout his/her four years of B. Tech Programme.
- The student must opt for a course that is compulsory from another discipline/branch, not from the same Major discipline/branch, and also the course must be not related to his/her major degree/branch courses.
- For Open Electives 8 credits are offered from semester IV to semester VI.
- Two courses of 3 credits and one course of 2 credits.

Table 7: Open Electives

Sr. No	Course Code	Course Name
Open Elective I (SEM-IV)		
1	24-OEC-2-4-01	Precision Agriculture
2	24-OEC-2-4-02	Soil and Water Conservation for Agriculture
3	24-OEC-2-4-03	Business Development, Marketing and Finance
4	24-OEC-2-4-04	Financial Accounting and Management
5	24-OEC-2-4-05	Information Technology Laws and Policies
Open Elective II (SEM-V)		
1	24-OEC-3-5-01	Agronics
2	24-OEC-3-5-02	Digital Marketing
3	24-OEC-3-5-03	Estimation and Costing
4	24-OEC-3-5-04	Sustainable Energy Engineering
5	24-OEC-3-5-05	Occupational Health and Safety
Open Elective III (SEM-VI)		
1	24-OEC-3-6-01	E-Governance in Agriculture
2	24-OEC-3-6-02	Agro Entrepreneurship
3	24-OEC-3-6-03	Startup and New Venture Management
4	24-OEC-3-6-04	Rural Finance Management and Budgeting
5	24-OEC-3-6-05	Green Energy

#Note: You can refer syllabus of sem IV Open Elective Courses from

https://snjb.org/engineering/uploads/media/2025/03/SY2025-26-Open-Electives-2024-28.pdf

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)
Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor
To be implemented for 2024-28 Batch
(With Effect from Academic Year 2025-26)

3. DOUBLE MINORS

- In addition to 172 credits of B. Tech Programmes (Bachelor of Technology) i.e. Major in which the student has taken admission, a student may opt for Specialization Minor in another discipline/branch/emerging areas, not in Major discipline/branch.
- A student is required to earn an additional 18 credits in another discipline/ branch/ emerging areas for Specialization Minor distributed over semesters III to VIII.
- The total number of credits required to complete the Specialization Minor in another discipline/ emerging area is 18 credits, in addition to 172 credits in the Major.
- Minor Courses can be completed through an online platform.

Table 8: Double Minors

Double Minor Offered by	To be Opted By Department	Double Minor Basket Name	Sr No	Course Code	Course Name	Semester
Double Minor Basket (UG) (2024-28)						
Artificial Intelligence & Data Science Engineering	Students other than the Computer and AIDS department	High Performance Computing	1	24-DMC-AD-2-01	Computer Networks	III
			2	24-DMC-AD-2-02	Cloud Computing	IV
			3	24-DMC-AD-3-03	Distributed Computing	V
			4	24-DMC-AD-3-04	Blockchain Technology	VI
			5	24-DMC-AD-4-05	High Performance Computing	VII
			6	24-DMC-AD-4-06	Mastering in Cloud Architecture	VIII
Civil Engineering	Students other than Civil department	Infrastructure Engineering	1	24-DMC-CE-2-01	Infrastructure Planning and Management	III
			2	24-DMC-CE-2-02	Infrastructure Economics	IV
			3	24-DMC-CE-3-03	Project Formulation and Appraisal	V
			4	24-DMC-CE-3-04	Advanced and Sustainable Materials in Infrastructure	VI
			5	24-DMC-CE-4-05	Management Information Systems	VII
			6	24-DMC-CE-4-06	Computational Methods in Infrastructure Engineering	VIII
Computer Engineering	Students other than Computer and AIDS department	Data Science	1	24-DMC-CS-2-01	Foundation of Data Science	III
			2	24-DMC-CS-2-02	Principles of Artificial Intelligence and Machine Learning	IV
			3	24-DMC-CS-3-03	Data analytics with Python	V
			4	24-DMC-CS-3-04	Business Intelligence & Analytics	VI

			5	24-DMC-CS-4-05	Natural Language Processing	**VII**
			6	24-DMC-CS-4-06	Large Language Models	**VIII**
Electronics & Telecommunication Engineering	**Students other than E&TC department**	**Embedded System**	1	24-DMC-ET-2-01	Digital Electronics	**III**
			2	24-DMC-ET-2-02	Micoprocessor & Microcontroller	**IV**
			3	24-DMC-ET-3-03	Analog Circuits	**V**
			4	24-DMC-ET-3-04	Mechatronics	**VI**
			5	24-DMC-ET-4-05	Embedded System	**VII**
			6	24-DMC-ET-4-06	Internet of Things	**VIII**
Mechanical Engineering	**Students other than Mechanical department**	**Sustainable Energy Engineering**	1	24-DMC-ME-2-01	Introduction to Sustainable Energy Systems	**III**
			2	24-DMC-ME-2-02	Solar PV Design Optimization & Manufacturing	**IV**
			3	24-DMC-ME-3-03	Future Solar Energy Harnessing Technologies	**V**
			4	24-DMC-ME-3-04	Grid Integration and Smart Grid Technologies	**VI**
			5	24-DMC-ME-4-05	Sustainable Engineering Solutions	**VII**
			6	24-DMC-ME-4-06	Sustainability Assessment and Analysis	**VIII**

#Note for NPTEL/SYAYAM: Approved courses and platforms will be enlisted timely by authorities along with rules and regulations

#Note: You can refer syllabus of all SEM III and IV Double Minor Courses from

https://snjb.org/engineering/uploads/media/2025/03/SY2025-26-Double-Minors-2024-28.pdf

4. HONORS

- In addition to 172 credits of B. Tech Programmes (Bachelor of Technology) i.e. Major in which the student has taken admission, a student may opt for Honors in the same Tech. discipline/branch / Emerging Areas.
- A student is required to earn an additional 18 credits in the same Tech. discipline/ branch / Emerging Areas for Honors distributed over semesters III to VIII.
- The total number of credits required to complete the Honors in the same Tech. discipline/ Emerging Areas is 18 credits, in addition to 172 credits in Major.
- Students will have to compulsorily choose Honors from the same Tech. discipline/branch.
- Honors Degree in the Bachelor of Engineering programme shall be awarded to students earning additional total credits of all six semesters from the second year to final year, i.e., 18 Credits, in addition to 172 credits or 130 credits respectively. The student admitted in the first year must earn 172 credits and 130 credits admitted in lateral entry (admitted after Diploma or B.Sc.) in the second year.
- Minor Courses can be completed through an online platform.

The student has to choose One Honor out of the Two Honor groups provided below

Honors offered by Civil Engineering are as follows:

Table 9: Honors

Sr No	Name of Honors Offered by Department
A.	Construction Management
B.	Sustainability Engineering

The detailed syllabus structure for the same is as follows:

Table 10A: Specialization Honors in Construction Management

Sr. No	Category	SEM	Course Code	Course Name	L	T	P	Total Hours	Credits
01	HOC	III	24-HOC-CE-2-01A	Project Planning and Control	3	-	-	3	3
02	HOC	IV	24-HOC-CE-2-02A	Principles of Construction Management	3	-	-	3	3
03	HOC	V	24-HOC-CE-3-03A	Admixtures and Special Concretes	3	-	-	3	3
04	HOC	VI	24-HOC-CE-3-04A	Sustainable Engineering Concepts and life Cycle Analysis	3	-	-	3	3
05	HOC	VII	24-HOC-CE-4-05A	Safety in Construction	3	-	-	3	3
06	HOC	VIII	24-HOC-CE-4-06A	Bridge Engineering	3	-	-	3	3
Total					**18**	**-**	**-**	**18**	**18**

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)
Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor
To be implemented for 2024-28 Batch
(With Effect from Academic Year 2025-26)

Table 10B: Specialization Honors in Sustainability Engineering

Sr. No	Category	SEM	Course Code	Course Name	Teaching Scheme				Credits
					Hours				
					L	T	P	Total Hours	
01	HOC	III	24-HOC-CE-2-01B	Environmental legislation in India	3	-	-	3	3
02	HOC	IV	24-HOC-CE-2-02B	Sustainable Construction Materials	3	-	-	3	3
03	HOC	V	24-HOC-CE-3-03B	Smart Cities and Smart Villages	3	-	-	3	3
04	HOC	VI	24-HOC-CE-3-04B	Flood Mitigation and Hazard Management	3	-	-	3	3
05	HOC	VII	24-HOC-CE-4-05B	Green Buildings	3	-	-	3	3
06	HOC	VIII	24-HOC-CE-4-06B	Environment Sustainability and Climate Change	3	-	-	3	3
Total					18	-	-	18	18

#Note for NPTEL/SYAYAM: Approved courses and platforms will be enlisted timely by authorities along with rules and regulations

#Note: You can refer syllabus of all SEM III and SEM IV Honors Courses from
https://snjb.org/engineering/uploads/media/2025/03/SYBTech_Civil-Honors_2025-26.pdf

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)
Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor
To be implemented for 2024-28 Batch
(With Effect from Academic Year 2025-26)

5. HONORS WITH RESEARCH AND MULTIDISCIPLINARY MINOR

- The Student will work on a Research Project or Dissertation for 18 Credits in the Fourth Year in the respective discipline.
- The distribution of 18 Credits for Research projects in Sem-VII and Sem-VIII is given below.
- To get a B. Tech in Civil Engineering-Honors with Research and Multidisciplinary Minor degree Students need to earn a total of 190 Credits which consist of 172 credits of regular Multidisciplinary Minor courses, 18 Credits of Honor courses, 18 credits of Research courses.

Table 11: Honors with Research and Multidisciplinary Minor (Sem-VII)

Course Code	Course Name	Teaching Scheme				Evaluation Scheme							Total Marks
		Hours			Credit	Theory Course				Lab Course			
		L	T	P	Total	CIE	MSE	SEE	TH Marks	TW	PR	OR	
24-HRC-4-01	Intellectual Property Right (IPR)	2	-	-	2	-	50	50	100	-	-	-	100
24-HRC-4-02	Research Project (Synopsis) Phase-I	-	-	4	2	-	-	-	-	50	-	50	100
24-HRC-4-03	Research Specific Core Course-I (Online NPTEL Course**#**)	3	-	-	3	-	50	50	100	-	-	-	100
Total		**5**	**-**	**4**	**7**	**-**	**100**	**100**	**200**	**50**	**-**	**50**	**300**

Final Year B. Tech Semester-VII

#Note for NPTEL/SYAYAM: Approved courses and platforms will be enlisted timely by authorities along with rules and regulations

Table 12: Honors with Research and Multidisciplinary Minor (Sem-VIII)

Course Code	Course Name	Teaching Scheme				Evaluation Scheme							Total Marks
		Hours			Credit	Theory Course				Lab Course			
		L	T	P	Total	CIE	MSE	SEE	TH Marks	TW	PR	OR	
24-HRC-4-04	Research Project Phase-II	-	-	22	11	-	-	-	-	50	-	50	100
Total		**-**	**-**	**22**	**11**	**-**	**-**	**-**	**-**	**50**	**-**	**50**	**100**

Final Year B. Tech Semester-VIII

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad

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

Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor

To be implemented for 2024-28 Batch

(With Effect from Academic Year 2025-26)

TEACHING AND EVALUATION SCHEME FOR FIRST YEAR B-TECH

Semester – I

Sr. No	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme							Total Marks
				Hours				Credits	Theory Course				Lab Course			
				L	T	P	Total Hours		CIE	MSE	SEE	TH Marks	TW	PR	OR	
1	BSC	24-BSC-1-02	Engineering Chemistry	3	-	-	3	3	20	20	60	100	-	-	-	100
2	BSC	24-BSC-1-03	Linear Algebra And Differential Calculus	3	1	-	4	4	20	20	60	100	-	-	-	100
3	ESC	24-ESC-1-03	Engineering Graphics	3	-	-	3	3	20	20	60	100	-	-	-	100
4	ESC	24-ESC-1-04	Smart Building & Materials	2	-	-	2	2	20	20	60	100	-	-	-	100
5	BSC	24-BSC-1-06	Engineering Chemistry Laboratory	-	-	2	2	1	-	-	-	-	25	-	-	25
6	ESC	24-ESC-1-08	Engineering Graphics Lab	-	-	2	2	1	-	-	-	-	25	-	-	25
7	ESC	24-ESC-1-09	Smart Building & Materials Lab	-	-	2	2	1	-	-	-	-	25	-	-	25
8	VSEC	24-VSC-1-02	TechShop	-	-	4	4	2	-	-	-	-	50	-	-	50
9	CCC		Co-curricular Course -I	-	-	2	2	1	-	-	-	-	50	-	-	50
10	IKS	24-IKS-1-01	Indian Knowledge System	-	2	-	2	2	-	-	-	-	50	-	-	50
11	AEC	24-AEC-1-01	Professional Communication Skills	-	1	-	1	1	-	-	-	-	25	-	-	25
Total				11	4	12	27	21	80	80	240	400	250	-	-	650

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)
Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor
To be implemented for 2024-28 Batch
(With Effect from Academic Year 2025-26)

Course Code	Basket of Co-curricular Course
24-CCC-1-A	Yoga
24-CCC-1-B	Sports
24-CCC-1-C	NSS (National Service Scheme)
24-CCC-1-D	Cultural

Note: Students have to select any one course from the above basket.

