SVKM NMIMS GLOBAL UNIVERSITY, DHULE
School of Technology, Management & Engineering
Department of Civil Engineering

Shri Vile Parle Kelavani Mandal's

NMIMS Global University, Dhule

School of Technology, Management & Engineering

Survey No. 499, Plot No. 02, Behind Gurudwara,
Mumbai Agra National Highway,
Dhule- 424 001, Maharashtra, India

Curriculum Structure and

Syllabus Of

Second Year B. Tech. (Civil Engineering)

(Regulation 2026)

Effective from Academic Year 2026-27

SVKM NMIMS GLOBAL UNIVERSITY, DHULE
School of Technology, Management & Engineering
Department of Civil Engineering

Vision

"SVKM NMIMS Global University aspires to be a world-renowned institution of higher learning, dedicated to fostering excellence in education, research and innovation with social responsibility"

Mission

1. To foster a dynamic and inclusive learning environment that nurtures the educational and research aspirations of students from diverse backgrounds.
2. To deliver state-of-the-art pedagogy, emphasizing interdisciplinary collaboration and innovation.
3. To uphold the values of ethics and community engagement to cultivate global citizens and leaders who actively contribute to the advancement of society and the world.

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CURRICULUM FRAMEWORK

LIST OF ABBREVIATIONS

Sr. No.	Abbreviation	Type of Course
1	BSC	Basic Science Course
2	ESC	Engineering Science Course
3	PCC	Programme Core Course
4	PEC	Programme Elective Course
5	MDM	Multidisciplinary Minor
6	OEC	Open Elective Course
7	VSEC	Vocational and Skill Enhancement Course
8	AEC	Ability Enhancement Course
9	EEM	Entrepreneurship/Economics/Management Course
10	IKS	Indian Knowledge System
11	VEC	Value Education Course
12	ELC	Experiential Learning Courses
13	LLC	Liberal Learning Courses
14	HSSM	Humanities Social Science and Management

SEMESTER-WISE COURSE AND CREDIT DISTRIBUTION

Sr. No.	Type of Course	Course Distribution: Semester Wise			Credit Distribution: Semester Wise		
		No. of Courses / Semester			No. of Credits / Semester		
		III	IV	Total	III	IV	Total
1.	Basic Science Course (BSC)						
2.	Engineering Core Course (ECC)	01		01	04		04
3.	Programme Core Course (PCC)	06	06	12	12	12	24
4.	Programme Elective Course (PEC)						
5.	Multidisciplinary Minor Course (MDC)		01	01		03	03
6.	Open Elective Course (OEC)						
7.	Vocational and Skill Enhancement Course (VSEC)	01		01	02		02
8.	Ability Enhancement Course (AEC)						
9.	Entrepreneurship/ Economics/ Management Course (HSSM)	02	03	05	04	05	09
10.	Indian Knowledge System (IKS)						
11.	Value Education Course (VEC)						
12.	Experiential Learning Courses (ELC)		01	01		02	02
13.	Co-curricular courses (CC)						
Total		**10**	**11**	**21**	**22**	**22**	**44**

Curriculum Structure
B. Tech.
Second Year
Civil Engineering

CURRICULUM STRUCTURE

Second Year B. Tech. (Civil Engineering)
Semester – III

Second Year Civil Engineering (Regulations 2025) (With effect from Academic Year 2026-27) Semester III (Credits = 22)																
Course Code	Course Name	Credit Scheme				Teaching Scheme (Hours/Week)			Evaluation Scheme and Marks							
									Continuous Assessment			Semester End Assessment			Total
		L	T	P	Total	L	T	P	Term Test 1 (TT1)	Term Test 2 (TT2)	Internal Assessment	SEE	TW	PR/ OR	
T25BEM201	Engineering Mathematics-III	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25BEM201T	Engineering Mathematics-III Tutorial	-	1	-	1	-	1	-	-	-	25	-	-	-	25
T25BSM202	Strength of Materials	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25BSM202L	Strength of Materials Lab	-	-	1	1	-	-	2	-	-	-	-	25	25	50
T25BFM203	Fluid Mechanics	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25BFM203L	Fluid Mechanics lab	-	-	1	1	-	-	2	-	-	-	-	25	25	50
T25BAP204	Architectural Planning and Design of Buildings	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25BAP204L	Architectural Planning and Design of Buildings Lab	-	-	1	1	-	-	2	-	-	-	-	25	25	50
T25BED205	Employability Skill Development	2	-	-	2	2	-	-	15	15	10	60	-	-	100
T25BUH206	Universal Human Value -II	2	-	-	2	2	-	-	15	15	10	60	-	-	100
T25BAC207L	AutoCAD Lab	-	-	2	2	-	-	4	-	-	-	-	50	50	100
Total		**16**	**01**	**05**	**22**	**16**	**01**	**10**	**90**	**90**	**85**	**360**	**125**	**125**	**875**

Second Year B. Tech. (Civil Engineering)
Semester – IV

Second Year Civil Engineering (Regulations 2025) (With effect from Academic Year 2026-27)																
Semester IV (Credits = 22)																
Course Code	Course Name	Credit Scheme				Teaching Scheme (Hours/Week)			Evaluation Scheme and Marks							
									Continuous Assessment			Semester End Assessment				
		L	T	P	Total	L	T	P	Term Test 1 (TT1)	Term Test 2 (TT2)	Internal Assessment	SEE	TW	PR/ OR	Total	
T25BSA251	Structural Analysis	3	-	-	3	3	-	-	15	15	10	60	-	-	100	
T25BCT252	Concrete Technology	3	-	-	3	3	-	-	15	15	10	60	-	-	100	
T25BCT252L	Concrete Technology Lab	-	-	1	1	-	-	2	-	-	-	-	25	25	50	
T25BSV253	Surveying	3	-	-	3	3	-	-	15	15	10	60	-	-	100	
T25BSV253L	Surveying Lab	-	-	1	1	-	-	2	-	-	-	-	25	25	50	
T25BED254	Entrepreneurship Development	2	-	-	2	2	-	-	15	15	10	60	-	-	100	
T25BBR255	Basic Human Right	2	-	-	2	2	-	-	15	15	10	60	-	-	100	
T25BML256	Modern Indian Languages Marathi (मराठी)	1	-	-	1	1	-	-	-	-	-	-	25	-	25	
T25BGE257L	Geological Engineering Lab	-	-	1	1	-	-	2	-	-	-	-	25	25	50	
T25BCP258L	Community Engineering Project / Field Project	-	-	2	2	0	-	2	-	-	-	-	50	50	100	
T25BEE259	Introduction to Environmental Engineering	3	-	-	3	3	-	-	15	15	10	60	-	-	100	
Total		**17**	**0**	**5**	**22**	**17**	**0**	**08**	**80**	**80**	**40**	**300**	**150**	**125**	**875**	

L-Lecture, **P**-Practical, **T**-Tutorial, **TT1**–Term Test 1, **TT2**-Term Test 2, **SEE** –Semester End Examination, **TW**-Term Work, **PR**-Practical, **OR**-Oral.

Internal Assessment: Assignment/Group Discussion/Course Project/Quiz/Presentation/Any Other.

Second Year B. Tech. (Civil Engineering)
Semester – III

Second Year Civil Engineering (Regulations 2025) (With effect from Academic Year 2026-27) Semester III (Credits = 22)																
Course Code	**Course Name**	**Credit Scheme**				**Teaching Scheme (Hours/Week)**			**Evaluation Scheme and Marks**							
									Continuous Assessment			**Semester End Assessment**			**Total**
		L	**T**	**P**	**Total**	**L**	**T**	**P**	**Term Test 1 (TT1)**	**Term Test 2 (TT2)**	**Internal Assessment**	**SEE**	**TW**	**PR/ OR**	
T25BEM201	Engineering Mathematics-III	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25BEM201T	Engineering Mathematics-III Tutorial	-	1	-	1	-	1	-	-	-	25	-	-	-	25
T25BSM202	Strength of Materials	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25BSM202L	Strength of Materials Lab	-	-	1	1	-	-	2	-	-	-	-	25	25	50
T25BFM203	Fluid Mechanics	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25BFM203L	Fluid Mechanics lab	-	-	1	1	-	-	2	-	-	-	-	25	25	50
T25BAP204	Architectural Planning and Design of Buildings	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25BAP204L	Architectural Planning and Design of Buildings Lab	-	-	1	1	-	-	2	-	-	-	-	25	25	50
T25BED205	Employability Skill Development	2	-	-	2	2	-	-	15	15	10	60	-	-	100
T25BUH206	Universal Human Value -II	2	-	-	2	2	-	-	15	15	10	60	-	-	100
T25BAC207L	AutoCAD Lab	-	-	2	2	-	-	4	-	-	-	-	50	50	100
Total		**16**	**01**	**05**	**22**	**16**	**01**	**10**	**90**	**90**	**85**	**360**	**125**	**125**	**875**

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Program:	**Civil & Mechanical Engineering**					**Semester: III**		
Course:	**Engineering Mathematics -III**					**Code: T25BEM201**		
Credit	**Teaching Scheme (Hrs./Week)**			**Evaluation Scheme and Marks**				
	Lecture	**Practical**	**Tutorial**			**Assignment /Quiz/ Oral**	**ESE**	**Total**
				TT1	**TT2**			
4	**3**	**-**	**1**	**15**	**15**	**10**	**60**	**100**

Prior knowledge of Engineering Mathematics –I, Engineering Mathematics -II

Course Objectives:

This course aims to enable students to:

1. **Apply** matrix algebra techniques to solve engineering problems.
2. **Analyze and compute** Fourier series representations of periodic functions over various intervals.
3. **Solve** partial differential equations arising in real-world engineering applications.
4. **Understand and apply** concepts of complex variables, including limits, continuity, differentiation, integration, and complex integrals.
5. **Apply** Laplace and inverse Laplace transforms to solve linear and simultaneous differential equations with constant coefficients.

Course Outcomes:

After successful completion of the course, the students will be able to:

CO1: Apply matrix theory concepts, including Cayley–Hamilton theorem, eigenvalues and eigenvectors, matrix diagonalization, to solve engineering problems.

CO2: Compute Fourier series representations of periodic functions over different intervals.

CO3: Solve partial differential equations that model real-world engineering problems.

CO4: Apply concepts of analytic functions, Cauchy–Riemann equations, harmonic functions, and Cauchy's integral theorem along with residue techniques to evaluate complex integrals

CO5: Apply Laplace and inverse Laplace transform techniques to solve linear and simultaneous Differential equations with constant coefficients.

