



SANDIP
FOUNDATION

SANDIP FOUNDATION'S

**SANDIP INSTITUTE OF TECHNOLOGY AND
RESEARCH CENTRE**

**(An autonomous institute permanently affiliated to Savitribai Phule Pune
University, Pune and Accredited by NAAC 'A' Grade)**

**BACHELOR OF TECHNOLOGY
IN
CIVIL ENGINEERING**

**PROGRAM STRUCTURE AND SYLLABI FOR I to VIII
SEMESTERS FROM ACADEMIC YEAR 2023 - 24**

CURRICULA FOR UG PROGRAMS

Table 1: Coverage of Subject Area over Curriculum (UG Programs)

Semester	Subject Area Coverage
I-II	Engineering Sciences (Physics & Chemistry), Engineering Mathematics, Elements of basic engineering (Mechanical, Civil & Electrical), Personality Development, Indian Knowledge System (IKS)
III-IV	Combined institute and program core courses, Open Electives, Foreign Languages (At least one), Value Added Courses, Skill Development Courses, Employability Certificate Courses
V-VI	Combined institute and program core courses, Program Electives towards specialisation, Vocational Internship (Mandatory), Value Added Courses, Skill Development Courses, Employability Certificate Courses
VII - VIII	Program core courses Program Electives, Program lined Project work, Value Added Courses

Table 2: Coding for Courses used in Curriculum

Course Code XXYYZZZE	Definitions
XX	Year of curriculum implementation
YY	Branch code
ZZZ	Level of program & Course no. 1: First Year (UG) 2: Second Year (UG) 3: Third Year (UG) 4: Fourth Year (UG) 5: First Year (PG) 6: Second Year (PG)
E	Suffix only for elective
VAC	Value Added Course
Branch Code (YY)	Branch/Program
00	Institute Level Course/Program
01	Engineering Sciences and Humanities
10	Computer Engineering
11	Electrical Engineering
12	Mechanical Engineering
13	Automation & Robotics
14	Civil Engineering
15	Information Technology
16	Master of Business Administration (M.B.A.)
17	Electronics & Telecommunication Engineering
18	Artificial Intelligence & Data Science

Table 3(a): Distribution of Credits and Marks for B.Tech Programs

Part I: Program Courses									
Semester									Total
I	II	III	IV	V	VI	VII	VIII		
Credits	22	22	21	21	20	21	22	22	171
Marks	750	750	725	725	650	675	700	700	5675
Part II: Value Added Courses									
Credits	-	-	1	1	2	1	Audit	Audit	5
Marks	-	-	25	25	50	25	Audit	Audit	125
Total Marks	750	750	750	750	700	700	700	700	5800
TOTAL MINIMUM CREDITS TO EARN (Part I + II)							171 + 5 = 176		

Table 3(b): Distribution of Credits and Marks for Honors/Minors Programs (UG)

Semester					Total
V	VI	VII	VIII		
Credits	5	4	5	4	18
Marks	150	100	150	100	500

Abbreviations

CIA	Continuous Internal Assessment	AEC	Ability Enhancement Course
L	Theory Lecture	BS	Basic Science
T	Tutorial	ES	Engg. Science
P	Practical	CEP	Community Engagement Project
TC	Total Credits	EC	Exit Course
CP	Credits for Practical	HSSM	Humanities, Social Science and Management
CT	Credits for Theory	IKS	Indian Knowledge System
IC	Institute Core	VSEC	Vocational and Skill Enhancement Course
IE	Institute Elective	MD	Multidisciplinary Minor
OE	Open Elective	LLC	Liberal Learning Course
PC	Programme Core	VEC	Value Education Course
PE	Programme Elective	ELC	Experiential Learning Course
VAC	Value Added Course	^a	Oral/ Presentation Examination
HM	Honors / Minor Program Course	^b	Practical Examination
SDC	Skill Development Course		
EEC	Employability Enhancement Course		

Formative Assessment for Theory Course <i>(Scaled to allotted marks)</i>		
CIA	Weightage	Description
CIA 1	20%	Home Assignment
CIA 2	40%	Mid-Term Exam (MTE)
CIA 3	20%	Quizzes
CIA 4	20%	Topic Based Presentation
TOTAL	100%	



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE
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First Year of B. Tech Program (2023 Pattern)

Semester – I (Common)

SECTION	Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)						Examination Scheme				Total Marks
					L	T	CT	P	CP	TC	Formative Assessment CIA		Summative Assessment ESE		
											Theory	Lab	Theory	Lab	
I	1	IC (BS)	2301101	Engineering Mathematics-I	3	--	3	--	--	3	50	--	50	--	100
	2	IC (BS)	2301102 / 2301103	Engineering Physics / Engineering Chemistry	2	--	2	2	1	3	25	25	50	--	100
	3	IC (ES)	2312104	Elements of Mechanical Engineering	2	--	2	2	1	3	25	25	50	--	100
	4	IC (ES)	2311105 /2317106	Elements of Electrical Engineering/ Elements of Electronics Engineering	2	--	2	2	1	3	25	25	50	--	100
	5	IC (ES)	2314107	Elements of Civil Engineering	2	--	2	2	1	3	25	25	50	--	100
	6	IC (AEC1)	2301104	Language Communication Lab	--	--	--	2	1	1	--	25	--	25 ^a	50
	7	IC (AEC2)	2301105	Social Media Content Creation Lab	--	--	--	2	1	1	--	25	--	25 ^b	50
II	8	IC (VSEC)	23YYZZZ	One Group 'A' Course						2					75
	9	IC (ES)	23YYZZZ	One Group 'B' Course						1					25
	10	IC (LLC)	23YYZZZ	One Group 'C' Course						2					50
TOTAL (SECTION I+ II)					13/12	00	13/12	18/20	9/10	22	150	225	300	75	750



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First Year of B. Tech Program (2023 Pattern)

Semester – II

SECTION	Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)						Examination Scheme				Total Marks
					L	T	CT	P	CP	TC	Formative Assessment CIA		Summative Assessment ESE		
											Theory	Lab	Theory	Lab	
I	1	IC (BS)	2301106	Engineering Mathematics-II	3	--	3	--	--	3	50	--	50	--	100
	2	IC (BS)	2301102 / 2301103	Engineering Physics / Engineering Chemistry	2	--	2	2	1	3	25	25	50	--	100
	3	IC (BS)	2314107	Environmental Science	2	--	2	--	--	2	25	--	50	--	75
	4	IC (ES)	2312108	Engineering Graphics	1	--	1	2	1	2	--	25	50	--	75
	5	IC (ES)	2311105 / 2317106	Elements of Electrical Engineering / Elements of Electronics Engineering	2	--	2	2	1	3	25	25	50	--	100
	6	PC	23YY109	Program Specific Core	2	--	2	--	--	2	25	--	50	--	75
	7	IC (IKS)	2300110	Democracy, Election and Governance	2	--	2	--	--	2	25	--	50	--	75
II	8	IC (VSEC)	23YYZZZ	One Group 'A' Course						2					75
	9	IC (ES)	23YYZZZ	One Group 'B' Course						1					25
	10	IC (LLC)	23YYZZZ	One Group 'C' Course						2					50
TOTAL (SECTION I+ II)					12/13	00	12/13	20/18	10/9	22	175	150	400	25	750



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Grouping of Courses
(Offered in both Semesters)

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)						Examination Scheme				Total Marks
				L	T	CT	P	CP	TC	Formative Assessment CIA		Summative Assessment ESE		
										Theory	Lab	Theory	Lab	
Group A														
8	IC (VSEC)	2315111	Problem Solving and Programming using Python	1	--	1	2	1	2	--	25	25	25 ^b	75
		2312112	Engineering Draftsmanship	1	--	1	2	1	2	--	25	50		75
Group B														
9	IC (ES)	2313113	Introduction to Drone Technology	1	--	1	--		1	--	--	25	--	25
		2312114	Workshop Practice	--	--	--	2	1	1	--	25	--	--	25
Group C														
10	IC (LLC)	2300115	Physical Education and Yoga	--	--	--	4	2	2	--	50	--	--	50
		2300116	Physical Education and Sports	--	--	--	4	2	2	--	25	--	25 ^b	50
TOTAL				3	--	3	14	07	10	--	150	100	50	300
Certificate Course Work (Only for Exit Criteria)														
11	CUG	ECYY1	Skill based Course	--	--	--	--	6*	4	--	100	--	--	100
12	CUG	ECYY2	Internship (2 Weeks)	--	--	--	--	2#	2	--	50	--	--	50
TOTAL				-	--	6	--	--	10	--	150	--	--	150
* 6 hrs/day for Skill based Course over three consecutive weeks														
# Internship of 2 weeks (36-40 hours of engagement per week) only after satisfactory completion of Skill Based Course work														



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Program Specific Core Courses (PC)

Sr. No.	Course Code	Course Name
Automation & Robotics/Mechanical/Civil Engineering		
1	2314109	Statics & Dynamics of Engineering Systems
Computer/ Information Technology/ Artificial Intelligence & Data Science		
1	2310109	Fundamentals of Computing & C programming
Electronics & Telecommunication Engineering		
1	2317109	Introduction to EDA tools
Electrical Engineering		
1	2311109	Component Materials and Testing



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Skill Based Courses for UG Certificate (Exit Option)

Sr. No.	Course Code	Course Name
Automation & Robotics		
1	EC131	Robot Maneuverability
Computer Engineering		
1	EC101	Java Script
Information Technology		
1	EC151	Data Analytics using MS-Excel, POWER BI & Tableau
Artificial Intelligence & Data Science		
1	EC181	Elementary Data Analytics using MS-Excel
Electronics & Telecommunication Engineering		
1	EC171	Identification of active and passive components
Electrical Engineering		
1	EC111	Basics of Electrical Wiring System
Civil Engineering		
1	EC141	Basics of Civil Engineering for Construction
Mechanical Engineering		
1	EC121	Basic Machining operations using Lathe



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I

2301101: Engineering Mathematics -I

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3 hrs/week	Th:03	Theory	CIA: 50
			End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Convert given complex number into polar form.
2. Understand and distinguish Mean Value Theorems, Define Taylor's and Maclaurin's series, know the indeterminate forms.
3. Define and understand functions of several variables.
4. Know the concept and properties of Jacobian.
5. Compare different forms of matrix.
6. Acquire the knowledge of Eigen values and Eigen vectors.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Solve Algebraic equations using De-Moivre's theorem.

CO2: Apply Mean Value Theorems for solving examples and Taylor's and Maclaurin's series to find the expansions of functions.

CO3: Apply Euler's theorem on Homogeneous functions to find partial order derivatives .

CO4: Discuss maxima and minima of functions of two variables.

CO5: Solve examples of rank, nullity and inverse of a matrix.

CO6: Apply Cayley Hamilton theorem to find inverse of a matrix.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I

2301101: Engineering Mathematics- I

Unit 1:Complex Number	6 hrs	CO
Complex numbers and their applications: Revision of complex numbers, Argand diagram, Polar form of complex number, Euler's theorem, De-Moiré's Theorem (without proof), Roots of algebraic equations.		CO1
Hyperbolic functions, Inverse hyperbolic functions, Separation into real and imaginary parts		
Unit 2: Differential Calculus	7 hrs	CO2
Mean Value Theorems : Rolle's Theorem , Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorems		
Expansion of Functions: Taylor's series and Maclaurin's series, Expansion of functions using standard expansions.		
Indeterminate Forms: L Hospital's Rule, Evaluation of Limits.		
Unit 3:Partial Differentiation	8 hrs	CO3
Introduction to functions of two and three variables, Partial Derivatives, Euler's Theorem on Homogeneous functions, Partial derivative of composite function.		
Unit 4: Applications of Partial Differentiation	6 hrs	CO4
Jacobian , Errors and Approximations		
Maxima and Minima of functions of two variables.		
Unit 5: System of Linear Equations	8 hrs	CO5
Rank of a Matrix, System of Linear equations, Linear Dependence and Independence.		
Linear and Orthogonal Transformations.		
Unit 6: Linear Algebra	7 hrs	CO6
Eigen values and Eigen vectors, Cayley Hamilton Theorem, Diagonalization of a matrix.		