Induction Program (Mandatory)	3 Weeks Duration
The induction program (as per AICTE guidelines) is to be completed at the start of the first year.	- SIP Module 1: UHV 1 - SIP Module 2: Physical Health and Related Activities - SIP Module 3: Familiarization of Department/ Branch and Innovation - SIP Module 4: Visit to a Local Area - SIP Module 5: Lectures by Eminent People - SIP Module 6: Proficiency Modules - SIP Module 7: Literature / Literary Activities - SIP Module 8: Creative Practices - SIP Module 9: Extra Curricular Activities

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

Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor

To be implemented for 2024-28 Batch

(With Effect from Academic Year 2025-26)

Semester – II

Sr. No	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme								Total Marks
				Hours				Credits	Theory Course				Lab Course				
				L	T	P	Total Hours		CIE	MSE	SEE	TH Marks	TW	PR	OR		
1	BSC	24-BSC-1-01	Engineering Physics	3	-	-	3	3	20	20	60	100	-	-	-		100
2	BSC	24-BSC-1-04	Statistics and Integral Calculus	3	-	-	3	3	20	20	60	100	-	-	-		100
3	ESC	24-ESC-1-01	Basic Electrical and Electronics Engineering	3	-	-	3	3	20	20	60	100	-	-	-		100
4	ESC	24-ESC-1-06	Programming and Problem Solving using Python	2	-	-	2	2	20	20	60	100	-	-	-		100
5	PCC	24-PCC-CE-1-01	Engineering Mechanics	2	-	-	2	2	20		30	50	-	-	-		50
6	BSC	24-BSC-1-05	Engineering Physics Laboratory	-	-	2	2	1	-	-	-	-	25	-	-		25
7	ESC	24-ESC-1-05	Basic Electrical and Electronics Engineering Lab	-	-	2	2	1	-	-	-	-	25	-	-		25
8	ESC	24-ESC-1-10	Python Programming Lab	-	-	2	2	1	-	-	-	-	25	-	-		25
9	PCC	24-PCC-CE-1-02	Engineering Mechanics Lab	-	-	2	2	1	-	-	-	-	25	25	-		50
10	VSEC	24-VSC-1-01	TechSkill	-	-	4	4	2	-	-	-	-	50	-	-		50
11	CCC	24-CCC-1-05	Co-curricular Course -II	-	-	4	4	2	-	-	-	-	25	-	-		25
Total				13	-	16	29	21	100	80	270	450	175	25	-		650

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)
Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor
To be implemented for 2024-28 Batch
(With Effect from Academic Year 2025-26)

Level 4.5 Exit Criteria: Mandatory Courses to be completed after the first year to obtain One Year UG Certificate in Civil Engineering

Sr. No	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme								
				Hours				Credits	Theory Course				Lab Course			Total Marks
				L	T	P	Total Hours		CIE	MSE	SEE	TH Marks	TW	PR	OR	
1	EXT	24-EXT-1-01	Internship / Fieldwork/OJT	-	-	8	8	4	-	-	-	-	100	-	-	100
2	EXT	24-EXT-1-02	Mini Project	-	-	8	8	4	-	-	-	-	50	-	50	100
Total				-	-	16	16	8	-	-	-	-	150	-	50	200

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad

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

Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor

To be implemented for 2024-28 Batch

(With Effect from Academic Year 2025-26)

TEACHING AND EVALUATION SCHEME FOR SECOND YEAR B-TECH

Semester – III

Sr. No	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme							Total Marks
				Hours				Credits	Theory Course				Lab Course			
				L	T	P	Total Hours		CIE	MSE	SEE	TH Marks	TW	PR	OR	
1	PCC	24-PCC-CE-2-01	Numerical Methods & Statistics	3	-	-	3	3	20	20	60	100	-	-	-	100
2	PCC	24-PCC-CE-2-02	Strength of Materials	3	-	-	3	3	20	20	60	100	-	-	-	100
3	PCC	24-PCC-CE-2-03	Surveying	3	-	-	3	3	20	20	60	100	-	-	-	100
4	MD M		Multi Disciplinary Minor-I	2	-	-	2	2	20	-	30	50	-	-	-	50
5	MD M		Multi Disciplinary Minor-I Lab	-	-	2	2	1	-	-	-	-	25	-	25	50
6	PCC	24-PCC-CE-2-04	Strength of Materials Lab	-	-	2	2	1	-	-	-	-	25	-	25	50
7	PCC	24-PCC-CE-2-05	Surveying Lab	-	-	2	2	1	-	-	-	-	25	25	-	50
8	EEM	24-EEM-2-01	Engineering Economics	1	-	2	3	2	-	-	-	-	25	-	-	25
9	AEC	24-AEC-2-01	Business Communication Skill	-	-	2	2	1	-	-	-	-	25	-	-	25
10	VEC	24-VEC-2-01	Universal Human Values-II	3	-	-	3	3	-	-	-	-	50	-	-	50
11	ELC (CEP/FP)	24-ELC-CE-2-01	Community Engagement Project / Field Project	-	-	4	4	2	-	-	-	-	25	-	25	50
Total				**15**	**-**	**14**	**29**	**22**	**80**	**60**	**210**	**350**	**200**	**25**	**75**	**650**

Semester – IV

Sr. No	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme							Total Marks
				Hours				Credits	Theory Course				Lab Course			
				L	T	P	Total Hours		CIE	MSE	SEE	TH Marks	TW	PR	OR	
1	PCC	24-PCC-CE-2-06	Structural Analysis	3	-	-	3	3	20	20	60	100	-	-	-	100
2	PCC	24-PCC-CE-2-07	Geotechnical Engineering	3	-	-	3	3	20	20	60	100	-	-	-	100
3	MD M		Multi Disciplinary Minor-II	3	-	-	3	3	20	20	60	100	-	-	-	100
4	OE/OEC		Open Elective-I	3	-	-	3	3	20	20	60	100	-	-	-	100
5	PCC	24-PCC-CE-2-08	Structural Analysis Lab	-	-	2	2	1	-	-	-	-	50	-	-	50
6	PCC	24-PCC-CE-2-09	Geotechnical Engineering Lab	-	-	2	2	1	-	-	-	-	25	-	25	50
7	AEC		Modern Language	1	-	2	3	2	-	-	-	-	-	-	25	25
8	EEM	24-EEM-2-02	Entrepreneurship Development	1	-	2	3	2	-	-	-	-	50	-	-	50
9	VSEC	24-VSEC-CE-2-01	Drawing Assessment & calculation	-	-	4	4	2	-	-	-	-	25	25	-	50
10	VEC	24-VEC-2-02	Digital and Technological Solutions	1		2	3	2	-	-	-	-	25	-	-	25
Total				15	-	14	29	22	80	80	240	400	175	25	50	650

AEC- Modern Language Basket		
Course Code	**Course Name**	**Who can Opt**
Indian Languages		
24-AEC-2-02-A	Modern Language- Basic Marathi	Students who have not studied this course from Grade I to Grade X can opt this course in the curriculum
24-AEC-2-02-B	Modern Language- Advance Marathi	Students who have studied this course from Grade I to Grade XIcan opt this course in the curriculum
24-AEC-2-02-C	Modern Language- Basic Hindi	Students who have not studied this course from Grade I to Grade X can opt this course in the curriculum
24-AEC-2-02-D	Modern Language- Advance Hindi	Students who have studied this course from Grade I to Grade X can opt this course in the curriculum
24-AEC-2-02-E	Modern Language- Sanskrit	Students who have not studied this course from Grade I to Grade X can opt this course in the curriculum
Foreign Languages		
24-AEC-2-02-F	Modern Language- Japanese	Students who have not studied this course from Grade I to Grade X can opt this course in the curriculum
24-AEC-2-02-G	Modern Language- German	Students who have not studied this course from Grade I to Grade X can opt this course in the curriculum
24-AEC-2-02-H	Modern Language- French	Students who have not studied this course from Grade I to Grade X can opt this course in the curriculum

#Note: Students have to select any one course from the above basket.

#Note: You can refer syllabus all AEC- Modern Language Basket from

https://snjb.org/engineering/uploads/media/2025/03/SY2025-26-Modern-Languages-2024-28.pdf

Level 5.0 Exit Criteria

Mandatory Courses to be completed after Second Year for obtaining Two Years UG Diploma in

Civil Engineering

Sr. No	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme								
				Hours				Credits	Theory Course				Lab Course			Total Marks
				L	T	P	Total Hours		CIE	MSE	SEE	TH Marks	TW	PR	OR	
1	EXT	24-EXT-2-01	Internship / Fieldwork/OJT	-	-	8	8	4	-	-	-	-	100	-	-	100
2	EXT	24-EXT-2-02	Mini Project	-	-	8	8	4	-	-	-	-	50	-	50	100
Total				**-**	**-**	**16**	**16**	**8**	**-**	**-**	**-**	**-**	**150**	**-**	**50**	**200**

TEACHING AND EVALUATION SCHEME FOR THIRD YEAR B-TECH

Semester – V

Sr. No	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme								
				Hours				Credits	Theory Course				Lab Course			Total Marks
				L	T	P	Total Hours		CIE	MSE	SEE	TH Marks	TW	PR	OR	
1	PCC	24-PCC-CE-3-01	Reinforced Concrete Structures	3	-	-	3	3	20	20	60	100	-	-	-	100
2	PCC	24-PCC-CE-3-02	Concrete Technology	3	-	-	3	3	20	20	60	100	-	-	-	100
3	PEC		Program Elective Course –I	4	-	-	4	4	20	20	60	100	-	-	-	100
4	MD M		Multi Disciplinary Minor-III	2	-	-	2	2	20	-	30	50	-	-	-	50
5	MD M		Multi Disciplinary Minor-III Lab	-	-	2	2	1	-	-	-	-	25	-	25	50
6	OE/OEC		Open Elective-II	2	-	-	2	2	20	-	30	50	-	-	-	50
7	PCC	24-PCC-CE-3-03	Reinforced Concrete Structures Lab	-	-	4	4	2	-	-	-	-	25	-	25	50
8	PCC	24-PCC-CE-3-04	Concrete Technology Lab	-	-	2	2	1	-	-	-	-	25	-	25	50
9	PEC		Program Elective Course –I Lab	-	-	4	4	2	-	-	-	-	25	-	25	50
10	AEC	24-AEC-3-01	Environmental Science	-	-	4	4	2	-	-	-	-	50	-	-	50
Total				14	-	16	30	22	100	60	240	400	150	-	100	650

Program Elective Course – I				
	Course Code-TH	Name of the Course- TH	Course Code-PR	Name of the Course(PR/OR)
A	24-PEC-CE-3-01A	Air Pollution and Control	24-PEC-CE-3-02A	Air Pollution and Control Lab
B	24-PEC-CE-3-01B	Advanced Mechanics of Structures	24-PEC-CE-3-02B	Advanced Mechanics of Structures Lab
C	24-PEC-CE-3-01C	Fluid Mechanics	24-PEC-CE-3-02C	Fluid Mechanics Lab
D	24-PEC-CE-3-01D	Introduction to Multimodal Urban Transportation Systems	24-PEC-CE-3-02D	Introduction to Multimodal Urban Transportation Systems Lab

Semester – VI

Sr. No	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme							Total Marks
				Hours				Credits	Theory Course				Lab Course			
				L	T	P	Total Hours		CIE	MSE	SEE	TH Marks	TW	PR	OR	
1	PCC	24-PCC-CE-3-05	Design of Steel Structures	3	-	-	3	3	20	20	60	100	-	-	-	100
2	PEC		Program Elective Course–II	3	-	-	3	3	20	20	60	100	-	-	-	100
3	MD M		Multi Disciplinary Minor-IV	2	-	-	2	2	20		30	50	-	-	-	50
4	OE/OEC		Open Elective-III	3	-	-	3	3	20	20	60	100	-	-	-	100
5	PCC	24-PCC-CE-3-06	Design of Steel Structures Lab	-	-	2	2	1	-	-	-	-	25	-	25	50
6	PEC		Program Elective Course–II Lab	-	-	2	2	2	-	-	-	-	25	-	25	50
7	VSEC	24-VSEC-CE-3-01	Computer Aided Design in Civil Engineering	-	-	4	4	2	-	-	-	-	25	25	-	50
8	ELC	24-ELC-CE-3-01	Research Methodology	4	-	-	4	4	20	20	60	100	-	-	-	100
9	ELC	24-ELC-CE-3-02	Project-stage-I	-	-	4	4	2	-	-	-	-	25	-	25	50
Total				**15**	**-**	**12**	**27**	**22**	**100**	**80**	**270**	**450**	**100**	**25**	**75**	**650**

Program Elective Courses For SEM VI				
	Course Code-TH	Name of the Course- TH	Course Code-PR	Name of the Course(PR/OR)
A	24-PEC-CE-3-03A	Solid and Hazardous Waste Management	24-PEC-CE-3-04A	Solid and Hazardous Waste Management Lab
B	24-PEC-CE-3-03B	Advanced Design of Reinforced Concrete Structures	24-PEC-CE-3-04B	Advanced Design of Reinforced Concrete Structures Lab
C	24-PEC-CE-3-03C	Hydrology & Water Resources Engineering	24-PEC-CE-3-04C	Hydrology & Water Resources Engineering Lab
D	24-PEC-CE-3-03D	Traffic Systems and Engineering	24-PEC-CE-3-04D	Traffic Systems and Engineering Lab

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

Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor

To be implemented for 2024-28 Batch

(With Effect from Academic Year 2025-26)

Level 5.5 Exit Criteria

Mandatory Courses to be completed after Third Year for obtaining Three Year Bachelor's

Degree in Vocation (B. Voc.) in Civil Engineering

Sr. No	Category	Course Code	Course Name	Teaching Scheme				Credits	Evaluation Scheme							Total Marks
				Hours					Theory Course				Lab Course			
				L	T	P	Total Hours		CIE	MSE	SEE	TH Marks	TW	PR	OR	
1	EXT	24-EXT-3-01	Internship / Fieldwork/OJT	-	-	8	8	4	-	-	-	-	100	-	-	100
2	EXT	24-EXT-3-02	Mini Project	-	-	8	8	4	-	-	-	-	50	-	50	100
Total				-	-	16	16	8	-	-	-	-	150	-	50	200

TEACHING AND EVALUATION SCHEME FOR FINAL YEAR B-TECH

Semester – VII

Sr. No	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme								
				Hours				Credits	Theory Course				Lab Course			Total Marks
				L	T	P	Total Hours		CIE	MSE	SEE	TH Marks	TW	PR	OR	
1	PCC	24-PCC-CE-4-01	Transportation Engineering	3	-	-	3	3	20	20	60	100	-	-	-	100
2	PCC	24-PCC-CE-4-02	Environmental Engineering	3	-	-	3	3	20	20	60	100	-	-	-	100
3	PEC		Program Elective Course –III	4	-	-	4	4	20	20	60	100	-	-	-	100
4	MD M		Multi Disciplinary Minor-V	2	-	-	2	2	20	-	30	50	-	-	-	50
5	MD M		Multi Disciplinary Minor -V Lab	-	-	2	2	1	-	-	-	-	25	-	25	50
6	PCC	24-PCC-CE-4-03	Transportation Engineering Lab	-	-	2	2	1	-	-	-	-	25	-	25	50
7	PCC	24-PCC-CE-4-04	Environmental Engineering Lab	-	-	4	4	2	-	-	-	-	25	-	25	50
8	PEC		Program Elective Course –III Lab	-	-	4	4	2	-	-	-	-	25	-	25	50
9	ELC	24-ELC-CE-4-01	Project-stage -II	-	-	6	6	3	-	-	-	-	50	-	50	100
Total				12	-	18	30	21	80	60	210	350	150	-	150	650

Program Elective Course For SEM VII				
	Course Code-TH	Name of the Course- TH	Course Code-PR	Name of the Course(PR/OR)
A	24-PEC-CE-4-05A	Industrial Waste Water Treatment	24-PEC-CE-4-06A	Industrial Waste Water Treatment Lab
B	24-PEC-CE-4-05B	Design of Pre-stressed Concrete Structures	24-PEC-CE-4-06B	Design of Pre-stressed Concrete Structures Lab
C	24-PEC-CE-4-05C	Hydropower Engineering	24-PEC-CE-4-06C	Hydropower Engineering Lab
D	24-PEC-CE-4-05D	Intelligent Transport System	24-PEC-CE-4-06D	Intelligent Transport System Lab

Semester – VIII

Sr. No	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme								
				Hours				Credits	Theory Course				Lab Course			Total Marks
				L	T	P	Total Hours		CIE	MSE	SEE	TH Marks	TW	PR	OR	
1	PCC	24-PCC-CE-4-05	Hydraulic Engineering	3	-	-	3	3	40	-	60	100	-	-	-	100
2	PEC		Program Elective Course –IV	3	-	-	3	3	40	-	60	100	-	-	-	100
3	MD M		Multi Disciplinary Minor-VI	3	-	-	3	3	40	-	60	100	-	-	-	100
4	ELC	24-ELC-CE-4-02	Internship	-	-	24	24	12	-	-	-	-	200	-	150	350
Total				9	-	24	33	21	120	-	180	300	200	-	150	650

Note: The above Courses from Sr. No. 1 to 3 of SEM-VIII will be conducted in online mode or may be mapped with suitable NPTEL/SWAYAM Courses.