Detailed Syllabus

Unit	**Description**	**Duration (H)**
I	**Linear Algebra** 1.1 Cayley-Hamilton theorem (without proof) & it's applications 1.2 Eigen values and Eigen vectors, 1.3 Similar matrices, diagonalizable of matrix & it's applications.	7
II	**Fourier Series** 2.1 Introductory remarks- Euler's formulae ; Conditions for Fourier series expansion – Dirichlet's conditions , 2.2 Fourier expansion over the interval $(c, c+2l)$,	6

	2.3 Fourier expansion of odd and even functions , 2.4 Half-range series.	
III	**Partial Differential Equation** 3.1 Introduction to Partial differential equation- Solution of Partial differential equation using variable separable method 3.2 One dimensional wave equation & Two dimensional wave Equation at steady state. 3.3, One dimensional Heat flow Equation & Two dimensional Heat flow Equation at steady state. 3.4 Numerical Solution of Partial differential equation using Bender Schmidt Formula & Crank Nicholson Simplified Formula.	8
IV	**Functions of Complex Variable** 4.1 Analytic functions; Cauchy- Riemann equations 4.2 Harmonic functions in Cartesian form 4.3 Cauchy's integral theorem; Cauchy's integral formula, 4.4 Residues; Cauchy's residue theorem (All theorems without proofs).	8
V	**Laplace Transform** 5.1 Definition – conditions for existence; Transforms of elementary functions 5.2 Properties of Laplace transforms - Linearity property, first shifting property, second shifting property, transforms of functions multiplied by t^n ,scale change property, transforms of functions divided by t, transforms of integral of functions, transforms of derivatives; Evaluation of integrals by using Laplace transform; 5.3 Introductory remarks; Inverse transforms of some elementary functions; General methods of finding inverse transforms; 5.4 Convolution Theorem for finding inverse Laplace transforms; 5.5 Applications to find the solutions of linear differential equations with constant coefficients.	11
Total		**40**

Text Books:

1. Linear Algebra and its Applications by David C. Lay, Pearson Third Edition
2. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.

Reference Books:

1. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York.
2. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.
3. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
4. A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pte Ltd., Singapore.
5. A Text Book of Engineering Mathematics by N. P. Bali, Dr. Manish Goyal, Laxmi Publication Ltd, New Delhi

Program:	**Civil & Mechanical Engineering**			**Semester: III**	
Course:	**Engineering Mathematics -III**			**Code: T25BEM201T**	
Credit	**Teaching Scheme (Hrs./Week)**			**Evaluation Scheme and Marks**	
	Theory	**Practical**	**Tutorial**	**Term work**	**Total**
1	**-**	**-**	**1**	**25**	**25**

List of Suggested Tutorials

(Minimum 13 tutorial should be considered for term work submission)

1. Cayley-Hamilton theorem
2. Eigen values and Eigen vectors
3. Diagonalization of Matrix
4. Fourier Series in $(c, c + 2l)$
5. Fourier Series of odd and even functions
6. Half Range Series
7. Formation of Partial differential equations
8. Lagrange's linear equations
9. Numerical Solution of PDE
10. Analytic Functions
11. Cauchy's Integral Theorem
12. Residue
13. Properties of Laplace Transform
14. Evaluation of integral using LT
15. Inverse Laplace Transform

Program	**B.Tech. (Civil Engineering)**			**Semester - III**				
Course	**Strength of Materials**			**Code: T25BSM202**				
Credit	**Teaching Scheme(Hrs./Week)**			**Evaluation Scheme and Marks**				
	Lecture	**Practical**	**Tutorial**	**SEE (60 Marks)**	**Continuous Assessment (40 Marks)**			**Total**
					TT1	**TT2**	**Internal Assessment**	
03	**03**	**0**	**0**		**15**	**15**	**10**	**100**

Course Objectives:

This course aims to enable students to:

1. Analyse the concepts of shear force and bending moment in statically determinate beams and their applications.
2. Analyse the behaviour of materials under different types of stresses and strains and understand their elastic properties.
3. Compute bending and shear stresses in beams and derive stress distributions across various cross-sections.
4. Determine principal stresses, torsional stresses, and strains in shafts and structural members.
5. Calculate slopes and deflections in beams using various analytical methods.

Course Outcomes:
On the completion of the course students will be able to:

CO 1: Analyze and draw shear force and bending moment diagrams for statically determinate beams under various loading conditions.
CO 2: Analyze stresses and strains in materials subjected to axial loads and understand elastic moduli relationships.
CO 3: Compute bending and shear stresses in beams and evaluate their stress distributions for various cross-sections.
CO 4: Determine principal stresses, planes, and analyze torsional stresses in shafts using equations and graphical methods.
CO 5: Calculate slopes and deflections of beams using double integration, moment area, and conjugate beam methods.

Detailed Syllabus

Module	**Description**	**Duration (Hrs)**	**CO**	**BL**
I	**Shear Force and Bending Moment:** Bending Moment (BM) and Shear Force (SF) diagrams for statically determinate beams with or without overhangs for different types of loadings, point of contra flexure under various types of loadings.	9	CO1	L4

II	**Simple Stresses and Strains:** Concept of stress and strain, elasticity and plasticity, types of stresses and strains, Hooke's law, Stress-Strain diagram for mild steel, Poisson's ratio and volumetric strain, different moduli (E, G, & K) and their relationship, composite bars, temperature stresses.	8	CO2	L4
III	**Flexural Stresses and Shear Stresses:** **Flexural Stresses:** Theory of simple bending, assumptions, derivation of bending equation, determination of bending stresses, Section modulus of rectangular and circular sections (Solid and Hollow) **Shear Stresses:** Derivation, shear stress distribution across various beam sections like rectangular, circular, triangular, I-section, T-section, angle sections.	7	CO3	L3
IV	**Principal Stresses** **Principal Stresses:** Concept of principal stresses and planes, normal and tangential stress on any oblique plane, determination of principal stresses and principal planes, Mohr's circle method.	5	CO4	L3
V	**Slope and deflection:** Concept and application of Macaulay's method, double integration method, moment area method, and Conjugate beam method to calculate slope and deflections of beams.	10	CO5	L3
	Total	39		

Text Books:

1. Bansal, R.K. (2018). *Strength of Materials*. 6th Edition. Laxmi Publications.
2. Khurmi, R.S., & Gupta, J.K. (2008). Strength of Materials (Mechanics of Solids). S. Chand Publishing.
3. Rajput, R.K. (2015). Strength of Materials. 6th Edition. S. Chand Publishing.

Reference Books:

1. Timoshenko, S., & Young, D. H. (1962). Elements of Strength of Materials (4th Edition). Van Nostrand, New York, USA.
2. Ramamrutham, S. (2017). Strength of Materials and Theory of Structures. Dhanpat Rai Publishing Company.
3. Hibbeler, R. C. (2004). Mechanics of Materials (6th Edition). Pearson Prentice Hall, East Rutherford, NJ.
4. Crandall, S. H., Dahl, N. C., & Lardner, T. J. (1978). An Introduction to the Mechanics of Solids (2nd Edition). McGraw Hill, New York, NY.

Program : B.Tech. (Civil Engineering)				**Semester - III**	
Course: Strength of Materials Lab				**Code: T25BSM202L**	
Teaching Scheme (Hrs Per Week)				**Evaluation Scheme (Marks & Weightage)**	
Lecture	**Practical**	**Tutorial**	**Credit**	**End Sem. Exam (25 Marks)**	**Internal Continuous Assessment (ICA) (25 Marks)**
0	**2**	**0**	**1**		

Course Objectives:

This course aims at enabling students:

1. To enable students to understand and perform material testing procedures for evaluating mechanical properties like tensile strength, shear strength, impact resistance, and torsion.
2. To familiarize students with experimental methods for measuring stresses, strains, deflections, and principal stresses in different materials under various loading conditions.
3. To provide hands-on experience with laboratory equipment and develop the ability to analyze and interpret experimental data effectively.

Course Outcomes: On the completion of the course students will be able to:

CO 1: Perform standard mechanical tests (tensile, shear, torsion, and impact tests) on materials and interpret the results

CO 2: Analyze experimental data to evaluate stress, strain, and deformation of materials under different loading conditions and present the findings graphically

CO 3: Measure deflections and determine stress distributions in beams and other structural members using experimental techniques

List of Experiments

Term work shall consist of performing following experimental from the list below.

1. Tensile test on mild steel.
2. Shear Test on mild steel.
3. Torsion test on mild steel.
4. Compression test on concrete
5. To determine impact strength of steel by Izod test
6. To determine impact strength of steel by Charpy test
7. Measurement of strain in a bar
8. Bending test on timber
9. Graphical solution method for principal stress problems
10. Measurement of deflections in statically determinate beam

Program	**B.Tech. (Civil Engineering)**				**Semester -III**			
Course	**Fluid Mechanics**				**Code: T25BFM203**			
Credit	**Teaching Scheme(Hrs./Week)**			**Evaluation Scheme and Marks**				
	Lecture	**Practical**	**Tutorial**	**SEE (60 Marks)**	**Continuous Assessment (40 Marks))**			**Total**
					TT 1	**TT2**	**Internal Assessment**	**100**
3	**3**	**0**	**0**		15	15	10	

Course Objectives:

This course aims to enable students:

1. To develop understanding of fundamental fluid properties and pressure measurement techniques.
2. To enable students to analyse hydrostatic forces on surfaces and understand buoyancy and stability of floating bodies.
3. To equip students with the ability to apply principles of fluid kinematics for determining flow characteristics.
4. To develop problem-solving skills using fluid dynamics principles such as Bernoulli's equation and momentum equation.
5. To provide knowledge to evaluate pipe flow behaviour, head losses, and boundary layer concepts in fluid flow.

Course Outcomes:
On the completion of the course students will be able to:
CO1: Explain fluid properties and pressure measurement concepts.
CO2: Analyze hydrostatic forces and buoyancy effects.
CO3: Apply fluid kinematics principles to determine flow characteristics.
CO4: Apply fluid dynamics principles to solve engineering problems.
CO5: Evaluate pipe flow and boundary layer behaviour.