Recommended books

1. Basic Engineering Mathematics Volume 2 – H.K.Dass , Dr. Rama Verma.
2. Wiley C. R “Advanced Engineering Mathematics” Mc Graw Hill Inc.,New York Ed.1993.
3. Higher Engineering Mathematics by B. V.Ramana (Tata McGraw Hill).
4. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.).



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I

2301101: Engineering Mathematics- I

Reference books

1. B. S. Grewal, Higher Engineering Mathematics, 43rd edition, Khanna Publishers.
2. R. K. Jain, S. R. K. Iyengar, Advanced Engineering Mathematics, 2nd Edition, Narosa Publishing House
3. Amit Sharma, Vijay Kumar, Naveen Mani, Reeta Bhardwaj, A Text Book of Applied Mathematics I, Bharti Publication (P) Ltd., New Delhi
4. David E. Penney and C. Henry Edwards , Single variable calculus, Prentice Hall; 6th edition , 2002.

LIST OF ASSIGNMENTS (CIA-1)

1. Find the roots of Algebraic equations using De- Moivre's theorem.
2. Verify Mean Value Theorms and to evaluate limits using L Hospital's rule.
3. Apply Euler's theorem on Homogeneous functions to find partial order derivatives.
4. Find approximate error and find maxima and minima of functions of two variables.
5. Solve the system of linear equations.
6. Find Eigen values and Eigen vectors.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem -I/II

2301102: Engineering Physics

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2 hrs/week	Th:02	Theory	CIA : 25
Practical: 02 hrs/week	Practical: 01		End-Sem:50
		Pract:	25
		Oral:	--
		Termwork	--

Course Objectives: To understand

1. To provide basic concepts to resolve many engineering and technological problems.
2. After completing this course student will be able to appreciate and use the methodologies to analyze and design a wide range of engineering systems.
3. To understand the recent trends and advances in technology, this requires precise control over dynamics of microscopic engineering systems.
4. Basic sciences like physics also invoke manipulation of processes over micro and even Nano scale level as there is a growing demand of solid understanding the principles of basic sciences.
5. Physics provides the basic ideas and gives the solution for developing mathematical and analytical abilities with higher precision.

Course Outcomes:

On completion of the course, learner will be able to–

CO1:- Apply the mathematical skill to resolve optical problems in the field of engineering.

CO2:- Examine the applications related with Laser and Optical Fibre, and Nanotechnology in engineering field.

CO3:- Analyze the behaviour of semiconductor & semiconducting devices regarding their conductivity.

CO4:- Apply the concepts of physics for Non Destructive Testing & examine its applications in various field



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2301102: Engineering Physics

Unit I - Wave Optics	7 hrs	CO
(A) <u>Interference</u> – Introduction to interference, Types of Interference, Interference due to thin film of uniform thickness(with derivation), applications: anti-reflection coating using interference of light, Numericals on uniform thin film. Interference due to wedge shaped film (qualitative discussion), band width derivation, Applications: Flatness of surface, Numericals on band width, wedge angle, etc.		CO1
(B) <u>Diffraction</u> – Definition, types of diffraction, Fraunhofer’s diffraction at single slit, conditions for maxima and minima, intensity pattern, Fraunhofer diffraction from a diffraction grating, Conditions for Principal maxima, minima, Numericals on diffraction grating. Rayleigh’s criterion, resolving power of grating, resolving power of telescope.		
Unit II - Laser and Optic Fibre	7hrs	
(A) <u>Laser</u> -Basics of laser and its mechanism, Metastable state, Population inversion, characteristics of laser, Ruby laser, Gas laser: CO ₂ , Semiconductor laser, Applications of lasers: Holography, industrial, medical.		CO2
(B) <u>Optic Fiber</u> - Introduction, parameters: Acceptance Angle, Acceptance Cone, Numerical Aperture, Types of optical fiber- step index and graded index, Attenuation and reasons for losses in optic fibers (qualitative), Communication system: basic building blocks Advantages of optical fiber communication over conventional methods. Numericals on Numerical Aperture		
Unit III – Semiconductor Physics	7 hrs	
Band theory, Classification of solid on the basis of band theory, Electrical conductivity of conductors and semiconductors, Numericals on conductivity of conductor and semiconductor. Fermi Dirac probability distribution function, Fermi energy and fermi level, position of Fermi level in intrinsic semiconductors (with derivation) & in extrinsic semiconductors, Energy band picture of p-n junction. Solar cell and its applications. Hall effect: Derivation for Hall voltage, Hall coefficient, applications of Hall effect, Numericals on Hall Effect.		CO3
Unit IV: Non Destructive Testing and Nanotechnology	7 hrs	
(A) <u>Non Destructive Testing</u> – Classification of Non-destructive testing methods, Principles of physics in Non-destructive Testing, Advantages of Non-destructive testing methods, Acoustic Emission Testing, Ultrasonic (thickness measurement, flaw detection), Radiography testing		CO4
(B) <u>Nanotechnology</u> - Introduction to nanotechnology - Quantum confinement and surface to volume ratio - Properties of nanoparticles: optical, electrical, mechanical, Applications of nanoparticles: Medical (targeted drug delivery), electronics, space and defense, automobile		



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F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2301102: Engineering Physics

LIST OF PRACTICALS

Sr. No.	Title	CO
1	Experiment based on Newton's rings (determination of wavelength of monochromatic light, determine radius of curvature of plano-convex lens)	CO1
2	To find out Resolving power of Diffraction Grating/Telescope	CO1
3	Study of position of diffraction minima by studying diffraction at a single slit	CO1
4	To determine unknown wavelength by using plane diffraction grating	CO1, CO2
5	Any Experiment based on Laser (Thickness of wire, determination of number of lines on grating surface)	CO2
6	To determine band gap of given semiconductor	CO3
7	To determine Hall coefficient and charge carrier density	CO3
8	To study I-V characteristics and determine Fill factor of solar cell	CO3

REFERENCE BOOKS:

1. Fundamentals of Physics, Resnick and Halliday (John Wiley and Sons)
2. Optics, Jenkins and White (Tata Mcgraw Hill)
3. Principles of Physics, Serway and Jewett (Saunders college publishing)
4. Introduction to Solid State Physics, C. Kittel (Wiley and Sons)
5. Principles of Solid State Physics, H. V. Keer, New Age International
6. Laser and Non-Linear Optics, B. B. Laud (Oscar publication)
7. Nanotechnology: Principles and Practices, Dr. S. K. Kulkarni (Capital Publishing Company)



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2301103: Engineering Chemistry

Teaching Scheme:	Credits	Examination Scheme	
Theory: 02 hrs/week	Th:02	Theory	CIA: 25
Practical: 02 hrs/week	Practical: 01		End-Sem:50
		Pract:	25
		Oral:	--
		Termwork:	--

Course Objectives:

1. To understand technology involved in analysis and improving quality of water as commodity.
2. To gain knowledge about fossil fuels used and future fuels.
3. To familiarize the students to various electro-analytical techniques that facilitates the study of materials.
4. To develop consciousness about corrosion and its prevention.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Utilize different methods for analysis of water and techniques used for purification of water.

CO2: Analyze the fuel and suggest an appropriate alternative fuels.

CO3: Choose appropriate instrumental method for analysis of materials.

CO4: Apply the different methods of corrosion control for preventing material destruction.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2301103: Engineering Chemistry

Unit 1: Water Technology	7 hrs	CO
Sources, conservation of water, impurities in water and their effects. WHO guideline and BIS guideline for drinking water,		CO1
Hardness of water: Types, Units and Numericals. Determination of hardness (by EDTA method using molarity concept) and alkalinity, numerical		
Boiler troubles – priming and foaming, boiler corrosion, caustic embrittlement, scale and sludge, causes and effects, methods of prevention.		
Water treatment: i) Zeolite method and numericals ii) Demineralization method, Softening of water, lime-soda, ion-exchange process and numerical		
Unit-2: Fuels & Combustion	7 hrs	CO2
Introduction (definition, classification of fuel based on chemical reactions and characteristics of an ideal fuel), Calorific value (CV): Higher calorific value (HCV) and Lower calorific value (LCV), Solid fuel – Coal: Analysis of Coal-Proximate and Ultimate analysis, numerical, Liquid fuel: Petroleum: Refining of petroleum /crude oil and composition, boiling range and uses of various fractions Gaseous fuel: Composition, properties and applications of CNG, Hydrogen gas as a future fuel		CO2
Unit 3: Battery Technology & Electro-analytical Techniques	6 hrs	CO3
Battery Technology: Types of reference electrode (calomel electrode), indicator electrode (glass electrode), Basic requirements for commercial batteries. Construction, working and applications of: Zn-Ag ₂ O, Ni-Cd, Zn-air and Lithium ion battery.		CO3
Conductometry: Introduction, conductivity cell, Conductometric titrations of acid versus base with titration curve.		
pH-metry: Introduction, standardization of pH meter, pH metric titration of strong acid versus strong base with titration curve.		
Unit 4: Corrosion & its prevention	8 hrs	CO4
Types of corrosion – Dry and Wet corrosion, mechanism of dry corrosion, nature of oxide films, wet corrosion – mechanism: hydrogen evolution and oxygen absorption, galvanic cell corrosion, Factors influencing rate of corrosion. Methods of corrosion control and prevention i) Using inhibitors, ii) Cathodic protection-sacrificial anode and impressed current methods iii) Protective coatings-metal coatings-galvanizing and tinning.		CO4



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Sem-I/II

2301103: Engineering Chemistry

LIST OF PRACTICALS

Sr. No.	Title	CO
1	To determine hardness of water by EDTA method	CO1
2	To determine alkalinity of water	CO1
3	Proximate analysis of coal.	CO2
4	To determine strength of strong acid using pH meter	CO3
5	Titration of a mixture of weak acid and strong acid with strong base using digital conductivity meter.	CO3
6	Preparation of polystyrene/phenol-formaldehyde/urea-formaldehyde resin	CO3
7	To coat copper and zinc on iron plate using electroplating.	CO4
8	To determine maximum wavelength of absorption of CuSO_4 , verify Beer's law and find unknown concentration of given sample.	CO4

Textbooks

1. Engineering Chemistry, Dr.S.S.Dara,Dr.S.S.Umare,S.Chand Publications.
2. Engineering Chemistry by Jain & Jain, DhanpatRai Publishing, 15thEdn.

Reference books

1. Engineering Chemistry, Wiley India Pvt. Ltd.
2. Inorganic Chemistry, 5 Edn by Shriver and Atkins, Oxford University Press.
3. Basic Concept of Analytical Chemistry, 2ed , S. M. Khopkar, New Age-International Publisher
4. Instrumental Methods of Chemical Analysis, G. R. Chatwal& S. K. Anand, Himalaya Publishing House.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE
F.Y. B. Tech(Common) (2023 Pattern)
Sem-I
2312104: Elements of Mechanical Engineering

Teaching Scheme:		Credits - 03	Examination Scheme	
Theory: 02hrs/week		Th: 02	Theory	CIA:25
Practical: 02 hrs/week		Practical: 01		End-Sem:50
			Termwork:	25
Course Objectives: <ol style="list-style-type: none">1. To understand different power transmitting elements.2. To explain the basic concept of engineering thermodynamics and its application. To identify the sources of energy and their conversions3. To identify different power producing and absorbing devices as per applications.4. To Classify different manufacturing processes.				
Course Outcomes: On completion of the course, learner will be able to-- CO1: Illustrate and elaborate different power transmitting elements. CO2: Interpret basic governing laws in thermal engineering. Compare different energy resources and their applications CO3: Identify different power producing and absorbing devices as per applications. CO4: Classify different manufacturing processes.				



