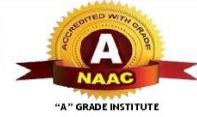Shri Ambabai Talim Sanstha's

SANJAY BHOKARE GROUP OF INSTITUTES, MIRAJ

Tilak Nagar, Sangli-Miraj Road Miraj - 416 410 Dist. Sangli

Faculty of Engineering

An Autonomous Institute

DTE CODE: 6644
MSBTE CODE :1552

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Department of

CIVIL Engineering

CURRICULUM

Second Year B.Tech. Engineering Program
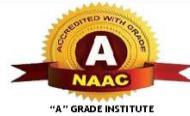# With effect from 2025-26

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Institute

Vision

To be a reputed Technological and Management Institute imparting Quality Education and developing Core Human Values (H3).

(H3): Honest - Humble - Human Being

Mission

We are committed for Enrichment of the Institute by disseminating the knowledge to achieve academic excellence and develop industry ready technical manpower

Department

Vision

To be reputed Technological Civil Engineering Department imparting Advanced Engineering tools applicable for Industry & Society

Mission

M1: To enrich Students in the Fundamentals of Civil Engineering and their Applications.

M2: To organize Training Programs on Advanced Computational Tools and Equipment during the Curriculum of Civil Engineering.

M3: To undertake Collaborative Civil Engineering Projects from Industry towards Strong Interaction with Academia.
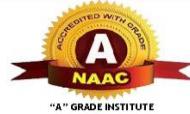
M4: To inculcate the Core Human Values in Students

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Program Outcomes (POs)

Engineering Graduates will be able to:

1. **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.

2. **Problem analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4).

3. **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).

4. **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).

5. **Modern 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).

6. **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).

7. **Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9).

8. **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

9. **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.

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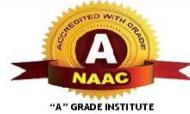
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10. **Project management and finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

11. **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).

Department of **Civil** Engineering

Program Specific Outcomes (PSOs)

Upon successful completion of UG course, the students will attain following Program Specific Outcomes:

1. Make the student employable in engineering industries

2. Motivate the students for higher studies and research

3. Motivate the students for various Competitive examinations

4. To promote start up activity and entrepreneur

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B.Tech. Program with one Major and one Minor (Credits)
Semester wise Indicative Credit Distribution

Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science Course (BSC)	BSC/ESC	8	8							16
Engineering Science Course (ESC)		4	10							14
Programme Core Course (PCC)	Programme Courses	4		16	13	12	10	8	4	67
Programme Elective Course (PEC)							3	6		09
Multidisciplinary Minor (MDM)	Multi-disciplinary Courses			2	2	4	3	3		14
Open Elective (OE)						3	3	2		8
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	2	1		2	2		1		8
Ability Enhancement Course (AEC -01), Modern Indian Language (AEC-02)	Humanities Social Science and Management (HSSM)	3		2						5
Entrepreneurship/Economics / Management Courses (EEM)					2					2
Indian Knowledge System (IKS)			2							2
Value Education Course (VEC)				2	2		2			6
Internship / OJT (Int/OJT)	Experiential Learning Courses (ELC)								12	12
Project (Proj)								2	4	6
Community Engagement Activity (CEA) / Field Project (FP)					1		1			2
Co-curricular & Extracurricular Activities (CCA)	Liberal Learning Course (LLC)	1	1			1				3
Total Credits (Major)		22	22	22	22	22	22	22	20	174

SANJAY BHOKARE GROUP OF INSTITUTES, MIRAJ

Teaching and Evaluation Scheme
Program: B. Tech. Civil Engineering

Class.: **Second Year, B. Tech.**   Semester: **SEM - III**   W.E.F.: **2025-2026**

Sr. No.	Course Code	Course Title	Course Category	L	T	P	Contact Hrs / wk	Course Credits	CA-I	MSE	CA-II	ESE	CIE	ESE	Total
				Teaching Scheme					**Evaluation scheme**						
									Theory				**Practical**		
									CIE						
01	24CV301T	Applied Mathematics	PCC	3	-	-	3	3	15	20	15	50	-	-	100
02	24CV302T	Strength of Materials	PCC	3	-	-	3	3	15	20	15	50	-	-	100
03	24CV303T	Fluid Mechanics	PCC	3	-	-	3	3	15	20	15	50	-	-	100
04	24CV304T	Engineering Survey	PCC	3	-	-	3	3	15	20	15	50	-	-	100
05	24CV305T	MDM-I	MDM	2	-	-	2	2	15	20	15	50	-	-	100
06	24UHV306T	Universal Human Values	VEC	2	-	-	2	2	15	20	15	50	-	-	100
07	24CV307T	Business Communication & Presentation Skills	AEC	1	1	-	-	2	-	-	-	-	100	-	100
08	24CV302L	Strength of Materials Laboratory	PCC	-	-	2	2	1	-	-	-	-	30	20	50
09	24CV303L	Fluid Mechanics Laboratory	PCC	-	-	2	2	1	-	-	-	-	30	20	50
10	24CV304L	Engineering Survey Laboratory	PCC	-	-	4	4	2	-	-	-	-	60	40	100
		Total		17	01	08	26	22	90	120	90	300	220	80	900

L: Lecture, **T:** Tutorial, **P:** Practical, **CA-I:** Continuous Assessment-I, **CA-II:** Continuous Assessment-II, **CIE:** Continuous in Semester Evaluation, **ESE**: End Semester Examination

Course Category	BSC	ESC	PCC	PEC	MDM	OE	VSEC	AEC-01, AEC-02	EEM	IKS	VEC	Int/OJT	Proj.	CEA/FP	CCA
	BSC/ESC		**Program Courses**		**Multidisciplinary Courses**		**Skill Courses**	**Humanities Social Science and Management (HSSM)**				**Experiential Learning Courses (ELC)**			**Liberal Learning Courses (LLC)**
Credits	-	-	16	-	2	-	-	2	-	-	2	-	-	-	-
Cum. Sum	16	14	20		02		03	05			02	02			02

Shri Ambabai Talim Sanstha's
SANJAY BHOKARE GROUP OF INSTITUTES, MIRAJ
Teaching and Evaluation Scheme
Program: B. Tech. Civil Engineering

Class.: **Second Year, B. Tech.**   Semester: **SEM - IV**   W.E.F.: **2025-2026**

Sr. No.	Course Code	Course Title	Course Category	Teaching Scheme				Course Credits	Evaluation scheme							Total
				L	T	P	Contact Hrs/wk		Theory					Practical		
									CIE			ESE	CIE	ESE	
									CA-I	MSE	CA-II				
01	24CV401T	Structural Mechanics	PCC	3	-	-	3	3	15	20	15	50	-	-	100
02	24CV402T	Building Planning and Drawing	PCC	2	-	-	2	2	15	20	15	50	-	-	100
03	24CV403T	Concrete Technology	PCC	2	-	-	2	2	15	20	15	50	-	-	100
04	24CV404T	Open Channel Flow and Hydraulic Machines	PCC	3	-	-	3	3	15	20	15	50	-	-	100
05	24CV405T	Hydrology & Water Resources Engineering	PCC	2	-	-	2	2	15	20	15	50	-	-	100
06	24COI406T	Constitution of India	VEC	2	-	-	2	2	-	-	-	-	50	-	50
07	24CV407T	MDM-II	MDM	2	-	-	2	2	15	20	15	50	-	-	100
08	24CV408T	Software Applications in Civil Engineering	EEM	2	-	-	2	2	-	-	-	-	50	-	50
09	24CV402L	Building Planning and CAD Laboratory	VSEC	-	-	4	4	2	-	-	-	-	60	40	100
10	24CV403L	Concrete Technology Laboratory	PCC	-	-	2	2	1	-	-	-	-	30	20	50
11	24CV409L	Seminar	CEP	-	-	2	2	1	-	-	-	-	30	20	50
		Total							90	120	90	300	220	80	900

L: Lecture, **T:** Tutorial, **P:** Practical, **CA-I:** Continuous Assessment-I, **CA-II:** Continuous Assessment-II, **CIE:** Continuous in Semester Evaluation, **ESE**: End Semester Examination

Course Category	BSC/ESC		Program Courses		Multidisciplinary Courses		Skill Courses	Humanities Social Science and Management (HSSM)				Experiential Learning Courses (ELC)			Liberal Learning Courses (LLC)
	BSC	ESC	PCC	PEC	MDM	OE	VSEC	AEC-01, AEC-02	EEM	IKS	VEC	Int/OJT	Proj.	CEA/FP	CCA
Credits			13		02		02		02		02			01	
Cum. Sum	16	14	33		04		05	05	02	02	04			01	02

Shri Ambabai Talim Sanstha's

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Department of CIVIL Engineering

Teaching and Evaluation Scheme for Minor in "Leadership and Management"

Sr. No.	Course Code	Course Title	Course Category	Teaching Scheme				Course Credits	Evaluation scheme							
									Theory				Practical		Total
				L	T	P	Contact Hrs/wk		CIE			ESE	CIE	ESE	
									CA-I	MSE	CA-II				
01	24CV305T	Management in Engineering	MDM	2	-	-	2	2	15	20	15	50	-	-	100
02	24CV406T	Lean Concept and Management Approach	MDM	2	-	-	2	2	15	20	15	50	-	-	100
03	24CV506T	Disaster Management and Mitigation Techniques	MDM	2	-	-	2	2	15	20	15	50	-	-	100
04	24CV506L	Disaster Management and Mitigation Techniques Laboratory	MDM	-	-	2	2	1	-	-	-	-	30	20	50
05	24CV606T	Operation Research	MDM	2	-		2	2	15	20	15	50	-	-	100
06	24CV606L	Operation Research Laboratory	MDM	-	-	2	2	1	-	-	-	-	30	20	50
07	24CV706T	Sustainable Engineering and Trends	MDM	2	-		2	2	15	20	15	50	-	-	100
08	24CV706L	Capstone Project	MDM	-	-	4	4	2	-	-	-	-	60	40	50
		Total		10	-	08	18	14	75	100	75	250	120	80	700

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DTE CODE: 6644
MSBTE CODE : 1552

Multidisciplinary Minor (MDM)

- Students should select any one minor, excluding those offered by their parent department, from the diverse range of minors available.
- Students should complete all courses within their selected minor in order to earn credits.