Program Elective Course For SEM VIII		
	Course Code-TH	**Name of the Course- TH**
A	24-PEC-CE-4-07A	Sanitation Engineering
B	24-PEC-CE-4-07B	Finite Element Analysis
C	24-PEC-CE-4-07C	Watershed Management
D	24-PEC-CE-4-07D	Pavement Design & Economics

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)
Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor
To be implemented for 2024-28 Batch
(With Effect from Academic Year 2025-26)

SEM III

24-PCC-CE-2-01: Numerical Methods & Statistics		
Teaching Scheme: Theory: 3 Hours/Week	**Credit:** 03	**Examination Scheme:** **CIE :** 20 Marks **MSE :** 20 Marks **SEE :** 60 Marks

Prerequisites Courses: Prerequisites Courses: 24-BSC-1-03 : Linear Algebra And Differential Calculus & 24-BSC-1-04: Statistics and Integral Calculus.

Companion Course: -

Course Objectives:
- To make the students familiarize with concepts and techniques in Ordinary & Partial differential equations, Numerical methods, Statistical methods, Probability theory and Vector calculus.
- The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in their disciplines.

Course Outcomes:
After completion of the course, learners should be able to

CO No	CO	BL
1	**Understand** the basic Concept.	2
2	**Solve** systems of linear equations using direct & iterative numerical techniques and develop solutions for ordinary differential equations using single step & multistep methods applied to hydraulics, geotechnics and structural systems.	3
3	**Apply** Interpolating polynomial methods to solve numerical differentiation and integration, ordinary differential equations used in modern scientific computing.	3
4	Perform Vector differentiation & integration, analyze the vector fields and **apply** to fluid flow problems	3
5	**Apply** Statistical methods and probability theory in data analysis and predictions in civil engineering	3
6	Solve Partial differential equations such as wave equation, one and two dimensional heat flow equations	3

Course Contents		
Unit I	**Numerical solutions of system of linear equations**	**6 Hours**

Numerical solutions of system of linear equations: Gauss elimination method, Cholesky Method, Jacobi and Gauss-Seidel methods, LU Decomposition Method & Gauss Jorden Method , Application to Civil Engineering

#Exemplar/Case Studies: Assignment on LU Decomposition , Gauss seidal Method.

*Mapping of Course Outcomes	CO1 & CO2	
Unit II	**Numerical solutions of ordinary differential equations:**	**7 Hours**
Numerical solutions of ordinary differential equations: Euler's, Modified Euler's, Runge-Kutta 4th and Second order and Adams and Miline Predictor-Corrector methods , Application to Civil Engineering.		
#Exemplar/Case Studies: Assignment on Euler's, Modified Euler's, Runge-Kutta 4th Method		
*Mapping of Course Outcomes	CO1 & CO2	
Unit III	**Interpolation polynomial**	**7 Hours**
Interpolation: Finite Differences, Newton's and Lagrange's Interpolation formulae, Numerical Differentiation. Numerical Integration: Trapezoidal and Simpson's rules, Bound of truncation error, Application to Civil Engineering.		
#Exemplar/Case Studies: Assignment on Lagrange's interpolation methods & Newton's interpolation methods		
*Mapping of Course Outcomes	CO1 & CO3	
Unit IV	**Vector Calculus**	**6 Hours**
Physical interpretation of Vector differentiation, Vector differential operator, Gradient, Divergence and Curl, Directional derivative, Solenoidal, Irrotational and Conservative fields, Scalar potential, Vector identities, Line, Surface and Volume integrals, Work-done, Green's Lemma Application to Civil Engineering.		
#Exemplar/Case Studies: Assignment on Vector Identities, Curl field.		
*Mapping of Course Outcomes	CO1 & CO4	
Unit V	**Introduction To Statistics And Sampling Theory**	**7 Hours**
Statistics: Introduction, Origin and Development of Statistics, Definition, Importance and Scope,Limitations, Distrust of Statistics Population and Sample: Sampling –Introduction, Types of Sampling, Purposive Sampling, Random Sampling, Simple Sampling, Stratified Sampling, Parameter and Statistic, Sampling Distribution, Statistical Inference, Sampling With and Without Replacement, Random Samples: Random Numbers, Population Parameters, Sample Statistics, Sampling Distributions, Fitting various curve.		
#Exemplar/Case Studies: Assignments on Curve fitting		
*Mapping of Course Outcomes	CO1 & CO5	
Unit VI	**Applications of Partial Differential Equations (PDE)**	**7 Hours**
Basic concepts, modeling of Vibrating String, Wave equation, One and two dimensional Heat flow equations, method of Separation of variables, use of Fourier series, Applications of PDE to problems of Civil and allied Engineering.		
#Exemplar/Case Studies: Assignment in wave equations and one and two dimensional Heat flow equations.		
*Mapping of Course Outcomes	CO1 & CO6	
Learning Resources		

Text Books
T1. Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill).   **T2.** Numerical Methods for Engineers,7e by S. C. Chapra and R. P. Canale (McGraw-Hill Education)
Reference Books :
R1. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education).   **R2.** Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Cengage Learning).
Additional Resources: (Books, e-Resources)
MOOC Courses links :   ●

24-PCC-CE-2-02: Strength of Materials		
Teaching Scheme: Theory: 3 Hours/Week	**Credit:** 3	**Examination Scheme:** **CIE** : 20 Marks **MSE :** 20 Marks **SEE** : 60 Marks

Prerequisite Courses: Engineering Mechanics

Companion Course: Strength of Materials Lab (24-PCC-CE-2-04)

Course Objectives:
- To study various types of stresses for determinate structural members.
- To learn the concept of Shear Force and Bending Moment Diagram for determinate beams.
- To determine the stresses for various load conditions for various structures.

Course Outcomes:
After completion of the course, learners should be able to

CONo	CO	BL
1	Evaluate the stress-strain behavior and different physical properties of determinate, indeterminate, homogeneous, composite materials.	3
2	Plot Shear Force and Bending Moment diagram for determinate beams.	3
3	Demonstrate shear and bending stress in beams and plot the distribution diagram.	3
4	Use theory of torsion to determine the stresses in circular shaft	3
5	Analyze axially loaded and eccentrically loaded columns.	3
6	Understand the concept of Principal stresses and strains and evaluate the principal stresses and their planes.	3

Course Contents		
Unit I	**Simple Stress and Strain**	**7 Hours**

Concepts of stress, strain, Elastic constants and their Relation, Hook's Law, Stress-Strain Diagram for elastic, plastic materials and brittle material, Idealized stress-strain diagram , Concept of axial stresses (compression, tension), strains(linear, lateral, shear and volumetric).
Stresses, strains and deformations in determinate and indeterminate structures for homogeneous and composite structures under concentrated loads and temperature changes

#Exemplar/Case Studies: Stress analysis in the specimen

*Mapping of Course Outcomes	CO1

Unit II	Shear Force and Bending Moment	7 Hours

Concept of shear force and bending moment. Relation between shear force, bending moment and intensity of loading. Shear force and bending moment diagrams for determinate beams due to concentrated, uniformly distributed, uniformly varying loads and couples. Bending moment and loading diagram from given shear force diagram, Shear force and loading diagram from given Bending moment diagram

#Exemplar/Case Studies: Shear force analysis in bridge.

*Mapping of Course Outcomes	CO1, CO2

Unit III	Shear and Bending Stresses	7 Hours

a) Shear stresses in beams: concept of shear, derivation of shear stress formula, shear stress distribution for various cross sections, maximum and average shear stress for circular, rectangular, I, T and channel sections. b) Bending stresses in beams: theory of simple or pure bending, assumptions, derivation of flexure formula, bending stress distribution diagrams for symmetrical and unsymmetrical sections, Moment of Resistance of cross-section

#Exemplar/Case Studies: Strength comparison of various sections of beam

*Mapping of Course Outcomes	CO1, CO2, CO3

Unit IV	Torsion of Circular Shaft	7 Hours

Torsion of circular shafts: theory of torsion, assumptions, derivation of torsion formula. Stresses, strains and deformations in determinate and indeterminate shafts of hollow, solid, homogeneous cross-sections subjected to twisting moments. Power transmitted by shafts

#Exemplar/Case Studies	Torsional stress analysis in shafts.

*Mapping of Course Outcomes	CO1, CO4

Unit V	Axially and Eccentrically Loaded Columns.	7 Hours

Axially loaded columns: concept of critical load and buckling, Euler's formula for buckling load with hinged ends, concept of equivalent length for various end conditions, Rankine's formula, safe load on column and limitations of Euler's formula. Direct and bending stresses for eccentrically loaded short columns and other structural components such as retaining walls, dams, chimneys, etc. Effect of lateral force and self-weight. Resultant stress diagrams due to axial loads, uni-axial and bi-axial bending. Concept of core of section for solid and hollow rectangular and circular sections.

#Exemplar/Case Studies: (Any one) 1. Strength comparison of various sections of columns. 2. Model making

*Mapping of Course Outcomes	CO1, CO2, CO3, CO5

Unit VI	Principal stress-strains and thin cylinders	7 Hours

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 And maximum shear stress. Stresses and strains in thin cylindrical under internal pressure.

#Exemplar/Case Studies: Stress analysis in shafts by Graphical or Analytical Method.

*Mapping of Course Outcomes	CO1, CO3, CO6

Learning Resources

Text Books
T1. S.S. Bhavikatti, Strength of Material, Vikas Publishing House Pvt. Ltd. T2. S.B. Junnarkar, Mechanics of Structures Vol I, Charotar Publication house, 27th Edition, 2008 T3. Strength of Materials by R. Subramanian, Oxford University Press. T4. Strength of Materials by S. S. Ratan, Tata McGraw Hill.
Reference Books :
R1. Elements of Strength of Materials by Timoshenko and Young, East-West Press Ltd. R2. Strength of Materials by F.L. Singer and Andrew Pytel, Harper and Row Publication. R3. Mechanics of Materials by Beer and Johnston, McGraw Hill Publication.
Additional Resources: (Books, e-Resources) https://onlinecourses.nptel.ac.in/noc23_me140/preview
MOOC Courses links :   ●   https://nptel.ac.in/courses/112107146

24-PCC-CE-2-03: Surveying

Teaching Scheme: Theory: 03 Hours/Week	Credit: 03	Examination Scheme: CIE : 20 MSE : 20 SEE : 60

Prerequisites Courses: 1 .(24-PCC-CE-1-01) Engineering Mechanics
　　　　　　　　　　 2.(24-BSC-1-03) Linear Algebra And Differential Calculus

Companion Course: (24-PCC-CE-2-05) Surveying Lab

Course Objectives:
- To develop Core Competence with the foundational knowledge of surveying principles, tools, and methods.
- To proficiently use surveying instruments like the compass, theodolite, level, and total station for accurate field measurements and data collection.
- To develop proficiency in setting out simple and compound circular curves using linear & Angular methods.
- To adapt modern surveying technologies such as SBPS systems and total stations for efficient and precise surveying solutions.

Course Outcomes:
After completion of the course, learners should be able to

CO No.	CO	BL
01	Define and recall basic concepts of surveying, including its principles, types, and measurements (linear and angular).	01
02	Explain the different types of surveying methods, including compass surveying, plane table surveying.	02
03	Perform leveling techniques and calculations using instruments like dumpy level, auto level, and digital level to determine elevations and create cross-section.	03
04	Analyze survey data using theodolites and total stations, including computation of coordinates, traversing methods, and contour mapping.	03
05	Design and implement horizontal and vertical curves in road design, including setting out methods.	03
06	Articulate advancements in surveying such as space based positioning systems.	03

Course Contents		
Unit I	**Compass & Plane Table Surveying**	**08 Hours**

　　a) **Surveying-** Introduction, Definition, Object of Survey, Primary Division of Surveying, classification of Surveys,Principles of Surveying, Units of Measurement (Linear and Angular measure), Scale and R.F.Plan & Map.
　　b) **Compass Surveying-** Concept of Meridian & their Type, Concept of Bearing & their Type,WCB, RB,,Construction & use of Prismatic compass,Local attraction & correction,Dip Of needle ,Declination & Calculation of true

bearing,Numericals

c) **Plane Table Surveying-** Principle, Accessories & Their Uses , Advantages & Disadvantages,Method of Plane table surveying:Radiation ,Intersection,Traversing,Resection.

Exemplar/Case Studies:- 1. Road Alignment Survey Using Compass

Mapping of Course Outcomes	CO3

Unit II	Levelling & Contouring	08 Hours

a) Introduction to leveling, Types of leveling, Types of benchmarks, Study and use of dumpy level, auto level, digital level and laser level in construction industry, principal axes of dumpy level, testing and permanent adjustments, reciprocal leveling, curvature and refraction corrections, distance to the visible horizon. Collimation Plane Method, Rise & Fall Method.Profile leveling & Cross-sectioning & their application.Numericals

b) Contouring – Definition of Contours, Characteristics of Contours, Contour Patterns for various natural features, direct and indirect methods of contouring, uses of contour maps, study and use of topo-sheets.

Exemplar/Case Studies :-
1. To determine the elevation of the terrain and calculate the amount of earthwork required for road construction.
2. To create a contour map of the road alignment

Mapping of Course Outcomes	CO3

Unit III	Theodolite Surveying	08 Hours

a) Study of vernier transit 20" theodolite,1" Theodolite, uses of theodolite for measurement of horizontal angles by repetition and reiteration, vertical angles, measurement of deflection angles using transit theodolite, setting out an angle with a theodolite. Fundamental axes of theodolite: testing and permanent adjustments of a transit theodolite.

b) Theodolite traversing – computation of consecutive and independent co-ordinates, adjustment of closed traverse by transit rule and Bowditch's rule, Gales traverse table. Checks, area calculation by independent co-ordinates. Numericals

Exemplar/Case Studies:
1. To conduct a closed traverse survey and compute independent and consecutive coordinates for accurate boundary mapping.