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE
F.Y. B. Tech(Common) (2023 Pattern)
 Sem-I
 2312104: Elements of Mechanical Engineering

Units		
Unit 1	Elements of Power Transmission System	(06 Hrs.)
<p><i>Mechanical Elements:</i> Function, sketch, description, use of - Shaft, axle, key, coupling (rigid flange coupling), bearing (ball bearing), clutch-single plate clutch, brake (disc brake and Drum Brake)</p> <p><i>Power transmission devices</i> - construction, working, comparison and application of belt drive (flat and V belt), chain drive and spur gear drive arranged with simple gear train</p>		CO1
Unit 2	Introduction to Thermal Engineering	(08 Hrs.)
<p>Laws of Thermodynamics, heat engine, heat pump, refrigerator (<i>simple numerical</i>) Modes of heat transfer: conduction, convection and radiation, Fourier's law, Newton's law of cooling, Stefan Boltzmann's law. (<i>Simple numerical</i>), Two stroke and Four stroke engines (Petrol, Diesel and CNG engines)</p> <p><i>Energy Sources & its Conversion</i> Thermal energy, Hydropower energy, Nuclear energy, Solar energy, Wind energy, Hydrogen energy.</p>		CO2
Unit 3	Applied Thermal Engineering	(6 Hrs.)
<p><i>Power producing devices:</i> Boiler (water tube and fire tube), Turbines-impulse and reaction <i>Power absorbing devices:</i> Pumps - reciprocating and centrifugal, compressors (single acting single stage reciprocation air compressor), refrigeration-vapour compression refrigeration process, household refrigerator, window air conditioner (working with block diagram)</p>		CO3
Unit 4	Basic Manufacturing Processes	(06 Hrs.)
<p>Introduction to Manufacturing Processes (Casting, Forging, Sheet Metal Working), Metal Joining Processes - Welding, Soldering and Brazing, Centre Lathe Machine Operations, Drilling Operations.</p>		CO4
Books & Other Resources		
<p>Reference Books:-</p> <ol style="list-style-type: none"> 1. Khan, B. H., "Non-Conventional Energy Sources, Tata McGraw-Hill Publisher Co. Ltd. 2. Boyle, Godfrey, "Renewable Energy", 2nd Ed., Oxford University Press 3. Khurmi, R.S., and Gupta, J. K., "A Textbook of Thermal Engineering", S. Chand & Sons 4. Incropera, F. P. and Dewitt, D.P., (2007), "Fundamentals of Heat and Mass Transfer, 6th Ed., John Wiley and Sons, USA 5. Groover, Mikell P., (1996), "Fundamentals of Modern Manufacturing: Materials, Processes, and Systems", Prentice Hall, USA 6. Norton, Robert L., (2009), "Kinematics and Dynamics of Machinery", Tata McGrawHill 7. Cleghorn, W. L., (2005), "Mechanisms of Machines", Oxford University Press 8. Juvinal, R. C., (1994), "Fundamentals of Machine Component Design", John Wiley and Sons, USA 9. Ganeshan, V., (2018), "Internal Combustion Engines", McGraw Hill 		



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I

2312104: Elements of Mechanical Engineering

Term Work:-

The student shall complete the following activity as a term work.

Group -A

Expt. No. 1	Study of Different Mechanical Elements – Clutch, Brakes and Gear Drives	CO1
Expt. No. 2	Demonstration of Two Stroke and Four Stroke Engine	CO2
Expt. No. 3	Study of Any Power Plant	CO2
Expt. No. 4	Study of Domestic Refrigerator and Window AC	CO2
Expt. No. 5	Study of Water Tube and Fire Tube Boiler	CO3
Expt. No. 6	Study of Basic Operation on Centre Lathe Machine	CO4
Group -B		
Visit	The Visit of Students to Industry /Workshop is mandatory, to provide awareness and understanding of Course	CO1,CO4



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2311105: Elements of Electrical Engineering

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2 hrs/week	Th:02	Theory	CIA: 25
Practical: 02 hrs/week	Termwork: 01		End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	25

Course Objectives: To understand

1. To introduce fundamental concepts, various laws-principles and theorems associated with electrical systems.
2. To impart basic knowledge of all electrical quantities such as current, voltage, power, energy, frequency along with different types of fields.
3. To provide knowledge about fundamental parameters such as resistance, inductance and capacitance and magnetic circuits, AC and DC circuits.
4. To provide knowledge of the concepts of transformer, different energy conversions techniques.

Course Outcomes:

On completion of the course, learner will be able to–

- CO1:** Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.
- CO2:** Apply and analyze the resistive circuits using KVL, KCL under DC supply, series, parallel capacitor as well as characteristics parameters of alternating quantity, suggest applications of various batteries, concept of charging and discharging and depth of charge.
- CO3:** Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.
- CO4:** Relate phase and line electrical quantities in poly phase networks.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2311105: Elements of Electrical Engineering

Unit 1: Electromagnetism	(7 Hrs)	CO
Resistance, Effect of temperature on resistance, resistance temperature coefficient, insulation resistance. Magnetic effect of an electric current, cross and dot conventions, right hand thumb rule, Concept of mmf, flux, flux density, reluctance, permeability and field strength, their units and relationships.		CO1
Simple series magnetic circuit, Introduction to parallel magnetic circuit(Only theoretical treatment), comparison of electric and magnetic circuit,		
Faradays laws of electromagnetic induction, Fleming’s right hand rule, statically and dynamically induced e.m.f, self and mutual inductance, coefficient of couplings. Energy stored in magnetic field.		
Unit 2: Electrostatics and Batteries	(7 Hrs)	CO2
A) Electrostatics: Electrostatic field, electric flux density, electric field strength, absolute permittivity, relative permittivity and capacitance. Capacitor, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors (no derivation) and time constant.		CO2
B) Batteries :Kirchhoff’s law (DC Circuit), Different types of batteries (Lead Acid and Lithium Ion), construction, working principle, applications, ratings, charging and discharging, maintenance of batteries, series -parallel connection of batteries		
Unit 3: AC Fundamentals and Single Phase AC Circuit	(06 Hrs)	CO3
A) AC Fundamentals: Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of cycle, Period, frequency, instantaneous, peak(maximum), average and r.m.s. values, peak factor and form factor. Phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasor.		CO3
B) Study of AC circuits consisting of pure resistance, pure inductance, pure capacitance, series R-L, R-C and R-L-C circuits, phasor diagrams, voltage, current and power waveforms, resonance in series RLC circuits, concept of impedance, concept of active, reactive, apparent, complex power and power factor, Parallel AC circuits (No numerical), concept of admittance.		
Unit 4: Polyphase A.C. Circuits and Electrical Installations:	(06 Hrs)	CO4
A) Polyphase A.C. Circuits: Concept of three-phase supply and phase sequence. Balanced and unbalanced load, Voltages, currents and power relations in three phase balanced star-connected loads and delta-connected loads along with phasor diagrams.		CO4
B) Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, Earthing. Elementary calculations for energy consumption:		



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2311105: Elements of Electrical Engineering

Guidelines for Instructor's Manual

The Instructor's Manual should contain following related to every experiment –

1. Brief theory related to the experiment.
2. Apparatus with their detailed specifications.
3. Connection diagram /circuit diagram.
4. Observation table/ simulation waveforms.
5. Sample calculations for one/two reading.
6. Result table.
7. Graph and Conclusions.
8. Few questions related to the experiment.
9. Relevance of practical in real life /industry

Guidelines for Student's Lab Journal

The Student's Lab Journal should contain following related to every experiment –

1. Theory related to the experiment.
2. Apparatus with their detailed specifications.
3. Connection diagram /circuit diagram.
4. Observation table/ simulation waveforms.
5. Sample calculations for one/two reading.
6. Result table.
7. Graph and Conclusions.
8. Few short questions related to the experiment

Guidelines for Lab /TW Assessment

1. There should be continuous assessment for the TW.
2. Assessment must be based on understanding of theory, attentiveness during practical, understanding.
3. Session, how efficiently the student is able to do connections and get the results.
4. Timely submission of journal.

LIST OF PRACTICALS (min 08)

Sr. No.	Title
1	To study safety precautions while working on electrical systems, handling of various equipment's such as multimeter, ammeters, voltmeters, wattmeter's, real life resistors, inductors and capacitors
2	To demonstrate Faradays laws of Electromagnetic Induction Principle
3	To measure steady state response of series RL and RC circuits on AC supply and observations of voltage and current.
4	To Verify KVL and KCL.
5	To Study the different types of batteries, their rating and Testing.
6	To verify the relation between phase and line quantities in three phase balanced star and delta connections of load.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2311105: Elements of Electrical Engineering

7	To demonstrate different types of electrical protection equipments such as fuses, MCB, MCCB, and ELCB.
8	To study pipe, plate and strip Earthing
9	To study calculation of LT electricity bill.

Textbooks

1. V.D. Toro, Principles of Electrical Engineering, Prentice Hall India, 1989
2. D. P. Kothari, I.J. Nagrath, Theory and Problems of Basic Electrical Engineering, PHI Publication
3. V.K. Mehta, Rohit Mehata Basic Electrical Engineering, S Chand Publications
4. B.L. Theraja, A text book on electrical technology Vol-I

Reference books

1. H Cotton, Electrical technology, CBS Publications
2. L. S. Bobrow, —Fundamentals of Electrical Engineering, Oxford University Press, 2011.
3. E. Hughes, —Electrical and Electronics Technology, Pearson, 2010.
4. D. C. Kulshreshtha, —Basic Electrical Engineering, McGraw Hill, 2009.



SANDIP
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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2317106: Elements of Electronics Engineering

Teaching Scheme:	Credits - 03	Examination Scheme	
Theory: 02hrs/week	Th: 02	Theory	CIA:25
Practical: 02 hrs/week	Practical: 01		End-Sem:50
		Termwork:	25
Course Objectives: <ol style="list-style-type: none">1. To explain the working principle of P-N junction diode and special purpose diodes.2. To explain the working principle of BJTand OP-AMP as an amplifier.3. To outline number systems, logic gates, digital circuits and its applications.4. To explore the working principle of wired and wireless communication system.			
Course Outcomes: On completion of the course, learner will be able to-- CO1: Select appropriate diodes as per applications. CO2: Design a circuit using BJTand OP-AMP as an amplifier. CO3: Develop and verify the truth table for combinational and sequential circuits. CO4: Compareand contrast the wired and wireless communication system.			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2317106: Elements of Electronics Engineering

Unit 1: Diodes and Circuits	6 hrs	CO
<p>Introduction to Semiconductor: Intrinsic, Extrinsic, N-type and P-type Semiconductors, P-N Junction Diode: Construction, working principle in forward and reverse biasing, V-I Characteristics.</p> <p>Rectifier: Circuit diagram, modes of operation and input-output waveform of Half Wave Rectifier (HWR) and Full Wave Rectifier (FWR), Rectifier: Circuit diagram, modes of operation and input-output waveform of Bridge configuration, Comparison among HWR, FWR and Bridge configuration rectifier.</p> <p>Zener Diode: symbol, working principle in forward and reverse biasing with circuit diagram, V-I Characteristics and specifications.</p> <p>Light Emitting Diode (LED): symbol, construction, working principle in forward and reverse biasing with circuit diagram, V-I Characteristics.</p>		CO1
Unit 2: Bipolar Junction Transistor and Operational Amplifier	8 hrs	
<p>Working principle of transistor and its types (NPN, PNP), Bipolar Junction Transistor (BJT): symbol, construction, operation of NPN type transistor, Types of configuration (CE, CB and CC), BJT (NPN type) Common Emitter Circuit diagram and its working, input and output V-I characteristics, Modes of operation of BJT CE configuration on output characteristics with its applications.</p> <p>Performance parameters of BJT: α_{dc} and β_{dc}, Relation between α_{dc} & β_{dc} and numerical on it, Applications of Amplifier: Voltage divider biased single stage BJT (NPN) CE Amplifier: Circuit diagram and function of each component used in circuit.</p> <p>Operational Amplifier (OP-AMP): symbol, block diagram and its working, OP-AMP performance parameters (ideal and practical for IC 741): input offset voltage, input offset current, input bias current, slew rate, Common Mode Rejection Ratio (CMRR), Applications of OP-AMP: (i) Inverting Amplifier, (ii) Non-inverting Amplifier: Circuit diagram, derivation of output voltage, input-output voltage waveform.</p>		CO2
Unit 3: Digital Electronics	7 hrs	
<p>Number Systems: Binary, Octal Decimal, Hexadecimal and its Conversion, Logic Gates: Symbols, Boolean expressions, Truth Table of NOT, AND, OR, NAND, NOR, EX-OR, EX-NOR Gates, De-Morgan's Theorem and implementation using Logic Gates, Introduction to</p>		CO3