MDM Name	Sr. No	Course Code	Course Name	Sem	Offered by Department
Leadership and Management	1	24CV305T	Management in Engineering	III	Civil Engineering
	2	24CV406T	Lean Concept and Management Approach	IV	
	3	24CV506T	Disaster Management and Mitigation Techniques	V	
	4	24CV506L	Disaster Management and Mitigation Techniques Laboratory	V	
	5	24CV606T	Sustainable Engineering and Trends	VI	
	6	24CV706T	Operation Research	VII	

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DTE CODE: 6644
MSBTE CODE :1552

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

Course Code	24CV301T		Course Name	Applied Mathematics		
Teaching Scheme				**Evaluation Scheme**		
L	T	Credits		CA-I	MSE	CA-II	ESE
3	-	3		15	20	15	50

Course Prerequisites:

Students are able to know the fundamentals of calculus, differential equations, linear algebra, and basic numerical methods

Course Objective:

1. To introduce fundamental concepts of Laplace, Transform & Inverse Laplace transform and its applications.
2. To introduce Partial Differential Equations and its Applications
3. To develop Mathematical skills and enhance thinking power of students.
4. To introduce Mathematics and their applications in engineering fields
5. To understand numerical methods for differentiation and integration to solve engineering problems.

Course Outcome:

CO-1	Comprehend the fundamental knowledge of the Laplace transforms and its properties for elementary functions.
CO-2	Use Laplace Transform and Inverse Laplace Transform to solve linear differential equations with constant coefficients
CO-3	Understand the Fourier transform and its properties
CO-4	Apply PDEs for solving Engineering problems.
CO-5	Apply numerical methods for differentiation and integration to solve engineering problems.

Course Contents

Unit-I	**Laplace Transform**	Hours:09
Definition – conditions for existence ; Transforms of elementary functions ; Properties of Laplace transforms - Linearity property, first shifting property, second shifting property, transforms of functions multiplied by tn , scale change property, transforms of functions divided by t, transforms of integral of functions, transforms of derivatives ; Evaluation of integrals by using Laplace transform ; Transforms of some special functions- periodic function, Heaviside Module step function, Dirac delta function.		

Unit-II	**Inverse Laplace Transform**	Hours:09
Introductory remarks; Inverse transforms of some elementary functions; General methods of finding inverse transforms; Partial fraction method and Convolution Theorem for finding inverse Laplace transforms; Applications to find the solutions of linear differential equations and simultaneous linear differential equations with constant coefficients		

Unit-III	**Fourier Transform**	Hours:09
Definitions – integral transforms; Fourier integral theorem (without proof); Fourier sine and cosine integrals; Complex form of Fourier integrals; Fourier sine and cosine transforms; Properties of Fourier transforms; Parseval's identity for Fourier Transforms.		

Unit-IV	**Partial Differential Equations and Their Applications**	Hours:09
Formation of Partial differential equations by eliminating arbitrary constants and functions; Equations solvable by direct integration; Linear equations of first order (Lagrange's linear equations); Method of		

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separation of variables – applications to find solutions of one-dimensional heat flow equation ($\partial u \, \partial t = c \, 2 \, \partial \, 2u \, \partial x \, 2$), and one-dimensional wave equation (i.e.$\partial \, 2y \, \partial t \, 2 = c \, 2 \, \partial \, 2y \, \partial x \, 2$).

Unit-V	Numerical Differentiation and Integration	Hours:09

Numerical differentiation, methods based on interpolation, Error analysis, numerical integration, methods based on interpolation, Newton cotes methods, Error estimates for trapezoidal and Simpson's rule.

Text Books:

1. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.
2. A course in Engineering Mathematics (Vol III) by Dr. B. B. Singh, Synergy Knowledge ware, Mumbai.
3. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
4. "A Text Book of Applied Mathematics", P. N. and J. N. Wartikar, Vol I and II", Vidyarthi Griha Prakashan, Pune, 2006.
5. "Introductory Methods of Numerical Analysis", S.S. Sastry, 3rd edition, Prentice Hall of India, 1999.

Reference Books:

1. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York.
2. A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pte Ltd., Singapore.
3. Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw-Hill Publishing Company Ltd., New Delhi.
4. "Advanced Engineering Mathematics", Wylie C.R, Tata McGraw Hill Publication, 8th Edition, 1999.
5. "Fundamentals of Mathematical Statistics", Gupta and Kapoor, S. Chand & Sons Publishers, 10th Edition, 2000.
6. "Numerical methods for scientific and Engineering Computation", M. K. Jain, S. R. K. Iyengar, R. K. Jain, New Age International Limited Publishers.

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

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DTE CODE: 6644
MSBTE CODE :1552

Course Code	24CV302T		Course Name	Strength of Materials		
Teaching Scheme				**Evaluation Scheme**		
L	T	Credits		CA-I	MSE	CA-II	ESE
3	-	3		15	20	15	50

Course Prerequisites:
Students are able to know the basics of engineering mechanics, equilibrium of forces, and fundamental mathematics

Course Objective:
1. To introduce the fundamental concepts of stress, strain, and material behavior under various loading conditions.
2. To develop the ability to determine internal forces such as axial force, shear force, and bending moment in statically determinate structures.
3. To enable students to understand and analyze the flexural and shear behavior of beams using fundamental principles and stress distribution concepts.
4. To equip students with the theoretical foundation for analyzing short and long columns, including buckling behavior and eccentric loading conditions.
5. To develop the ability to assess complex stress states in components and apply various failure theories for safe and efficient design

Course Outcome:	
CO-1	The fundamental concepts of stress, strain, elastic constants, and the behavior of materials under axial and thermal loading.
CO-2	Internal forces such as axial force, shear force, and bending moment in beams using equilibrium conditions.
CO-3	Analyse flexural and shear stresses in beams under various loading conditions and *apply* torsion theory to determine stresses in circular shafts.
CO-4	Evaluate the strength and stability of columns under axial and eccentric loading using Euler's and Rankine's theories.
CO-5	Interpret the state of stress at a point using Mohr's circle and *apply* failure theories to determine the safety of structural elements.

Course Contents

Unit-I	**Basic Concepts of Stress and Strain**	Hours:09
Engineering properties of different materials, St. Venant's principle, Simple stress and strain Hooke's law, Elastic behavior of the body under external actions, Composite sections under axial loading, Temperature stresses, Elastic constants, Normal stresses and strains in three dimensions		
Unit-II	**Axial Force, Shear Force and Bending Moment in Beam**	Hours:09
Axial force, shear force, and moment in beams, Concept of unbalanced forces at a, transverse section, Axial forces, shear forces, and moment – interaction, Relations among load, shear, and moment		
Unit-III	**Stresses in beams**	Hours:09
Theory of cylindrical bending, Relationship between intensity of loading, shear force and ending moment over elemental length, Derivation of flexural formula, economic sections, analysis of flexural action, derivation of formula for shearing stress, concept of shear flow, shear lag and shear center Torsion -Assumptions, derivation of torsion formulae, torsion of circular shafts, power transmission, stresses and deformation in determinate solid/hollow homogeneous shafts		

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Unit-IV	Columns and Struts	Hours:09

Concept of short and long columns, formulae by Euler and Rankin, Euler's Crippling load for different end conditions, limitation of Euler's formula, equivalent length, eccentrically loaded short compression members, Kern of a section; load applied off the axes of symmetry, introduction to combined axial and flexural loads

Unit-V	Combined Stresses and Failure Theories	Hours:09

State of simple shear, Analytical and graphical representation of state of combined stress at a point, Absolute maximum shearing stress, Application of Mohr's circle to combined loading, Principal stresses and strains, Theories of Failure

Text Books:

1. Singer F.L. and Pytle, 2011, "Strength of Materials", Harper Collins Publishers, Fourth Edition
2. Junnarkar S.B. (2014), "Mechanics of Structures", Charotor Publishers, Anand, 31st edition,
3. Khurmi R.S., 2018, "Strength of Material", S. Chand and Co., Edition revised 1968, New Delhi
4. Dr. Sadhu Singh, 1978, "Strength of Materials", Khanna Publishers, N. Dehli, ISBN No. 978-81-7409-048-7
5. Prasad I.B, 1988, "A text book of Strength of Materials", Khanna Publishers, N. Dehli, ISBN NO:978-81-7409-069-X
6. Timoshenko S.P. and Young D.H., 2002, "Elements of Strength of Materials", East West Press, 4th edition 1962, New Delhi
7. Ramamrutham S., 2011, "Strength of Materials", Dhanpat rai and Sons, Delhi

Reference Books:

1. Beer F P., Jhonston E. R., John. T. D E wolf, 2017, "Mechanics of Materials" TMH, 7th edition
2. Popov E.P.,2015, "Introduction to Mechanics of Solids", Prentice-Hall, Second Edition 2005
3. Crandall S.H., Dahl N.C., & Lardner T.J., 1955, "An Introduction to Mechanics of Solids", Tata McGraw Hill, 2nd Edi, 1978
4. Nash W., 2005, "Strength of Materials Schaum's outline series", McGraw Hill, fourth edition
5. Punmia B. C., 2018, "Mechanics of Materials" Laxmi Publications, revised edition, 2016
6. Subramanian R., 2016, "Strength of Materials" Oxford University Press, 2nd edition, New Delhi

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

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Course Code	24CV303T	Course Name		Fluid Mechanics			
Teaching Scheme				**Evaluation Scheme**			
L	T	Credits		CA-I	MSE	CA-II	ESE
3	-	3		15	20	15	50

Course Prerequisites:

Students are able to know the basics of engineering physics, applied mathematics, and fundamentals of engineering mechanics

Course Objective:

1. Illustrate the fundamental properties of fluids and basic concepts of fluid statics.
2. Explain the principles of fluid kinematics and visualize flow characteristics using flow nets and velocity potential functions.
3. Apply fluid dynamics principles including Bernoulli's and Euler's equations to analyze practical flow situations.
4. Differentiate between laminar and turbulent flow regimes and analyze flow characteristics using velocity and shear stress profiles.
5. Solve engineering problems involving energy losses in pipes and evaluate flow in pipe networks including transient condition

Course Outcome:

CO-1	Demonstrate an understanding of fluid properties and analyze hydrostatic pressure, forces on submerged bodies, and buoyancy.
CO-2	Analyze fluid motion using kinematic principles, including streamline patterns, flow nets, and the continuity equation.
CO-3	Apply Bernoulli's and Euler's equations to solve flow problems and evaluate the performance of flow-measuring devices.
CO-4	Analyze laminar and turbulent flow in conduits and apply relevant theoretical models to determine velocity and shear stress distributions.
CO-5	Evaluate head losses in pipe systems, solve multi-reservoir and pipeline network problems, and explain transient flow phenomena like water hammer.