Detailed Syllabus

Module	**Description**	**Duration (Hrs)**	**CO**	**BL**
I	**Introduction & Properties of Fluid** Definition of fluid, continuum concept, Units and dimensions, Physical properties: density, specific weight, specific gravity, viscosity (Newton's law), Variation of viscosity with temperature, Newtonian & Non-Newtonian fluids, Surface tension and capillarity, Vapour pressure and cavitation, Fluid pressure: pressure at a point, Pascal's law, Pressure measurement: simple & differential manometers	8	1	2

II	**Fluid Statics** Hydrostatic forces on plane surfaces (horizontal, vertical, inclined), Centre of pressure, Hydrostatic forces on curved surfaces, Buoyancy: Archimedes' principle, Stability of floating bodies, Metacentric height, Conditions of equilibrium	7	2	3
III	**Fluid Kinematics** Types of flow: steady/unsteady, uniform/non-uniform, laminar/turbulent, Compressible & incompressible flow, Flow visualization: streamline, pathline, streakline, Continuity equation (1D & applications), Velocity potential and stream function (Concept only)	8	3	3
IV	**Fluid Dynamics** Euler's equation of motion, Assumptions, Bernoulli's Equation, Assumptions, Applications of Bernoulli's Equation, Venturimeter, Orifice meter, Pitot tube, Orifices and mouthpieces (basic concept), Momentum Equation	7	4	3
V	**Laminar & Turbulent Flow** Reynolds experiment, Reynolds number, Laminar and turbulent flow characteristics, Hagen–Poiseuille equation, Darcy–Weisbach equation, Major and minor losses, Hydraulic and energy grade lines Boundary Layer Theory (Concept only) - Boundary layer development over flat plate, Boundary layer thickness, Displacement and momentum thickness, Laminar and turbulent boundary layer, Boundary layer separation and control	9	5	3
	Total	39		

Text Books:

1. P M Modi and S M Seth, Hydraulics and Fluid Mechanics, 22nd Edition, Standard Book House, 2019.
2. K. Subramanya, Theory and Applications of Fluid Mechanics, 2nd Edition, Tata McGraw Hill, 2018
3. Bansal R. K., 1989, "Fluid Mechanics", Laxmi publication Delhi

Reference Books:

1. R.L. Daugherty, J.B. Franzini and E. J. Finnemore, Fluid Mechanics with Engineering Applications, International Student Edition, Mc Graw Hill, 2017.
2. Victor L. Streeter, E. Benjamin Wylie, Fluid mechanics, 9th Edition, McGraw Hill, 2017

Program: B.Tech. (Civil Engineering)				**Semester - III**	
Course: Fluid Mechanics lab				**Code: T25BFM203L**	
Teaching Scheme (Hrs Per Week)				**Evaluation Scheme (Marks & Weightage)**	
Lecture	**Practical**	**Tutorial**	**Credit**	**End Sem. Exam (25 Marks)**	**Internal Continuous Assessment (ICA) (25 Marks)**
0	**2**	**0**	**1**		

Course Objectives:
This course aims to enable students :

1. To provide practical exposure to fundamental principles of fluid mechanics.
2. To develop skills in conducting experiments and interpreting experimental data.
3. To verify theoretical concepts through laboratory investigations.
4. To familiarize students with hydraulic equipment and measuring devices.

Course Outcomes:

After learning the course, the students will be able to:

CO1: Measure fluid properties and pressure using appropriate experimental setups.
CO2: Determine hydrostatic forces and analyze buoyancy characteristics experimentally.
CO3: Evaluate flow parameters using flow measuring devices and verify Bernoulli's principle.
CO4: Determine head losses in pipes and analyze laminar and turbulent flow behavior.

Detailed Syllabus

Practical Work consists of at least eight performances from list below and detailed reporting in form of journal. Practical examination shall be based on above.

1) Measurement of Viscosity of various fluids
2) Demonstration of working of different types of valves and pipe fittings
3) Measurement of pressure Piezometer, manometers, Pressure gauges
4) Measurement of discharge - Calibration of measuring tank
5) Verification of Bernoulli's Theorem
6) Determination of metacentric height.
7) Calibration of an orifice / mouthpiece / venturimeter / orifice meter
8) Study of factors affecting coefficient of friction for pipe flow
9) Determination of loss of head due to Pipe Fittings
10) Numerical Assignment -1
11) Numerical Assignment -2
12) Numerical Assignment - 3

Program	**B.Tech. (Civil Engineering)**			**Semester -III**				
Course	**Architectural Planning and Design of Buildings**			**Code: T25BAP204**				
Credit	**Teaching Scheme(Hrs./Week)**			**Evaluation Scheme and Marks**				
	Lecture	**Practical**	**Tutorial**	**SEE (60 Marks)**	**Continuous Assessment (40 Marks)**			**Total**
					TT1	**TT2**	**Internal Assessment**	
03	**03**	**00**	**0**		**15**	**15**	**10**	**100**

Course Objectives:

This course aims to enable students to :

1. Apply principles of planning, drawing conventions, anthropometrics, spatial organization, and regulatory codes.
2. Impart knowledge of bye-laws, area calculations, and building classification.
3. Provide understanding of ventilation, air conditioning, plumbing, and acoustics.
4. Develop skills in planning and rendering residential buildings and perspectives.
5. Develop ability to plan dimensioned line plans for public buildings.

Course Outcomes:

After learning the course, the students will be able to:

CO1: Apply principles of planning, drawing conventions, anthropometrics, spatial organization, and regulatory codes in building design.
CO2: Analyze and apply bye-laws, area calculations, and occupancy-based classifications for site planning and built form.
CO3: Identify and integrate ventilation, air conditioning, plumbing, and acoustics for occupant comfort and functional efficiency.
CO4: Develop architectural drawings and perspectives for residential building types using appropriate structural systems.
CO5: Analyze functional requirements and prepare dimensioned line plans for various public building types.

Detailed Syllabus

Module	**Description**	**Duration (Hrs)**	**BL**	**CO**
I	**Principles and Codes of Practices for Planning and Designing of Buildings** a) Architectural and building drawings: Principles of building planning, significance sun diagram, wind diagram sizes , layout, scales, projection, line work of drawings, Introduction about submission drawing and types of working drawings. b) Architectural Graphics: Anthropometrics; Organization of space; Circulation- horizontal and vertical; Codes, Standards ,Bye-Laws and Acts	07	2	CO1
II	**Study of Building byelaws, Types of building** a) Study of building Byelaws- Necessity, plot sizes, road width, open spaces, floor area ratio (F.A.R.), marginal distances, building line, control line, height regulation, room sizes, types of area calculations – built-up area, floor area, carpet area, Rules for ventilation, lighting, drainage,	08	4	CO2

	sanitation and parking of vehicles Study of sun path diagram, wind rose diagram, sun shading devices. b) Types of building as per occupancy, structure, height etc.			
III	**Building Services** a) Ventilation- Necessity of Ventilation, Natural ventilation, stack effect and wind effect, Mechanical ventilation and its types. b) Air Conditioning Systems- Classification, object and necessity of air conditioning. c) Plumbing- One pipe and Two pipe system, Water storage and disposal arrangement, septic tank, Plumbing systems, and various types of traps, Fixtures and Fittings. d) Noise and Acoustics- Sound insulation, Acoustical defects, Reverberation time, Sabine's formula, sound absorbents, planning for good acoustics.	08	3	CO3
IV	**Planning of Residential Building** a) Development of ground floor plan, elevation, sections, site plan, layout plan and schedule of openings of residential buildings such as – (i) Bungalows, (ii) Row houses, (iii) Apartments using Load bearing / Framed Structure. b) Perspective Drawings– One point and Two-point perspective of an object and simple Residential building.	08	4	CO4
V	**Planning of Public Building** Functional requirements and planning of industrial buildings, commercial buildings, Educational Building (School, Colleges), Hostel, Library building, Restaurant/ Hotel building, Primary Health Center/ Hospital, Shopping complex, Community/marriage halls, post offices, banks. Two dimensioned line plans of above public buildings.	08	4	CO5
	Total	39		

Text Books:

1. Shah M.G., Kale C.M. and Patki S.Y., "Building drawing an Integrated approach to Built environment", Tata McGraw Hill (Fifth edition)

2. Building Planning & Drawing by Dr. N. KumaraSwamy, A. Kameswara Rao, 7th edition, Charotar Publishing House.

3. Y.S.Sane, "Planning and Designing Buildings", Engineering Book Publishing Co., Pune – 16, Edition 1996

4. S.P.Arora and S.P. Bindra, "A Text Book of Building Construction", Dhanpat Rai& Sons, Delhi, Edition 1996

Reference Books:

1. National Building Code of India 2005, Bureau of Indian Standard, New Delhi.

2. Dr. B.C. Punmia, "Building Construction" Laxmi Publications Pvt. Ltd., New Delhi, Edition, 1998

3. I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings.

4. Building science and planning by Dr. S. V. Deodhar, Khanna Publishers.

5. A Course in Civil Engineering Drawing", by V. B. Sikka, S. K.Kataria & Sons.

Program : B.Tech. (Civil Engineering)				**Semester -III**	
Course: Architectural Planning and Design of Buildings Lab				**Code: T25BAP204L**	
Teaching Scheme (Hrs Per Week)				**Evaluation Scheme (Marks & Weightage)**	
Lecture	**Practical**	**Tutorial**	**Credit**	**End Sem. Exam (25 Marks)**	**Internal Continuous Assessment (ICA) (25 Marks)**
0	**2**	**0**	**1**		

Course Objectives:

This course aims at enabling students:

1. To develop basic planning skills, and design residential /public buildings/commercial buildings on paper.
2. To draw elevation, section and aesthetics of proposed building by perspective view.
3. Students will able to prepare working and submission drawing of a building.

Course Outcomes:

On the completion of the course students will be able to:

CO1: Understand different scales of drawings

CO2: Plan residential and public buildings according occupant's requirements

CO3: Prepare working and submission drawing of residential and public buildings.

CO4: Draw one and two-point perspective view of object and building.

Detailed Syllabus Content:

Term work shall consist of detailed report of in form of set of drawings mentioned below.

A) Group A- Planning of Residential Building -

Planning of a small residential buildings/bungalow/duplex from given data (load bearing or framed structure).

1. Draw different floor detailed plans with furniture arrangement.
2. Draw front elevation, sections (preferably through staircase).
3. Site plan, built up area calculations.
4. Schedules of area and openings.

B) Group B- Planning of Public Building -

Minimum G+1: Full set of drawings for

1. Typical floor plans- Draw all details units of each floor.
2. Front and Road side elevations- Draw all detail elevation with elegance.
3. Sections- Draw section through staircase and toilet with all constructional details.
4. Foundation Plan- Draw all foundation details.
5. Layout plan and site plan project building.
6. Layout plan showing water supply and drainage arrangements –Draw plan showing water supply line from municipal connection to various required tap connections within project building.
7. Project report giving details of Drainage System, Water Supply System, Water Tank, and Septic Tank Design of terrace Drainage System
8. Visit report- Report regarding visit of any advanced building construction site with photos/drawings etc.

Program:	**B. Tech. (Civil Engineering)**				**Semester: III**	
Course:	**Employability Skill Development**				**Code: T25BED205**	
Credits	**Teaching Scheme (Hrs./Week)**			**Evaluation Scheme and Marks**		
	Lecture	**Practical**	**Tutorial**	**ISE**	**SEE**	**Total**
02	**02**	**-**	**-**	**40**	**60**	**100**

Pre-requisite: Effective Communication Skills

Course Objectives:

This course aims at enabling students:

1. To develop their soft skills and professional communication abilities required for effective interaction in academic, workplace, and societal environments.
2. To familiarize students with the principles, processes, and ethical dimensions of business communication and enable them to communicate effectively through presentations, negotiations, persuasion, and cross-cultural interactions in professional environments.
3. **To** enhance quantitative aptitude, logical reasoning, and verbal ability necessary for solving analytical and placement-oriented problems.
4. **To** strengthen proficiency in written English by improving grammar, comprehension, and professional writing skills.
5. **To** prepare students for employment selection processes by developing interview skills, group discussion competence, active listening, and non-verbal communication.