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2317106: Elements of Electronics Engineering

<p>Combinational Circuits and Sequential Circuits.</p> <p>Half Adder and Full Adder: Block schematic, Truth Table, K-map and implementation using Logic gates.</p> <p>Concept of Flip flop, Logic Symbol and Truth Table of D, T, S-R and J-K Flip Flop, Application of Flip Flops</p>	
<p>Unit 4: Communication System 7 hrs</p>	
<p>Typical Electronic Communication System and its Block Diagram and its Functional block diagram. Types of Communication media: Wired and Wireless, Twisted Pair, Co-axial Cable and Fiber Optic Cable: working, advantages, limitation and applications, Compare and Contrast wired and wireless communication system.</p> <p>Wireless Media: IEEE Electromagnetic Frequency Spectrum: enlist applications as per frequency and wavelength.</p> <p>Concept of Cellular System, Block diagram of basic cellular system, Global System for Mobile (GSM): Block Diagram, Elements of Architecture, Features. Evolution of Wireless Network: Introduction to 2G, 3G, 4G and 5G wireless network.</p>	CO4

List of Practical: (Perform any 4 practical)	CO
1. Implement the Bridge configuration rectifier circuit using 1N4007 diodes on breadboard and observe the input-output voltage waveform.	CO1
2. Build and test and simulate single stage BJT CE amplifier on breadboard and observe the output voltage waveform. Determine the value of voltage gain.	CO2
3. Build and test and simulate) the inverting and non-inverting amplifier using OP-AMP and determine the value of voltage gain. Compare the practical value with theoretical one.	CO2
4. Design, build and test Half Adder and Full Adder Circuits using logic gates on breadboard and verify its truth table.	CO3
5. Study the use cases of <i>any two</i> 4G / 5G Wireless Networks (viz. Healthcare, Education, Entertainment, Smart Cities, Autonomous Vehicles, Agriculture, Internet of Things etc.)	CO4
6. Perform the experiments using Virtual Lab: V-I characteristics of diode. Link: http://vlabs.iitkgp.ernet.in/be/	CO1



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2317106: Elements of Electronics Engineering

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a hands-on resource and reference.

The Copy of Curriculum, Conduction & Assessment guidelines, List of Experiments are to be attached.

Guidelines for Student's Lab Journal

The laboratory assignments/experiments are to be submitted by student in the form of journal.

Journal consists of Certificate, table of contents, and handwritten write-up for each experiment.

Each experiment should consist of:

1. Title.
2. Objectives.
3. Problem Statement, Outcomes
4. Hardware / Software (If any) requirements.
5. Concept.
6. Experimental procedure / Setup.
7. Observation table
8. Conclusion.

Guidelines for Lab /TW Assessment

Continuous assessment of laboratory work is done based on overall performance. Each lab assignment/ experiment assessment will assign grade / marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment / experiment assessment include:

- a) Timely completion.
- b) Performance.
- c) Punctuality and neatness.

The parameters for assessment are to be known to the students at the beginning of the course.

Textbooks

- 1) Thomas. L. Floyd, "Electronics Devices", 9th Edition, Pearson (Unit I, II).
- 2) R.P. Jain, "Modern Digital Electronics", 4th Edition, Tata McGraw Hill (Unit III).
- 3) Kennedy & Davis, "Electronic Communication Systems", 4th Edition, Tata McGraw Hill (Unit IV).
- 4) M. Schwartz, "Mobile Wireless Communication", Cambridge University Press (Unit IV).
- 5) Saro Velrajan, "An Introduction to 5G Wireless Networks: Technology, Concepts and Use- cases". (Unit IV).



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2317106: Elements of Electronics Engineering

Reference books

- 1) Boylestad and Nashelsky, “Electronic Devices and Circuit Theory”, 11th Edition, Pearson. (Unit I, II)
- 2) Ramakant A. Gayakwad, “Op-Amps and Linear Integrated Circuits”, 4th Edition, Pearson. (Unit II)
- 3) J. Schiller, “Mobile Communication”, 2nd Edition, Pearson. (Unit IV)
- 4) Donald Neaman, “Electronic Circuit Analysis and Design”, 3rd Edition, Tata McGraw Hill. (Unit I, II)

MOOC / NPTEL Courses:

- 1) NPTEL Course on “Basic Electronics” by Prof. Mahesh B. Patil, IIT Bombay
Link: <https://nptel.ac.in/courses/108101091>
- 2) NPTEL Course on “Basic Electronics” by Dr. Pramod Agarwal, IIT Roorkee
Link: <https://nptel.ac.in/courses/117107095>
- 3) NPTEL Course on “Basic Electronics” by Prof. Chitrlekha Mahanta, IIT Guwahati
Link: <https://nptel.ac.in/courses/117103063>

Virtual Lab Links:

- 1) Basic Electronics Virtual Lab developed by IIT Kharagpur:
Link: <http://vlabs.iitkgp.ernet.in/be/>
- 2) Digital Electronics Virtual Lab developed by IIT Roorkee:
Link: <https://de-iitr.vlabs.ac.in/List%20of%20experiments.html>
- 3) Digital Electronics Virtual Lab developed by IIT Guwahati:
Link: <https://www.iitg.ac.in/cseweb/vlab/Digital-System-Lab/index.php>
- 4) Electronic Circuits Simulation using Virtual Lab developed by IIT Kharagpur:
Link: <https://be-iitkgp.vlabs.ac.in/List%20of%20experiments.html>



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I

2314107: Elements of Civil Engineering

Teaching Scheme:		Credits		Examination Scheme	
Theory: 2hrs/week		Th:02		Theory	CIA: 25
Practical: 2hrs/week		Practical: 01			End-Sem:50
				Pract:	--
				Oral:	--
				Termwork	25
Course Objectives: The student should be able to					
<ol style="list-style-type: none">1. Impart knowledge about the branches of civil engineering and utilize the knowledge of civil engineer in the construction of various infrastructures.2. Impart knowledge of the basic materials and planning of building construction.3. Impart knowledge to uses of maps and modern survey equipment for field surveys.					
Course Outcomes:					
On completion of the course, learner will be able to–					
CO1: Use the knowledge of civil engineering to construct infrastructure projects for 21 st century.					
CO2: Use different civil Engineering materials and building planning in the construction as per the requirement, and the properties of materials.					
CO3: Use modern survey methods.					
CO4: Use different building planning principles and rules as per the requirement.					



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I

2314107: Elements of Civil Engineering

Unit 1: Introduction to civil engineering	7 hrs	CO
a) Introduction to structural engineering, geotechnical engineering, Construction technology, hydraulics, water resources and irrigation engineering, transportation engineering, environmental and sanitary engineering, GIS, earthquake engineering.		CO1
b) Role of Civil Engineers in the development of the nation. Role of Civil Engineer in the construction of buildings, dams, expressways, and infrastructure projects for 21st century. Importance of an interdisciplinary approach in civil engineering.		
Unit 2: Materials and construction	7 hrs	
a) Basic materials for construction –Requirement, types, uses, properties, and importance of Civil Engineering materials like, Stone, brick, wood, glass, aluminum, cement, aggregates, concrete, steel, RCC, PSC, recycling of materials.		CO2
b) <u>Substructure</u> : Definition and function of foundation (only concepts of settlement and bearing capacity of soils) Types of shallow foundations, deep foundations (only concept of friction and end bearing pile)		
c) <u>Superstructure</u> : Types of loads –dead load and live load, wind loads, earthquake considerations. Types of construction –Load bearing, framed, composite. Fundamental requirement of masonry.		
Unit 3: Surveying, Levelling and Mapping	7 hrs	
a) Introduction: Definition of Surveying, Aims and applications, Fundamental principles of surveying, Classification of surveying, Plans and maps, Scales, Units of measurement.		CO3
b) Linear Measurement: Methods, Instruments used in chain surveying, Selection of stations, Chaining, Ranging, Offsetting.		
c) Aims and applications, Definition of various terms, Instruments for leveling, Methods of leveling, Recording observations in level-book, Computing reduced levels by HI and rise & fall method, Definition of contour, Characteristics of contours of different terrains and application of contour maps, Introduction to planimeter, Introduction to Global positioning system (GPS), remote sensing (RS) and Geographical information system (GIS).		
Unit 4: Planning for built environment	7 hrs	
a) Definition and concept of plan of a simple residential building, Elementary principles and basic requirements for building planning, elevation, and section of a residential building.		CO4
b) Role of by-laws in regulating the environment, concept of built –up area, carpet area, plinth area, plot area, FSI.		
c) Use of various eco-friendly materials in construction, Concept of green buildings. Concept of an integrated built environment – natural and manmade.		



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I

2314107: Elements of Civil Engineering

Term work	
Any 6 practical exercises from those given below should be carried out, record to be submitted in the field book and file which will form a part of term work.	CO
1. Study of any four types of maps and writing their uses.	CO3
2. Exercise on use of Dumpy level and Auto level.	CO3
3. Measurement of area of irregular figures by Digital planimeter.	CO3
4. Drawing of plan elevation and section for residential buildings, single-storeyed frames, load bearing structure. Preparing schedule of opening one half imperial sheet.	CO4
5. Determination of coordinates of a traverse using Global positioning system (GPS).	CO3
6. Measurement of distance by EDM and comparing it with the distance measure using tape.	CO3
7. Visit to a construction site for studying the various construction materials used, types of structures, type of foundation and components of superstructure submission of visit report.	CO2
8. Demonstration of use of any four civil engineering softwares.	CO1

Textbooks

1. Surveying and levelling by Kanetkar, Kulkarni- Pune Vidyarthi Prakashan
2. Build planning and build environment by Shah Kale, Patki-Tata MC Gaw Hill
3. Civil engineering materials by Dr S.V. Devdhar -Khanna Publications

Reference books

- 1) Basic Civil Engineering by M. S. Palanichamy Tata Mc-Graw Hill Publishing Co. Ltd.
- 2) Basic Civil Engineering B. Y. Shatheesh Gopi-Pearson
- 3) Elements of Civil Engineering and Engg Mech by R. V. Raikr- PHI Learning Pvt. Ltd.
- 4) Civil Engg. Drawing by S. C. Rangwala, Publication: Charotar Pub. House Anand
- 5) Surveying Vol. I & II by Dr. B. C. Punmia, Publication: Laxmi Publication Delhi
- 6) Surveying Vol. I and II, Author: S. K. Duggal, Publisher: Tata Mc-Graw hill Publication New Delhi
- 7) Building Construction, Author: Dr. B. C. Punmia, Publisher: Laxmi Pub. Delhi
- 8) Engineering Material, Author: Dr. S. C. Rangwala, Publisher: Charotar Pub. House
- 9) Elements of Civil Engineering Author: Dr. R. K. Jain and Dr. P. P. Lodha Publisher: McGraw Hill Education, India Pvt. Ltd.
- 10) Highway Engineering Author: Khanna S. K. and Justo C. E. G. Publisher: Nemchand and Brothers



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I

2301104 : Language Communication Lab

Teaching Scheme:	Credits	Examination Scheme	
Theory: 0 hrs/week	Th:00	Theory	CIA: --
Practical: 02 hrs/week	Practical: 01		End-Sem:--
		Pract:	--
		Oral:	25
		Termwork	--
Course Objectives: <ol style="list-style-type: none">1. To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm2. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking3. To improve the fluency of students in spoken English and neutralize their mother tongue influence4. To train students to use language appropriately for public speaking and interviews.			
Course Outcomes: <p>On completion of the course, learner will be able to–</p> <p>CO1:Better understanding of nuances of English language through audio- visual experience and group activities</p> <p>CO2: Neutralization of accent for intelligibility.</p> <p>CO3: Speaking skills with clarity and confidence which in turn enhances their employability skills.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I