Course Contents

Unit-I	Fluid Statics	Hours:10
Definition of fluids, fluid properties-density, specific weight, specific volume, specific gravity, viscosity, compressibility, surface tension, capillarity, vapour pressure, types of fluids - Newtonian and non-Newtonian fluid, continuum, fluid pressure, Forces on fluid elements, fundamental equation, manometers, hydrostatic thrust on submerged surfaces, buoyancy, stability of unconstrained bodies, fluids in rigid body motion		

Unit-II	Fluid Kinematics	Hours:06
Types of Flows, Stream lines, Streak Line, Path Line, Stream Tube, Stream Bundle, Equipotential lines, velocity and acceleration of fluid, Stream Function and Velocity Potential Function, Flow Net-(Properties and Uses), Continuity Equation (3-D Cartesian Form)		

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Unit-III	Fluid Kinetics	Hours:10

Forces Acting on Fluid in Motion, Euler's Equation along a Streamline, Bernoulli's equations, Bernoulli's Theorem assumptions, Limitations and modifications. Bernoulli's Applications: Venturi meter (Horizontal and Vertical), Orifice meter, Orifices, Time required for Emptying the Tank, Concept of HGL and TEL. Theoretical and Experimental determination of hydraulic coefficients of orifice. Introduction of mouthpiece and Rotameter.

Unit-IV	Laminar and Turbulent Flow	Hours:09

Laminar flow: Fully developed laminar flow between infinite parallel plates, both plates stationary, upper plate moving with constant speed, fully developed laminar flow in pipe.

Turbulent flow: Shear stress distribution and turbulent velocity profiles in fully developed pipe flow, velocity distribution and shear stresses in turbulent flow, Prandtl mixing length theory, Nikuradse's experiment, Introduction to Boundary Layer Theory

Unit-V	Losses in Pipes	Hours:10

Major and Minor Losses, Darcy-Wiesbach Equation, Concept of Equivalent Pipe, Dupit's Equation. Pipes in Series, Parallel and Syphon, Two Reservoir Problems, Three Reservoir Problems Concept of Water hammer. Surge Tanks (Function, Location and Uses)

Text Books:

1. Fluid Mechanics – A.K. Jain – Khanna Pub., Delhi.
2. Fluid Mechanics – Hydraulic and Hydraulic Mechanics -Modi/Seth – Standard Book House, Delhi.
3. Fluid Mechanics – S. Nagrathanam – Khanna Pub., Delhi.
4. Fluid Mechanics – Garde-Mirajgaonkar – Nemchandand Bros., Roorkee.
5. Fluid Mechanics – Arora.
6. Fluid Mechanics through Problems – Garde R. J.
7. Fluid Mechanics and hydraulic machine-R.K.Bansal, Laxmi Pubication.

Reference Books:

1. Fluid Mechanics – Streeter-McGraw-Hill International Book Co., Auckland.
2. Elementary Fluid Mechanics – H. Rouse – Toppan C. Ltd. Tokyo.
3. Fundamentals of Fluid Mechanics, Munson, Young, Okiishi, Huebesch, Wiley Publication.
4. Fluid Mechanics – Shames - McGraw-Hill International Book Co., Auckland.

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

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Course Code	24CV304T	Course Name		Engineering Survey		
Teaching Scheme				**Evaluation Scheme**			
L	**T**	**Credits**		**CA-I**	**MSE**	**CA-II**	**ESE**
3	-	3		15	20	15	50

Course Prerequisites:
Students are able to know the basics of engineering graphics, applied mathematics, and fundamentals of geometry and trigonometry

Course Objective:
1. To provide foundational knowledge of levelling techniques
2. To familiarize students with plane table surveying and modern instruments like Total Station
3. To explain the use and functioning of theodolite.
4. To impart knowledge about horizontal and vertical curve design
5. To educate students on various types of engineering surveys

Course Outcome:	
CO-1	Conduct levelling operation
CO-2	Conduct plane table surveys and operate Total Station for field measurements.
CO-3	Use theodolite instruments to measure angles and conduct traversing for accurate surveying
CO-4	Design and set out horizontal and vertical curves using linear and angular methods relevant to highway and railway engineering
CO-5	Plan and perform engineering surveys including reconnaissance, route surveys, and mine/tunnel correlation for infrastructure projects.

Course Contents

Unit-I	Levelling	Hours:10
Terminology, Types of levels- components, working and use of Dumpy and Auto, Types of levelling, Reciprocal Levelling, Curvature and Refraction, Temporary and Permanent Adjustments of Dumpy Level		
Contouring- Definition, characteristics contour interval, equivalent, uses and characteristics of contour lines, direct and indirect methods of contouring. Computation of Areas and Volumes		

Unit-II	Plane Table Surveying and Study of Total Station	Hours:08
Principle, accessories, significance and adjustments, Methods and applications of plane table survey Total Station: Principle, Methods and applications of Total Station		

Unit-III	Theodolite Traversing	Hours:10
Theodolite- parts and technical terms, temporary and permanent of a transit Theodolite, Electronic Theodolite. Applications of Theodolite- measurement of horizontal angle-, vertical angle, prolongation of a straight line, extending a line, measuring magnetic bearing of a line, Theodolite Traversing, Omitted measurements		

Unit-IV	Study of Curves	Hours:10
Significance of curves, Type of horizontal curves, elements of simple, compound, transition and combined curves, setting out of simple curve by linear and angular methods.		
Vertical curves – types, lengths of vertical curves		

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Unit-V	Engineering Surveys	Hours:07

Reconnaissance, Preliminary and location surveys for engineering projects, Layout, Setting out works, Route Surveys for highways, railways and waterways, introduction to curve ranging, Mine Surveying - Instruments – Tunnels: correlation of underground and surface surveys, shafts.

Text Books:

1. Surveying and Leveling, N.N.Basak ,Tata McGraw Hill Publications,
2. Surveying and Leveling, B C Punmia Vol I & II, Laxmi Publications.
3. Plane Surveying----A.M. Chandra---- New Age International Publishers
4. Surveying Vol. I ---- Dr.K. R. Arora
5. Surveying Vol. I and II - S. K. Duggal, Tata McGraw Hill, New Delhi.

Reference Books:

1. Plane and Geodetic surveying for Engineers. Vol. I -- David Clark
2. Surveying and Levelling Vol. I and II - T.P Kanetkar and S.V Kulkarni, Pune Vidhyarthi Gruha

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos

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Course Code	24CV305T	Course Name	Building Planning and Construction			
Teaching Scheme				**Evaluation Scheme**		
L	T	Credits		CA-I	MSE	CA-II	ESE
2	-	2		15	20	15	50

Course Prerequisites:

Students are able to know the basics of engineering drawing, building materials, and fundamentals of construction practices

Course Objective:

1. Understand the fundamental principles of building planning and zoning regulations.
2. Learn the key building requirements and types of masonry construction using various materials.
3. Acquire knowledge of concrete components, admixtures, and basic formwork systems used in modern construction.
4. Identify various types of doors, windows, stairs, and movement systems with functional and design considerations.
5. Understand and apply concepts related to flooring, roofing systems, precast structures, and waterproofing materials used in modern buildings

Course Outcome:

CO-1	Apply building planning principles and zoning regulations to prepare space-efficient and climate-responsive layouts.
CO-2	Identify different types of masonry and partition wall systems and explain their functional requirements and construction methods.
CO-3	Demonstrate an understanding of concrete materials, admixtures, and basic formwork used in small-scale construction projects.
CO-4	Analyze the design and functional aspects of doors, windows, stairs, ramps, and elevators in a building.
CO-5	Evaluate appropriate flooring, roofing systems, and modern construction methods including precast and waterproofing techniques in building construction.

Course Contents

Unit-I	Building Planning Principles	Hours:06
Zoning: Purpose of zoning, Types of urban zones, How to separate zones, Objects of Zoning, Density Zoning, Zoning Powers, Zoning economy Principles of planning: Aspect, prospect, privacy, grouping, circulation, roominess Orientation and climate-responsive design Building bye-laws: Setbacks, FSI, coverage, height control Space standards for residential buildings (NBC norms)		
Unit-II	**Basic Requirements and Masonry Construction**	**Hours:06**
Basic building requirements: Strength, stability, dimensional stability, damp-proofing, water-proofing, heat and sound insulation, termite protection. Stone masonry: Types – Random rubble, coursed rubble, ashlar masonry. Brick masonry: English bond, Flemish bond, Rat trap bond. Composite masonry and partition walls: Brick, aluminum, timber.		
Unit-III	**Concrete for Construction**	**Hours:06**

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Ingredients of concrete: Cement, aggregates, water – properties and quality. Introduction to admixtures: Fly ash, pozzolana, plasticizers, retarders. Properties of fresh and hardened concrete. Basics of formwork: Materials and requirements (wooden, steel, aluminum).