Mapping of Course Outcomes	CO4

Unit IV	Tacheometry and Total Station	08 Hours

a) Tacheometry – applications and limitations, principle of stadia tacheometry, fixed hair method with vertical staff to determine horizontal distances and elevations of points, finding tacheometric constants. Tacheometric contouring. Numericals

b) Surveying with Total station-Study & Use of Total station and its types,Functioning-Elevation Measurement,Remote distance measurement,Area measurement,data processing and analysis, Field work: Point data collection (Easting, Northing and Height).

Exemplar/Case Studies:
1. To collect precise point data (Easting, Northing, and Height) for designing the road alignment .

Mapping of Course Outcomes	CO4	
Unit V	**Curve**	**08 Hours**

a) Introduction to horizontal and vertical curves,different types of curves and their applications, Notation use with simple and compound circular curves,
b) Definitions and explanation of different terms- Degree of curve, relation between radius and degree of curve, super elevation, centrifugal ratio.
c) setting out by linear methods - i) radial and perpendicular offsets, ii) offsets from long chords, iii) successive bisection of chord and iv) offsets from chords produced.
d) setting out by Angular methods- Rankine's method of deflection angles (one and two theodolite methods).
e) Transition curves:Introduction, necessity.
(Numerical on simple circular curves and compound curves to be asked),

Exemplar/Case Studies:
1. To design a simple circular curve with appropriate radius, degree of curve, and superelevation based on road design standards.

Mapping of Course Outcomes	CO5	
Unit VI	**Introduction SBPS ,DGPS & Drone Survey**	**06 Hours**

a) Introduction to SBPS, SBPS systems - GPS, GLONASS, Galileo, GAGAN, BeiDou and their features, Segments of SBPS (Space, Control and User), applications of SBPS in surveying.
b) Introduction to Differential GPS (DGPS):Principle, Concepts and Function,Use of DGPS in Topographical Survey, Base, Rover, DGPS Connections and Settings,
c) Introduction to Drone Technology-Types,Components and functions of drones,Flight mechanics and control systems,Regulations and safety protocols,Drone Surveying Principles,Data Processing and Analysis,Applications of Drone Surveying.

Exemplar/Case Studies:
1. To collect accurate geospatial coordinates using Global Navigation Satellite Systems (GNSS) such as GPS, GLONASS, Galileo, BeiDou, and GAGAN.
2. Case studies showcasing real-world applications of drone surveying

Mapping of Course Outcomes	CO6
Learning Resources	

Text Books

T1. Surveying and Levelling Vol. I and Vol. II by T. P. Kanetkar and S. V. Kulkarni, Pune Vidyarthi Griha Prakashan.
T2. Surveying, Vol. I & II by Dr. B. C. Punmia, Ashok K. Jain, Arun K. Jain, Laxmi Publications.

Reference Books :

R1. Surveying & levelling by N.N.Basak,McGraw Hill Education (india),New Delhi Publication
R1. Surveying: Theory and Practice" by James M. Anderson and Edward M. Mikhail,McGraw-Hill Education

Additional Resources: (Books, e-Resources)
- http://www.digimat.in/nptel/courses/video/105104101/L04.html

MOOC Courses links :

- https://www.udemy.com/course/surveying/?srsltid=AfmBOopgKdcAANHFkslQDW8BeLTYgsm8Pfh7Fb5AxpMS71No98ejjJft.

24-PCC-CE-2-04 : Strength of Materials Lab

Teaching Scheme: Practical: 4 Hours/Week	Credit: 1	Examination Scheme: TW: 25 Marks Oral : 25 Marks

Prerequisites Courses: Engineering Mechanics

Companion Course:

Course Objectives:
- To find out the properties of metals.
- To evaluate the properties of timber like compressive strength.
- To examine the qualities of bricks and tiles.
- To prepare students for professional practice in testing of materials.

Course Outcomes:

After completion of the course, learners should be able to

CONo	CO	BL
1	Evaluate the various properties of metals such as ultimate stress, breaking stress, shear stress, toughness.	3
2	Determine the toughness of metals.	3
3	Determine the good quality of timbers, bricks and tiles by evaluating its various properties	3
4	Able to get the knowledge of various tests for different materials as per their properties.	3

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a reference and hands-on resource. It should include a prologue (about University/program/ institute/ department/foreword/ preface), curriculum of the course, conduction and Assessment guidelines, topics under consideration, concept, objectives, outcomes, set of typical applications/assignments/ guidelines, and references.

Guidelines for Student's Laboratory Journal

The laboratory experiments/assignments are to be submitted by students as a journal. The journal consists of a Certificate, table of contents, and handwritten write-up of each assignment (Title, Date of Completion, Objectives, Problem Statement, Specimen details, Assessment grade/marks and assessor's sign, Theory- Concept in brief, test procedure, observation table, calculations, result,, conclusion.

Guidelines for Laboratory /Term Work Assessment

Continuous assessment of laboratory work should be based on the overall performance of Laboratory assignments by a student. Each Laboratory assignment assessment will assign grades/marks based on parameters, such as timely completion, performance, innovation, efficient codes, and punctuality.

Guidelines for Practical Examination

Problem statements must be decided jointly by the internal examiner and external examiner. During the practical assessment, maximum weightage should be given to satisfactory implementation of the problem statement. Relevant questions may be asked at the time of evaluation to test the student's understanding of the fundamentals and effective and efficient implementation. This will encourage transparent evaluation and a fair approach, and hence will not create any uncertainty or doubt in the minds of the students. So, adhering to these principles will consummate our team efforts to the promising start of student's academics.

Guidelines for Laboratory Conduction

Understand the objectives of the experiment.
- Keep your workspace organized and tidy.
- Record observations and data meticulously.
- Report any damaged or malfunctioning equipment immediately.
- Report accidents, spills, or injuries immediately.
- Analyze and review experiment results accurately.
- Follow institutional and regulatory guidelines.

Virtual Laboratory: (If Any):

- https://sm-nitk.vlabs.ac.in/

Suggested List of Laboratory Experiments	
Group A: Experiments (Mandatory Assignment)	

Sr No	Experiments Title	*Mapping of Course Outcomes
1.	Tension test on mild and TMT steel.	CO1, CO2, CO4
2.	Shear (Single & Double)test on mild steel	CO1, CO2, CO4
3.	Torsion test on mild steel.	CO1, CO2, CO4
4.	Impact (Izod&Charpy) test on mild steel, aluminum, brass.	CO1, CO2, CO4
5	Hardness test of metals	CO1, CO2, CO4
6	Compression test on timber (Parallel & Perpendicular)	CO3, CO4
7	Bending test on timber and plywood	CO3, CO4
8	Field tests on bricks	CO3, CO4
9	Water absorption test on bricks.	CO3, CO4
10	Efflorescence test on bricks	CO3, CO4
11	Compressive strength test on bricks	CO3, CO4
12	Flexural strength of flooring tiles.	CO3, CO4
13	Abrasion test of flooring tiles.	CO3, CO4

Group B: Assignments (Compulsory)		
Sr No	**Assignment Title**	***Mapping of Course Outcomes**
1.	One Assignment on each unit of this subject.	
Group C: Assignments <<Mini Project/Field Visit Etc>>		
Sr No	**Assignment Title**	***Mapping of Course Outcomes**
1.	Market survey of structural materials including its costing.	CO1, CO2, CO3, CO4
Learning Resources (If applicable)		
Text Books		
T1. S.S. Bhavikatti, Strength of Material, Vikas Publishing House Pvt. Ltd. **T2.** Strength of Materials by S. S. Ratan, Tata McGraw Hill.		
Reference Books :		
R1. Elements of Strength of Materials by Timoshenko and Young, East-West Press Ltd. **R2.** Strength of Materials by F.L. Singer and Andrew Pytel, Harper and Row Publication.		
MOOC Courses links : ● https://nptel.ac.in/courses/112107146		

24-PCC-CE-2-05: Surveying Lab

Teaching Scheme: Practical: 02 Hours/Week	Credit: 01	Examination Scheme: Termwork **(TW)** : 25 Marks Practical **(PR)** : 25 Marks

Prerequisites Courses: 1. (24-BSC-1-03) Linear Algebra And Differential Calculus
2.(24-ESC-1-03) Engineering Graphics

Companion Course: (24-PCC-CE-2-03) Surveying (TH)

Course Objectives:
- To Develop Proficiency in Basic Surveying Techniques
- To Develop Proficiency in Leveling and Angle Measurements
- To Provide Hands-On Experience in Advanced Surveying Techniques

Course Outcomes:
After completion of the course, learners should be able to

CO No.	CO	BL
01	Proficiency in Basic Surveying Techniques such as measure magnetic bearings using a prismatic compass & also perform plane table surveys using Radiation and Intersection methods for mapping .	03
02	Demonstrate competency in conducting simple and differential leveling with multiple change points using an auto level. & also measure horizontal angles (by repetition method) and vertical angles using Vernier Transit Theodolites (1" and 20").	03
03	Demonstrate competency in use a tacheometer to calculate horizontal distances and vertical elevations accurately	03
04	Carry out road projects, including fixing alignment, profile leveling, cross-sectioning, and plotting longitudinal and cross-sections manually as well on software	03
05	Create contour maps for hilly terrains using tachometric methods and also can compare manual and software-generated contours.	03
06	Demonstrate competency in using a Total station & making report on City Survey , 7/12 uttara,Drone Survey.	2,3

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a reference and hands-on resource. It should include a prologue (about University/program/ institute/ department/foreword/ preface), curriculum of the course, conduction and Assessment guidelines, topics under consideration, concept, objectives, outcomes, set of typical applications/assignments/ guidelines, and references.

Guidelines for Student's Laboratory Journal

The laboratory journal is a comprehensive record of all surveying experiments and assignments. It should be maintained meticulously and submitted as per the following guidelines:

1. Journal Structure and Components

Certificate,Table of Contents,Handwritten Write-Ups,Title,Date of Completion,Objectives,Problem Statement,Equipment and Software/Hardware Requirements,Assessment Details,Theory/Concept, Methodology, Conclusion/Analysis etc.

2. Presentation and Maintenance

> Handwriting and Neatness: Ensure that all handwritten entries are neat. Use proper headings, sub-headings, and bullet points for clarity.
>
> Consistency: Maintain consistency in the format, structure, and presentation of each experiment throughout the journal.
>
> Binding**:** Bind the journal neatly using a spiral binding or any other acceptable method as specified by the department.

4. Submission and Evaluation

> Timeliness: Submit the laboratory journal on or before the deadline provided by the instructor.
>
> Verification: The journal will be verified by the Laboratory in charge. Ensure that all equipment used is properly documented, and the data is accurately recorded.

Guidelines for Laboratory /Term Work Assessment

Continuous assessment of laboratory work should be based on the overall performance of Laboratory assignments by a student. Each Laboratory assignment assessment will assign grades/marks based on parameters, such as timely completion, performance, innovation, efficient codes, and punctuality.

Guidelines for Practical Examination

Problem statements must be decided jointly by the internal examiner and external examiner. During the practical assessment, maximum weightage should be given to satisfactory implementation of the problem statement. Relevant questions may be asked at the time of evaluation to test the student's understanding of the fundamentals and effective and efficient implementation.

Guidelines for Laboratory Conduction

1. General Instructions

- Students must wear appropriate safety gear (safety shoes, helmets if required, and gloves for handling equipment).
- Maintain discipline and follow the lab schedule strictly.
- Handle all surveying instruments with care and return them to their designated storage after use.
- Keep the lab area clean and organized at all times.

2. Pre-Laboratory Preparation

- Read the experiment manual and understand the objective of the practical before entering the lab.
- Carry a field book, calculator, and necessary stationery for data recording.
- Form groups as per instructor's guidelines and distribute responsibilities among members.

3. Conducting the Experiments

- Calibrate and check instruments (e.g., total station, theodolite, digital level, compass) before use.
- Follow the correct procedure for setting up instruments, taking readings, and recording data.
- Maintain a field book with accurate observations and sketches where required.
- Avoid unnecessary movement and talking during practical sessions to prevent disturbances.

4. Safety & Equipment Handling

- Do not tamper with instruments or attempt unauthorized repairs.
- Use tripods and leveling screws properly to avoid damage.
- Report any malfunctioning equipment immediately to the instructor.
- Be cautious while working in outdoor environments, especially on roads or uneven terrains.

5. Post-Laboratory Work

- Cross-check and verify recorded data before leaving the lab or site.
- Submit reports and observations as per deadlines.
- Return instruments properly, ensuring they are clean and in working condition.

Virtual Laboratory: (If Any):

- https://sl-iitr.vlabs.ac.in/

Suggested List of Laboratory Experiments/Assignments		
Group A: Assignments (Mandatory Assignment)		
Sr No	**Experiments Title**	**Mapping of Course Outcomes**
1.	Measurement of magnetic bearings of sides of a triangle or quadrilateral, correction for local attraction and calculations of true bearings using prismatic compass	01
2.	Plane table survey consisting 1.Radiation Method 2. Intersection method.	01
3.	Simple and differential leveling with at least three change points using Auto level.	02
4.	Measurement of horizontal angles (by repetition method) and vertical angles using 1" or 20" Vernier Transit Theodolite.	02
5.	Finding horizontal distance and vertical elevation using a Tacheometer.	03
Group B: Assignments (Out of List perform any 2)		
Sr No	**Assignment Title**	**Mapping of Course Outcomes**
1.	Brief Introduction to City Survey	06
2.	Write the report in details on "7/12 utara"	06
3	Write the report in details on "RERA"	06
4	Measure the area of "SNJB's Campus"by using any google apps and make report	06
5.	Brief Introduction to Drone Survey.	06
Group C: Mini Project		
Sr No	**Assignment Title**	***Mapping of Course Outcomes**
1.	Road project using Auto level for a minimum length of 100 m including fixing of alignment, profile levelling, cross-sectioning, plotting of L section and Cross Section. (One full imperial sheet including plan, L-section and any three typical Cross-section.	04

2.	Tachometric contouring project on hilly area with at least two instrument stations and generating contours using both methods, manual as well as using any suitable software such as Autodesk land desktop, Auto-civil, Foresight etc.	05
3.	Total Station Traversing	06

Learning Resources (If applicable)

Text Books

T1. Surveying Vol. 1 & 2" by B.C. Punmia Publisher: Laxmi Publications Pvt. Ltd.
T2. Surveying: Volume 1" by Dr. K.R. Arora,Standard Book House

Reference Books :

R1. Surveying: Theory and Practice" by James M. Anderson and Edward M. Mikhail,McGraw-Hill Education
R2. Surveying and Levelling" by N.N. Basak,Tata McGraw-Hill Education

Additional Resources: (Books, e-Resources)
- http://www.digimat.in/nptel/courses/video/105104101/L04.html

MOOC Courses links :
- https://www.udemy.com/course/surveying/?srsltid=AfmBOopgKdcAANHFkslQDW8BeLTYgsm8Pfh7Fb5AxpMS71No98ejjJft

24-EEM-2-01: Engineering Economics		
Teaching Scheme: Theory: 1 Hours/Week Practical: 2 Hours/Week	**Credit:** 02	**Examination Scheme:** Term work (TW): 25 Marks

Prerequisites Courses: - –

Companion Course:- –

Course Objectives:
- To introduce the fundamentals of Economics and its application in engineering.
- To learn to apply the time value of money in project evaluation.
- To understand cost behavior and classification for decision-making.
- To analyze and apply depreciation policies in calculating asset depreciation.