2301104 : Language Communication Lab

Module 1	7 hrs	CO
Computer Assisted Language Learning (CALL) Lab: <i>Understand:</i> Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening. <i>Practice:</i> Introduction to Phonetics – Speech Sounds – Vowels and Consonants.		
Interactive Communication Skill Lab: <i>Understand:</i> Communication at Work Place- Spoken vs. Written language. <i>Practice:</i> Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.		
Module 2	7 hrs	
CALL Lab: <i>Understand:</i> Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context. <i>Practice:</i> Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.		
ICS Lab: <i>Understand:</i> Features of Good Conversation – Non-verbal Communication. <i>Practice:</i> Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette		
Module 3	7 hrs	
Technical skill Essential of writing – Technical paper / report writing, concise writing Administrative / Business documentation - Circular writing- meeting – agenda-minutes - Resolution		
Module 4	7 hrs	
Getting ready for job – Before interview- Curriculum vitae / Resume -covering letter e-mail writing During Interview- Mock interview- Psychometric test- Follow up After Interview – Excelling profession – Team spirit – work culture		

Textbooks

- 1) Thomas. L. Floyd, “Electronics Devices”, 9th Edition, Pearson (Unit I, II).
- 2) R.P. Jain, “Modern Digital Electronics”, 4th Edition, Tata McGraw Hill (Unit III).
- 3) Kennedy & Davis, “Electronic Communication Systems”, 4th Edition, Tata McGraw Hill (Unit IV).
- 4) M. Schwartz, “Mobile Wireless Communication”, Cambridge University Press (Unit IV).
- 5) Saro Velrajan, “An Introduction to 5G Wireless Networks: Technology, Concepts and Use-cases”. (Unit IV).



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I

2301104 : Language Communication Lab

Reference books

- 1) Boylestad and Nashelsky, “Electronic Devices and Circuit Theory”, 11th Edition, Pearson. (Unit I, II)
- 2) Ramakant A. Gayakwad, “Op-Amps and Linear Integrated Circuits”, 4th Edition, Pearson. (Unit II)
- 3) J. Schiller, “Mobile Communication”, 2nd Edition, Pearson. (Unit IV)
- 4) Donald Neaman, “Electronic Circuit Analysis and Design”, 3rd Edition, Tata McGraw Hill. (Unit I, II)

MOOCs / NPTEL Courses:

- 1) NPTEL Course on “Basic Electronics” by Prof. Mahesh B. Patil, IIT Bombay
Link: <https://nptel.ac.in/courses/108101091>
- 2) NPTEL Course on “Basic Electronics” by Dr. Pramod Agarwal, IIT Roorkee
Link: <https://nptel.ac.in/courses/117107095>
- 3) NPTEL Course on “Basic Electronics” by Prof. Chitralkha Mahanta, IIT Guwahati
Link: <https://nptel.ac.in/courses/117103063>

Virtual Lab Links:

- 1) Basic Electronics Virtual Lab developed by IIT Kharagpur:
Link: <http://vlabs.iitkgp.ernet.in/be/>
- 2) Digital Electronics Virtual Lab developed by IIT Roorkee:
Link: <https://de-iitr.vlabs.ac.in/List%20of%20experiments.html>
- 3) Digital Electronics Virtual Lab developed by IIT Guwahati:
Link: <https://www.iitg.ac.in/cseweb/vlab/Digital-System-Lab/index.php>
- 4) Electronic Circuits Simulation using Virtual Lab developed by IIT Kharagpur:
Link: <https://be-iitkgp.vlabs.ac.in/List%20of%20experiments.html>



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I

2301105: Social Media Content Creation Lab

Teaching Scheme:	Credits: 01	Examination Scheme	
Theory: --	Th: 00	Theory	CIA: --
Practical: 2 hr/week	PR: 01		End-Sem: --
		Pract:	25
		Oral:	--
		Termwork	25

Course Objectives: The student should be able to

1. Understanding the ethics while designing social media content
2. Understand and design the topic based social media content without violating IPR
3. Understand and learn basics of tools for digital content development

Course Outcomes:

On completion of the course, learner will be able to –

CO1: Recognize and produce ethically correct contents for social media

CO2: Write script and collect relative data for content delivery without violating IPR

CO3: Understand and use different content creation tools

CO4: Launch his/her own social media channel/blog on YouTube/Google etc

Sr. No.	List of Practical's	CO
1	Identify the local/global topic before human society and create a presentation for it.	CO1
2	Study of different FOSS tools required to create video content for social media	CO3
3	Create and setup your own social blog or YouTube Channel	CO4
4	Create a sample video using script, presentation, and Tools on some engineering topic	CO1 to CO4
5	Create a sample video using script, presentation, and Tools on some historical topic	CO1 to CO4
6	Create a sample video using script, presentation, and Tools on some Health topic	CO1 to CO4
7	Create a sample video using script, presentation, and Tools on some cooking topic	CO1 to CO4



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-II

2301106: Engineering Mathematics -II

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3 hrs/week	Th:03	Theory	CIA: 50
	Termwork: 00		End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Understand Ordinary Differential Equation and its applications.
2. Apply the various applications of first order first degree differential equation and Engineering related problems..
3. Acquire the knowledge of Directional derivatives of a scalar point function.
4. Learn advanced integration techniques such as Reduction formulae, Gamma and Beta functions, differentiation under integral sign and error function.
5. Familiarize with the concept of tracing of the curve for a given equation.
6. Understand multiple integrals and their applications.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Apply different methods to solve first order first degree differential equations and Identify Integrating factors which makes the given differential equation Exact.

CO2: Solve different engineering problems using differential equations.

CO3: Find the divergence and curl of a vector point function.

CO4: Evaluate the integrals using Gamma function and Beta function.

CO5: Trace the curve for a given equation.

CO6: Evaluate multiple integrals and apply to find area bounded by curves, volume bounded by surfaces.



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem- II

2301106: Engineering Mathematics -II

Unit 1: First Order Ordinary Differential Equations	6 hrs	CO
Exact Differential Equations, Equations reducible to exact form.		CO1
Linear Differential Equations (LDE). Equations reducible to Linear form, Bernoulli's Equations.		
Unit 2: Applications of Differential Equations	7hrs	CO2
Applications of Differential Equations to orthogonal Trajectories, Newton's law of cooling, Kirchoff's law of electrical circuits, One dimensional conduction of Heat.		
Unit 3: Vector Calculus	8hrs	CO3
Del operators, Scalar and vector fields, Gradient of a scalar point function, properties.		
Directional derivatives of a scalar point function. Divergence and curl of a vector point function and its properties.		
Unit 4: Integral Calculus	6 hrs	CO4
Reduction formulae, Gamma and Beta functions, Differentiation under Integral sign.		
Unit 5: Curve Tracing	7 hrs	CO5
Tracing of curves – Cartesian, Polar and Parametric Curves, Rectification of curves.		
Unit 6: Multiple Integrals and their Applications	8 hrs	CO6
Double and Triple Integration , Change of order of Integration , Applications to find Area , Volume , Mass.		

Recommended books

1. Kreyszig. E., Advanced Engineering Mathematics, 10th edition, John Wiley and Sons, Singapore 2012.
2. Dr. K. Ganesan, Dr. Sundarammal Kesavan , Professor K. S. Ganapathy Subramanian, Dr. V. Srinivasan , Matrices and Calculus , Gamma Publications , Revised edition , 2013.
3. Advanced Engineering , 7e, by Peter V. O'Neil(Thomson Learning)

Reference books

1. B. S. Grewal, Higher Engineering Mathematics, 43rd edition, Khanna Publishers.
2. Kandasamy P et al , Engineering Mathematics , Volume I (4th revised edition) , S. Chand and Co., New Delhi , 2000.
3. R. K. Jain, S. R. K. Iyengar, Advanced Engineering Mathematics, 2nd Edition, Narosa Publishing House.
4. Venkataraman M. K. , Engineering Mathematics – First Year (2nd edition) , National Publishing Co., Chennai, 2000.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem- II

2301106: Engineering Mathematics -II

LIST OF ASSIGNMENTS (CIA-1)

1. Find the solution of First Order Differential Equation.
2. Apply first order DE for finding temp, time, current. voltage.
3. Find the directional derivatives of a scalar point function.
4. Obtain the reduction formulae for standard trigonometric functions and use Gamma and Beta Functions to evaluate the integrals.
5. Trace the the curves of different forms and find the length of curves for various forms of curves.
6. Evaluate double and triple integrals.



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-II

2314107:Environmental Science

Teaching Scheme:		Credits	Examination Scheme	
Theory: 2hrs/week		Th:02	Theory	CIA: 25
Practical: Nil		Practical: Nil		End-Sem:50
			Pract:	--
			Oral:	--
			Termwork	--
Course Objectives: The student should be able to have <ol style="list-style-type: none">1. An Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities and population explosion.2. An understanding of the environmental impact of developmental activities.3. An understanding of the causes, effects and control of various types of environmental pollution.4. An Acquaintance of environmental pollution control by enactment of various environmental protection laws.				
Course Outcomes: On completion of the course, learner will be able to– CO1: Describe the scope, importance of sustainability, Concept of population explosion and Control. CO2: Explain the importance of Natural Resources for the sustenance of life and conservation of Natural resources. CO3: Illustrate the adverse effects of pollution and remedial solutions. CO4: Awareness of various environmental laws for environmental protection.				



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-II

2314107 : ENVIRONMENTAL SCIENCE

Unit 1: Multidisciplinary nature of Environmental Studies	7 hrs	CO
a) Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit– Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, Population growth and explosion, Factors causing population change (birth,death, immigration and emigration), effects. Definition of Carrying Capacity; Malthusian view: concept of ‘over-population’ and shortage of resources.		CO1
b) Threats to the ecosystem: habitat destruction, genetic erosion; loss of diversity; increasing human consumption. Green Revolution, Basic principls of Green Revolution. Elements of Sustainable agriculture. Mixed farming, mixed cropping.		
Unit 2: Natural resources and associated problems	7 hrs	
a) Forest resources: Use and over –exploitation, deforestation –Timber extraction – Mining, dams and other effects on forest and tribal people. Water resources: Use and over utilization of surface and ground water –Floods, drought, conflicts over water, dams –benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.		CO2
b) Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Land resources. Concept of carbon credits and carbon trading in regulating emmissions. Implementation of CNG Programme, Phasing out of old commercial vehicles and promotion of public transport.		
Unit 3: Environmental Pollution	7 hrs	
Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Solid Waste Management: Sources, Classification, effects and control .Biomedical, Hazardous and e –waste management.		CO3
Unit 4: Social Issues and the Environment	7 hrs	
a) Rain water harvesting, Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.		CO4
b) Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism.		

Textbooks

1. Environmental studies by Anubha Kaushik and C.P.Kaushik.
2. Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

Reference books

- 1) Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage learning.
- 2) Glimpses of Environment by K.V.S.G. Murali Krishna Published by Environmental Protection Society, Kakinada, A.P.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-II

2312108: Engineering Graphics

Teaching Scheme: TH : 1 Hrs./Week PR : 2 Hrs./Week	Credits	Examination Scheme: CIA : -- ESE : 50 Termwork: 25
	Th:01	
	Practical: 01	
Course Objectives:- <ol style="list-style-type: none">1. To develop the manual drawing skill, drawing interpretation skill.2. To understand the projections of lines and planes.3. To understand the projections of solids.		
Course Outcomes:- <p>On completion of the course, learner will be able to</p> <ul style="list-style-type: none">• CO1: draw the basic views related to projections of Lines.• CO2: Able to draw the basic views related to projections of Planes.• CO3: Able to draw the basic views related to projections of Solids.		