Unit-IV	Doors, Windows, and Lateral Movement Systems	Hours:06

Doors and windows: Classification based on materials, fixtures, fastening. Stairs: Terminology, types (dog-legged, open-well, quarter-turn), design requirements. Ramps and elevators: Functional aspects, planning considerations. Use of composite materials for frames and shutters.

Unit-V	Flooring, Roofing and Modern Construction Systems	Hours:06

Floor types: Ground and upper floors, tiled floorings, special industrial floors (trimix). Roof types: Pitched roofs, trusses (King Post, Queen Post), flat roofs. Roof coverings: Mangalore tiles, A.C. sheets, G.I. sheets, synthetic sheets. Precast and pre-engineered buildings: Advantages and limitations. Basics of waterproofing materials and systems.

Assignment: On Drawing Book

1. Lettering, Symbols, Types of lines and dimensioning as per IS 962.
2. Stone Masonry: Uncoursed Rubble, Course Rubble
3. Brick masonry: English bond, Flemish bond, rat trap bond.
4. Types of Doors and Windows
5. Types of Staircases: Dog legged, quarter turn and Open well.

Text Books:

1. Punmia B.C., Jain A. K., 2008, "Building Construction", Laxmi Pub. Pvt. Ltd., 10th Edi, N. Delhi
2. Arora S. P. and Bindra S. P., 2010, "Text Book of Building Construction", Dhanpat Rai Publications

Reference Books:

1. Sikka V. B., 2015, "A Course in Civil Engineering Drawing", S. K. Kataria and Sons
2. SP 7- National Building Code Group 1 to 5, B.I.S. New Delhi
3. I.S. 962 - 1989 Code for Practice for Architectural and Building Drawings, B.I.S. New Delhi

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

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Course Code	24UHV306T	Course Name	Universal Human Values			
Teaching Scheme				**Evaluation Scheme**		
L	T	Credits		CA-I	MSE	CA-II	ESE

L	T	Credits		CA-I	MSE	CA-II	ESE
2	-	2		15	20	15	50

Course Prerequisites:

Students are able to know the basics of human values, ethics, and fundamental understanding of self, family, society, and environment

Course Objective:

1. To introduce the concept of value education and the process of self-exploration for understanding human aspirations.
2. To develop an understanding of the human being as a co-existence of self and body and promote harmony within.
3. To foster harmonious relationships within the family, society, and promote mutual trust and respect.
4. To cultivate a holistic understanding of nature, its interdependence, and coexistence for sustainable living.
5. To enable learners to apply value-based understanding in professional ethics and social responsibility.

Course Outcome:

CO-1	Explain the role of value education and analyze human aspirations of happiness and prosperity through right understanding.
CO-2	Differentiate between the needs of the self and the body and demonstrate harmony within the individual.
CO-3	Illustrate the importance of trust and respect in relationships and develop a vision for harmony in family and society.
CO-4	Interpret the interconnectedness of nature and evaluate the concept of coexistence across natural systems.
CO-5	Apply holistic understanding to evaluate professional ethics and propose value-based strategies for personal and professional development.

Course Contents

Unit-I	Introduction to Value Education	Hours:06

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

Unit-II	Harmony in the Human Being	Hours:06

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

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Unit-III	Harmony in the Family and Society	Hours:06
Harmony in the Family – the Basic Module of Human Interaction, Values in Human-to-Human Relationship, 'Trust' – the Foundational Value in Relationship, 'Respect' as the Right Evaluation, Understanding Harmony in the Society, Vision for the Universal Human Order		

Unit-IV	: Harmony in the Nature	Hours:06
Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence		

Unit-V	Implications of the Holistic Understanding– a Look at Professional Ethics	Hours:06
Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models, Typical Case Studies, Strategies for Transition towards Value-based Life and Profession		

Text Books:
1.   A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana,

Reference Books:
1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

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Course Code	24CV307T		Course Name	Business Communication & Presentation Skills			
Teaching Scheme				Evaluation Scheme			
L	T	Credits		CA-I	MSE	CA-II	ESE
1	1	2		25	0	25	50

Course Prerequisites:

Students are able to know the basics of English language, grammar, and fundamental computer skills

Course Objective:

1. Develop an understanding of the fundamentals, principles, and barriers of effective business communication.
2. Train students in professional written communication such as letters, reports, resumes, and business documents.
3. Enhance interpersonal, group, and cross-cultural communication skills for teamwork and leadership.
4. Provide hands-on skills in Microsoft Word and PowerPoint for professional document processing and presentation design.
5. Equip students with Microsoft Excel skills for data management, analysis, and decision-making in business contexts.

Course Outcome:

CO-1	Demonstrate effective oral and written communication using appropriate etiquette and professional standards.
CO-2	Draft business correspondence, reports, and resumes with clarity, conciseness, and proper formatting.
CO-3	Participate confidently in group discussions, negotiations, and multicultural professional settings.
CO-4	Create well-structured documents and impactful presentations using MS Word and PowerPoint.
CO-5	Analyze, interpret, and present data effectively using MS Excel functions, charts, and pivot tables.

Course Contents

Unit-I	Introduction to Business Communication	Hours:06
Definition, importance, and objectives, Process of communication, Principles of effective communication (7 Cs), Types of communication: Verbal & Non-verbal, Formal & Informal, Internal & External, Essentials of oral communication, Public speaking techniques, Voice modulation, clarity, and tone, Listening skills, Body language: Gestures, posture, eye contact, facial expressions, Etiquette in professional interactions (meetings, interviews, etc. Barriers to communication and how to overcome them		

Unit-II	Written Business Communication	Hours:06
Writing business letters: inquiry, complaint, adjustment, sales, etc., Email writing etiquette, Memorandums and Notices, Agendas and Minutes of Meetings, Circulars and Office Orders, Report writing: Types, structure, and format, Resume and Cover Letter Writing		

Unit-III	Group, Cross-Cultural and Digital Communication	Hours:06
Conducting and participating in meetings, Group Discussions (GD): Techniques and evaluation		

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parameters, Negotiation skills, Team communication and collaboration, Conflict resolution, Understanding cultural differences in business communication, Communication in global teams, Email, chat, and video conferencing etiquette, Use of social media in professional communication

Unit-IV	Microsoft Word – Document Processing and Microsoft PowerPoint – Presentation Design	Hours:06

Microsoft Word :Text formatting, styles, and themes, Page layout: margins, orientation, breaks, columns, Tables, charts, SmartArt, and images, Table of contents, index, footnotes, endnotes, Header/footer, page numbering, Mail merge and labels, Proofing tools: spell check, grammar check, thesaurus, Track changes and comments for review, Document templates (Project report, Resume, etc.)

Microsoft PowerPoint: Slide design: layouts, themes, templates, Using transitions and animations effectively, Inserting multimedia: images, videos, audio, Hyperlinks and action buttons, Slide master and design consistency, Presenter view and printing options, Tips for effective technical presentations

Unit-V	Microsoft Excel – Data Management and Analysis	Hours:06

Microsoft Excel: Workbook and worksheet operations, Cell formatting and conditional formatting, Formulas and functions: Math: SUM, AVERAGE, COUNT, Logical: IF, AND, OR, Lookup: VLOOKUP, HLOOKUP, Text, Date, and Financial functions, Sorting, filtering, and data validation, Charts and graphs (Pie, Bar, Line, Scatter), Pivot tables and pivot charts, Basic macros and automation, Introduction to What-If Analysis (Goal Seek, Data Tables)

Text Books:
1. Hariharan S. (2010)"Soft Skills" MJP Publishers, Chennai
2. Seely S. (2009)"Oxford Guide to Effective Writing and Speaking" Oxford University Press, UK
3. Huckin T. N. and Olsen L. A."Technical Writing and Professional Communication for Nonnative Speakers of English"Tata McGraw Hills, UK

Reference Books:
1. Masters A. & Harold R. W. (2011) Personal Development for Life & Work, Learning India Private Limited.

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

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Course Code	24CV302L	Course Name	Strength of Materials Laboratory	
Teaching Scheme			**Evaluation Scheme**	
P	**Credits**		**CIE**	**ESE**
2	1		30	20

Course Prerequisites:
Students are able to know the basics of engineering mechanics, material properties, and laboratory safety practices

Course Objective:
1. To understand the operation and application of the Universal Testing Machine (UTM).
2. To determine mechanical properties of materials through tensile and compression tests.
3. To evaluate the shear strength of materials using the direct shear test.
4. To assess material toughness using Charpy and Izod impact tests.
5. To examine the quality of bricks and timber through absorption, compression, and bending tests.

Course Outcome:	
CO-1	Demonstrate proper operation of the Universal Testing Machine (UTM) and explain its applications in various material tests.
CO-2	Perform tensile and compression tests on mild steel, TMT bars, cast iron, bricks, and timber, and analyze their mechanical properties like strength, ductility, and stiffness.
CO-3	Evaluate shear strength of materials using direct shear test
CO-4	Conduct impact tests using Charpy or Izod methods and compare the toughness of different metals under dynamic loading.
CO-5	Assess the quality of bricks and timber through water absorption, compression, and bending tests.

Course Contents

Exp. No.	Experiment Title	CO
1	Study of Universal Testing Machine.	01
2	Tensile test on Mild steel and TMT steel.	02
3	Compression test on M.S. and C.I, cement bricks or paving blocks	02
4	Compression test on timber.	02
5	Direct shear test on M.S.	03
6	Charpy or Izod Impact test on different metals.	04
7	Bending test on M.S. bar and Timber.	04
8	Water absorption and compression test on burnt bricks.	05

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Course Code	24CV303L	Course Name	Fluid Mechanics Laboratory		
Teaching Scheme			**Evaluation Scheme**		
P	**Credits**		**CIE**		**ESE**
2	1		30		20

Course Prerequisites:

Students are able to know the basics of fluid properties, engineering physics, and safe laboratory practices

Course Objective:

1. To measure fluid viscosity and pressure using viscometers, piezometers, and manometers.
2. To verify Bernoulli's theorem and determine metacentric height for fluid energy and stability analysis.
3. To calibrate flow measuring devices and calculate discharge using orifices, mouthpieces, and Venturimeters.
4. To evaluate head loss due to friction and fittings in various pipe systems.