Course Outcomes:
After completion of the course, learners should be able to

CO No	CO	BL
CO1	**Explain** the key concepts of microeconomics and macroeconomics and their relevance in engineering decision-making.	2
CO2	**Understand** the present value and future value of the business.	2
CO3	**Calculate** break-even for different production levels.	3
CO4	**Understanding** different depreciation methods and their impact on asset valuation.	2

Guidelines for Instructor's Manual
The instructor's manual is to be developed as a reference and hands-on resource. It should include a prologue (about University/program/ institute/ department/foreword/ preface), curriculum of the course, conduction and Assessment guidelines, topics under consideration, concept, objectives, outcomes, set of typical assignments/ guidelines, and references.

Guidelines for Student's Laboratory Journal
The laboratory assignments are to be submitted by students as a journal. The journal consists of a Certificate, table of contents, and handwritten write-up of each assignment (Title, Date of Completion, Objectives, Problem Statement,Assessment grade/marks and assessor's sign, Theory- Concept in brief, test cases, conclusion/analysis.All performed assignments will be submitted as softcopy. As a conscious effort and little contribution towards Green IT and environmental awareness, attaching printed papers as part of write-ups to journals must be avoided. For reference one or two journals may be maintained in the Laboratory.

Guidelines for Laboratory /Term Work Assessment

Continuous assessment of laboratory work should be based on the overall performance of Laboratory assignments by a student. Each Laboratory assignment assessment will assign grades/marks based on parameters, such as timely completion, performance and punctuality.

Guidelines for Laboratory Conduction

Students are expected to perform one assignment each week, do a thorough case study and prepare a presentation on it. He/She has to present it during lab hours within 6-10 minutes. The instructor is expected to assign Assignments and conduct presentations in two separate practical sessions.

Sr No	Assignment Title	*Mapping of Course Outcomes
1.	Determination of equilibrium price under perfect competition for a Company	CO1
2.	Determining elasticity of demand for a company	CO1
3.	Determining elasticity of Supply for a company.	CO1
4.	Evaluation of engineering projects using Present worth method and Future worth method for a Company	CO2
5.	Determining the Break-even analysis for a product of a company.	CO3
6.	Preparation of cost sheet of a company.	CO3
7.	Calculating Depreciation of Assets using Straight line method.	CO4
8.	Calculating Depreciation of Assets using declining balance method.	CO4

Note:-Companies will be assigned to the students before the practical.

Learning Resources (If applicable)

Text Books

T1. Fundamentals of Engineering Economics by Pravin Kumar, John Wiley Publishing INC
T2. Engineering Economics R. Panneerselvam Ed.2nd © 2001 by PHI Learning Private Limited, New Delhi.

Reference Books :

R1.Economics for engineering students,.Seema Singh,2009,IK International Publication House.
R2. Engineering Economics,James L. Riggs, David D. Bedworth, and Sabah U. Randhawa,, Ed.4th Tata McGraw Hill Education Private Limited.

Additional Resources: (Books, e-Resources)
- https://www.hzu.edu.in/engineering/engineering%20economy.pdf
- https://www.uoanbar.edu.iq/eStoreImages/Bank/6298.pdf
- https://brijbhooshan.in/Brij%20Data/Industrial%20Management/Book/Engineering%20Economics%20By%20R.%20Paneerselvam.pd

MOOC Courses links :
- Link to NPTEL course contents: Engineering Economics Analysis
  https://archive.nptel.ac.in/courses/112/107/112107209/#
- Udemy Course - Fundamental of Engineering Economics
  https://www.udemy.com/course/fundamentals-of-engineering-economics/?couponCode=NVDIN35

24-AEC-2-01 : Business Communication Skill

Teaching Scheme: Practical: 2 Hours/Week	Credit: 01	Examination Scheme: Termwork **(TW)** : 25 Marks

Prerequisites Courses: 24-AEC-1-01 Professional Communication Skill

Companion Course: NA

Course Objectives:
- **Professional Writing Skill:** To understand the concepts of professional writing skills.
- **Business drafting skills**: Develop proficiency in professional business correspondence, including writing formal Memorandum, Drafting notices and preparing agendas
- **Team Based Learning**: To enhance learning through collaborative teamwork and active problem-solving.
- **Business ethics and conduct:** To promote ethical decision-making and integrity in professional business practices.

Course Outcomes:
After completion of the course, learners should be able to

CO No	CO	BL
CO1	**Apply writing** techniques to craft clear and professional job application letters, resumes, and emails using advanced tools and strategies.	3
CO2	**Apply** business drafting concepts to create clear, professional and impactful business documents	3
CO3	**Perform** tasks utilizing knowledge to enhance critical thinking, problem-solving, and communication skills in a team setting.	3
CO4	**Understand** the concepts of business ethics and conduct	2

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a reference and hands-on resource. It should include a prologue (about University/program/ institute/ department/foreword/ preface), curriculum of the course, conduction and Assessment guidelines, topics under consideration, concept, objectives, outcomes, set of typical applications/assignments/ guidelines, and references

Guidelines for Student's Laboratory Journal

The laboratory assignments are to be submitted by students as a journal. The journal consists of a Certificate,

table of contents, and handwritten write-up /print of each assignment (Title, Date of Completion, Objectives, Problem Statement, Assessment grade/marks and assessor's sign, Theory- Concept in brief).

Guidelines for Laboratory /Term Work Assessment

Continuous assessment of laboratory work should be based on the overall performance of Laboratory assignments by a student. Each Laboratory assignment assessment will assign grades/marks based on parameters, such as timely completion, performance, innovation, and punctuality.

Virtual Laboratory:

- https://ve-iitg.vlabs.ac.in/Business%20Communication.html

	Suggested List of Laboratory Experiments/Assignments	
Sr No	**Assignment Title**	***Mapping of Course Outcomes**
1.	**Draft a job application letter** for a fresher applying to your dream company, along with a professional email to accompany the application.	CO1
2	**Create a resume** as a fresher applying to your dream company	CO1
3	**Compose a professional email** to accompany the job application, following proper email etiquette.	CO1
4	**Write a memorandum** announcing the guest lecture, providing details about the speaker, the date, time, venue, and any preparation students should do before attending	CO2
5	**Draft a notice** to inform students about the Annual Gathering Symposium, including key event details such as the date, time, venue, and registration procedure, along with any specific instructions for participants or attendees.	CO2
6	**Prepare a meeting agenda** for the upcoming project review meeting. Include topics such as progress updates on the prototype, technical challenges, resource requirements, timelines, and the next steps for each department. Ensure time is allocated for discussions and question-	CO2
7	**Develop a unique advertisement** poster for a product, keeping in mind the characteristics and preferences of their target market	CO3

	(Group of 4-5 Students)	
8	**Conduct case studies on business ethics** by analyzing any corporate organizations (e.g., Enron, Volkswagen, TATA).	CO4

Learning Resources (If applicable)

Text Books :

T1.The Ace of Soft Skills - Attitude Communication and Etiquette for Success by Ramesh Gopal Swamy Ramesh Mahadevan

T2. Personality Development & Communication Skills by Gupta Sachin

References Books :

R1. Global Business Foundation Skills by : Accenture Convergys

R2. Business Ethics by: Awasthappab K

Additional Resources: (Books, e-Resources)
- https://nptel.ac.in/courses/109104031
- https://archive.nptel.ac.in/courses/109/106/109106129/

MOOC Courses links :
- https://www.coursera.org/courses?query=communication%20skills
- https://www.britishcouncil.in/english/online/resources-websites/moocs

24-VEC-2-01: Universal Human Values-II		
Teaching Scheme: Theory: 3 Hours/Week	**Credit:** 03	**Examination Scheme:** **Termwork(TW): 50 Marks**

Prerequisites Courses: 24-IKS-1-01: IKS, SIP Module 1- UHV-I

Companion Course: NA

Course Objectives:
- To appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.
- To facilitate the development of a holistic perspective among students to lead their personal and professional lives in an ethical way
- To highlight plausible implications of such a holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior, and mutually enriching interaction with nature.

Course Outcomes:
After completion of the course, learners should be able to

CO No	CO	BL
CO1	**Demonstrate** the relevance of 'Universal Human Values'.	3
CO2	**Develop** an understanding about human being as coexistence of 'Self' & 'Body'	2
CO3	**Apply** the learnings to ensure harmony in family and society.	3
CO4	**Model** coexistence with nature by integrating Universal Human Values for ethical personal and professional lives.	3

Course Contents		
Unit 1	**Introduction to Value Education**	**6 Hours**

Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity - the Basic Human Aspirations and their Fulfilment, Right Understanding, Relationship and Physical Facility, Happiness and Prosperity - Current Scenario, Method to Fulfil the Basic Human Aspirations

#Exemplar/Case Studies : PS1 Sharing about Oneself, PS2 Exploring Human Consciousness, PS3 Exploring Natural Acceptance	
*Mapping of Course Outcomes	CO1,CO2

Unit 2	**Harmony in the Human Being**	**6 Hours**

Understanding Human being as the Co-existence of the Self and the Body,
Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self

Harmony of the Self with the Body, Programme to Ensure self-regulation and Health

#Exemplar/Case Studies: PS4 Exploring the difference of Needs of Self and Body, PS5 Exploring Sources of Imagination in the Self
PS6 Exploring Harmony of Self with the Body

*Mapping of Course Outcomes	CO1,CO2

Unit 3	Harmony in the Family and Society	6 Hours

Harmony in the Family - the Basic Unit of Human Interaction "Trust' - the Foundational Value in Relationship, 'Respect' - as the Right Evaluation Values in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order

#Exemplar/Case Studies : PS7 Exploring the Feeling of Trust, PS8 Exploring the Feeling of Respect
PS9 Exploring Systems to fulfil Human Goal

*Mapping of Course Outcomes	CO1,CO3

Unit 4	Harmony in the Nature (Existence)	6 Hours

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Coexistence at All Levels, The Holistic Perception of Harmony in Existence

#Exemplar/Case Studies : PS10 Exploring the Four Orders of Nature, PS11 Exploring Co-existence in Existence

*Mapping of Course Outcomes	CO1,CO4

Unit 5	Implications of the Holistic Understanding - a Look at Professional Ethics	6 Hours

Basis for Universal Human Values, Definitiveness of (Ethical) Human Conduct, Professional Ethics in the light of Right Understanding, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Holistic Technologies, Production Systems and Management Models Typical Case Studies, Strategies for Transition towards Value-based Life and Profession

#Exemplar/Case Studies: PS12 Exploring Ethical Human Conduct, PS13 Exploring Humanistic Models in Education, PS14 Exploring Steps of Transition towards Universal Human Order

*Mapping of Course Outcomes	CO1,CO2,CO3,CO4

Learning Resources

Text Books

T1. A Nagraj, 1998, Jeevan Vidya EkParichay, Divya Path Sansthan, Amarkantak.

Reference Books :

R1. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
R2. A N Tripathy, 2003, Human Values, New Age International Publishers.
R3. E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.

Additional Resources: (Books, e-Resources)
- **https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2026-28%20Ethics%20v1.pdf**
- **https://www.aicte-india.org/sites/default/files/Model_Curriculum/Minor%20Degree%20in%20UHV.pdf**

- https://www.youtube.com/c/UniversalHumanValues
- https://atmiyauni.ac.in/public/file/HVPE%20Text%20Book.pdf
- https://drive.google.com/file/d/1C8qp78Uesoptk5lLR2PQNJOOm43ni7da/view?usp=sharing
- https://drive.google.com/file/d/1q_uwhIGqNJuYLgIAu9hOjciZ6q2RsNlc/view?usp=sharing
- https://fdp-si.aicte-india.org/UHVII.php

MOOC Courses links :
- http://madhyasth-darshan.info/postulations/knowledge/knowledge-of-humane-conduct/
- https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw
- https://youtu.be/OgdNx0X923I
- https://fdp-si.aicte-india.org/UHV-II%20Practice%20Sessions.php
- https://fdp-si.aicte-india.org/download.php#1/

24-ELC-CS-2-01: Community Engagement Project / Field Project		
Teaching Scheme: **Practical:** 4 Hours/Week	**Credit:** 02	**Examination Scheme:** **TW**: 25 Marks **OR:** 25 Marks

Prerequisites Courses: (24-CCC-1-05) Co-curricular Course -II, (24-VSC-1-01) Techskill, (24-AEC-1-01) Professional Communication Skills

Companion Course: (24-AEC-2-01) Basic Communication Skills.

Course Objectives:
- To develop an appreciation of rural culture, lifestyle, and wisdom amongst students.
- To learn about the status of various agricultural and development programmes.
- To understand the causes for distress and poverty faced by vulnerable households and explore solutions for the same.
- To apply classroom knowledge of courses to field realities and thereby improve the quality of learning.

Course Outcomes:
After completion of the course, learners should be able to

CO No	CO	BL
1	Gain an understanding of rural life, Indian culture & ethos, and social realities	2
2	Develop a sense of empathy and bonds of mutuality with the local community	3
3	Appreciate the significant contributions of local communities to Indian society and economy	2
4	Learn to value the local knowledge and wisdom of the community	2
5	Identify opportunities for contributing to the community's socio-economic improvements	2

Course Contents

Preamble

The Community Engagement Project/Field Project subject involves activities that will expose students to socio-economic issues in society so that the theoretical learning can be supplemented by actual life experiences to generate solutions to real-life problems.

Assessment

The course requires students to participate in any **TWO** field-based learning/projects as listed below under the supervision of faculty. This will help educate local communities about new technological innovations as well as make students aware of ways to harness local technology and knowledge. In this approach, students apply their knowledge and skills in a chosen community to improve the lives of people in that community. The activities may also be conducted other of working hours.