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-II

2312108: Engineering Graphics

Units		CO
Unit 1	Projections of Lines (4 Hrs.)	CO1
Projections of points, projections of lines, lines inclined to one reference plane, lines inclined to both reference planes. . (Lines in First Quadrant Only).		
Unit 2	Projections of Planes (4 Hrs.)	CO2
Projection of planes, inclination of the plane with HP and VP. (Planes in First Quadrant Only).		
Unit 3	Projections of Solids (4 Hrs.)	CO3
Introduction to Solids, Types of Solids, and Projections of Solids inclined to one and both reference planes (Prism and Pyramid – max. six side base only) (Note – Problems of Solids resting on H.P. Only)		
Books & Other Resources		
Text Books:-		
1. Bhatt, N. D. and Panchal, V. M., (2016), “Engineering Drawing”, Charotar Publication, Anand, India 2. K. Venugopal, K, (2015), “Engineering and Graphics”, New Age International, New Delhi 3. Jolhe, D. A., (2015), “Engineering Drawing with introduction to AutoCAD”, Tata McGraw Hill, New Delhi 4. Rathnam, K., (2018), “A First Course in Engineering Drawing”, Springer Nature Singapore Pte. Ltd., Singapore		
Reference Books:-		
1. Madsen, D. P. and Madsen, D. A., (2016), “Engineering Drawing and design”, Delmar Publishers Inc., USA 2. Bhatt, N. D., (2018), “Machine Drawing”, Charotar Publishing House, Anand, India 3. Dhawan, R. K., (2000), “A Textbook of Engineering Drawing”, S. Chand, New Delhi 4. Luzadder, W. J. and Duff, J. M., (1992), “The Fundamentals of Engineering Drawing: With an Introduction to Interactive Computer Graphics for Design and Production”, Peachpit Press, USA 5. Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Loving, R. O., Dygon, J. T., (1990), “Principles of engineering graphics”, McMillan Publishing, USA 6. Jensen, C., Helsel, J. D., Short, D. R., (2008), “Engineering Drawing and Design”, McGraw-Hill International, Singapore		
Term Work:-		CO
Sheet No. 1 to 3 on A2 (594X420mm) Half Imperial Size Drawing Sheet.		
Sheet No. 1	To Draw Projections of Lines (Two Problems)	CO1
Sheet No. 2	To Draw Projections of Planes (Two Problems)	CO2
Sheet No. 3	To Draw Projections of Solids (Two Problems)	CO3



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-II

2314109:Statics & Dynamics of Engineering Systems

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2hrs/week	Th:02	Theory	CIA: 25
Practical: --	Practical: --		End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. To impart knowledge about force systems and methods to determine resultant centroid and moment of inertia.
2. To teach methods to calculate force of friction.
3. To impart knowledge about types of supports and reactions and to determine reaction of beams.
4. To train students to solve problems related to particle mechanics using principles of kinematics, kinetics and work power energy.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Determine resultant of various force systems

CO2: Determine centroid, moment of inertia and solve problems related to friction

CO3: Draw free body diagram and Determine reactions of beams.

CO4: Calculate position, velocity and acceleration of particle using principles of kinematics



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-II

2314109: Statics & Dynamics of Engineering Systems

Unit 1: Resolution and Composition of Forces	7 hrs	CO
Principle of statics, Force system, Resolution and composition of forces, Resultant of concurrent forces. Moment of a force, Varignon's theorem, resultant of parallel force system, Couple, Equivalent force couple system, Resultant of parallel general force system		CO1
Unit 2: Distributed Forces and Friction	7 hrs	
Moment of area, Centroid of plane lamina and wire bends, Moment of Inertia. Friction- Laws of friction, application of friction on inclined planes Wedges and ladders friction Application to flat belt		CO2
Unit 3: Equilibrium	7 hrs	
Free body diagram Equilibrium of concurrent, parallel forces in a plane Equilibrium of general forces in a plane Equilibrium of three forces in a plane, Types of beams, simple and compound beams, Type of supports and reaction		CO3
Unit 4: Kinematics of Particle	7 hrs	
Kinematics of linear motion- Basic concepts Equation of motion for constant acceleration Motion under gravity. Kinematics of curvilinear motion- Basic Concepts Equation of motion in Cartesian coordinates Equation of motion in path coordinates Equation of motion in polar coordinates		CO4

Text Books

1. Vector Mechanics for Engineers, by F. P. Beer and E. R. Johnson, McGraw-Hill Publication
2. Engineering Mechanics by R. C. Hibbeler, Pearson Education
3. D. S. Kumar, "Engineering Mechanics – Statics and Dynamics", S. K. Kataria and Sons Publication

Reference Books

1. Engineering Mechanics by S. P. Timoshenko and D. H. Young, McGraw- Hill publication
2. Engineering Mechanics by J. L. Meriam and Craige, John Willey
3. Engineering Mechanics by F L Singer, Harper and Rowe publication
4. Engineering Mechanics by A. P. Boresi and R. J. Schmidt, Brooks/Cole Publication



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Semester - II

2310109: Fundamentals of Computing & C programming

Teaching Scheme:	Credits	Examination Scheme	
Theory: 02 hrs/week	TH:02	Theory	CIA: 25
Practical: --	Practical:00		ESE: 50
		Practical:	--
		Oral:	--
		Term work	--
Course Objectives: To understand <ol style="list-style-type: none">1. To learn the problem-solving techniques writing algorithm and flowchart.2. To learn the fundamentals of computer organization, syntax and semantics for C programming language.3. To learn to write, compile and debug programs (in C language).4. To introduce the constructs of structured programming.			
Course Outcomes: On completion of the course, learner will be able to– CO1. To formulate simple algorithms for arithmetic and logical problems. CO2. To translate the algorithms to programs (in C language). CO3. To implement conditional branching, iteration and recursion. CO4. To decompose a problem into functions and synthesize in a complete.			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-II

2310109 : Fundamentals of Computing & C programming

Unit 1: Introduction to Programming	(07 Hrs.)	CO
Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, syntax and logical errors in compilation, object and executable code.		CO1
Unit 2: Arrays Arithmetic expressions and precedence	(07 Hrs.)	
Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops. Arrays (1-D, 2-D), Character arrays and Strings. Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required).		CO2
Unit 3: Function	(07 Hrs.)	
Functions (including using built in libraries), Parameter passing in functions, call by value, passing array to functions: idea of call by reference, Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.		CO3
Unit 4: Structure and Pointers	(07 Hrs.)	
Structures, Defining structures and Array of Structures, Idea of pointers, defining pointers, use of pointers in self-referential structures, notion of linked list (no implementation), File handling		CO4

Textbooks

1. R. G. Dromey, "How to Solve it by Computer", 1st Edition, Prentice-Hall International, 1982.
2. Brian W Kernighan, Dennis M Ritchie, "C Programming Language", 2nd Edition, Pearson, 1988.
3. E. Balagurusamy, "Programming in ANSI C", 8th Edition, McGraw Hill, 2019.

Reference books

1. Maureen Sprankle, "Problem Solving and Programming Concepts", 7th Edition, Prentice Hall, 1989.
2. Yashavant Kanetkar, "Let Us C", 16th edition, BPB publications, 2018
3. Herbert Schildt, "C: The Complete Reference", 4th Edition, McGraw Hill, 2000



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-II

2317109: Introduction to EDA Tools

Teaching Scheme:	Credits	Examination Scheme
Theory: 00 hrs/week	TH: 00	Pract: 50
Practical: 04 hrs/week	Practical: 02	Oral:-- Termwork:25

Course Objectives:

1. To outline the need of Electronic Design Automation (EDA) tools.
2. To plot the frequency response of amplifiers using Multisim/e-Sim.
3. To explore the MATLAB/Scilab environment.
4. To explore various advanced EDA tools for industrial applications.

Course Outcomes:On completion of the course, learner will be able to --

CO1: Recognize the need of EDA tool.

CO2:Analyze the frequency response of amplifier developed with Multisim/e-Sim simulator.

CO3:Develop MATLAB code for basic operations.

CO4:Visualize the effectiveness of industrial application process using advanced EDA tool.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-II

2317109: Introduction to EDA Tools

Unit 1: Basics of EDA Tools	6 hrs	CO
Introduction to EDA Tools, Need of EDA Tools, Major classes of EDA tools and its applications, Essential EDA concepts: Design View, Design Data, Design Hierarchy, Design Style, Design Partitioning, Brief introduction of various simulators, Process of developing project file in EDA tools, File formats of EDA tools.		CO1
Unit 2: Electronics Design and Analysis using Multisim / e-Sim	8 hrs	
Multisim/e-Sim Environment: Design Process, Setting environment preferences, Schematic capture of circuits, Libraries of Components, List of Instruments, Placing components, Wiring components, simulation and result display in MultiSim/e-Sim. Concept of frequency response: Single stage and Multistage BJT CE/MOSFET CS amplifier, frequency response analysis. Device modeling: Clippers and clampers using diode, voltage regulator, AC voltage measurement.		CO2
Unit 3: Introduction to MATLAB / SCILAB	6 hrs	
MATLAB / SCILAB environment: MATLAB / SCILAB window Command window Workspace Command history Setting directory working with the MATLAB / SCILAB user interface Basic commands Assigning variables, operations with variables. Data types: int float, double, long character etc., MATLAB / SCILAB command format, BODMAS Rules, Arithmetic and logical operations, Operators and special characters.		CO3
Unit 4: EDA Tools for Industrial Applications	8 hrs	
Proteus/TinkerCAD: Schematic Description, Input files, element values, Nodes, circuit elements, sources, output variables, format of circuit and output files, Placing graphs, probes and generators, Design Rule Check Process, Development of Program Code, Process for implementing circuits. PCB Layout design using Proteus. Introduction to Simulink, Simulink Environment & Interface, Study of Library, Circuit Oriented Design, Equation Oriented Design. Virtual Instrumentation: LabVIEW Software and Hardware, LabVIEW Application in Process, Biomedical, Electronic Instrumentation and Industrial automation.		CO4

List of Practical: (Perform any 10 practical)	CO
1. Study of Electronic Design Automation Tool environment and getting started with various EDA tool schematic windows.	CO1
2. AC analysis of single stage and multistage BJT CE/MOSFET CS amplifier circuit and plot the frequency response using Multisim / e-sim.	CO2
3. DC analysis of NMOS and PMOS Transistor using Multisim / e-sim and obtain the operating point.	CO2
4. Perform experiment using e-Sim (Oscad): Bridge Rectifier / Clipper / Clamper Circuits Link: https://esim.fossee.in/circuit-design-simulation-marathon	CO2
5. Perform Matrix based arithmetic and logical operations using MATLAB / Scilab.	CO3



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-II

2317109: Introduction to EDA Tools

6. Write a MATLAB code to obtain the rank, eigen values and eigen vectors from given matrix.	CO3
7. Design a Data Acquisition System using Proteus / TinkerCAD.	CO4
8. Simulate the PCB artwork design of linear regulated DC power supply using Proteus.	CO4
9. Study the LabVIEW based design of Cathode Ray Oscilloscope / Digital Storage Oscilloscope / Spectrum Analyzer / Logic Analyzer etc.	CO4
10. Simulate any industrial automation process using MATLAB Simulink.	CO3
11. Perform experiment using Virtual Lab: Studies on BJT CE Amplifier Link: https://be-iitkgp.vlabs.ac.in/List%20of%20experiments.html	CO2

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a hands-on resource and reference.

The Copy of Curriculum, Conduction & Assessment guidelines, List of Experiments are to be attached.

Guidelines for Student's Lab Journal

The laboratory assignments/experiments are to be submitted by student in the form of journal.

Journal consists of Certificate, table of contents, and handwritten write-up for each experiment.

Each experiment should consist of:

1. Title.
2. Objectives.
3. Problem Statement, Outcomes
4. Software requirements.
5. Concept.
6. Experimental procedure / Setup.
7. Observation table
8. Conclusion.

Guidelines for Lab /TW Assessment

Continuous assessment of laboratory work is done based on overall performance. Each lab assignment/ experiment assessment will assign grade / marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment / experiment assessment include:

- a) Timely completion.
- b) Performance.
- c) Punctuality and neatness.