Course Outcome:

CO-1	Measure and analyze fluid viscosity and pressure using viscometers, piezometers, and manometers.
CO-2	Verify Bernoulli's theorem and determine metacentric height to study energy conservation and fluid stability.
CO-3	Calibrate flow measuring devices and compute discharge accurately using orifices, mouthpieces, and Venturimeters.
CO-4	Determine head loss due to friction and fittings in pipes and evaluate the impact of different pipe materials and diameters.

Course Contents

Exp. No.	Experiment Title	CO
1	Measurement of Viscosity of various fluids	1
2	Demonstration of working of different types of valves and pipe fittings	4
3	Measurement of pressure Piezometer, manometers, Pressure gauges	1
4	Measurement of discharge - Calibration of measuring tank, Use of hook or point gauge.	3
5	Verification of Bernoulli's Theorem	2
6	Determination of metacentric height.	2
7	Calibration of an orifice / mouthpiece / Venturimeter / orifice meter	3
8	Study of factors affecting coefficient of friction for pipe flow (for two different materials and two different diameters)	4
9	Determination of loss of head due to Pipe Fittings	4

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Course Code	24CV304L	Course Name	Engineering Survey Laboratory	
Teaching Scheme			**Evaluation Scheme**	
P	**Credits**		**CIE**	**ESE**
4	2		60	40

Course Prerequisites:

Students are able to know the basics of geometry, trigonometry, and fundamental concepts of measurement

Course Objective:

1. To determine the relative position of any objects or points of the earth.
2. To determine the distance and angle between different objects.
3. To perform measurements in linear/angular methods
4. To perform plane table surveying in general terrain

Course Outcome:

CO-1	Determine the relative position of any objects or points of the earth.
CO-2	Determine the distance and angle between different objects.
CO-3	Perform measurements in linear/angular methods
CO-4	Perform plane table surveying in general terrain

Course Contents

Exp. No.	Experiment Title	CO
1	Use of Dumpy Level, Auto Level and Tilting Level.	01
2	Reciprocal Levelling	01
3	Sensitivity of Bubble Tube using Dumpy Level	01
4	Illustration of Permanent adjustment of Dumpy Level	01
5	Methods of Plane Table Survey	04
6	Experiments using total station	02
7	Measurement of Horizontal Angle by Various Methods	03
8	Measurement of Magnetic Bearing and Vertical Angle by Theodolite	03
9	Setting out of simple Circular Curve by Linear method	03
10	Setting out of simple Circular Curve by Angular method	03
	Projects: (Any Two)	
1	Block Contouring Project	01
2	Theodolite Traversing	02
3	Road project – at least 500m	03

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

Course Code	24CV401T	Course Name	Structural Mechanics			
Teaching Scheme				**Evaluation Scheme**		
L	T	Credits	CA-I	MSE	CA-II	ESE
3	-	3	15	20	15	50

Course Prerequisites:
Students are able to know the fundamentals of statics, equilibrium, shear force and bending moment diagrams, and basic strength of materials.

Course Objective:
1. To introduce students to classical methods for computing deflection in statically determinate beams.
2. To develop understanding of energy principles and their application in structural deformation analysis.
3. To provide students with a foundation for analyzing statically indeterminate structures using the method of consistent deformation.
4. To enable students to apply the moment distribution method for analyzing continuous beams and portal frames.
5. To equip students with the knowledge and skills to analyze continuous beams and rigid frames using the slope deflection method.

Course Outcome:	
CO-1	Compute deflections and slopes in beams using double integration, moment area, conjugate beam, and superposition methods.
CO-2	Apply strain energy and virtual work principles to determine deflections in various structural elements.
CO-3	Analyze statically indeterminate beams using the method of consistent deformation and Castigliano's theorem.
CO-4	Evaluate internal forces and draw shear force and bending moment diagrams for continuous beams and frames using the moment distribution method.
CO-5	Analyze continuous beams and rigid frames (with and without sway) using slope deflection equations, considering settlement and complex geometries.

Course Contents

Unit-I	Slope and Deflections in Beams	Hours:08
Calculation of Slope and deflection for statically determinate beams using: Double Integration Method, Macaulay's Method, Moment Area Method, Conjugate Beam Method, Superposition Method		
Unit-II	Energy Principles	Hours:08
Strain energy concepts in axial, shear, bending, and torsion members, Castigliano's and Engessor's Energy Theorems Principle of Virtual Work for beam deflection, Maxwell's Reciprocal Theorem, Williot-Mohr Diagrams		

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Unit-III	Method of Consistent Deformation	Hours:09
Concept of structural indeterminacy, Application of Castigliano's Theorem for indeterminate structures, Analysis of Propped Cantilever and Fixed Beams under various loadings, Calculation of fixed-end moments, slopes, and deflections		

Unit-IV	Moment Distribution Method	Hours:10
Analysis of continuous beams and propped cantilevers, Theorem of Three Moments, Effects of support settlement and thermal loads, Drawing Shear Force and Bending Moment Diagrams, Analysis of portal frames with and without sway		

Unit-V	Slope Deflection Method	Hours:10
Analysis of continuous beams using slope deflection equations, Analysis of rigid frames with and without sway, Consideration of support settlements, Introduction to frames with sloping legs and gabled frames		

Text Books:

1. Reddy C. S., "Basic Structural Analysis", Tata McGraw Hill,3rd edition 2010
2. Wang C.K., "Statically Indeterminate Structures", McGraw Hill
3. Vazirani V.N., Ratwani M.M and Duggal S.K., "Analysis of Structures - Vol. I", ISBN NO: 978-81-7409-140-8
4. Khurmi R.S., "Theory of Structures", S Chand, Delhi
5. Punmia B.C., "Structural Analysis", Laxmi Publications

1. Timoshenko and Young, "Theory of structures", McGraw Hill
2. Kinney J. S., "Indeterminate Structural Analysis", Oxford and IBH
3. Hibbler R. C., "Structural Analysis", Pearson Publications, 9th Edition
4. Schodek, "Structures", Pearson Education, 7th edition
5. Ramamrutham S. and Narayanan R., "Theory of Structures" Dhanpat Rai Publishers, Delhi

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

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DTE CODE: 6644
MSBTE CODE :1552

Course Code	**24CV402T**	Course Name	Building Planning and Drawing			
Teaching Scheme				**Evaluation Scheme**		
L	**T**	**Credits**	**CA-I**	**MSE**	**CA-II**	**ESE**
2	-	2	15	20	15	50

Course Prerequisites:

Students are able to know the basic concepts of engineering drawing, fundamentals of civil engineering materials, and elementary principles of building construction.

Course Objective:

1. To understand the components and structural elements involved in basic building construction.
2. To apply principles of building planning, orientation, and sustainability under Indian climatic and regulatory conditions.
3. To analyze residential building requirements based on anthropometry, functionality, and building codes.
4. To evaluate various building services like plumbing, HVAC, fire safety, and acoustics for functional efficiency.
5. To create accurate 2D building plans, sections, and elevations using Computer Aided Drawing tools.

Course Outcome:

CO-1	Identify and explain various components of buildings such as foundations, walls, doors, and windows.
CO-2	Interpret and apply principles of orientation, sun and wind diagrams, and green building concepts to site planning.
CO-3	Analyze anthropometric data and circulation requirements to plan functional residential spaces.
CO-4	Evaluate and choose appropriate plumbing, electrical, and fire safety systems for small-scale buildings.
CO-5	Develop 2D AutoCAD drawings for architectural plans, elevations, and service layouts using standard symbols.

Course Contents

Unit-I	**Building Components, Formwork**	**Hours:06**

Basic Building Components: Foundations: Types – stepped, isolated, combined, strip, raft, cantilever, pile. Superstructure: Walls, columns, beams, slabs, roofs. Doors and Windows: Types by material, geometry, fixtures; composite materials. Lintels and Arches: Types, materials, construction techniques. Stairs and Ramps: Terminology, requirements, types, planning for disabled access. Elevators: Types and usage. Formwork: Wooden, steel, aluminum – function and requirements.

Unit-II	**Principles of Building Planning and Orientation**	**Hours:06**

Principles of Building Planning, Sun and Wind Diagrams: Significance and application in planning. Orientation: Definition, importance under Indian climatic conditions. Factors Affecting Orientation:

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Climate, topography, wind direction, sun path. Green Building Concepts: Planning level: Site selection, layout efficiency. Construction stage: Sustainable materials, waste management. Operational level: Energy & water efficiency, waste treatment. Building Bye-laws & Regulations: As per SP-7 and NBC Group 1 to 5.

Unit-III	Residential Building Planning and Permissions	Hours:05

Basic Requirements of a Building: Strength, stability, waterproofing, damp prevention. Heat insulation, sound insulation, daylighting, ventilation. Anti-termite treatment. Anthropometry: Human body dimensions, Indian standards. Concept of percentile, space for daily activities. Circulation space requirements. Types of Residential Buildings: Bungalows, twin bungalows, row houses, apartments. Building Permission Procedure: Documentation, drawing submission, online portals (where applicable). Certificates in Building Lifecycle: Commencement Certificate, Plinth Completion Certificate, Occupancy Certificate

Unit-IV	Building Services	Hours:07

Plumbing & Drainage: Materials: Stoneware, GI, AC, CI, PVC, HDPE. Types of Traps, Fittings, Chambers. Septic Tank: Need and function. Plumbing and Drainage Plan: Concept and components. Rainwater Harvesting: Gutters, outlets, down-take systems. Electrification: Wiring types. Locations and requirements of switchboards, light and power points. Concept and importance of earthing. Fire Resistance in Buildings: Fire protection, fire hazards, resisting materials. Fire-resistant construction features. Ventilation: Necessity, functional requirements, types of systems. Air Conditioning (HVAC): Purpose, classification, principles, various systems. Acoustics and Sound Insulation: Absorption of sound, Sabine's formula. Conditions for good acoustics. Sound insulation methods, noise control. Thermal Insulation: Concept, materials, methods, computation of heat loss/gain.