Recommended field-based activities (Tentative):

1. Interaction with Self Help Groups (SHGs) women members, and study of their functions and challenges; planning for their skill building and livelihood activities

2. Visit the Mahatma Gandhi National Rural Employment Guarantee Act 2005 (MGNREGS) project sites, interact with beneficiaries, and interview functionaries at the work site

3. Field visit to Swachh Bharat project sites, conduct analysis, and initiate problem-solving measures

4. Conduct Mission Antyodaya surveys to support under Gram Panchayat Development Plan (GPDP)

5. Interactive community exercise with local leaders, panchayat functionaries, grass-root officials, and local institutions regarding village development plan preparation and resource mobilization

6. Visit Rural Schools / mid-day meal centres, study academic and infrastructural resources and gaps

7. Participate in Gram Sabha meetings, and study community participation

8. Associate with Social audit exercises at the Gram Panchayat level, and interact with programme beneficiaries

9. Visit to local Nagarpalika office and review schemes for urban informal workers and migrants

10. Attend Parent Teacher Association meetings, and interview school dropouts

11. Visit the local Anganwadi Centre and observe the services being provided

12. Visit local NGOs, civil society organisations, and interact with their staff and beneficiaries,

13. Organize awareness programmes, health camps, Disability camps, and cleanliness camps

14. Aware / conduct soil health tests, drinking water analysis, energy use and fuel efficiency surveys and guide solar powered village

15. Raise understanding of people's impacts of climate change, building up community's disaster preparedness

16. Organise orientation programmes for farmers regarding organic cultivation, rational use of irrigation and fertilizers and promotion of traditional species of crops and plants

17. Formation of committees for common property resource management, village pond maintenance and fishing

18. Identifying small business ideas for rural areas to make the people self-reliant.

19. Undertaking research projects in partnership with the local community through community-based research methods

20. Social innovation projects with a social impact

21. Financial Literacy Awareness Programme

22. Digital Literacy Awareness Programme

23. Education Loan Awareness Programme

24. Entrepreneurship Awareness Programme

25. Awareness Programmes on Government Schemes

26. Products Market Awareness

27. Services Market Awareness

28. Consumer Awareness Programme

29. Accounting Awareness Programme for Farmers

30. Accounting Awareness Programme for Street Vendors etc.

31. Nutrition survey for mothers and children, and educate them about hygiene and nutrition.

Students must conduct comprehensive studies on various challenges that they face in their chosen field. Every work relevant to the subject matter should be compiled and documented.

Students should keep a separate fieldwork diary or maintain a journal to record their fieldwork experiences, i.e. reading, e-contents, tasks, planning, and work hours have to be recorded in the diary. Detailed work records report on students' fieldwork experiences and activities to be submitted and should be presented.

Every student shall submit a report in the form of a journal that may include, but not be limited to, the following.

1. A map (physical, visual, or digital) of the village you visited, and write an essay about inter-family relations in that village/community.

2. Videos and/or Geo-tagged photographs of events/activities conducted

3. Describe your analysis of the rural household economy, its challenges, and possible pathways to address them

4. How effectively are institutions functioning? What would you suggest to improve their effectiveness? Present a case study (written or audio-visual).

5. Describe the benefits received and challenges faced in the delivery of one of these programmes in the local community; give suggestions about improving the implementation of the programme for the community.

Guidelines for Students

Students must submit an assignment in the form of a journal. Faculty in charge will monitor and assess continuously, with grade or mark each project on the completion date declared for each of them. Assessments of students shall include a review of their involvement and contributions to community engagement. It shall also include the presentation of project findings as documented in the journal.

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)
Curriculum and Evaluation Scheme for Second Year B. Tech. in Civil Engineering with Multidisciplinary Minor
To be implemented for 2024-28 Batch
(With Effect from Academic Year 2025-26)

SEM IV

24-PCC-CE-2-06: Structural Analysis		
Teaching Scheme: Theory: 3 Hours/Week	**Credit:** 3	**Examination Scheme:** **CIE** : 20 Marks **MSE : 20** Marks **SEE** : 60 Marks

Prerequisites Courses: 1. Engineering Mechanics :   24-PCC-CE-1-01
                                        2. Strength of Materials :   24-PCC-CE-2-02

Companion Course: 24-PCC-CE-2-08 : Structural Analysis Lab

Course Objectives:
- To impart the knowledge about the basic concepts required for analysis of structures.
- To develop the ability of analyzing structures.
- To learn application of influence line diagrams to find the forces in the members.

Course Outcomes:
After completion of the course, learners should be able to

CO No	CO	BL
1	Understand the basic concept of static and kinematic indeterminacy and analysis of indeterminate beams.	2
2	Analyze redundant trusses by unit load method	4
3	Implement application of the slope deflection method to beams and portal frames.	3
4	Analyze beams and portal frames using the moment distribution method.	4
5	Analyze the beam by influence line diagram.	4
6	Determine response of beams and portal frames using structure approach of stiffness matrix method.	3

Course Contents		
Unit I	**Fundamentals of structure and analysis of redundant beams.**	**7 Hours**

a) Types and classification of structures based on structural forms, concept of indeterminacy, static and kinematics degree of indeterminacy.
b) Analysis of propped cantilever, fixed beam and continuous beams with indeterminacy up to second degree by strain energy method.

#Exemplar/Case Studies: Comparison of various structural forms (trusses, frames, arches, and cables)

*Mapping of Course Outcomes	CO1

Unit II	Analysis of redundant pin jointed frames	7 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).

#Exemplar/Case Studies: Determination of member forces in a statically indeterminate truss using the unit load method under external loading.

*Mapping of Course Outcomes	CO2	

Unit III	Slope-Deflection Method	8 Hours

a) 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, shear force and bending moment diagram.
b) Sway analysis of rigid joint rectangular single bay single storey portal frames using Slope- deflection method. (Involving not more than three unknowns)

#Exemplar/Case Studies: Drawing bending moment and shear force diagrams for a continuous beam with joint translation due to support movement.

*Mapping of Course Outcomes	CO3	

Unit IV	Moment Distribution Method	8 Hours

a) Stiffness factor, carry over factor, distribution factor, application of Moment distribution method of analysis to beams with and without joint translation and yielding of support, application to non sway rigid jointed rectangular portal frames, shear force and a bending moment diagram.
b) Sway analysis of rigid jointed rectangular single bay single storey portal frames using Moment distribution method (Involving not more than three unknowns).

#Exemplar/Case Studies: Analysis of a fixed-ended beam under point loads using the moment distribution method.

*Mapping of Course Outcomes	CO4	

Unit V	Influence Line Diagram	7 Hours

a) Basic concept, Muller: Braslau's principle, influence line diagram for reaction, shear and moment to simply supported and overhanging beams, application of influence line diagram to determine reaction, shear and moment in beams.

#Exemplar/Case Studies: Use of influence line diagrams for reaction and bending moment in simply supported bridge girders under moving loads.

*Mapping of Course Outcomes	CO5	

Unit VI	Stiffness method	8 Hours

a) Fundamental concepts of flexibility and stiffness, relation between them. Stiffness method of analysis- Structure approach only. Application to beams (Involving not more than three unknowns).
b) Application of Stiffness structure approach to rigid jointed rectangular portal frames (Involving not more than three unknowns).

#Exemplar/Case Studies: Comparative study between slope-deflection method and stiffness method for the same beam to understand computational efficiency.	
*Mapping of Course Outcomes	CO6

Learning Resources

Text Books

T1. Theory of Structures by S. Ramamrutham and R. Narayan, Dhanpat Rai Publishing Company (P) Ltd.
T2. Structural Analysis-I & II by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd.
T3. Structural Analysis: A Matrix Approach by G.S.Pandit and S. P. Gupta, Tata McGraw Hill Education Pvt. Limited.

Reference Books :

R1. Intermediate Structural Analysis by C. K. Wang, Tata McGraw Hill Education Pvt. Ltd.
R2. Mechanics of Structures Vol. II (Theory and Analysis of Structures) by Dr. H. J. Shah and S. B. Junnarkar, Charotar Publishing House Pvt. Ltd.
R3. Structural Analysis by R. C. Hibbler, Pearson Education.
R4. Matrix Analysis of Framed Structures by William Weaver Jr. and James M. Gere, Springer
R5. Basic Structural Analysis by C. S. Reddy, Tata McGraw Hill Education Pvt. Ltd.

Additional Resources: (Books, e-Resources)
e-Resources:
https://nptel.ac.in/courses/105/101/105101086/
 https://nptel.ac.in/courses/105/106/105106050/

24-PCC-CE-2-07: Geotechnical Engineering		
Teaching Scheme: Theory: 3 Hours/Week	**Credit:** 03	**Examination Scheme:** **CIE** : 20 Marks **MSE :** 20 Marks **SEE** : 60 Marks

Prerequisite Course: Engineering Mechanics 24-PCC-CE-1-01

Companion Course: - 24-PCC-CE-2-09: Geotechnical Engineering Lab

Course Objectives:
- Understand Soil Properties: Learn how soil is formed, classified, and its key characteristics.
- Study Permeability and Settlement: Understand how water moves through soil and how soil settles under load.
- Analyze Stress and Strength: Learn how soil handles pressure and resists forces like shearing.
- Explore Geo-Environmental Engineering: Study waste management, landfill design, and the use of geosynthetics in construction.

Course Outcomes:
After completion of the course, learners should be able to

CONo	CO	BL
CO1	Identify type of soils and its various properties	2
CO2	Explain permeability and seepage analysis of soil by construction of flow net.	3
CO3	Determine compaction and consolidation of soil	3
CO4	Compute stress distribution and earth pressure	3
CO5	Express shear strength of soil and its measurement under various drainage conditions.	3
CO6	Understand the stability of slopes for different types of soils and geosynthetic applications	2

Course Contents		
Unit I	**Properties of Soil**	**7 Hours**

Properties of Soil:
Introduction to Soil Mechanics, formation of soil & soil structure, three phase soil system, weight volume relationships, detail index properties of soil - methods of determination and its significance, particle size and shape, classification of soils, soil consistency, field identification of soils

#Exemplar/Case Studies: Soil Investigation for the Chennai Metro Rail Project, India

*Mapping of Course Outcomes	CO1

Unit II	Permeability and Seepage	8 Hours

Permeability and Seepage :
Darcy's law, Factors affecting permeability, Determination of permeability by constant head and falling head method as per IS - 2720, field test as per IS – 5529 (part I) - pumping in test and pumping out test. Permeability of layered soils, Seepage forces, General flow equation (Laplace equation). Flow net construction and applications, Concept of effective neutral & total stress in soil mass. Quick sand condition. Uplift pressure, exit gradient, failure due to piping.

#Exemplar/Case Studies: Tehri Dam Seepage Issues, Uttarakhand	

*Mapping of Course Outcomes	CO2

Unit III	Compaction and Consolidation:	8 Hours

Compaction and Consolidation:
Factors affecting compaction, Dry density and moisture content relationship, Zero air voids line, Effect of compaction on soil structure, Standard Proctor test and Modified Proctor test as per IS – 2720. Field compaction equipment and methods, Field control of compaction, Spring analogy, Terzaghis theory of one-dimensional consolidation, Determination of coefficient of consolidation-square root of time fitting method and logarithm of time fitting method, Rate of settlement, normally consolidated and over consolidated soils, Determination of pre consolidation pressure.

#Exemplar/Case Studies: Compaction and Consolidation Issues in the Yamuna Expressway, India	

*Mapping of Course Outcomes	CO2

Unit IV	Stress Distribution in Soil & Earth pressure	8 Hours

Stress Distribution in Soil & Earth pressure:
Boussinesq theory- point load, line load, strip load, pressure distribution diagram on a horizontal and vertical plane, pressure bulb, Westergaard's theory, equivalent point load method, Newmark chart, contact pressure, approximate stress distribution method, earth pressure at rest, active and passive condition. Rankines and Coulomb's theory of earth pressure.

#Exemplar/Case Studies: Earth Pressure & Settlement – Bandra-Worli Sea Link, Mumbai	

*Mapping of Course Outcomes	CO4

Unit V	Shear Strength	7 Hours

Shear Strength:
Coulomb's theory and failure envelope, Principle stress, stress analysis (Total stress approach and effective stress approach), representation of stresses on Mohr's circle for cohesive, cohesionless, saturated and partly saturated soil, Application of shear stress parameters in the field Unconsolidated undrained, consolidated undrained and consolidated drained, type of test -box shear test, Triaxial compression test with pore pressure and volume change measurement, unconfined compression test, vane shear test.

#Exemplar/Case Studies: Shear Strength Failure in the Naini Bridge Approach Embankment, Uttar Pradesh	

*Mapping of Course Outcomes	CO5

Unit VI	Introduction to Geo-Environmental Engineering and Geo-synthetics	7 Hours

Introduction and Principles of Slope stability and Geo-synthetics:

Introduction and Principles of Slope stability: Introduction, types of slope and failures, Factors affecting slope stability, Concepts of stability analysis, Factor Of Safety concept.,Introduction to Retaining wall, Landslide -Causes and Remedial Measures, Introduction to Geosynthetic techniques and Geotextile.

#Exemplar/Case Studies: Landslide and Slope Stability Issues in the Konkan Railway, India

*Mapping of Course Outcomes	CO6

Learning Resources

Text Books

T1. B. C. Punmia, "Soil Mechanics and Foundations", New Delhi, India: Laxmi Publications (P) Ltd., 2015.
T2. V. N. S. Murthy, "Soil Mechanics and Foundation Engineering", New Delhi, India: U. B. S. Publishers and Distributors, 2011

Reference Books :

R1.B. C. Punmia, "Soil Mechanics and Foundations", New Delhi, India: Laxmi Publications (P) Ltd., 2015.
R2.K. R. Arora, "Soil Mechanics and Foundation Engineering", Delhi, India: Standard Publishers Distributors, 2011
R3.B. J. Kasamalkar, "Geotechnical Engineering", Pune, India: Pune Vidyarthi Griha Prakashan, 2010
R4.K. Terzaghi and R. B. Peck, "Soil Mechanics", New York, NY, USA: John Wiley and Sons, 1994.

Additional Resources: (Books, e-Resources)

MOOC Courses links :
http://nptel.iitm.ac.in by Prof. B. V. S. Viswanadham and Prof. G. Venkatachalam

24-PCC-CE-2-08: Structural Analysis Lab

Teaching Scheme: Practical: 2 Hours/Week	Credit: 1	Examination Scheme: Termwork **(TW)** : 50 Marks

Prerequisites Courses: 1. Engineering Mechanics : 24-PCC-CE-1-01
2. Strength of Materials : 24-PCC-CE-2-02

Companion Course: 24-PCC-CE-2-06: Structural Analysis

Course Objectives:
1. To impart the knowledge about the basic concepts required for analysis of structures.
2. To develop the ability of analyzing structures.
3. To learn application of influence line diagrams to find the forces in the members.