The parameters for assessment are to be known to the students at the beginning of the course.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-II

2317109: Introduction to EDA Tools

Textbooks

- 1) Essential Electronic Design Automation (EDA), by Mark D. Birnbaum, Pearson, ISBN: 0131828290.
- 2) Electronic Design Automation for Integrated Circuits Handbook – 2, by Scheffer Lavagno Scheffer Martin.
- 3) A Guide to MATLAB: For Beginners and Experienced User by Brian R Hunt, Ronald L Lipsman, J. M. Rosenberg 3rd Edition.
- 4) Circuit Analysis with Multisim by David Báez-López, Félix E. Guerrero-Castro, Morgan and Claypool Publishers.

Reference books

- 1) Essential Circuit Analysis Using Proteus® by Farzin Asadi
- 2) Introduction to Scilab: For Engineers and Scientists by Sandeep Nagar, Apress.
- 3) MATLAB for Beginners: A Gentle Approach: Peter Kattan Revised Edition.
- 4) Hands-on exercise manual for LabView programming, data acquisition and analysis by Jeffrey Y. Beyon, Prentice Hall.
- 5) User Manual for e-Sim. Link: https://static.fossee.in/esim/manuals/eSim_Manual_2.3.pdf

MOOC / NPTEL Courses

- 1) NPTEL Course on “ESim - EDA tool for circuit design, simulation, analysis and PCB design” by Prof Kannan Moudgalya, IIT Bombay
Link: https://onlinecourses.swayam2.ac.in/aic20_sp59/preview

Virtual Lab / Other Links:

- 1) Electronic Circuits Simulation using Virtual Lab developed by IIT Kharagpur:
Link: <https://be-iitkgp.vlabs.ac.in/List%20of%20experiments.html>

Other Links:

- 1) <http://www.linear.com/>
- 2) <http://www.expresspcb.com/>
- 3) <http://www.spice.sourceforge.net/>



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-II

2311109: Component Materials and Testing

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2hrs/week	Th:02	Theory	CIA: 25
	Practical: --		End-Sem:50
		Pract: --	
		Oral: --	
		Termwork	--

Course Objectives:

1. Knowledge of Electronic, electrical components & devices is quite essential for a student of electronic engineering and electrical engineering.
2. With the knowledge of these active and passive components he will work successful in every field of the branch.
3. Therefore a student in electronics and electrical engineering must be equipped with the fundamental knowledge about electronic /electrical components, semiconductor diode, active and passive component , ICs for successful handling of industrial problems.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Identify and distinguish between passive components such as resistor, capacitor, inductor .

CO2: Identify and distinguish between active components such as diode, LED, photodiode etc

CO3: Identify Different types of transducer and there application.

CO4: Make use of different types of ICs and construction of ICs.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem- II

2311109: Component Materials and Testing

Unit 1: Passive circuit elements	7 Hrs	CO
Resistor Introduction of Passive circuit, Resistors, Resistor Types, Power rating, Value tolerance, Resistor color code and calculation of value using color coding, resistor troubles, and checking resistor with an ohmmeter.		CO1
Inductor Introduction of Inductor, Types of inductor, inductance of inductor, comparison of different cores, variable inductor		
Capacitor Introduction of Capacitors, Capacitance, and capacitor connected to a battery, Factors controlling capacitance, Types of capacitors, voltage rating of capacitors, troubles in capacitors, checking of capacitor with ohmmeter.		
Unit 2: Active circuit elements	7 Hrs	CO
Introduction of Diode , Diode parameters, Diode rating , Diode testing ,Diode fabrication ,Application of diode , LED, construction of LED , Applications of LED , Photodiodes, zener diode , construction of zener diode , Application of Zener diode		CO2
Unit 3: Transducers	7 Hrs	CO
Classification of transducers, Resistive position transducer, Resistive pressure transducer, Inductive pressure transducer, Capacitive pressure transducer, Linear variable differential transformer (LVDT), Piezoelectric Transducer, Strain gauge, Temperature transducer, and Photoelectric transducers.		CO3
Unit 4: Integrated Circuit	7 Hrs	CO
Introduction , Advantage of Ics, Drawbacks of Ics, Scale of integration , Classification of Ics by structure ,comparison between different Ics ,Classification by function , IC terminology , Ics symbol , Fabrication of IC component Popular application of ICs , study of data sheet of ICs		CO4

Textbooks

- 1) A Textbook of Electrical Technology - Volume I B.L.Theraja (Basic Electrical Engineering)
- 2) A Textbook of Electrical Technology - Volume II B.L.Theraja (Basic Electrical Engineering)

Reference books

- 1) Modern Digital Electronics, R.P.jain 4th edn



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-II

2300110: Democracy, Election & Governance

Teaching Scheme:		Credits	Examination Scheme	
Theory: 2hrs/week		Th:02	Theory	CIA: 25
Practical: --		Termwork: --		End-Sem:50
			Pract:	--
			Oral:	--
			Termwork	--
Course Objectives: <ol style="list-style-type: none">1. To introduce the students meaning of democracy and the role of the governance.2. To help them understand the various approaches to the study of democracy and governance3. To give students the conceptual tools to understand how democracy as a model of governance can be complimented by institution building.				
Course Outcomes: <p>On completion of the course, learner will be able to–</p> <p>CO1: Demonstrate knowledge of the constitutional structure of democracy in India</p> <p>CO2: Examine the election process in the country.</p> <p>CO3: Analyze the democratic framework with the help of its standards of governance.</p> <p>CO4: Show awareness of institutional practices of regulation, lobbying, etc.</p>				



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-II

2300110: Democracy, Election & Governance

Unit 1: Democracy- Foundation and Dimensions	7 hrs	CO
i) Constitution of India		CO1
ii) Different models of Democracy		
iii) Dimensions of Democracy-Social, Economic & political		
Unit-2: Elections	7 hrs	CO2
i) History of panchayat Raj institution in the lost independence period		
ii) 73 rd and 74 th Constitutional Amendment act: Institutions at the local level		
iii) Election commission of India, local body elections-urban & rural.		
Unit 3: Governance	7 hrs	CO3
i) Meaning and Concepts		
ii) Government and Governance		
iii) Initiatives in Good Governance		
Unit-4: Dynamics of Civil Society	7 hrs	CO4
i) New Social Movements and Various interests, Role of NGO's		
ii) Political significance of Media and Popular Culture		

Reference books

1. Banerjee-Dube, I. (2014). A history of modern India. Cambridge University Press.
2. Basu, D. D. (1982). Introduction to the Constitution of India. Prentice Hall of India.
3. Bhargava, R. (2008). Political theory: An introduction. Pearson Education India.
4. Bhargava, R., Vanaik, A. (2010) Understanding Contemporary India: Critical Perspective. New Delhi: Orient Blackswan.
5. Chandhoke. N., Prayadardhi.P, (ed) (2009), 'Contemporary India: Economy, Society, Politics', Pearson India Education Services Pvt. Ltd, ISBN 978-81- 317-1929-9.
6. Chandra, B. (1999). Essays on contemporary India. Har-Anand Publications.
7. Chatterjee, P. (1997). State and Politics in India.
8. Dasgupta. S., (ed) (2011), 'Political Sociology', Dorling Kindersley (India) Pvt. Ltd., Licensees of Pearson Education in south Asia. ISBN: 978-317-6027- 7.
9. Deshpande, S. (2003). Contemporary India: A Sociological View, New Delhi: Viking Publication.
10. Guha, R. (2007). India After Gandhi: The History of the World's Largest. Democracy, Harper Collins Publishers, New York.

E-Resources: <http://eci.nic.in/>



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Semester – I/II

2315111: Problem Solving and Programming using Python

Teaching Scheme:		Credits		Examination Scheme	
Theory: 01 hrs/week		TH:01		Theory	CIA : - -
Practical: 02 hrs/week		Practical:01			End-Sem: 25
				Pract:	25
				Oral:	--
				Termwork	25
Course Objectives: To understand <ol style="list-style-type: none">1. To understand problem solving, problem solving aspects, programming and to know about Various program design tools.2. To learn problem solving with computers3. To learn basics, features and future of Python programming.4. To acquaint with data types, input output statements, decision making, looping and functions in Python5. To learn features of Object Oriented Programming using Python6. To acquaint with the use and benefits of files handling in Python					
Course Outcomes: On completion of the course, learner will be able to– CO1: Inculcate and apply various skills in problem solving. CO2: Choose most appropriate programming constructs and features to solve the problems in diversified domains. CO3: Exhibit the programming skills for the problems those require the writing of well-Documented programs including use of the logical constructs of language, Python. CO4: Demonstrate significant experience with the Python program development environment.					



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2315111: Problem Solving and Programming using Python

Unit I: Programming Methodology	(04 Hrs)	CO
<p>Problem definition, Types of Problem, Step involving in Problem Solving, Algorithms, Flowcharts and Pseudo-codes, implementation of Algorithms, Basics of Python Programming: Features of Python, History and Future of Python, Literal constants, variables and identifiers, Data Types, Input operation, Comments, Reserved words, Indentation, Operators and expressions, Expressions in Python.</p>		CO1
Unit II: Decision Control Statements	(04 Hrs)	CO
<p>Decision control statements, Selection/conditional branching Statements: if, if-else, nested if, if-elif-else statements, Basic loop Structures/Iterative statements: while loop, for loop, selecting appropriate loop, Nested loops, break, continue, pass, else statement used with loops, Other data types: Tuples, Lists and Dictionary.</p>		CO2
Unit III: Functions and Modules	(06 Hrs)	CO
<p>Need for functions, Function: definition, call, variable scope and lifetime, the return statement, Defining functions, Lambda or anonymous function, documentation string, good programming practices, Introduction to modules, Introduction to packages in Python, Introduction to standard library modules.</p>		CO3

LIST OF PRACTICALS

Sr. No.	Title	CO
1	Write a python program to simulate simple calculator that performs basic tasks such as addition, subtraction, multiplication and division.	CO2
2	Write a python program to swap value of two variables.	CO2
3	To accept an object mass in kilograms and velocity in meters per second and display its momentum. Momentum is calculated as $e=mc$ where m is the mass of the object and c is its velocity.	CO2
4	To accept N numbers from user. Compute and display maximum in list, minimum in list, sum and average of numbers.	CO2
5	To accept N numbers from user. Compute and display maximum in list, minimum in list, sum and average of numbers.	CO2
6	To accept from user the number of Fibonacci numbers to be generated and print the Fibonacci series.	CO3
7	To accept two numbers from user and compute smallest divisor and Greatest Common Divisor of these two numbers.	CO3
8	Write a python program to create student name database using list and perform operations like add, delete, search student name in the list.	CO3



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2315111: Problem Solving and Programming using Python

Textbooks

1. R. G. Dromey, "How to Solve it by Computer", 1st Edition, Prentice-Hall International, 1982.
2. Reema Thareja, "Python Programming Using Problem Solving Approach", Oxford University Press, ISBN 13: 978-0-19-948017-6.
3. R. Nageswara Rao, "Core Python Programming", Dreamtech Press; Second edition ISBN-10: 938605230X, ISBN-13: 978-9386052308 ASIN: B07BFSR3LL

Reference books

1. Maureen Spankle, "Problem Solving and Programming Concepts", Pearson; 9th edition, ISBN-10: 9780132492645, ISBN-13: 978-0132492645
2. Jeeva Jose, P. Sojan Lal, "Introduction to Computing & Problem Solving with Python", Khanna Computer Book Store; First edition, ISBN-10: 9789382609810, ISBN-13: 978-9382609810.
3. R. G. Dromey, "How to Solve it by Computer", Pearson Education India; 1st edition, ISBN-10: 8131705625, ISBN-13: 978-8131705629
4. Paul Barry, "Head First Python- A Brain Friendly Guide", SPD O'Reilly, 2nd Edition, ISBN: 978-93-5213-482-3.
5. Martin C. Brown, "Python: The Complete Reference", McGraw Hill Education, ISBN-10: 9789387572942, ISBN-13: 978-9387572942, ASIN: 9387572943.
6. Romano Fabrizio, "Learning Python", Packt Publishing Limited, ISBN: 9781783551712, 1783551712.