Unit-V	CAD Drawing	Hours:06

Computer Aided Drawing (CAD): Introduction to Auto CAD. 2D Drafting of building plans, elevations, and sections. Symbols for plumbing, electrical, and furniture layouts. Creation of site plans, working drawings.

Text Books:
1. Building planning and drawing: Dr. N Kumarswamy, A. Kameshwara Rao
2. "Building Construction" Arora N.L. and Gupta B.R, Satya Prakashan
3. Shah, Kale, Patki, " Building Drawing", Tata McGraw- Hill
4. S.P. Arora, S.P. Bindra, "A Text Book of Building Construction", Dhanpat Rai Publications

Reference Books:
1. SP 7- National Building Code Group 1 to 5 - B.I.S. New Delhi
2. V.B. Sikka, "A Course in Civil Engineering Drawing" , S.K .Kataria and Sons .
3. Jain A.K., "The Idea of Green Building"Khanna Publishers, N. Dehli, ISBN No. 978-81- 7409-246-4
4. I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

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Course Code	24CV403T		Course Name	Concrete Technology			
Teaching Scheme				**Evaluation Scheme**			
L	T	Credits		CA-I	MSE	CA-II	ESE
2	-	2		15	20	15	50

Course Prerequisites:

Students are able to know the fundamentals of building materials, basic chemistry of cement and aggregates, and elementary concepts of strength of materials.

Course Objective:

1. To become familiar with the proper selection of concrete materials based on technical principles used in construction fields.
2. To understand the characteristics of different concrete ingredients and mix design concepts.
3. Identify special concrete different types and concrete handling equipment.
4. Provide examples of how basic information is applied to concrete's fresh and hardened qualities.
5. To learn about a multitude of issues, including deterioration and repair techniques.

Course Outcome:

CO-1	Identify the characteristics and importance of each concrete element.
CO-2	Use IS code methods to demonstrate the design of a concrete mix of the specified grade.
CO-3	Understand various types of special concrete, as well as the tools and methods used in the process.
CO-4	To check the properties of concrete in fresh and hardened state.
CO-5	To predict deteriorations in concrete and get acquainted to various repairing methods and techniques.

Course Contents

Unit-I	Overview of Concrete as a Material for Construction.	Hours:06

Cement: classification of cement, types of cement, hydration of cement. Physical properties of cement. Aggregate: Different classifications of aggregate, mechanical and physical properties, Alkali – Aggregate reaction, Grading of Aggregate, Artificial and recycled aggregate. Admixtures: Classification and types of admixtures. their effects on proportion of concrete. Water: Quality of water for use in concrete, Specifications of water as per IS 456 – 2000.

Unit-II	Concrete Mix Design and Methods of Mix Design	Hours:06

Concept and objectives of concrete mix design, factors affecting the mix design, quality control, variability of laboratory test result, acceptance criteria, Grade designation and IS requirements as per IS 456 (Exposure conditions, minimum & maximum cement content and maximum W/C ratio Methods of Mix Design: IS code method and DOE method.

Unit-III	Concreting techniques and Special Concretes.	Hours:08

Concreting Equipment's and Techniques–Batching plants, concrete mixers, hauling, pumps, concrete vibrators and compaction equipment's. Special concreting techniques- ready mix concrete, under water concreting, roller compacted concrete, cold and hot weather concreting. Special concretes – Lightweight concrete and its types, foam concrete, no fines concrete, self-compacting concrete, high density

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concrete, fibre reinforced concrete, geo-polymer concrete and Ferrocement technique.

Unit-IV	Properties and Testing of Hardened Concrete.	Hours:06

Hardened concrete – Strength of concrete, factors affecting strength, micro-cracking and stress-strain relationship, relation between tensile and compression strength, impact strength, abrasion resistance, creep and shrinkage. Testing of hardened concrete –Destructive tests -compression strength, flexural strength, indirect tensile strength, core test. Non-destructive tests: rebound hammer, ultrasonic pulse velocity, pull out test and impact echo test.

Unit-V	Deterioration and Repairs in Concrete.	Hours:06

Deterioration –Durability, factors affecting the durability of concrete, Permeability, sulphate attack, acid attack, chloride attack, corrosion of reinforcement, carbonation of concrete. Repairs – Symptoms and diagnosis of distress, evaluation of cracks, selection of repair procedure, repair of defects using various types and techniques – shotcrete and grouting. Introduction to retrofitting of concrete structures by fiber reinforced polymer (FRP), polymer impregnated concrete. Corrosion monitoring and preventive measures

Text Books:

1. M.S. Shetty, "Concrete Technology", S. Chand and Company Ltd, New Delhi.
2. M.L. Gambhir, "Concrete Technology", Tata McGraw-Hill publishing Company Ltd, New Delhi.
3. Concrete technology by A. M. Neville, J.J. Brooks, Pearson.

Reference Books:

1. Concrete Technology by A. R. Shanta Kumar, Oxford University Press, 2018.
2. Properties of Concrete by A. M. Neville, Longman Publishers.
3. Concrete Technology by R.S. Varshney, Oxford and IBH. 4. Microstructure and Properties of Concrete by P. Kumar Mehta, Prentice Hall.
4. Orchard, "Concrete Technology", Applied Science Publishers.
5. Neville A. M., "Properties of Concrete", Pearson Education.
6. Relevant Publications by Bureau of Indian Standards, New Delhi.

IS Codes: Latest revised editions of IS codes: IS 456, IS 269, IS 1489, IS 4031, IS 383, IS 2386, IS 9103, IS 516, IS 1199, IS 10262, SP 23.IS 13311

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

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Course Code	24CV404T	Course Name	Open Channel Flow and Hydraulic Machines			
Teaching Scheme			**Evaluation Scheme**			
L	T	Credits	CA-I	MSE	CA-II	ESE
3	-	3	15	20	15	50

Course Prerequisites:

Students are able to know the fundamentals of fluid mechanics, including fluid properties, fluid statics, continuity equation, Bernoulli's theorem, and basics of flow through pipes.

Course Objective:

1. Understand the principles of open channel flow and the design of most economical cross-sections for efficient water conveyance.
2. Study the characteristics and behavior of non-uniform flow in open channels, including gradually and rapidly varied flows and hydraulic jumps.
3. Learn the application of the impulse-momentum principle in the analysis of jet impacts on various types of vanes.
4. Gain knowledge of the classification, working principles, and performance characteristics of hydraulic turbines used in hydroelectric power generation.
5. Understand the types, construction, working, and performance of pumps used in water and fluid transport systems.

Course Outcome:

CO-1	Design open channel sections in the most economical way using Chezy's and Manning's equations for various cross-sections.
CO-2	Analyze non-uniform flows in open channels and describe the nature, formation, and energy loss characteristics of hydraulic jumps.
CO-3	Apply the momentum principle to compute forces and velocities associated with the impact of jets on stationary and moving flat or curved vane
CO-4	Explain the working principles of Pelton, Francis, and Kaplan turbines, and evaluate turbine performance based on specific speed and efficiency curves.
CO-5	Identify different types of pumps, explain their working mechanisms, analyze their performance curves, and select appropriate pumps for engineering applications

Course Contents

Unit-I	**Uniform Flow in Open Channel**	Hours:10
Introduction, difference between pipe flow and open channel flow, types of open channels, types of flows in open channel, geometric elements, velocity distribution, measurement of velocity-(pitot lube, current meter) weir & spillway: sharp, broad & round crested weirs, calibration of weir, time of emptying tank with weir, profile of ogee spillway, flow below gates		

Unit-II	**Steady & Uniform Flow**	Hours:10
Chezy's & Manning's formula, Roughosity coefficient, uniform flow computations, hydraulically efficient section- considerations for rectangular, triangular, trapezoidal, circular sections Specific		

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energy: definition & diagram, concept of critical, sub-critical, super-critical flow, specific force, specific discharge derivation of relationships and numerical computations

Unit-III	**Varied Flow & Impact of Jet**	Hours:10

Gradually (G.V.F.): Definition, classification of channel Slopes, dynamic equation of G.V.F. (Assumption and derivation), classification of G.V.F. profiles-examples, direct step method of computation of G.V.F. profiles

Rapidly varied flow (R.V.F.): Definition, examples, hydraulic jump- phenomenon, relation of conjugate depths, parameters, uses, types of hydraulic jump Impact of Jet: Impulse momentum principle, impact of jet on Vanes-flat, curved (stationary and moving), inlet & outlet velocity triangles under various conditions, Series of flat, curved vanes mounted on wheel

Unit-IV	**Turbines**	Hours:08

Turbines: Importance of hydro-power, classification of turbines, description, typical dimensions and working principle of Pelton, Francis & Kaplan turbine (detailed design need not to be dealt with), Module quantities, specific speed, performance characteristics, selection of type of turbine, description & function of draft tube, Thomas's cavitation number

Unit-V	**Pumps**	Hours:07

Pumps: Classification, component parts, working of centrifugal pump, performance characteristics, pump selection, common troubles & remedies, introduction to different types of pumps: reciprocating, multi-stage, jet, air lift, submersible pump.