CONo	CO	BL
1	Understand the basic concept of static and kinematic indeterminacy and analysis of indeterminate beams.	2
2	Analyze redundant trusses by unit load method	4
3	Implement application of the slope deflection method to beams and portal frames.	3
4	Analyze beams and portal frames using the moment distribution method.	4
5	Analyze the beam by influence line diagram.	4
6	Determine response of beams and portal frames using structure approach of stiffness matrix method.	3

Guidelines for Laboratory /Term Work Assessment

Continuous assessment of laboratory work should be based on the overall performance of Laboratory assignments by a student. Each Laboratory assignment will assign grades/marks based on parameters, such as timely completion, performance, innovation, efficient codes, and punctuality.

Guidelines for Practical Examination

Problem statements must be decided by the internal examiner. During the practical assessment, maximum weightage should be given to satisfactory implementation of the problem statement. Relevant questions may be asked at the time of evaluation to test the student's understanding of the fundamentals and effective and efficient implementation. This will encourage, transparent evaluation and a fair approach, and hence will not create any uncertainty or doubt in the minds of the students. So, adhering to these principles will consummate our team efforts to the promising start of student's academics.

Guidelines for Laboratory Conduction

Term Work assessment is an integral part of continuous evaluation in many educational systems. Below are general guidelines to ensure transparency, fairness, and consistency while assessing term work:
- **Assignments:** Quality, accuracy, and timely submission.
- **Attendance & Participation:** Regularity, discipline, and engagement in class/lab activities.
- **Viva/Oral Exams:** Conceptual clarity and ability to answer questions.

Rubrics for Evaluation
- Regularity/Timely Submission: 50%
- Oral/Quiz: 30%
- Performance of writing: 20%

Assessment Procedure

- **Regular Evaluation:** Conduct assessments throughout the term rather than in a single instance.
- **Feedback:** Provide constructive feedback for improvement after each evaluation.
- **Transparency:** Share evaluation criteria with students at the beginning of the term.

Final Term Work Submission

- Ensure that students submit their term work before the deadline.
- Have a checklist to verify the completeness of the submission.

Suggested List of Laboratory Experiments/Assignments		
Group A: Assignments (Mandatory Assignment)		
Sr No	Assignment Title	*Mapping of Course Outcomes
1.	**Assignment I: a)** Minimum four numericals to find static and kinematics degree of indeterminacy. **b)** Minimum four numerical to Analyse propped cantilever, fixed beam and continuous beams with indeterminacy up to second degree by strain energy method.	CO1
2.	**Assignment II: a)** Minimum Three numericals to Analyse redundant trusses by unit load method (indeterminacy up to second degree).	CO2
3.	**Assignment III:** Minimum four numericals to find slope and deflection of beams with varying flexural rigidity by Slope-Deflection Method.	CO3
4.	**Assignment IV:** Minimum four numericals to find final member moments of beam and Portal Frame with varying flexural rigidity by Moment Distribution Method.	CO4
5.	**Assignment V:** Minimum four numerical with influence line diagram for simple beam.	CO5
6.	**Assignment VI:** Minimum four numericals on beam and portal frame by Stiffness Matrix Method (Involving not more than three unknowns).	CO6
Group B: Assignments on Field Visit		
Sr No	Assignment Title	*Mapping of Course Outcomes
1.	Compulsory site visit for curved beams / Rolling Loads on Beam / arches.	CO5

Learning Resources (If applicable)
Text Books
T1. Theory of Structures by S. Ramamrutham and R. Narayan, Dhanpat Rai Publishing Company (P) Ltd. **T2.** Structural Analysis-I & II by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd. **T3.** Structural Analysis: A Matrix Approach by G.S.Pandit and S. P. Gupta, Tata McGraw Hill Education Pvt. Limited.
Reference Books :
R1. Intermediate Structural Analysis by C. K. Wang, Tata McGraw Hill Education Pvt. Ltd. **R2.** Mechanics of Structures Vol. II (Theory and Analysis of Structures) by Dr. H. J. Shah and S. B. Junnarkar, Charotar Publishing House Pvt. Ltd. **R3**. Structural Analysis by R. C. Hibbler, Pearson Education. **R4.** Matrix Analysis of Framed Structures by William Weaver Jr. and James M. Gere, Springer **R5.** Basic Structural Analysis by C. S. Reddy, Tata McGraw Hill Education Pvt. Ltd.

24-PCC-CE-2-09: Geotechnical Engineering Lab		
Teaching Scheme: Practical: 02 Hours/Week	**Credit:** 02	**Examination Scheme:** Termwork **(TW)** : 25 Marks Oral**(OR)** : 25 Marks

Prerequisites Courses: -24-PCC-CE-2-07: Geotechnical Engineering

Companion Course: - NA

Course Objectives:
- To introduce basic properties of soil
- To introduce Soil classification
- To introduce index and engineering properties of soil

Course Outcomes:
After completion of the course, learners should be able to

CONo	CO	BL
CO1	Determine index properties of the soil .	2
CO2	Compute permeability and shear strength of soil .	3
CO3	Experience with the measurement of geotechnical laboratory parameters.	3

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a reference and hands-on resource. It should include a prologue (about University/program/ institute/ department/foreword/ preface), curriculum of the course, conduction and Assessment guidelines, topics under consideration, concept, objectives, outcomes, set of typical applications/assignments/ guidelines, and references.

Guidelines for Student's Laboratory Journal

The laboratory assignments are to be submitted by students as a journal. The journal consists of a Certificate, table of contents, and handwritten write-up of each assignment (Title, Date of Completion, Objectives, Problem Statement, Assessment grade/marks and assessor's sign. As a conscious effort and little contribution towards environmental awareness, attaching printed papers for industrial visit and audits.

Guidelines for Laboratory /Term Work Assessment

Continuous assessment of laboratory work should be based on the overall performance of Laboratory assignments by a student. Each Laboratory assignment assessment will assign grades/marks based on parameters, such as timely completion, performance, innovation and punctuality.

Guidelines for Practical / Oral Examination

Problem statements must be decided jointly by the internal examiner and external examiner. During the practical/oral assessment, maximum weightage should be given to satisfactory implementation of the problem statement. Relevant questions may be asked at the time of evaluation to test the student's understanding of the fundamentals and effective and efficient implementation. This will encourage transparent evaluation and a fair approach, and hence will not create any uncertainty or doubt in the minds of the students. So, adhering to these principles will consummate our team efforts to the promising start of student's academics.

Guidelines for Laboratory Conduction

- Understand the objectives of the experiment.
- Keep your workspace organized and tidy.
- Record observations and data meticulously.
- Report any damaged or malfunctioning equipment immediately.
- Report accidents, spills, or injuries immediately.
- Analyze and review experiment results accurately.
- Follow institutional and regulatory guidelines.

Virtual Laboratory: (If Any):

- https://smfe-iiith.vlabs.ac.in/

Suggested List of Laboratory Experiments/Assignments		
Group A: Assignments (Mandatory Assignment)		
Sr No	**Assignment Title**	***Mapping of Course Outcomes**
1.	Determination of Water content of soil	CO1
2.	Determination of specific gravity of soil by pycnometer	CO1
3.	Determine grain size distribution of coarse grained soil by mechanical sieve analysis	CO1
4.	Determination of consistency limits liquid limit, plastic limit and shrinkage limit of soil	CO1
5.	Determination of field density by core cutter and sand replacement method	CO3
6.	Determination of MDD and OMC by Standard Proctor test	CO3
7.	Determination of co-efficient of permeability by constant head and by variable head method	CO2
8.	Understanding Bore Logs: Practical Assignment	CO3
Group B: Assignments (Out of List perform any 2) (Optional)		
Sr No	**Assignment Title**	***Mapping of Course Outcomes**
1.	Determination of shear strength of soil by direct shear test	CO2

2.	Determination of shear strength of soil by unconfined compression test	CO2
3.	Determination of shear strength of soil by Vane shear test	CO2
4.	Determination of shear strength of soil by triaxial shear test	CO2

Group C: Assignments (if Any) <<Mini Project/Field Visit Etc>>		
Sr No	**Assignment Title**	***Mapping of Course Outcomes**
1.	Collection of sample soil investigation report for any construction project.	CO1
2.	Rebhann's and Cullman's graphical method for determination of earth pressure	CO2

Learning Resources (If applicable)

Text Books

T1. Mandal J.N. and Divshikar D.G. (1994). Soil Testing in Civil Engineering, Oxford & IBH Publishing Company Pvt. Ltd., New Delhi**.**
T2. IS 2720 (Various parts). Methods of Test for Soils, Bureau of Indian Standards.

Reference Books :

R1. Punmia B.C., "Soil Mechanic and Foundation Engineering", Laxmi Publication Pvt. Ltd.
R2. Terzaghi K., Peck R. B. and Mesri G., "Soil Mechanics in Engineering Practice", John Wiley & Sons.

MOOC Courses links :
- https://nptel.ac.in/courses/105101160

24-EEM-2-02: Entrepreneurship Development		
Teaching Scheme: Theory: 1 Hours/Week Practical: 2 Hours/Week	**Credit:** 02	**Examination Scheme:** **Term work (TW):** 50 Marks

Prerequisite Course: 24-EEM-2-01-Engineering Economics

Companion Courses: 24-OEC-1-4-03: Financial Accounting & Management, 24-OEC-2-4-03 Business Development, Marketing and Finance

Course Objectives:
- To equip students with the foundational knowledge of entrepreneurship
- To develop skills for identifying potential market opportunities and generating innovative ideas
- To equip students with the knowledge needed to create a viable business plan.
- To enable students to translate a business model to a startup by understanding market research, marketing, and navigating the legal aspects of entrepreneurship.

Course Outcomes:

After completion of the course, learners should be able to

CONo	CO	BL
1	Understand foundational concepts of entrepreneurship and traits of successful entrepreneurs.	2
2	Identify market gaps and assess feasibility of business ideas.	4
3	Apply Business Model Canvas framework.	3
4	Apply business models to actionable startup plans by leveraging market intelligence and navigating the relevant legal frameworks for their ventures.	3

Guidelines for Student's Termwork

The termwork assignments will be submitted as presentations/PDFs by students via Google Classroom.

Guidelines for Term Work Assessment

Continuous assessment ofterm work should be based on the overall performance of assignments by a student. Each assignment assessment will assign grades/marks based on parameters, such as timely completion, performance, innovation, presentation skills, and punctuality.

Guidelines for Laboratory Conduction

Students are expected to select one assignment each week, do a thorough case study and prepare a presentation on it. He/She has to present it during lab hours within 6-10 minutes. The instructor is expected to assign Assignment 'a' to half batch and 'b' to the remaining half batch and conduct presentations in two separate practical sessions. The instructor is expected to create as much variety he/she can so that students get equipped with a vast entrepreneurial environment in a short span.

Suggested List of Laboratory Experiments/Assignments		
Group A: Assignments (Mandatory Assignment)		
Sr No	**Assignment Title**	***Mapping of Course Outcomes**
1.	a. Journey of Entrepreneurship through E-Cell/ Incubation Centre Support b. Disruptive Technological Innovation (Amazon, RedBus, etc..)	CO1
2.	a. Successful businesses that solved market gaps (e.g., Uber, Airbnb, Oyo, etc...) b. Feasibility of an outlet (cafe, retail store, etc.. in institute campus) justifying whether or not it should be launched	CO2
3.	a. Market Analysis of a Product b. Social Media Commercial (present in the form of a self-made video)	CO4
4.	a. Develop a Business Plan for an existing Company b. Develop a Business Plan for an innovative idea*	CO3
5.	a. Startups Raising Investor Funds b. Govt. Schemes	CO4
Group B: Assignments (Out of List; perform any 1)		
Sr No	**Assignment Title**	***Mapping of Course Outcomes**
1.	An advertisement pamphlet using tools like Canva, etc.. for any new idea with a novel logo, company name, etc...	CO4
2.	Build a website using Google Sites or any other no-code tool for any new idea and integrate forms to collect email/name/phone of potential customers	CO4
Group C: Assignments		
Sr No	**Assignment Title**	***Mapping of Course Outcomes**
1.	a. Registering your first startup and generating Udyog Aadhar or b. Case Study Report on Shark Tank Pitches	CO4
Learning Resources (If applicable)		
Text Books		
T1. Paul Swamidass, Engineering Entrepreneurship from Idea to Business Plan, Cambridge		

Reference Books :
R1. Charantimath Poornima, Entrepreneurship Development and Small Business Enterprises, Pearson Education, 2014 **R2**. Vangundy Arthur, Getting To Innovation - How Asking The Right Questions Generates The Great Ideas Your Company Needs, Prentice - Hall Of India Private Limited, 2008 **R3.** Dorf Richard, Technology Ventures - From Idea To Enterprise, Mcgraw - Hill, 2005 **R4.** Nandan H, Fundamentals of Entrepreneurship, PHI Learning Pvt Ltd, 2018
Additional Resources: (Books, e-Resources) ● "Jugaad Innovation: A Frugal and Flexible Approach to Innovation for the 21st Century" by Navi Radjou, Jaideep Prabhu, and Simone Ahuja ● Shirk Martha, How To Become Your Own Boss - Eleven Women Who Escaped Poverty By Their Entrepreneurship, Viva Books Private Ltd, 2007 ● National Innovation & Startup Policy (2019)
MOOC Courses links : ● Link to AICTE Evaluated Entrepreneurship Awareness Program: 16-Days Professional Certification by Turnip Innovations https://www.turnip.co.in/entrepreneurship-course/index.html ● Link to NPTEL course contents: Entrepreneurship https://nptel.ac.in/courses/110106141 ● Link to NPTEL course contents: Entrepreneurship Development https://onlinecourses.swayam2.ac.in/cec20_mg19/preview

24-VSEC-CE-2-01: Drawing Assessment & calculation

Teaching Scheme: Practical: 04 Hours/Week	**Credit:** 02	**Examination Scheme:** Termwork **(TW)** : 25Marks **Practical (PR)** : 25Marks

Prerequisites Courses: 24-ESC-1-09 Smart Building Materials and Lab

Companion Course: NA

Course Objectives:
- The course is aimed at developing Basic Drawing skills.
- Develop Skills in Preparation of Basic Drawings.
- Skills in Reading and Interpretation of Engineering Drawings.

Course Outcomes:
After completion of the course, learners should be able to

CONo	CO	BL
CO1	Apply basic principles of civil engineering drawing to create accurate site plans, elevations, and sections.	3
CO2	Develop structural and service layout drawings using both manual drafting techniques and CAD tools.	3
CO3	Analyze construction-related documentation, including sanction forms, building materials, and dimension standards, for compliance with industry norms.	2
CO4	Interpret real-world construction site observations and relate them to theoretical civil engineering drawings and practices.	2

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a reference and hands-on resource. It should include a prologue (about University/program/ institute/ department/foreword/ preface), curriculum of the course, conduction and Assessment guidelines, topics under consideration, concept, objectives, outcomes, set of typical applications/assignments/ guidelines, and references.