Course Outcomes:

After learning the course, the students will be able to:

CO1: Demonstrate effective use of soft skills and professional communication techniques to develop resumes, cover letters, presentations, and technical documents for employability.

CO2: Apply business communication principles to plan and deliver effective professional presentations and persuasive interactions in organizational contexts.

CO3: Utilize arithmetic, quantitative, logical reasoning, and verbal aptitude techniques to solve aptitude and analytical reasoning problems efficiently.

CO4: Employ grammatical rules and comprehension strategies to construct, transform, summarize, and convey ideas through clear and professional written English.

CO5: Practice interview, group discussion and non-verbal communication skills to perform effectively in professional selection and workplace interactions.

Detailed Syllabus

Unit	**Description**	**Duration (Hrs)**
I	**Soft Skills & Communication basics:** Soft skills Vs hard skills, Skills to master, Interdisciplinary relevance, Global and national perspectives on soft skills, Resume, Curriculum vitae, How to develop an impressive resume, Different formats of resume Chronological, Functional, Hybrid, Job application or cover letter.	5
II	**Fundamentals of Business Communication** Meaning and scope of Business Communication, Process and models of communication, Barriers to communication and strategies to overcome	6

	them, Ethics in business communication, Cross-cultural communication basics Professional presentation- planning, preparing and delivering presentations. Negotiation and persuasion basics	
III	**Arithmetic and Mathematical Reasoning and Analytical Reasoning and Quantitative Ability:** Aspects of intelligence: multiple intelligence theory, Number sequence test, mental arithmetic (square and square root, LCM and HCF, speed calculation, reminder theorem). Matching, Selection, Arrangement, Verifications (Exercises on each of these types). Verbal aptitude (Synonym, Antonym, Analogy).	5
IV	**Grammar and Comprehension:** English sentences and phrases, Analysis of complex sentences, Transformation of sentences, Paragraph writing, Story writing, Reproduction of a story, Letter writing, précis writing, Paraphrasing and e-mail writing.	5
V	**Skills for interviews:** Interviews- types of interviews, preparatory steps for job interviews, interview skill tips Group discussion- importance of group discussion, types of group discussion, difference between group discussion, panel discussion and debate, personality traits evaluated in group discussions, tips for successful participation in group discussion Non-verbal communication-body movement, physical appearance, verbal sounds, closeness, time.	5
Total		**26**

Textbooks:

1. R. Gajendra Singh Chauhan, Sangeeta Sharma, ―Soft Skills- An integrated approach to maximize personality‖, ISBN: 987-81-265-5639-7, First Edition 2016

Reference Books:

1. **Bovee, Courtland L. & Thill, John V.** *Business Communication Today.* Pearson Education, India
2. R. S. Aggarwal, "A modern approach to verbal reasoning", S. Chand publications.
3. Dr. Nilam Panchal, B.K. “Entrepreneurship Development” School of Business Management
4. Philip Carter, "The Complete Book of Intelligence Test", John Willey & Sons Ltd.
5. Philip Carter, Ken Russell, "Succeed at IQ test", Kogan Page.
6. Eugene Ehrlich, Daniel Murphy, “Schaum's Outline of English Grammar”, McGraw Hills.
7. David F. Beer, David A. McMurrey, ―A Guide to Writing as an Engineer, Wile
8. Wiley Wren and Martin, "English Grammar and Composition", S. Chand publications.

e-sources:

1. NPTEL: Employment Communication A Lab based course, Prof. Seema Singh, IIT Kharagpur.

Program:	**B.Tech. (Civil Engineering)**				**Semester:III**	
Course:	**Universal Human Value -II**				**Code: T25BUH206**	
Credits	**Teaching Scheme (Hrs./Week)**			**Evaluation Scheme and Marks**		
	Lecture	**Practical**	**Tutorial**	**ISE**	**SEE**	**Total**
2	**2**	**0**	**0**	**40**	**60**	**100**

Prerequisites: Indian Knowledge System (IKS), IPDC

Course Objectives:

This course aims at enabling students:

1. Understand the need, purpose, and process of value education, and explore the concepts of happiness, prosperity, and self-exploration.
2. Develop clarity about the human being as a coexistence of the self and the body and understand harmony within oneself.
3. Appreciate harmony in the family, society, and nature, leading to responsible and value-based human relationships.
4. Recognize the interconnectedness and holistic nature of existence, enabling sustainable and ethical living.
5. Apply holistic understanding to professional ethics, developing competence for value-based decisions and practices in personal and professional life.

Course Outcomes:

After learning the course, the students will be able to:

CO1: Explain the concepts of value education, self-exploration, happiness, prosperity, and methods to fulfil human aspirations.

CO2: Differentiate between the needs of the self and the body and demonstrate understanding of harmony within self and with the body

CO3: Analyze family and societal relationships based on trust and respect, contributing to harmonious living

CO4: Interpret harmony in nature and existence through the principles of interconnectedness, mutual fulfilment, and coexistence.

CO5: Exhibit ethical behavior and apply holistic human values in professional situations, supporting sustainable and humanistic practices

Detailed Syllabus

Unit	**Description**	**Duration (H)**
I	**Introduction to Value Education** Understanding Value Education, Self-exploration as the process for value education, Continuous happiness and prosperity as basic human aspirations, Right understanding, relationship, and physical facility, Happiness and prosperity: current scenario Methods to fulfill basic human aspirations	5

II	**Harmony in the Human Being** Human being as coexistence of the self and the body, needs of the self vs needs of the body, Body as an instrument of the self, Harmony in the self, Harmony of the self with the body, Programmed for self-regulation and health	5
III	**Harmony in the Family and Society** Family as the basic unit of human interaction, Values in human-to-human relationship, Trust as the foundational value, Respect as right evaluation, Harmony in society Vision of universal human order	5
IV	**Harmony in Nature (Existence)** Understanding harmony in nature, Interconnectedness, self-regulation, and mutual fulfilment, Four orders of nature, Existence as coexistence at all levels, Holistic perception of harmony in existence	5
V	**Implications of Holistic Understanding – Professional Ethics** Natural acceptance of human values, Definitiveness of ethical human conduct, Humanistic education and universal human order, Competence in professional ethics, Holistic technologies and production systems, Management models and case studies, Transition strategies towards value-based life and profession	6
Total		**26**

Textbooks:

1. Human Values and Professional Ethics R.R. Gaur, R. Sangal, G. Bagaria
2. A Foundation Course in Human Values and Professional Ethics R.R. Gaur, R. Sangal, G. Bagaria

Reference Books:

1. **Education for Human Values - From Personal to Global. R. Ramesh**
2. Professional Ethics. Mike Martin & Roland Schinzinger
3. Ethics in Engineering. Charles B. Fleddermann
4. Universal Human Values. Sharma, Kuldeep S. & Sachdeva, Sarveen Kaur. Booksclinic Publishing, 2023
5. Universal Human Values: Navigating Ethics and the Environment. Acharya, Debidutta & Nanda, Amitabh. S. Chand Publishing. 2025
6. Universal Human Values: A Global Perspective on Shared Principles and Ethics. Dr.Narayan R. Chandak & Adv. Jyotsna N.

e-sources: NPTEL/SWAYAM Course (if any)

1. Exploring Human Values: Visions of Happiness & Perfect Society http://nptel.ac.in/courses/109104068
2. https://uhv.org.in/UHV-II_Course_Material

Program: B.Tech. (Civil Engineering)				**Semester -III**		
Course: AutoCAD Lab				**Code: T25BAC207L**		
Teaching Scheme (Hours per Week)				**Evaluation Scheme (Marks & Weightage)**		
Lecture	**Practical**	**Tutorial**	**Credit**	**SEE (50 Marks)**	**Internal Continuous Assessment (ICA) (50 Marks)**	**Total (100 Marks)**
0	**4**	**0**	**2**			

Course Objectives:

This course aims at enabling students:

1. To develop basic and advanced skills in AutoCAD drafting required for civil engineering drawings.
2. To enable students to prepare 2D and basic 3D drawings related to building planning, structural detailing, and infrastructure works.
3. To train students in using layers, annotation, dimensioning, plotting, and standards for producing professional engineering drawings.

Course Outcomes:

After successful completion of the course, students will be able to:

CO1: Create and modify accurate 2D civil engineering drawings using AutoCAD tools and commands.

CO2: Prepare standard civil engineering drawings with proper layers, dimensioning, hatching, annotation, blocks, and plotting methods.

CO3: Draft and present building plans, structural drawings, and basic 3D models suitable for civil engineering applications.

Detailed Syllabus

Module	**Description**	**Duration (Hrs)**	**CO**
I	**Introduction to AutoCAD and Basic Drafting Tools** Introduction to CAD and its applications in civil engineering. AutoCAD interface, workspace, coordinate system (absolute, relative, polar), units and limits. Drawing setup and templates. Basic drawing commands: line, polyline, circle, arc, rectangle, polygon, ellipse. Object selection methods. Editing commands: erase, move, copy, rotate, mirror, offset, trim, extend, fillet, chamfer, stretch, scale. Object snaps (OSNAP), grid, snap, ortho mode.	10	1
II	**Precision Drawing and Civil Drafting Standards** Advanced drawing techniques using construction lines and reference geometry. Use of layers, layer properties, color coding, linetypes, lineweights, and layer standards. Drawing properties and object management. Annotation tools: text styles, single-line and multi-line text, leaders, multileaders. Dimensioning tools: linear, aligned, angular, radius, diameter, ordinate dimensions. Dimension styles and	10	1,2

	tolerances. Civil drawing standards and layout preparation.		
III	**Hatching, Blocks, and Drafting of Building Plan** Hatching and gradient commands for materials representation (brickwork, concrete, earthwork). Area and volume calculation tools. Creating and using blocks, dynamic blocks, attributes and attribute extraction. Use of groups and external references (XREF). Drafting of building drawings: centerline, wall layout, door-window blocks, staircase, and flooring. Preparation of building plan, elevation and section for a residential building as per standard practices.	08	1,2,3
IV	**Structural and Infrastructure Drawing Applications** layout, beam layout, slab detailing, reinforcement representation (basic). Drawing of RCC details like isolated footing, combined footing, beam-column joint, stair reinforcement detailing. Drafting of road cross-section, longitudinal section, typical pavement layer details, culvert drawing basics. Introduction to contour drawing and simple site plan preparation.	10	2,3
V	**Plotting, Sheet Preparation and Basic 3D Modelling** Paper space and model space concept. Layout setup, title block preparation, viewports, scaling, and plotting standards. Plot styles (CTB/STB), printer setup, exporting PDF and CAD files. Drawing management and file formats. Introduction to isometric drawings. Basic 3D modeling commands: extrusion, revolve, sweep, union, subtract, and 3D orbit. Preparation of simple 3D building model and presentation. Final drawing compilation and project-based drafting practice.	14	2,3
	Total	52	

Text Books:

1. Omura, G., & Benton, B. C. (2023). Mastering AutoCAD 2024 and AutoCAD LT 2024. Sybex (Wiley).
2. Madsen, D. A., & Madsen, D. P. (2016). AutoCAD and its applications: Comprehensive. Goodheart-Willcox.
3. Madsen, D. A., Madsen, D. P., & Shumaker, D. (2023). Engineering drawing and design. Cengage Learning.
4. Bethune, J. D. (2021). Engineering graphics with AutoCAD 2022. Pearson.
5. Leach, J., & Lockhart, S. (2023). AutoCAD 2024 instructor. SDC Publications.
6. Madsen, D. A., & Madsen, D. P. (2023). Problem solving with AutoCAD 2024. SDC Publications.
7. Luedtke, J. M. (2015). Architectural drafting and design. Pearson.
8. Ambrosius, L. (2020). AutoCAD: Professional tips and techniques. Wiley.