Text Books:
1. Modi, Seth, "Fluid Mechanics – Hydraulic & Hydraulic Mechanics" Standard Book House
2. Bansal R.K., "Fluid Mechanics", Laxmi Publications, 9th edition 2017
3. Garde R. J., "Fluid Mechanics through Problems", New Age Publications, 3rd edition 2011
4. Jain A. K., "Fluid Mechanics", Khanna Publications, 8th edition, 2003, Delhi
5. Kumar K. L., "Fluid Mechanics", Eurasia Publication House, 11th edition, Delhi
6. Rangaraju, "Open Channel flow", Tata McGraw-Hill Pub. Co., Delhi
7. Subramanian K., "Fluid Mechanics through Problems" Tata McGraw-Hill Pub. Co., Delhi
8. Subramanian K., "Flow in Open Channel", Edition V, Tata McGraw-Hill Pub. Co., Delhi

Reference Books:
1. Streeter, "Fluid Mechanics" McGraw-Hill International Book Co., 3rd edition, Auckland
2. Shames, "Mechanics of Fluids", McGraw Hill, 4th edition
3. Chaw V. T., "Flow in Open Channel", McGraw-Hill International Book Co., Auckland
4. Hughes & Brighton, "Fluid Mechanics", Tata McGraw Hill

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

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Course Code	24CV405T	Course Name	Hydrology & Water Resources Engineering			
Teaching Scheme				**Evaluation Scheme**		
L	**T**	**Credits**		**CA-I**	**MSE**	**CA-II**	**ESE**
2	0	2		15	20	15	50

Course Prerequisites:	
Students are able to know the fundamentals of fluid mechanics	

Course Objective:

1. To impart the basic knowledge of importance of Hydrology & know various hydro meteorological parameters and their estimation
2. To impart the basic knowledge of importance irrigation in water resources development
3. To impart knowledge of various hydraulic structures of an Irrigation Scheme.
4. To impart knowledge of Diversion Head Works
5. To understand the principles of watershed management and water harvesting

Course Outcome:

CO-1	Apply the knowledge of estimation of hydro meteorological parameters
CO-2	Understand need of Irrigation in India and water requirement as per farming practice in India.
CO-3	Understand various hydraulic structures of an Irrigation Scheme.
CO-4	Understand various Diversion Head Works
CO-5	Develop basis for design of watershed management techniques.

Course Contents

Unit-I	Hydrology	Hours:08

Introduction of Hydrology: Definition, Importance and scope of hydrology, the hydrologic cycle, Precipitation: Forms and types of precipitation, Methods of measurement, Graphical representation of rainfall - Mass rainfall curves, Hyetograph, Determination of average precipitation over the catchment. Evaporation: Process, factors affecting, measurement, and control of evaporation, Infiltration: Process, Factors affecting and measurement of Infiltration Runoff: Factors affecting runoff, Determination of annual runoff, Rainfall runoff relationship Hydrograph: Storm hydrograph, Base flow and Separation of base flow, direct runoff hydrograph, Module hydrograph – theory – assumptions and limitations, Derivation and use of Module hydrograph, S - curve hydrograph.

Unit-II	Irrigation	Hours:06

Introduction to irrigation: Definition and necessity of irrigation, ill-effects of irrigation, surface, sub-surface, sprinkler irrigation, Water logging and land drainage, Water requirement of crops: Principal crops and crop seasons, cropping pattern and crop rotation, Classes and availability of soil water, depth and frequency of irrigation, Duty, delta, base period and their relationship, factors affecting duty, methods of improving duty, Assessment and efficiency of irrigation water. Gross command area,

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culturable command area and command area calculations based on crop water requirement. Estimation of evapo-transpiration by blaney-criddle method and penman method

Unit-III	Dams and Hydraulic structures	Hours:07

Gravity Dams – Estimation of Loading, Design Criteria, Causes of Failure of Gravity Dam, Precaution against Failure, Theoretical and Practical Profile, Stability Calculations, Galleries, Joints Earth Dams: Components and their Functions, Design Criterion, Inverted Filters, Downstream Drainage, Causes of Failure of Earthen Dam. Spillway: Necessity and function components of spillway, different types, factors affecting choice of type of spillway. Elementary hydraulic design, types of energy dissipation arrangements, gates for spillway. Outlets in Dams: Outlets through concrete and earth dams.

Unit-IV	Diversion Head Works	Hours:06

Diversion Head Works: component parts & their functions, types of weir and barrages, Causes of failure and remedies, Introduction to Theory of seepage-Bligh's creep theory, critical exit gradient, Khosla's theory Canals: Types, alignment, typical sections of canals, balancing depth Kennedy's and Lacey's silt theories, canal lining-purpose, types, selection and economics.
C.D.Works: Necessity, Types. Canal Regulatory Works: head regulator, cross regulator, canal fall, canal escape, standing wave flume.

Unit-V	Watershed Management	Hours:04

Watershed Management: Need and importance of watershed management, Soil conservation
measures, Techniques of Rainwater and groundwater harvesting. Minor Irrigation works : General layout, main components and functioning of – 1. Percolation tanks, 2. K.T.Weir, 3. Bandhara irrigation 4. Lift irrigation

Text Books:

1. Irrigation Engineering – S. K. Garg – Khanna Publishers, Delhi.

2. Irrigation, Water Resources and Water power Engineering – Dr P.N. Modi

3. Irrigation and Water power Engineering – Dr Punmia and Dr. Pande – Laxmi Publications, Delhi

4. 'Engineering Hydrology' – Dr. K. Subramanya., -Tata McGraw Hill, New Delhi.

5. Hydrology – Dr. P Jayarami Reddy, Laxmi Publications, New Delhi

6. 'Engineering Hydrology' – Dr. Raghunath H.M. - New Age International Publishers

Reference Books:

1. USBR, "Design of Small Dam", OXFORD & IBH, Publishing Company

2. Justinn, 1961, "Engineering for Dam" Vol. I, II, III, Creager and Hinds

3. Circular of Government of Maharashtra, 18 February 1995, "Design of Canals"

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

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DTE CODE: 6644
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Course Code	24COI406T	Course Name		Constitution of India		
Teaching Scheme				**Evaluation Scheme**		
L	**T**	**Credits**		**CA-I**	**MSE**	**CA-II**	**ESE**
2	-	2		25	-	25	-

Course Prerequisites:

Students are able to know the fundamentals of political science, historical background of India's freedom movement, and the basic framework of governance in India.

Course Objective:

1. To familiarize the students with the key elements of the Indian constitution.
2. To enable students to grasp the constitutional provisions and values.
3. To acquaint the students with the powers and functions of various constitutional offices and Institutions.
4. To make students understand the basic premises of Indian politics and role of constitution and citizen-oriented measures in a democracy.

Course Outcome:

CO-1	Understand the key aspects of the Indian Constitution.
CO-2	Comprehend the structure and philosophy of the Constitution
CO-3	Understand the power and functions of various constitutional offices and institutions.
CO-4	Realize the significance of the constitution and appreciate the role of constitution and citizen

Course Contents

Unit-I	**Introduction**	Hours:06

Constitution' meaning of the term, Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive, Principles of State Policy

Unit-II	**Union Government and its Administration**	Hours:06

Structure of the Indian Union: Federalism, Centre- State, relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha

Unit-III	**State Government and its Administration**	Hours:05

Governor: Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

Unit-IV	**Local Administration**	Hours:7

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati Raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed

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officials, Importance of grass root democracy

Unit-V	Election Commission	Hours:06

Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women

Text Books:
1. Sastry, T. S. N., (2005). India and Human rights: Reflections, Concept Publishing Company India (P Ltd.),

Reference Books:
1. Nirmal, C.J., (1999). Human Rights in India: Historical, Social and Political Perspectives (Law in India), Oxford India.

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

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Course Code	24CV407T	Course Name	Environment &Water Resources Engineering			
Teaching Scheme			**Evaluation Scheme**			
L	T	Credits	CA-I	MSE	CA-II	ESE
2	0	2	15	20	15	50

Course Prerequisites:
Students are able to know the basics of chemistry, and fluid mechanics along with fundamental concepts of ecology and natural resources.

Course Objective:
1. To introduce concepts of environmental sustainability in water resources.
2. To impart knowledge of water treatment and water supply.
3. To provide knowledge of wastewater management.
4. To impart knowledge of hydrology and apply sustainable methods for water resources development and management.
5. To impart knowledge of Environmental Management & Policies

Course Outcome:	
CO-1	Explain fundamentals of environmental engineering and water resources
CO-2	Know water treatment process and distribution methods
CO-3	Understand wastewater management methods.
CO-4	Analyze hydrological data for water resource assessment.
CO-5	Understand Environmental Management & Policies

Course Contents

Unit-I	Introduction to Environmental Engineering	Hours:05
Importance of environment in Engineering practice, Water, air, and soil as environmental resources, Environmental pollution: causes, effects, and control measures, Environmental Impact Assessment (EIA), Sustainable development & UN SDGs		

Unit-II	Water Treatment and Supply	Hours:06
Sources of water and water demand estimation, Quality of water: physical, chemical, and biological characteristics, Drinking water standards (IS/WHO), Water treatment processes: sedimentation, coagulation, filtration, disinfection, Distribution systems – design and components		

Unit-III	Wastewater Engineering	Hours:08
Wastewater characteristics, Primary, secondary, and tertiary treatment methods, Sludge treatment and disposal, Septic tanks, oxidation ponds, and other low-cost systems		

Unit-IV	Hydrolgy & Water Resources	Hours:08
Hydrologic cycle, precipitation, infiltration, runoff estimation, Hydrographs & flood analysis Groundwater occurrence and aquifers, Watershed management & rainwater harvesting		

Unit-V	Environmental Management & Policies	Hours:04
River basin management, Water logging and land reclamation, Environmental laws: Water Act, EPA,		

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Climate change and its impact on water resources, Climate change and adaptation strategies
Text Books:
1. Irrigation Engineering – S. K. Garg – Khanna Publishers, Delhi. 2. Irrigation, Water Resources and Water power Engineering – Dr P.N. Modi 3. Irrigation and Water power Engineering – Dr Punmia and Dr. Pande – Laxmi Publications, Delhi
Reference Books:
1. 'Engineering Hydrology' – Dr. K. Subramanya., -Tata McGraw Hill, New Delhi. 2. Water Supply Engineering- P. N. Modi-Standard Book House 3. Sewage Treatment & Disposal and Waste Water Engineering- P. N. Modi-Standard Book House
MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

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Course Code	24CV408T		Course Name	Software Applications in Civil Engineering		
Teaching Scheme				**Evaluation Scheme**		
L	**T**	**Credits**		**CA-I**	**MSE**	**CA-II**	**ESE**
2	0	2		25	-	25	-

Course Prerequisites:

Students should have basic knowledge of civil engineering subjects (structures, geotechnics, hydraulics, transportation), engineering mechanics, and IS codes, along with fundamental computer and AutoCAD skills.