Guidelines for Student's Laboratory Journal

The laboratory assignments are to be submitted by students in the form of a journal. Journal consists of Certificate, table of contents, and handwritten write-up of each assignment (Title, Date of Completion, Objectives, Problem Statement,, Assessment grade/marks and assessor's sign, Theory- Concept in brief, test cases, Test Data Set(if applicable), conclusion/analysis. For reference one or two journals may be maintained in the Laboratory.

Guidelines for Laboratory /Term Work Assessment
Continuous assessment of laboratory work should be based on the overall performance of Laboratory assignments by a student. Each Laboratory assignment assessment will assign grades/marks based on parameters, such as timely completion, performance, innovation, efficient codes, and punctuality.

Guidelines for Practical Examination
Problem statements must be decided jointly by the internal examiner and external examiner. During the practical assessment, maximum weightage should be given to satisfactory implementation of the problem statement. Relevant questions may be asked at the time of evaluation to test the student's understanding of the fundamentals and effective and efficient implementation. This will encourage, transparent evaluation and a fair approach, and hence will not create any uncertainty or doubt in the minds of the students. So, adhering to these principles will consummate our team efforts to the promising start of student's academics.

Guidelines for Laboratory Conduction
1. All the experiments mentioned in the syllabus are compulsory. 2. Experiments should be performed in the group of 4-5 students. 3. Use of open source software and recent versions is to be encouraged.

Virtual Laboratory: (If Any):NA

Suggested List of Laboratory Experiments/Assignments

Group A: Assignments (Mandatory Assignment)

Sr No	Assignment Title	*Mapping of Course Outcomes
1.	Prepare a simple site plan and orthographic projections. 1: Fundamentals of Civil Drawing Introduction to Civil Engineering Drawing Drawing tools, scales, and conventions. Types of drawings: architectural, structural, and services.	CO1
2.	Prepare floor plans with sectional details. Residential Building Plan (Single Story): • Draft a floor plan, elevation, and sectional view for a single-story residential building. • Include doors, windows, and dimension annotations.	CO2
3.	Develop a complete set of drawings of practical no. 2 using CAD. • Basic 2D and 3D CAD operations. • Drafting floor plans, Elevation, and Sectional details in CAD.	CO2
4.	Prepare Foundation Plan Drawing: Create a foundation plan for isolated footings showing centerline	CO2
5.	Draw a layout showing water supply lines, sewer lines for a residential block. • Include legends and calculate pipe lengths and volumes.	CO2

Group B: Assignments (Out of List perform any 2) (Optional)		
Sr No	**Assignment Title**	***Mapping of Course Outcomes**
1.	Document collection: Different sanction forms and at least six brochures of building materials	CO3
2.	Terminology of Perspective drawing	CO3
3.	Dimension standards of Residential building and Public building	CO3
Group C: Assignments (if Any) <<Mini Project/Field Visit Etc>>		
Sr No	**Assignment Title**	***Mapping of Course Outcomes**
1.	Construction Site Visit (Residential/Commercial Building Project)	CO4
Learning Resources (If applicable)		

Text Books

T1. Principles of Building Drawing by MG Shah and CM Kale; MacMillan, Delhi
T2. National Building Code

Reference Books :

R1. *Civil Engineering Drawing* by M. Chakraborti
R2. *Building Drawing with Integrated Approach to Built Environment* by Shah, Kale & Patki
R3. *AutoCAD Civil 3D: A Problem-Solving Approach* by Sham Tickoo

Additional Resources: (Books, e-Resources)
   ● **E-books/e-tools/relevant software to be used as recommended by AICTE/ NITTTR,Chandigarh.**

MOOC Courses links :
   ● http://swayam.gov.in

24-VEC-2-02: Digital and Technological Solutions		
Teaching Scheme: Lecture: 1 Hour/Week Practical: 2 Hours/Week	**Credit:** 2	**Examination Scheme:** Termwork **(TW)**: 25 Marks

Prerequisite Courses: -

Course Description:

Digital Technological Solutions is a comprehensive course designed to equip students with essential skills and knowledge for navigating and contributing to the digital landscape. This course covers a broad spectrum of contemporary topics, and application software by examining critical tools and platforms used in modern workplaces, including productivity software, project management tools, and cloud-based applications.

A significant portion is dedicated to Digital India and e-Governance, where students explore India's initiatives to leverage digital technology for inclusive growth and improved governance. Through case studies and practical examples, they learn how digital transformation impacts citizens, businesses, and government functions.

The course also delves into Cybersecurity, a critical area as digital threats increase in frequency and complexity.

With a blend of theoretical knowledge and hands-on projects, students gain the ability to develop and implement digital solutions that align with current technological and economic trends, preparing them for roles in various tech-driven sectors

Course Objectives:

The objective of the **Digital Technological Solutions** course is to provide students with a foundational understanding and practical skills to thrive in a digital-first world. By the end of this course, students will be able to:

1. **Proficiency in Application Software**: Gain hands-on experience with key application software tools essential for productivity, collaboration, and management in digital workplaces.
2. **Understand Digital Transformation**: Grasp the significance of Digital India and e-Governance initiatives, recognizing how digitalization can enhance governance, inclusivity, and socio-economic growth in India and beyond.
3. **Enhance Cybersecurity Awareness**: Develop a solid understanding of cybersecurity principles, enabling students to identify potential threats, implement security measures, and contribute to safer digital ecosystems.
4. **Develop Digital Solutions**: Equip students with the knowledge and skills to design, implement, and manage digital solutions that address real-world challenges across sectors.

The course aims to empower students with a versatile skill set, preparing them for dynamic roles in the digital and technological domains.

Course Outcomes: After completion of the course, learners should be able to

CONo	CO	BL
CO1	Utilize workspace tools (Forms, Docs, Slides, and Sheets) to plan, organize, analyze data, and present information professionally while demonstrating critical thinking and problem-solving skills.	3

CO2	Develop impactful digital content, effectively use e-governance platforms, and perform secure financial transactions.	3
CO3	Apply cybersecurity principles to protect information and digital systems from threats and vulnerabilities.	3
CO4	Design and implement digital solutions for real-world challenges, demonstrating the ability to leverage technology for process optimization and improved outcomes.	3

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a reference and hands-on resource. It should include a prologue (about the University/Program/ Institute/ Department/ Foreword/ Preface), curriculum of the course, conduction and Assessment guidelines, topics under consideration, concept, objectives, outcomes, set of typical applications/assignments/guidelines, and references.

Guidelines for Student's Laboratory Journal

The laboratory assignments are to be submitted by students as a journal. The journal consists of a Certificate, table of contents, and handwritten write-up of each assignment (Title, Date of Completion, Objectives, Problem Statement, Software / Hardware requirements, Assessment grade/marks and assessor's sign, Theory- Concept in brief, algorithm (if applicable), flowchart, test cases (if applicable), Test Data Set(if applicable), mathematical model (if applicable), conclusion/analysis). Attaching printed papers as part of writeups must be avoided. For reference, one or two journals may be maintained with program prints in the laboratory.

Guidelines for Laboratory/Term Work Assessment

Continuous assessment of laboratory work should be based on the overall performance of laboratory assignments by a student. Evaluate assignments based on timeliness, creativity, technical accuracy, and professionalism, maintaining transparency and fairness.

Guidelines for Laboratory Conduction

Familiarize yourself with the syllabus, lab guidelines, and necessary tools. Prepare the lab environment with the required software and hardware. Communicate the objectives, deliverables, and timeline for each practical. Ensure students understand the mapping between assignments and course outcomes. Encourage hands-on practice, collaboration, and innovative problem-solving.

Suggested List of Laboratory Experiments/Assignments

Group A: Assignments (Mandatory Assignment)

Scenario: You are a project manager for a school event. Your task is to plan and organize the event using Workspace tools.

Sr No	Assignment Title	Mapping of Course Outcomes
1.	Create a **Form (Google/ Microsoft Form/Zoho Forms/ JotForm etc.)** to survey students' preferences for the event theme, date, and activities. Include various question types (multiple-choice, short-answer, etc.) to gather diverse information. Customize the form's appearance with a relevant theme and clear instructions. Share the form with students through email or a class website.	CO1
2.	Create a **spreadsheet** (**Google Sheets/Excel/Zoho Sheet)** to analyze the survey responses. Use five functions like COUNT, SUM, AVERAGE, and SORT to summarize the data. Visualize the data using charts and graphs to identify trends and	CO1

	preferences.	
3.	Create a **Document (Google Docs/ Microsoft Docs Online/Zoho Docs)**to outline the event schedule, including timings, activities, and responsibilities. Share the document with team members and collaborate on the schedule. Use formatting tools (headings, bullet points, etc.) to organize the information.	CO1
4.	Design a presentation (**Google Slides/ Canva/Prezi/Figma**) to showcase the event plan to the school community. Use slides to highlight key information, such as the event theme, date, time, activities, and expected outcomes. Incorporate images, videos, and animations to enhance the presentation's visual appeal. Practice the presentation to ensure smooth delivery.	CO1

Group B: Assignments (Out of List perform any 2)		
Sr No	**Assignment Title**	**Mapping of Course Outcomes**
1.	**Digital India and E-Governance Initiatives and Infrastructure** Create a Report on any five major Digital India Initiatives (Aple Sarkar, Digital Locker/APAAR, National Academic Depository (NAD), NPTEL/SkillIndia/National Career Service) * , etc. and register on any learning and assessment portal mentioned above and earn certification ***Note: Digital India Initiative names will be declared as per availability of the initiatives available in that particular year for the semester**	CO2, CO4
2.	**Basics of E-Commerce and Digital Marketing** Create one LinkedIn-specific post promoting an aspect of your institute (e.g., academic excellence, alumni success stories, or collaborations). Write compelling ad captions for the post. Research and suggest 10 relevant and trending hashtags to maximize reach.	CO4
3.	**Digital Financial Tools and Applications** Create a tutorial video / a comparison table, or an infographic explaining any 5 digital tools and applications. Simulate or demonstrate a simple transaction using a dummy banking app using any of the studied tools and applications	CO2,CO4,CO5

Group C: Assignments (Out of List perform any 2)		
Sr No	**Assignment Title**	***Mapping of Course Outcomes**
1.	Analyze Your Digital Footprint for online privacy and security by performing the audit of privacy settings on Facebook, Instagram, or LinkedIn: profile visibility, post/story visibility, location sharing, and linked accounts.	CO3,CO4
2.	Use online tools such as WHOis Lookup, GoPhish, or similar platforms to verify the authenticity of any website.	CO3
3.	Prepare a report or presentation on the concept of Cybercrime, its classification, and provide a detailed analysis of any one type of cybercrime, including its working, real-world examples, and preventive measures.	CO3

Learning Resources (If applicable)
Text Books
T1 Nina Godbole, Sunit Belapure, "Cyber Security: Understanding Cyber Crimes, Computer forensics and legal Perspectives", Wiley
Reference Books:
R1 Joel Elad, "LinkedIn For Dummies", OReilly, 5th Edition **R2** Dr. Nilakshi Jain, Dr Dhananjay R. Kalbande, "Digital Forensic", Wiley
Additional Resources: (Books, e-Resources) ● **GDrive:** https://support.google.com/a/users/answer/9389764?hl=en ● **Digital India Initiatives:** https://www.digitalindia.gov.in/about-us/ ● **Skill India :** https://www.skillindiadigital.gov.in/home ● **NPTEL:** https://onlinecourses.nptel.ac.in/ ● **National Career Service:** https://www.ncs.gov.in/Pages/default.aspx#main ● **WHOis Lookup:** https://who.is/ ● **GoPhish:** https://getgophish.com
MOOC Courses links: ● Digital Skilling: https://elearn.nptel.ac.in/shop/nptel/digital-skilling

Mid Semester Examination (MSE: March 2025)

Programme: AIDS/Civil/Computer/E&TC/Mechanical/MBA-I	
Class	Pattern:
Course Name:	Course Code:
AY:	Semester:
Time:	Maximum Marks: 20

Instructions to the candidates:
1. *Solve Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6*
2. *Bold-faced figures to the right indicate full marks.*
3. *Assume the suitable data if necessary*
4. *Any other instruction required for particular course may be added by subject/course chairman*

QN	Question	Mark
1a)	Q 1 can be bifurcated to maximum two sub questions	07
1b)		
	OR	
2	Q 2 can be bifurcated to maximum two sub questions	07
3	Q 3 can be bifurcated to maximum two sub questions	07
	OR	
4	Q 4 can be bifurcated to maximum two sub questions	07
5	Q 5 can be bifurcated to maximum two sub questions	06
	OR	
6	Q 6 can be bifurcated to maximum two sub questions	06

Semester End Examination (Regular) <<Month Year>>

Programme: Class:

Course and Code: Semester

Academic Year: Pattern:

Time: 2Hr 30 Min   Examination: SEE (Month Year)   Max. Marks: 60

Instructions to the candidates:
1. *Solve Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6, Q.7 OR Q.8*
2. *Bold-faced figures to the right indicate full marks.*
3. *Assume the suitable data if necessary, but Justify it.*
4. *Draw the neat labelled diagrams, wherever necessary.*

QN	Question	Marks
1 a)	Unit I	6
1 b)	Unit II	7
1 c)	Unit III	7
OR		
2 a)	Unit I	6
2 b)	Unit II	7
2 c)	Unit III	7
3 a)	Unit IV	7
3 b)	Unit IV	7
OR		
4 a)	Unit IV	7
4 b)	Unit IV	7
5 a)	Unit V	7
5 b)	Unit V	6
OR		
6 a)	Unit V	7
6 b)	Unit V	6
7 a)	Unit VI	7
7 b)	Unit VI	6
OR		
8 a)	Unit VI	7
8 b)	Unit VI	6

Supporting Document

Sr. No.	Syllabus Contains	Short Answer	Yes / No	Page No. (In Syllabus)
1	अभ्यासक्रम	Enclosed in Syllabus	Yes	1
2	पात्रता	(As per the Rules and Regulations mentioned in MoM)	Yes	83
3	अभ्यासक्रमाची उद्दिष्टे	Enclosed in Syllabus	Yes	29
4	विषयाचे नाव	Enclosed in Syllabus	Yes	20
5	घटकांचा तपशील	Enclosed in Syllabus	Yes	20
6	तासिका	Enclosed in Syllabus	Yes	20
7	श्रेयांक पद्धत	Enclosed in Syllabus	Yes	20
8	संदर्भ साहित्य	Enclosed in Syllabus	Yes	31
9	संदर्भ ग्रंथ	Enclosed in Syllabus	Yes	31
10	प्रश्नपत्रिकेचे स्वरूप	Enclosed in Syllabus	Yes	81
11	अंतर्गत मूल्यमापनाचे स्वरूप	Enclosed in Syllabus	Yes	20
12	सत्र परीक्षेचे स्वरूप	Enclosed in Syllabus	Yes	82
13	गुणांकन	Enclosed in Syllabus	Yes	20