Second Year B. Tech. (Civil Engineering)
Semester – IV

Second Year Civil Engineering (Regulations 2025) (With effect from Academic Year 2026-27) Semester IV (Credits = 22)																
Course Code	**Course Name**	**Credit Scheme**				**Teaching Scheme (Hours/Week)**			**Evaluation Scheme and Marks**							
									Continuous Assessment			**Semester End Assessment**			**Total**
		L	**T**	**P**	**Total**	**L**	**T**	**P**	**Term Test 1 (TT1)**	**Term Test 2 (TT2)**	**Internal Assessment**	**SEE**	**TW**	**PR/ OR**	
T25BSA251	Structural Analysis	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25BCT252	Concrete Technology	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25BCT2052L	Concrete Technology Lab	-	-	1	1	-	-	2	-	-	-	-	25	25	50
T25BSV253	Surveying	3	-	-	3	3	-	-	15	15	10	60	-	-	100
T25BSV253L	Surveying Lab	-	-	1	1	-	-	2	-	-	-	-	25	25	50
T25BED254	Entrepreneurship Development	2	-	-	2	2	-	-	15	15	10	60	-	-	100
T25BBR255	Basic Human Right	2	-	-	2	2	-	-	15	15	10	60	-	-	100
T25BML256	Modern Indian Languages Marathi (मराठी)	1	-	-	1	1	-	-	-	-	-	-	25	-	25
T25BGE257L	Geological Engineering Lab	-	-	1	1	-	-	2	-	-	-	-	25	25	50
T25BCP258P	Community Engineering Project / Field Project	0	-	2	2	0	-	2	-	-	-	-	50	50	100
T25BEE259	Introduction to Environmental Engineering	3	-	-	3	3	-	-	15	15	10	60	-	-	100
Total		**17**	**0**	**5**	**22**	**17**	**0**	**08**	**80**	**80**	**40**	**300**	**150**	**125**	**875**

Program	**B.Tech. (Civil Engineering)**			**Semester**	**IV**			
Course:	**Structural Analysis**			**Code**	**T25BSA251**			
Credits	**Teaching Scheme (Hours per Week)**			**Evaluation Scheme (Marks & Weightage)**				
	Lecture	**Practical**	**Tutorial**	**SEE (60 Marks)**	**Continuous Assessment (40 Marks)**			**Total**
					TT1	**TT2**	**Internal Assessment**	
3	**3**	**0**	**0**		**15**	**15**	**10**	**100**

Course Objectives:

This course aims at enabling students:

1. To introduce the fundamental concepts of structural analysis, including static and kinematic indeterminacy.
2. To apply theorems related to elastic structures and strain energy methods.
3. To construct and interpret influence line diagrams for statically determinate structures.
4. To analyze the behavior of arches, columns, and struts under various loading and boundary conditions.

Course Outcomes: On the completion of the course students will be able to:

CO 1: Determine static and kinematic indeterminacy of structures and apply general theorems for elastic analysis.

CO 2: Calculate deflections in statically determinate frames using energy methods and Castigliano's theorems.

CO 3: Draw and interpret influence line diagrams for statically determinate beams and trusses.

CO 4: Compute normal thrust, shear force, and bending moment in three-hinged and two-hinged arches.

CO 5: Examine buckling behavior of columns and struts using Euler's and Rankine's theories.

Detailed Syllabus

Module	**Description**	**Duration (Hrs)**	**CO**	**BL**
I	**Basics and General Theorems:** Types of structure, theory and numerical on static and kinematics indeterminacy, Theorems relating to elastic structures, principle of virtual work, strain energy in elastic structures, complementary energy, Castigliano's theorems, Maxwell-Betti's reciprocal theorem. Application to determinate beams.	9	CO1	L2
II	**Analysis and Deflection of Statically Determinate Frames:** Analysis of determinate pin jointed and rigid jointed frames, Deflection of determinate pin jointed and rigid jointed frames by principle of virtual work (unit load method), Strain Energy and Castigliano's theorems.	9	CO2	L3

III	**Influence Line Diagrams (ILD) for Statically Determinate Structures:** Influence lines for cantilever beam, simply supported beam, and overhanging beam. Criteria for maximum shear force and bending moment under moving loads for simply supported beams, absolute maximum bending moment.	6	CO3	L3
IV	**Three Hinged and Two Hinged Arches:** Normal thrust, shear force and bending moment for parabolic and segmental three hinged and two hinged arches. Influence lines for normal thrust, shear force and bending moment for three hinged parabolic arches.	9	CO4	L3
V	**Column & Struts:** Struts subjected to axial loads, concept of buckling. Euler's buckling theory of struts with different boundary conditions. Rankine's buckling theory for columns.	6	CO5	L4
	Total	39		

Text Books:

1. Junnarkar, S. B. (2016). Structural Mechanics - Volumes I and II. Charotar Publishing House.
2. Menon, D. (2010). Structural Analysis - Volumes I and II. Narosa Publishing House.
3. Punmia, B. C., Jain, A. K., & Jain, A. K. (2017). Theory of Structures. Laxmi Publications.
4. Ramamrutham, S. (2017). Theory of Structures. Dhanpat Rai Publishing Company.

Reference Books:

1. Reddy, C. S. (2010). Basic Structural Analysis (3rd Edition). Tata McGraw Hill.
2. Wang, C. K. (1983). Statically Indeterminate Structures. McGraw Hill.
5. Vazirani, V. N., Ratwani, M. M., & Duggal, S. K. (2015). Analysis of Structures - Vol. I. Khanna Publishers.

Program	**B.Tech. (Civil Engineering)**			**Semester - IV**			
Course:	**Concrete Technology**			**Code: T25BCT252**			
Credit	**Teaching Scheme (Hours per Week)**			**Evaluation Scheme (Marks & Weightage)**			
	Lecture	**Practical**	**Tutorial**	**SEE (60 Marks)**	**Continuous Assessment (40 Marks**		**Total**
					TT1	**TT2**	**Internal Assessment**	
3	**3**	**0**	**0**		**15**	**15**	**10**	**100**

Course Objectives:

This course aims at enabling students:

1. To impart knowledge of the physical and chemical properties of concrete ingredients.
2. To understand the behavior of concrete in both fresh and hardened states under various environmental conditions.
3. To master the methods of concrete mix design as per international and Indian standards.
4. To study specialized concretes, including High Performance and Fiber Reinforced concrete.
5. To learn modern techniques for testing, repair, and rehabilitation of concrete structures.

Course Outcomes:

After learning the course, the students will be able to:

CO 1: Identify and determine the properties of cement and aggregates and their influence on concrete performance.
CO 2: Apply methods for concrete mixes for specific strength and durability requirements using various standard methods.
CO 3: Interpret the effects of admixtures and specialized production methods like Ready Mix Concrete (RMC).
CO 4: Explain the properties and applications of high-performance and repair-oriented concrete types.
CO 5: Apply non-destructive testing methods to assess the structural integrity of existing concrete.

Detailed Syllabus

Module	**Description**	**Duration (Hrs)**	**CO**	**BL**
I	**Concrete Ingredients & Properties:** Physical properties of OPC (33, 43, 53 Grade) and specialized cements (PPC, Rapid Hardening, Low Heat, Sulphate Resisting). Properties of coarse and fine aggregates and their influence on concrete.	8	CO1	L2

II	**Fresh & Hardened Concrete:** Workability, durability, and strength requirements. Effect of w/c ratio. Concreting under special conditions: underwater and extreme weather. Grades of concrete: ordinary, lightweight, and high density.	8	CO1, CO2	L3
III	**Mix Design & Admixtures:** Mix design for compressive and flexural strength by I.S. methods, Road Note, and British methods. Study of Plasticizers, retarders, and accelerators; their chemistry and compatibility with concrete.	8	CO2, CO3	L3
IV	**Special Concrete & RMC:** Ready Mix Concrete (RMC) requirements and transit mixer details. Constituents and applications of High-Performance Concrete (HPC). Fiber-reinforced	7	CO3, CO4	L3
V	**Testing, Repair & Rehabilitation:** Non-Destructive Testing (NDT): Hammer test, Ultrasonic pulse velocity, Carbonation, and Corrosion tests. Concrete for repairs: Ferro-cement	8	CO5	L3
	Total	39		

Text Books:

- A. M. Neville (2012), Properties of Concrete, Tata McGraw Hill.
- M. S. Shetty (2005), Concrete Technology: Theory and Practice, S. Chand.
- M. L. Gambhir (2006), Concrete Technology, Tata McGraw Hill

Reference Books:

- A. R. Santhakumar (2006), Concrete Technology, Oxford University Press India.
- Relevant I.S. Codes (Physical properties and NDT provisions).

Program	**B.Tech. (Civil Engineering)**			**Semester –IV**	
Course	**Concrete Technology Lab**			**Code: T25BCT2052L**	
Credit	**Teaching Scheme (Hrs Per Week)**			**Evaluation Scheme (Marks & Weightage)**	
	Lecture	**Practical**	**Tutorial**	**End Sem. Exam (25 Marks)**	**Internal Continuous Assessment (ICA) (25 Marks)**
1	**0**	**02**	**0**		

Prerequisite: Basic knowledge of building materials and fundamental concepts of concrete technology.

Course Objectives

This course aims at enabling students:

1. To familiarize students with standard testing procedures for cement and aggregates.
2. To develop the ability to design concrete mixes using codal methods and evaluate fresh concrete.
3. To enable students to assess strength properties of hardened concrete using laboratory and NDT methods.