Course Objective:

1. To introduce the importance and need for software tools in various civil engineering disciplines.
2. To develop an understanding of software-based modeling, analysis, and design techniques through theoretical and practical case studies.
3. To enable students to analyze structural and geotechnical systems under different loading and boundary conditions using standard codes and practices.
4. To provide hands-on training with software tools for solving real-world civil engineering problems.
5. To foster critical thinking and error analysis skills related to modeling, data entry, result interpretation, and validation of software outputs.

Course Outcome:

CO-1	Understand the role and scope of software tools in civil engineering and distinguish between their advantages, limitations, and sources of error.
CO-2	Model and analyze structural elements (beams, columns, slabs) using software, including fixed and simply supported beams under various loading conditions
CO-3	Apply software tools in geotechnical and hydraulic problem-solving, such as slope stability, earth pressure calculation, and pipe network analysis.
CO-4	Design civil engineering structures like slabs, beams, footings, and steel members using IS code provisions via software-based approaches
CO-5	Gain practical experience with at least one software tool from four different civil engineering domains (e.g., ETABS for structures, Water GEMS for hydraulics, STAAD. Pro for design, AutoCAD Civil 3D for transportation), enhancing their job-readiness.

Course Contents

Unit-I	Introduction to Civil Engineering Software	Hours:06
Importance and need of software for modeling, analysis and design in Civil Engineering field, Advantages and limitations of software, causes for errors, validation of software results. Failures due to errors in modeling, data entry and interpretation of software results.		
Unit-II	Structural Analysis Applications	Hours:06
Determination of Bending Moment Diagram, Deflections for different loading conditions for a Simply Supported Beam and Cantilever Beam. Determination of fixed end moments for different loading conditions of a fixed beam. Calculation of Influence line diagrams at any section of a Simply Supported Beam.		
Unit-III	Geotechnical & Hydraulic Applications	Hours:06

Application of problems in Hydraulics such as Hardy cross method in the Analysis of pipe network, Computation of water surface profiles in open channel flows. Estimation of Settlement of foundations in Cohesive Soil, Stability Analysis of Slopes. Estimation Earth Pressures in Cohesive and Cohesionless soils.

Unit-IV	Structural Design Applications	Hours:06

Application of problems in Environmental engg., Transportation Engg. Design of Slabs using I.S. Code method. Analysis and Design of Beams by using Limit state method. Design of columns subjected to axial load and Uni-axial Moment. Design of Isolated Footing. Design of rolled steel columns, built up columns, Beams and built-up Beams.

Unit-V	Integrated Software Practice	Hours:06

Software application in various disciplines of Civil Engineering: Learning and practice of any one software: from at least any 4 domain from 14 domain

Text Books:
1. Computer aided design, software and analytical tools by C.S. Krishnamoorthy & S. Rajesh.
2. Computer applications in Civil Engineering by S.K. Parikh.
3. Computer aided design in Reinforced concrete by V.L. Shah.

Reference Books:
1. http://www.stepinau.com/offline/Civil/4-1/COMPUTER%20APPLICATIONS%20IN%20CIVIL%20%20ENGINEERING/COMPUTER%20APPLICATIONS%20IN%20CIVIL%20%20ENGINEERING.html#.YrANZXZBxQI
2. https://www.inspirenignite.com/mh/ce-c507-software-applications-in-civil-engineering-syllabus-for-ce-6th-sem-2018-pattern-mumbai-university/

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

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Course Code	24CV402L	Course Name	Building Planning and CAD Laboratory	
Teaching Scheme			**Evaluation Scheme**	
P	**Credits**		**CIE**	**ESE**
4	2		60	40

Course Prerequisites:

Students are able to know the fundamentals of engineering drawing, basics of building materials and construction, and elementary principles of building planning as per IS codes and bye-laws.

Course Objective:

1. To introduce students to architectural drafting standards, symbols, and conventions as per IS codes.
2. To develop the ability to represent and detail architectural components in technical drawings.
3. To provide hands-on experience in preparing measured drawings of existing buildings.
4. To impart knowledge of building planning and design principles in accordance with local bye-laws.
5. To train students in preparing complete building documentation, including working drawings and project reports with emphasis on sustainable services.

Course Outcome:

CO-1	Illustrate standard architectural symbols, lettering styles, line types, and dimensioning practices in accordance with IS 962 through sketchbook exercises.
CO-2	Draw detailed architectural components such as footings, doors, windows, and staircases, and interpret their construction requirements.
CO-3	Prepare measured drawings of an existing residential building, including plan, elevation, section, site plan, and compute area statements and specifications.
CO-4	Design a G+1 residential building and produce a complete set of submission and working drawings following relevant building bye-laws and functional requirements.
CO-5	Develop a technical project report that includes water supply, drainage, rainwater harvesting, and sanitation systems, and demonstrate understanding of sustainable building services.

Course Contents

Exp. No.	Experiment Title	CO
A	**List of Drawing Assignments on Sketchbook.**	
1.	Lettering, Symbols, Types of lines and dimensioning as per IS 962.	01
2.	Foundations: - Isolated, Combined Footings, Under Reamed Piles, Rafts.	02
3.	Doors: Elevation and Sectional Drawings.	02
4.	Windows: Elevation and Sectional Drawings, Standard Aluminum Sections	02
5.	Stairs: Plan and Sectional Drawings	02
B	**List of Drawing Assignments on Imperial size sheet:**	
I	Based on actual measurement of existing residential building consisting of plan, elevation, section passing through staircase, Site plan. Area statement & brief	03

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	specifications.	
II	Planning & design of a building (Minimum G+1): Full set of drawings for:	
1.	Municipal Submission drawing as per local statutory body bye-laws such as Town Planning, Municipal Council or Corporation Authorities.	04
2.	Foundation / Center Line Drawing.	04
3.	Furniture layout plan.	04
4.	Electrification plan.	04
5.	Water supply & drainage plan.	04
6.	Project report giving details of Drainage System, Water Supply System, Water Tank, Septic Tank Design of terrace Drainage System.	05
7.	Rain water harvesting systems	05

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Course Code	24CV403L	Course Name	Concrete Technology Laboratory	
Teaching Scheme			**Evaluation Scheme**	
P	**Credits**		**CIE**	**ESE**
2	1		30	20

Course Prerequisites:

Students are able to know the basic concepts of engineering chemistry, properties of construction materials, and fundamentals of strength of materials related to cement, aggregates, and concrete.

Course Objective:

1. To introduce standard testing methods for evaluating the physical and mechanical properties of cement and aggregates.
2. To impart hands-on experience in testing workability and strength of fresh and hardened concrete.
3. To familiarize students with IS codes for mix design and quality control of concrete.
4. To develop analytical skills for interpreting test results and ensuring compliance with standards.
5. To expose students to practical field practices through site visits to RMC plants and modern concrete technology applications.

Course Outcome:

CO-1	Determine the physical properties of cement (fineness, consistency, setting time, soundness, specific gravity, and tensile strength) using standard IS methods.
CO-2	Analyze the grading and characteristics of coarse aggregates through sieve analysis and fineness modulus determination.
CO-3	Assess the workability and strength of fresh and hardened concrete by slump test, compressive strength, indirect tensile, and flexural strength tests.
CO-4	Design concrete mixes as per IS code method considering materials, admixtures, and field requirements.
CO-5	Demonstrate awareness of modern practices in concrete production through site visits to RMC plants and relate laboratory results to field applications.

Course Contents

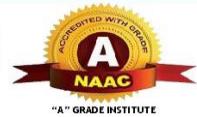| Exp. No.	Experiment Title	CO
1.	Testing of Cement: Consistency, Fineness, Setting Time, Soundness and Strength Test for Cement	01
2.	Testing of Aggregates: Specific Gravity, Sieve Analysis, Bulking of Fine Aggregate, Flakiness Index, Elongation Index and Percentage Elongation	02
3.	Placement Tests on Concrete: Workability Tests: Slump, Compaction,	03
4.	Strength Tests on Concrete: Compression, Flexure, Split & Tensile Test,	03
5.	Effects of Admixture: Accelerator, Retarder, Super Plasticizer,	04
6.	Exercise and verification of Concrete Mix Design by IS Code method	04
7.	Non-destructive Testing for Concrete.	05
8.	Site visit to RMC plant	05

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Course Code	24CV409L	Course Name	Seminar	

Teaching Scheme			Evaluation Scheme	
P	Credits		CIE	ESE
2	1		30	20

Course Prerequisites:

Students are able to know the fundamentals of technical communication, basics of report writing, literature review methods, and presentation skills with the use of audio-visual aids

Course Objective:

1. To develop communication and presentation skills.
2. To improve literature survey and report writing ability.
3. To inculcate self-learning and independent study habits.
4. To provide exposure to current trends in civil engineering.
5. To build confidence in technical discussions.

Course Outcome:

CO-1	Identify and select a relevant topic in civil engineering.
CO-2	Conduct literature survey using various resources.
CO-3	Prepare a well-structured seminar report.
CO-4	Deliver an effective oral presentation with visual aids.
CO-5	Demonstrate confidence and clarity in technical communication.

Course Contents

Students are required to select a Civil Engineering–related topic, preferably extending beyond the prescribed curriculum, under the guidance of a faculty member. They shall conduct an extensive literature review, compile a structured technical report, and present their findings through an oral presentation supported by visual aids. This activity is designed to promote independent learning, improve technical writing, enhance communication skills, and provide exposure to recent developments in Civil Engineering.

The topic for the seminar may be related to Civil Engineering area and interdisciplinary area related to Civil Engineering such as-

Sr. No.	Title
1.	Concrete Technology
2.	Environmental Engineering
3.	Geotechnical Engineering
4.	Transportation Engineering
5.	Water resources Engineering
6.	Surveying & Remote Sensing Techniques
7.	Earthquake Engineering
8.	Advanced Construction Technology
9	Advanced Engineering Construction Materials
10	Advanced Engineering Construction Methods