Course Outcomes:

After learning the course, the students will be able to:

CO1: Perform laboratory tests on cement and aggregates and interpret their properties as per IS codes.

CO2: Design concrete mixes using ACI and IS methods and evaluate fresh concrete workability.

CO3: Determine strength properties of hardened concrete using destructive and non-destructive tests.

Detailed Syllabus

Module	**Description**	**Duration (Hrs)**	**CO**
I	**Testing of cement** a. Fineness of cement. b. Normal consistency of cement. c. Initial and final setting times of cement d. Soundness of cement. e. Compressive strength of cement	10	CO 1
II	**Testing of aggregate (Any Three)** a. Water absorption and moisture content of aggregate. b. Specific gravity and bulk density of coarse and fine aggregates c. Fineness modulus of fine and coarse aggregate (sieve	6	CO1

	analysis). d. Flakiness index and elongation index of coarse aggregate. e. Impact value and crushing value of aggregate. f. Abrasion test on aggregates		
III	**Concrete Mix design by ACI and IS code method**	02	CO2
IV	**Tests on Fresh Concrete (Any One)** a. Workability tests- Slump cone test. b. Compaction factor test c. Vee-bee consistometer test	02	CO2
V	**Strength tests on Hard concrete** a. Compressive strength hardened concrete. b. Splitting Tensile strength of hardened concrete. c. Determination of Compressive strength of concrete by any one method of NDT	06	CO3
	Total	**26**	

Program	**B.Tech. (Civil Engineering)**			**Semester -IV**			
Course:	**Surveying**			**Code: T25BSV253**			
Credit	**Teaching Scheme (Hours per Week)**			**Evaluation Scheme (Marks & Weightage)**			
	Lecture	**Practical**	**Tutorial**	**SEE (60 Marks)**	**Continuous Assessment (40 Marks)**		**Total**
					TT1	**TT2**	**Internal Assessment**	**100**
3	**3**	**0**	**0**		**15**	**15**	**10**	

Prerequisite:

- Knowledge of surveying tools, methods, and principles.
- Proficiency in levelling, contouring, and earthwork estimation.
- Skills in data handling, error correction, and volume estimation.
- Awareness of safety standards and proper instrument use.
- Effective planning for objectives, permissions, and mapping.

Course Objectives:

This course aims at enabling students:

1. To provide an understanding of the fundamental principles and techniques of surveying, including linear, angular, and graphical measurements.
2. To equip students with the skills to operate modern surveying instruments such as Total Stations and GPS, enabling precise data collection and analysis.
3. To develop the ability to calculate earthwork volumes, perform levelling and contouring, and apply these techniques to real-world engineering projects.

Course Outcomes:

After learning the course, the students will be able :

CO1: To explain the principles of surveying, methods, survey stations, ranging, bearings, and levelling.
CO: To apply chain, compass, and plane table surveying techniques for field measurements and error correction.
CO3: To analyze levelling methods and contouring techniques for terrain representation and engineering applications.
CO4: To evaluate triangulation, trilateration, and theodolite surveying methods for establishing control networks.
CO5: To develop solutions using modern surveying instruments (Total Station, GPS) and compute earthwork quantities.

Detailed Syllabus

Module	**Description**	**Duration (Hrs)**	**CO**	**BL**
I	**Basics of Surveying** Principles, Linear, angular and graphical methods, Survey stations, Survey lines- ranging, Bearing of survey lines, Levelling: Plane table surveying, Principles of levelling-booking and reducing levels; differential, reciprocal Levelling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling; Contouring: Characteristics,	8	1	2

	methods, uses; areas and volumes.			
II	**Fundamentals of Land Surveying and Earthwork Estimation** Chain Surveying: Linear measurements, instruments, fieldwork, and error correction. Compass Surveying: Bearings, meridians, traversing, and closing error adjustment. Plane Table Surveying: Equipment, methods (radiation, intersection, traversing), and error reduction. Earthwork Calculation: Volume estimation (cut and fill), prismoidal and trapezoidal rules, and mass haul diagrams.	8	2	3
III	**Levelling and Contouring** Levelling: Types, Differential, trigonometric, and barometric. Instruments: Dumpy, automatic, and digital levels. Errors: Instrumental, personal, and natural. Contouring: Concept, Contour lines, index and supplementary contours. Methods: Spacing, interpolation, and mapping. Applications: Terrain analysis, road design, and construction.	8	3	4
IV	**Triangulation and Trilateration** Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical control - methods -triangulation - Network- Signals. Baseline - choices - instruments and accessories - extension of base lines - corrections - Satellite station - reduction to centre - Intervisibility of height and distances - Trigonometric levelling - Axis single corrections.	8	4	3
V	**Modern Field Survey Systems** Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems-Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy Considerations.	7	5	4
	Total	39		

Text Books:

- Surveying Vol. 1, 2, and 3 – B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain
- Plane Surveying – A.M. Chandra
- Advanced Surveying: Total Station, GIS, and Remote Sensing – Satheesh Gopi, R. Sathikumar, N. Madhu

Reference Books:

- Fundamentals of Surveying – S.K. Roy
- Introduction to GPS: The Global Positioning System – Ahmed El-Rabbany
- Remote Sensing and GIS – Basudeb Bhatta

Program: B.Tech. (Civil Engineering)				**Semester -IV**	
Course: Surveying Lab				**Code: T25BSV253L**	
Teaching Scheme (Hours per Week)				**Evaluation Scheme (Marks & Weightage)**	
Lecture	**Practical**	**Tutorial**	**Credit**	**End Sem. Exam (25 Marks)**	**Internal Continuous Assessment (ICA) (25 Marks)**
0	**2**	**0**	**1**		

Prerequisite:

- Proficiency in surveying tools and techniques.
- Understanding of safety protocols and their use.
- Ability to record and interpret data accurately.
- Prior planning with permissions and objectives defined.
- Basic knowledge of construction and layout principles.

Course Objectives:

This course aims at enabling students:

1. To provide students with a foundational understanding of surveying techniques, including chaining, levelling, and angular measurements, for accurate field data collection.
2. To introduce advanced surveying instruments like total stations and GPS for precise measurements and data acquisition in various applications.
3. To enable students to apply surveying principles to real-world projects such as contour mapping, road alignment, and building layout, ensuring effective design and implementation.

Course Outcomes:

After learning the course, the students will be able to:

CO1 Demonstrate proficiency in performing fundamental surveying tasks, including chaining, levelling, and angular measurements, for basic field operations.

CO2 Utilize modern surveying tools like total stations and GPS for advanced data collection and geospatial analysis.

CO3 Apply surveying techniques to practical projects, such as contour mapping and road alignment, and interpret survey data for decision-making in civil engineering tasks.

Detailed Syllabus

Experiment No.	**Description**	**Duration (Hrs)**	**CO**	**BL**
Group A (Any SIX to be performed)				
1	To perform Chaining and Ranging	2 Hours	1	1
2	Compass Surveying with Bearing and Direction.	2 Hours	1	1
3	To perform differential Levelling.	2 Hours	1	1
4	To perform Angle Measurement by theodolite.	2 Hours	1	1
5	To operate Total station for basic measurements.	2 Hours	1	1
6	To determine the location of points by forming triangles	2 Hours	1	1
7	To measure distance using tachometric surveying.	2 Hours	2	2
8	To perform surveying using Global Positioning	2 Hours	2	2

	System (GPS) technology			
9	Plotting of Survey Data (Manual and Software-based)	2 Hours	2	2
Group B (Any FOUR projects to be performed)				
10	To create a contour map showing the elevation and relief of land.	2 Hours	3	3
11	To design and set out horizontal curves on a road or railway track.	2 Hours	3	3
12	To set out a building layout from a given plan on the ground.	2 Hours	3	3
13	To set out the centreline of a road based on design specifications.	2 Hours	3	3
14	Conduct a comprehensive site survey using various surveying techniques.	2 Hours	3	3
Group C (Visits to any ONE site in the vicinity)				
16	Visit to a Highway Construction Site or Bridge Project	A Day	1,2,3	1,2,3
17	Visit to a Building Construction site.	A Day	1,2,3	1,2,3
	Total	26 Hours		

Text Books:

- Kanetkar, T. P., & Kulkarni, S. V. Surveying and Levelling: Volume 1 & 2. Pune Vidyarthi Griha Prakashan.
- Duggal, S. K. Surveying: Volume 1 & 2. McGraw Hill Education.
- Punmia, B. C., Jain, A. K., & Jain, A. K. Surveying: Volume 1, 2 & 3. Laxmi Publications.

Reference Books:

- Ghilani, C. D., & Wolf, P. R. Elementary Surveying: An Introduction to Geomatics (15th Edition). Pearson.
- Chandra, A. M. Higher Surveying. New Age International Publishers.
- Schofield, W., & Breach, M. Engineering Surveying. CRC Press.

Program:	**B.Tech. (Civil Engineering)**				**Semester:IV**	
Course:	**Entrepreneurship Development**				**Course Category: HSSM** **Code: T25BED254**	
Credits	**Teaching Scheme (Hrs./Week)**			**Evaluation Scheme and Marks**		
	Lecture	**Practical**	**Tutorial**	**ISE**	**SEE**	**Total**
02	**02**	**-**	**-**	**40**	**60**	**100**

Pre-requisite: Effective Communication Skills

Course Objectives:

This course aims at enabling students:

1. To develop entrepreneurial mindset and skills among students.
2. To understand the process of starting and managing a new venture.
3. To familiarize students with business planning, financing, and legal aspects.
4. To enhance knowledge about innovation, startup ecosystem, and government support.
5. To build marketing, branding, risk management capabilities, and to build ethics and social responsibility in business contexts.

Course Outcomes:

After learning the course, the students will be able to:

CO1: Identify entrepreneurial opportunities and generate business ideas.

CO2: Analyze feasibility and prepare a detailed business plan.

CO3: Understand the financial, legal, and operational aspects of a startup.

CO4: Apply innovation and technology in developing entrepreneurial ventures.

CO5: Demonstrate managerial and leadership skills in running enterprises.

Detailed Syllabus

Module	**Description**	**Duration (Hrs)**
I	**Introduction to Entrepreneurship** Definition and concept of entrepreneurship, Characteristics and qualities of successful entrepreneurs, Types of entrepreneurs (rural, social, women, tech entrepreneurs), Role of entrepreneurship in economic development, Entrepreneur vs Manager, Entrepreneurial ecosystem in India	5
II	**Idea Generation and Opportunity Recognition** Sources of business ideas, Creativity and innovation techniques (brainstorming, SCAMPER, design thinking basics) Opportunity identification and evaluation, Market research and demand analysis, Feasibility study (technical, financial, market feasibility)	5
III	**Business Plan Development** Meaning and importance of business plan, Components of a business plan, Executive summary, Product/service description, Market analysis, Marketing	5

	strategy, Operations plan, Financial projections, Preparation of business model canvas, Case studies of successful startups	
IV	**Financial and Legal Aspects of Entrepreneurship** Sources of finance: Bootstrapping, venture capital, angel investors, bank loans, Basics of financial management: Costing, pricing, break-even analysis, Legal requirements, Company registration procedures, Intellectual Property Rights (IPR): patents, trademarks, copyrights, Government schemes and support (Startup India, MSME schemes)	6
V	**Managing and Scaling the Enterprise** Business operations and supply chain basics, Marketing and branding strategies, Human resource management in startups, Risk management and failure handling, Growth strategies and scaling up, Digital entrepreneurship and e-commerce, Ethics and social responsibility in business	5
	Total	26

Textbooks:

1. Entrepreneurship Development and Small Business Enterprises. Poornima M. Charantimath. Pearson Education India

Reference books:

1. Entrepreneurship Development. S. Anil Kumar, S. C. Poornima, M. K. Abraham, K. Jayashree. New Age International Publishers
2. Fundamentals of Entrepreneurship. H. Nandan. PHI Learning
3. Business Model Generation. Alexander Osterwalder & Yves Pigneur. Wiley
4. Entrepreneurship in the 21st Century. A. C. Fernando. Pearson Education India

Program:	**B. Tech. (Civil Engineering)**				**Semester: IV**	
Course:	**Basic Human Right**				**Code: T25BBR255**	
Credits	**Teaching Scheme (Hrs./Week)**			**Evaluation Scheme and Marks**		
	Lecture	**Practical**	**Tutorial**	**ISE**	**SEE**	**Total**
02	**02**	**-**	**-**	**40**	**60**	**100**

Pre-requisite: Knowledge of Constitution of India

Course Objectives:

This course aims at enabling students:

1. Understand the basic concepts of human rights, human values, justice, equality, and duties in society.
2. Develop awareness of the historical evolution of human rights, including key global movements and declarations.
3. Analyze the relationship between society, culture, religion, and human behavior in the context of rights.
4. Identify various human rights issues and violations, especially among vulnerable groups.
5. Understand the constitutional and legal framework of human rights in India.
6. Gain knowledge about national and international human rights institutions and mechanisms.

Course Outcomes:

After learning the course, the students will be able to:

CO1. Explain the fundamental concepts and evolution of human rights and human values.
CO2. Analyze the impact of social structures, culture, and religion on human rights and social issues.
CO3. Identify and evaluate human rights violations affecting migrant workers and disabled individuals.
CO4. Explain the provisions of human rights in the Indian Constitution, including fundamental rights and duties.
CO5. Describe the role of national and international human rights organizations, such as NHRC and SHRC.

Detailed Syllabus

Unit	**Description**	**Duration (H)**
I	**Fundamentals and Evolution of Human Rights** The Basic Concepts: individual, group, civil society, state, equality, justice, human values, human rights and human duties. Origin, Contribution of American bill of rights, French revolution, Declaration of independence, Rights of citizen, Rights of working and exploited people.	5

II	**Society, Culture, and Social Issues** Fundamental rights and economic programs, society, religion, culture, and their inter-relationship; impact of social structure on human behavior. **Social Structure and Social Problems:** Social and communal conflicts and social harmony, rural poverty, unemployment, bonded labor.	6
III	**Human Rights Issues and Vulnerable Groups** Migrant workers and human rights violations, human rights of mentally and physically challenged, state, individual liberty, freedom and democracy. **NGOs and human rights in India**: land, water, forest issues	5
IV	**Human Rights in the Indian Constitution** The Constitution of India: Preamble, Fundamental rights, Directive principles of state policy, Fundamental duties and some other provisions.	5
V	**Human Rights Framework and Institutions** Universal declaration of human rights and provisions of India, Constitution and law, National human rights commission and State Human Rights Commission.	5
Total		**26**

Textbooks:

Shastry, T. S. N., India and Human rights: Reflections, Concept Publishing Company India (P Ltd.), 2005.

Reference Books:

Nirmal, C.J., Human Rights in India: Historical, Social and Political Perspectives (Law in India), Oxford India

e-sources: NPTEL

Human Rights in India by Prof. Rachana Kaushal

Program:	**B. Tech. (Civil Engineering)**				**Semester: IV**	
Course:	**Modern Indian Languages Marathi (मराठी)**				**Code: T25BML256**	
Credit	**Teaching Scheme (Hrs./Week)**			**Evaluation Scheme and Marks**		
	Lecture	**Practical**	**Tutorial**	**ICA**	**SEE**	**Total**
01	**01**	**00**	**0**	**25**	**0**	**25**

पाठ्यक्रम उद्दिष्टे (Course Objectives):

1. CO1: विद्यार्थ्यांना आधुनिक मराठी भाषेचे व्याकरण, संवाद कौशल्य आणि साहित्यिक संकल्पना यांचे सखोल ज्ञान प्रदान करणे.
2. **CO2:** मराठी भाषेच्या सामाजिक, सांस्कृतिक आणि ऐतिहासिक विकासाचा अभ्यास करून भाषिक जाणिवा विकसित करणे.
3. **CO3:** शैक्षणिक, व्यावसायिक लेखन व भाषांतर कौशल्य विकसित करून विद्यार्थ्यांना व्यवहार्य भाषिक क्षमता प्रदान करणे.

अभ्यासक्रम परिणाम (Course Outcomes)

अभ्यासक्रम पूर्ण झाल्यानंतर विद्यार्थी:

CO1: आधुनिक मराठी भाषेचे व्याकरण शुद्धपणे वापरून प्रभावी संवाद साधू शकतील.

CO2: मराठी भाषेच्या विकासातील सामाजिक व सांस्कृतिक घटकांचे विश्लेषण करू शकतील.

CO3: शैक्षणिक, व्यावसायिक लेखन व मराठी-इंग्रजी भाषांतर प्रभावीपणे करू शकतील.

अभ्यासक्रम:

आठवडा	प्रयोगात्मक कार्य	**तास**
१.	मराठी लिपी आणि उच्चारांचा सराव, भाषेचा इतिहास • स्वर, व्यंजन, संयुक्ताक्षरे यांचा अभ्यास • शुद्ध उच्चार सराव • मराठी भाषेचा उगम व विकास	1Hr
२.	साधी, संयुक्त व मिश्र वाक्यरचना; संवाद व अभिव्यक्ती • वाक्यांचे प्रकार व रचना • दिलेल्या वाक्यांचे रूपांतर • दैनंदिन संभाषण सराव	1Hr
३.	इंग्रजी ते मराठी भाषांतर • सोप्या वाक्यांवर आधारित भाषांतर • शुद्ध व्याकरण व अर्थसुसंगतीवर भर	1Hr
४.	मराठी ते इंग्रजी भाषांतर • लघुपरिच्छेदांचे भाषांतर • शब्दसंग्रह व योग्य वाक्यरचना	1Hr
५.	औपचारिक पत्रलेखन • रजा अर्ज	1Hr

	• विनंती पत्र • तक्रार पत्र	
६.	अनौपचारिक पत्रलेखन • मित्राला पत्र • कुटुंबियांना पत्र • निमंत्रण पत्र	1Hr
७.	परिच्छेद / सारांश लेखन (१००–१५० शब्द) • दिलेल्या उताऱ्यावर आधारित सारांश • सामाजिक विषयावर परिच्छेद	1Hr
८.	वृत्तलेखन • कार्यक्रम अहवाल • बातमी लेखन	1Hr
९.	संवाद लेखन • परिस्थितीनुसार संवाद • नाट्यसंवाद लेखन	1Hr
१०.	वाचन सराव • शुद्ध उच्चार • शब्दसंग्रह वाढ	1Hr
११.	संभाषण सराव • मुलाखत सादरीकरण • भूमिकानिर्मिती (Role Play)	2Hr
१२.	अंतिम प्रयोगात्मक परीक्षा व तोंडी परीक्षा • **अंतर्गत परीक्षा (**Internal Test) • **मौखिक परीक्षा** (Viva-Voce)	1Hr
एकूण तास		13

पाठ्यपुस्तके:

1. मराठी भाषेचे मूळ – वि. का. राजवाडे
2. मराठी भाषेचा इतिहास – गं. बा. सरदार
3. मराठी भाषा: उगम व विकास – कृ. पा. कुलकर्णी
4. साहित्याची भाषा – डॉ. भालचंद्र नेमाडे

संदर्भ ग्रंथ:

1. सुगम मराठी व्याकरण व लेखन – मो. रा. वाळिंबे
2. अनुवाद: तत्त्वज्ञान आणि प्रयोग – डॉ. भालचंद्र नेमाडे
3. प्रशासकीय लेखन – भाषा संचालनालय महाराष्ट्र शासन
4. मराठी भाषा आणि साहित्याचा इतिहास – वि. का. राजवाडे
5. बनगरवाडी – लेखक: वि. पु. माडगूळकर
6. ढग – लेखिका: उषा शेळके
7. बटाट्याची चाळ – लेखक: पु. ल. देशपांडे
8. NPTEL / SWAYAM Digital Reference – SWAYAM
   https://onlinecourses.swayam2.ac.in/nou25_lg30/preview

Program: B.Tech. (Civil Engineering)				**Semester -IV**	
Course: Geological Engineering Lab				**Code : T25BGE257L**	
Teaching Scheme(Hrs Per Week)				**Evaluation Scheme (Marks & Weightage)**	
Lecture	**Practical**	**Tutorial**	**Credit**	**End Sem. Exam (25 Marks)**	**Internal Continuous Assessment (ICA) (25 Marks)**
0	**2**	**0**	**1**		

Course Objectives:

This course aims at enabling students:

1. To recognize and classify rock and soil materials to identify suitable construction materials or as a stable foundation.
2. To offer the essential geological knowledge necessary for the construction of various kinds of civil engineering structures.
3. To focus on the core activities of engineering geologists like site characterization and geologic hazard identification and mitigation.
4. To arrange and carry out site investigation methods to extract the necessary characteristics for a variety of technical applications.
5. To interpret field and laboratory data for the safety and security of mega structures like tunnels and dams

Course Outcomes:

After successful completion of the course, students will be able to:

CO1 Identify minerals and rocks as basic components of foundation and construction material.

CO2 Read and interpret geological maps to identify and solve various geological difficulties.

CO3 Identify structures present in the field by studying structural geological blocks.

CO4 Read and identify the lithologs to assess the subsurface ground quality for construction of any Civil Engineering

CO5 Identify various geological structures in the field to avoid any mishaps.

Detailed Syllabus

Minimum seven experiments from given list

1 Study of physical properties of minerals.
2 Megascopic study of rock forming minerals.
3 Megascopic study of Igneous rocks.
4 Megascopic study of Secondary rocks.
5 Megascopic study of Metamorphic rocks.
6 Cross-section preparation and interpretation of geological maps.
7 Study of structural geological models.
8 Preparation and interpretation of bore log /litholog data on graph paper.
9 Study visit to the places of engineering geological importance.

Text Books:

1 Singh Prabin, 2009, “Engineering and General Geology”, S. K. Katariya and sons, Delhi.
2 Mukerjee P. K., 2013, “A Text Book of Geology”, World Press Pvt. Ltd., Calcutta.
3 Gokhale K.V.G.K. and Rao D. M., 1982, “Experiments in Engineering Geology”, TMN, New-

Delhi.
4 Gupte R. B., "A Text Book of Engineering Geology", Pune Vidyarthi Griha Prakashan, Pune.
5 Subinoy Gangopadhyay, 2013, "Engineering Geology", Oxford University Press.

Reference Books:

1 G. W. Tyrrell, 1926, "Principles of Petrology", B. I. Publication Pvt. Ltd., New Delhi .
2 Legget R. F., 1983"Geology Handbook in Civil Engineering", McGraw-Hill, New York.
3 Krynine D. P. & Judd W. R., 2005, "Principles of Engineering Geology & Geo- technics", CBS Publishers & distri. New Delhi.
4 Billings M. P., 1942, "Structural Geology", Prentice Hall of India Private Ltd., New Delhi.
5 A. Holmes, 1944, "Principles of Physical Geology", ELBS Chapman & Hall, London.

Program : B.Tech. (Civil Engineering)				**Semester -IV**	
Course: Community Engineering Project / Field Project				**Code: T25BCP258L**	
Teaching Scheme (Hours per Week)				**Evaluation Scheme (Marks & Weightage)**	
Lecture	**Practical**	**Tutorial**	**Credit**	**SEE (50 Marks)**	**Internal Continuous Assessment (ICA) (50 Marks)**
0	**2**	**0**	**2**		

Course Objectives

This course aims at enabling students:

1. To identify and analyze real-time civil engineering challenges within local urban or rural communities through direct field observations and stakeholder consultation.
2. To design and develop a simplified working model, prototype, or digital solution addressing the identified community issue using interdisciplinary engineering principles.
3. To demonstrate professional communication and teamwork skills by compiling a comprehensive technical report, and defending the project outcome via a PowerPoint presentation.

Course Outcomes:

After successful completion of the course, students will be able to:

CO1: Identify a community-centric problem and formulate a clear problem statement with defined objectives

CO2: Analyze technical data to synthesize design standards and develop a budget plan for project funding.

CO3: Develop a functional prototype using sustainable materials and validate its technical feasibility through testing

CO4: Compile a comprehensive project report and demonstrate the working model with effective technical communication

Detailed Syllabus Content:

Unit 1: Topic Selection & Problem Definition

- Independent selection of a mini project topic by the student in consultation with the assigned faculty mentor, ensuring alignment with civil engineering specialization or interdisciplinary domains.
- Preliminary literature review and information gathering from standard codes, research papers, case studies, and field surveys to establish theoretical foundation.
- Identification of a specific community-centric problem, formulation of a clear problem statement, and definition of project objectives and scope.

Unit 2: Information Synthesis & Sponsorship Acquisition

- Systematic collection, analysis, and synthesis of technical data, design standards, and site-specific observations to demonstrate comprehension and depth of knowledge.
- Exploration of potential industry partners, local governing bodies, NGOs, or community organizations for project sponsorship if possible.

- Preparation of sponsorship proposals, cost estimates, and budget plans to secure financial or material support, thereby simulating real-world project funding mechanisms.

Unit 3: Model Development & Fabrication

- Translation of the proposed solution into a simplified working model, scaled prototype, or functional device using appropriate materials and fabrication techniques.
- Emphasis on cost-effective, sustainable, and locally available materials to demonstrate engineering ingenuity and resource optimization.
- Testing, validation, and refinement of the working model through laboratory experiments or field trials to establish technical feasibility.

Unit 4: Documentation & Presentation

- Preparation of a concise yet comprehensive project report documenting the entire development process including introduction, literature summary, methodology, observations, cost analysis, conclusions, and future scope.
- Development of a professional PowerPoint presentation highlighting the problem identification, design approach, model demonstration, outcomes, and learning experiences.
- Final demonstration of the working model before the faculty panel, accompanied by a viva voce to assess the student's understanding, contribution, and ability to communicate technical content effectively.

SVKM NMIMS GLOBAL UNIVERSITY, DHULE
School of Technology, Management & Engineering
Department of Civil Engineering

Program	**B. Tech. (Civil Engineering)**			**Semester: IV**			
Course	**Introduction to Environmental Engineering**			**Course Category: MDC**			
				Course Code: T25BEE259			
Credits	**Teaching Scheme (Hours per Week)**			**Evaluation Scheme (Marks & Weightage)**			
				SEE (60 Marks)	**Continuous Assessment (40 Marks)**		**Total**
	Lecture	**Practical**	**Tutorial**		**TT1**	**TT2**	**Internal Assessment**	**100**
03	**3**	**0**	**0**		**15**	**15**	**10**	

Course Objectives:

This course aims at enabling students:

1. To introduce fundamental concepts of environmental engineering and sustainability in the context of engineering disciplines.
2. To create awareness about major environmental issues and their impact on engineering systems and society.
3. To develop understanding of basic environmental management systems such as water, wastewater, air, and solid waste management.
4. To familiarize students with standards, policies, and emerging technologies (IoT, modeling tools) used in environmental monitoring and management.
5. To enable students to apply sustainable engineering practices for addressing environmental challenges in real-world scenarios.

Course Outcomes:

After completion of this course, students would be able to:

CO1: Explain the fundamentals of environmental engineering and sustainability concepts in engineering practice.
CO2: Identify major environmental issues and their impact on various engineering domains.
CO3: Apply basic principles of water, wastewater, air, and solid waste management systems.
CO4: Apply environmental standards, tools, and technologies for monitoring and managing environmental systems.
CO5: Demonstrate the role of engineers in promoting sustainable development and ESG practices.

Detailed Syllabus

Module	**Content**	**Duration (Hrs)**	**BL**	**CO**
1	**Introduction to Environmental Engineering**: Definition, scope, and interdisciplinary nature of environmental engineering , Evolution of environmental concerns: local → global scale ,Concept of sustainability, ESG framework and SDGs , Key environmental issues: Climate change and global warming , Resource depletion (water, energy, minerals) , Environmental pollution (air, water, soil), Interaction between engineering systems and environment , Role of engineers in sustainable development , Case studies: urbanization, industrialization impacts	07	3	1
2	**Water and Wastewater Management**: Water demand and sources of water supply , Water quality parameters: physical, chemical, biological, Introduction to	08	4	2

	IS 10500:2012 (Drinking Water Standards) , Basic water treatment processes: Screening, coagulation, sedimentation, filtration, disinfection , Wastewater generation and characteristics , Wastewater treatment overview: Primary, secondary, tertiary treatment , Sustainable water management practices: Water conservation, reuse, recycling , Smart water systems: IoT-based sensors for real-time monitoring (pH, turbidity, DO) Introduction to modeling tools: EnviroSim, WaterCAD (conceptual understanding)			
3	**Solid Waste Management**: Types of waste: municipal, industrial, biomedical, e-waste , Waste generation trends and challenges in India , Waste management hierarchy: Reduce, Reuse, Recycle, Recover, Dispose , Collection, segregation, transportation systems , Processing techniques: Composting, vermicomposting, biomethanation, Recycling and material recovery , Introduction to landfill concepts: sanitary landfill basics , Circular economy concepts , Role of technology and smart waste systems , Case studies: Smart Cities waste management	08	3	2
4	**Air Quality Management**: Sources of air pollution: natural and anthropogenic Types of pollutants: particulate matter, NOx, SOx, CO, VOCs , Health and environmental impacts Ambient Air Quality Standards (India) Air pollution control technologies: Cyclones, scrubbers, electrostatic precipitators Machine learning applications: Prediction of AQI trends Case studies: urban air pollution (Delhi, Mumbai)	08	4	2
5	**Sustainable Practices in Engineering**: Concept of sustainable engineering design Green building principles: Energy efficiency, water efficiency, materials Rating systems (LEED, GRIHA) Renewable energy systems: Solar, wind, bioenergy (basic concepts) Environmental Management Systems (EMS) Introduction to **ISO 14001 (correct standard)** Life Cycle Assessment (LCA) basics ESG practices in industry Case studies: sustainable infrastructure projects	08	5	3
Total Lecture		**39**		

Text Books:

- Peavy H. S., Row D. R., and Tchobanoglous G., 2017, “Environmental Engineering”, 1st Edition

(Reprint), McGraw Hill Education, New Delhi
- Davis M. L., and Cornwell D. A., 2018, "Introduction to Environmental Engineering", 5th Edition, McGraw Hill Education, USA
- Kiely G., 2019, "Environmental Engineering", 3rd Edition, McGraw Hill Education, New Delhi

Digital Content:

NPTEL (SWAYAM):
- "Introduction to Environmental Engineering and Science" – IIT Kharagpur
- "Air Pollution and Control" – IIT Kanpur
- "Solid Waste Management" – IIT Roorkee

Coursera:
- "Introduction to Sustainability" – University of Illinois
- "Global Environmental Management" – Technical University of Denmark

edX:
- "Sustainable Development: The Post-Capitalist Order" – SDG Academy
- "Urban Water Systems" – Delft University of Technology

Virtual Labs / Tools:
- NITK Virtual Labs – Environmental Engineering
- USEPA Water Quality Modeling Tools (intro level)

Reference Books:

- Metcalf & Eddy, 2014, "Wastewater Engineering: Treatment and Resource Recovery", 5th Edition, McGraw Hill Education
- Masters G. M., and Ela W. P., 2018, "Introduction to Environmental Engineering and Science", 3rd Edition, Pearson Education
- Cunningham W. P., and Cunningham M. A., 2020, "Principles of Environmental Science", 9th Edition, McGraw Hill Education

Spellman F. R., 2017, "Handbook of Environmental Engineering", CRC Press

Term Work: Minimum 1 from Section A and minimum 2 from Section B shall be submitted.

Section A (Conceptual / Field / Analytical)

1. Study of environmental issues in a local area and submission of a report with suggested engineering solutions.
2. Preparation of a case study on any environmental disaster (e.g., air pollution episode, water contamination, waste mismanagement).
3. Water quality analysis report based on secondary data and comparison with IS 10500 standards.

Section B (Practical / Application-Based)

1. Preparation of a simple water treatment flow diagram for a selected area.
2. Design of a basic solid waste management plan for a campus or locality.
3. AQI analysis of a city using available data and interpretation of results.
4. Preparation of a rainwater harvesting plan for a building.
5. Assignment on renewable energy integration in engineering systems.
6. Mini project on sustainable campus practices (waste, water, energy).