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F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2312112: Engineering Draftsmanship

Teaching Scheme: TH : 1 Hr./Week PR : 2 Hrs./Week	Credits	Examination Scheme: CIA:-- End-Sem:50 TW : 25
	TH:01	
	Practical: 01	
Course Objectives:- <ol style="list-style-type: none">1. To acquire basic knowledge about engineering drawing language, line types, dimension methods, and simple geometrical construction. To acquire basic knowledge about the various CAD drafting software's and its basic commands required to construct the simple engineering objects.2. To acquire basic knowledge about physical realization of engineering objects and shall be able to draw its different views3. To visualize three dimensional engineering objects and shall be able to draw their isometric views.		
Course Outcomes:- On completion of the course, learner will be able to CO1: Draw the fundamental engineering objects using basic rules and able to construct the simple geometries. Draw fully-dimensioned 2D, 3D drawings using computer aided drafting tools. CO2: Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object. CO3: Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment.		



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F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2312112: Engineering Draftsmanship

Units		
Unit 1	Fundamentals of Engineering Drawing (02 Hrs.)	CO
Content- Fundamentals of Engineering Drawing, Need of Engg. Drawing and Design, Different layouts of Sheets, Types of Lines and Dimensioning, Geometrical Constructions- Simple only.		CO1
Introduction to CAD		
Content –What is CAD, Introduction to AutoCAD, Different Commands and Their Function, Use of AutoCAD to Draw simple drawings and dimensioning.		
Unit 2	Orthographic Projections (6 Hrs.)	CO2
Content – Principle of Projections, Introduction to First and Third Angle Method of Projections, Orthographic Projections of Machine Element/Parts, Sectional Orthographic Projection.		
Unit 3	Isometric Projections (6 Hrs.)	CO3
Content – Introduction to Isometric Projections and Isometric View, Isometric Projections from Given Orthographic View.		
Books & Other Resources		
Text Books:-		
1. Bhatt, N. D. and Panchal, V. M., (2016), “Engineering Drawing”, Charotar Publication, Anand, India		
2. K. Venugopal, K, (2015), “Engineering and Graphics”, New Age International, New Delhi		
3. Jolhe, D. A., (2015), “Engineering Drawing with introduction to AutoCAD”, Tata McGraw Hill, New Delhi		
4. Rathnam, K., (2018), “A First Course in Engineering Drawing”, Springer Nature Singapore Pte. Ltd., Singapore		
Reference Books:-		
1. Madsen, D. P. and Madsen, D. A., (2016), “Engineering Drawing and design”, Delmar Publishers Inc., USA		
2. Bhatt, N. D., (2018), “Machine Drawing”, Charotar Publishing House, Anand, India		
3. Dhawan, R. K., (2000), “A Textbook of Engineering Drawing”, S. Chand, New Delhi		
4. Luzadder, W. J. and Duff, J. M., (1992), “The Fundamentals of Engineering Drawing: With an Introduction to Interactive Computer Graphics for Design and Production”, Peachpit Press, USA		
5. Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Loving, R. O., Dygon, J. T., (1990), “Principles of engineering graphics”, McMillan Publishing, USA		
6. Jensen, C., Helsel, J. D., Short, D. R., (2008), “Engineering Drawing and Design”, McGraw-Hill International, Singapore		
Term Work:-		CO
Sheet No. 1 to 3 on A2 (594X420mm) Half Imperial Size Drawing Sheet		
Sheet No. 1	Types of Lines, Letter and Dimensioning	CO1
Sheet No. 2	To draw One Principal and One Sectional view of any Machine Element.	CO2
Sheet No. 3	To draw Isometric view of Machine Element (Two Problems)	CO3



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-I/II

2313113: Introduction to Drone Technology

Teaching Scheme:	Credits	Examination Scheme	
Theory: 1 hrs/week	Th:01	Theory	CIA: --
Practical: --	Practical: --		End-Sem:25
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Identify and describe common components of drone
2. Understand and design the application specific drone.
3. Understand and explain basics of aerodynamics

Course Outcomes:

On completion of the course, learner will be able to


CO1:Recognize and describe the role of drone in present, past and future society

CO2: Comprehend basic components of drone.

CO3: Explain the impact of various payloads of drone.

CO4: Interpret the aspects of legal issues

CO5: Implement and design application oriented drone.

 SANDIP FOUNDATION	SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE F.Y. B. Tech(Common) (2023 Pattern) Sem-I/II 2313113: Introduction to Drone Technology
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Unit 1: Introduction to Drone and its legal aspects	7Hrs	CO
Types of Drones and Their Technical Characteristics, Main Existing Drone Types, Level of Autonomy, Size and Weight, Differences in Energy Source, Widely Used Drone models, Legal issues on the use of frequency spectrum and electronic equipment, surveillance and compliance. Flight zones		CO1 to CO4
Unit 2: Payload Calculation and drone assembling	7Hrs	CO
Types of Payloads and their application sensors, other payloads and frequency spectrum issues. Parts of a Drone, Motor, Propellers, Flight Controllers, Electronic Speed Controllers, Safe Assembly of Drone and Drone air Flight for aerial Photos. Battery management systems		CO1 to CO5

Text Books:

1. The future of Drone Use Opportunities and Threats from Ethical & Legal Perspectives
2. DIY Drones for the Evil Genius: Design, Build, and Customize Your Own Drones
3. Build a Drone: A Step-by-Step Guide to Designing, Constructing, and Flying Your Very Own Drone Barry Davies
4. Drones: An Illustrated Guide to the Unmanned Aircraft that are Filling our Skies



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Semester – I/II

2312114: Workshop practice

Teaching Scheme:	Credits	Examination Scheme	
Theory: 00 hrs/week	TH:00	Theory	CIA: - -
Practical: 02 hrs/week	Practical: 01		End - Sem: - -
		Practical :	--
		Oral:	--
		Term work	25

Course Objectives: To understand

1. To understand industrial safety norms and working of machine tools and functions of its parts.
2. To develop the skill through hands-on practices using hand tools, power tools, machine tools in manufacturing and assembly shop leading to understanding of a production processes.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Familiar with safety norms to prevent any mishap in workshop.

CO2: handle appropriate hand tool, cutting tool and machine tools to manufacture a job.

CO3: understand the construction, working and functions of machine tools and their parts.

CO4: know simple operations (Turning and Facing) on a center lathe.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Semester – I/II

2312114: Workshop practice

LIST OF PRACTICALS

Guidelines for Laboratory Conduction

A. Any 6 from 1st to 7th Experiments

B. Any 2 from 8th to 11th Experiments

Sr. no	Title of Experiment	CO
1	Study of Safety on the Manufacturing shop and Industrial safety norms.	CO1
2	Lathe Machine- Demonstration and Working Principle: Introduction, Working Principle, Main Parts of lathe machine and machine accessories, Operations of Lathe Machine, Specification Functions of lathe Machine (At least one turning job is to be demonstrated).	CO2, CO3, CO4
3	Drilling Machine- Demonstration and Working Principle: Definition, Types, Parts, Working Principle, Operations on Vertical drilling machine/Radial drilling machine, Drilling tool, Tool holding devices, Concept of speed, feed and depth of cut.	CO2, CO3
4	Milling machine- Demonstration and Working Principle: What is milling machine, Milling machine Parts, Operation, Working Principle, Construction, Table movements, Indexing and Multipoint cutter and Gear Cutting Operation.	CO2, CO3
5	Grinding/ Shaper machine- Demonstration (Any one) : Grinder: Surface grinding machines, Tool and cutter grinding machines. Shaper: Shaping Machine Working Principle, Mechanism used in Shaper machine.	CO2, CO3
6	Injection Moulding Machine- Demonstration and Working Principle: Basics of Injection Moulding Process, machine parts and its function	CO2, CO3
7	CNC Turning Machine- Demonstration: Basics of CNC manufacturing and CNC programming.	CO2, CO3
8	One job using different welding operations : Study and demonstration of metal joining processes using Arc Welding, Gas Welding and Spot Welding machines.(Any one)	CO2
9	One job using different sheet Metal operations: Sheet metal working and Brazing Use of sheet metal, working hand tools, cutting, punching, blanking, bending, spot welding	CO2
10	Fitting Shop- One job involving following operations: marking, filing to size, centre punching, drilling, tapping, one simple male- female joint.	CO2
11	Carpentry Shop- One carpentry job involving wood turning .Use and setting of hand tools like hacksaws, jack planes, chisels and gauges for construction of various joints, wood turning and modern wood turning methods.	CO2



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Semester – I/II

2300115: Physical Education and Yoga

Teaching Scheme:	Credits	Examination Scheme	
Theory: --	Th:00	Theory	CIA: --
Practical: 4 hrs/week	Practical: 02		End-Sem:--
		Pract:	--
		Oral:	--
		Termwork	50
Course Aim and Objectives:			56 hrs
<p>Introduction to Physical Education and Yoga</p> <ul style="list-style-type: none"> · Introduction to Yoga - History of Yoga, Introduction to Ashtanga Yoga. · Mobility exercises – Neck up & down, Side to side, shoulder rotation, Twisting, Squats. · Practice of Prone and Supine Asanas <p>A student will have to perform standing and seating asanas, Pavanmuktasana, Shavasana, Setubandhasana, Ardha Halasana, Salabhasana, Bhujangasana, Halasana, Makarasana, Dhanurasana</p> <p>The following points to be covered:</p> <ul style="list-style-type: none"> • Benefits & Contraindication of each asana <p>Practice of Sitting and Standing Asanas:-</p> <p>A student will have to perform sitting and standing asana</p> <p>Vajrasana, Dandasana, Vakrasana, Ushtrasana, Uttanmandukasana, Bhadrasana, Vrikshasana, Shashankasan, Trikonasana, Padahastasana, Chakrasana - sideward, Tadasana</p> <p>The following points to be covered:</p> <ul style="list-style-type: none"> • Benefits & Contraindication of each asana 			
<p>Course Outcomes: The outcomes of the course are to create awareness among students about Yoga, and to facilitate knowledge about Asanas, This will help them to incorporate yogic practices in their lifestyle.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Semester – I/II

2300116: Physical Education and Sports

Teaching Scheme:	Credits	Examination Scheme	
Theory: --	Th:00	Theory	CIA: --
Practical: 4 hrs/week	Practical: 02		End-Sem:--
		Pract:	25
		Oral:	--
		Termwork	25

Course Aim and Objectives:

1. The aim of the scheme is to make Physical Education as an integral part of Educational System. Students studying in the colleges should have the benefit of Physical Education to improve their health during the course of college education. It is designed to ensure that on completion of this training they would attain the minimum prescribed standard.
2. The object of the scheme is to enhance physical efficiency and maintain fitness of mind, body and character, which would help the student to be mentally alert and physically efficient to withstand the strain and fatigue of daily life. It would prepare them for the strenuous training which will help them to be fit to face the different barriers in life. The students will undergo this scheme for the first year of his/her under graduate Course education.

Course Outcomes:

To enhance physical efficiency and maintain fitness of mind, body and character, which would help the student to be mentally alert and physically Efficient to withstand the strain and fatigue of daily life.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Semester – I/II

2300116: Physical Education and Sports

Participation in the scheme: 56 hrs

Compulsory Activities: Under this category, a student shall have to choose total three activities, at least one from each part of group B (Running, Jumping, Endurance and Strength) during the sem, and have to participate in them throughout the sem. Whatever may be choices according to the availability, students shall have to show sufficient skill and have to achieve minimum prescribed target at the end of the SEM.

The Scheme: Choices for Compulsory Activities and tests for its evaluation: (Opt any three activities, out of which one from each selected parts i.e. Part A/B/C/D/)

List of Activities and tests:-

PART	EVENT	STUDENT	TESTS FOR EVALUATION
Part A	100 m. Run	(Male and Female)	50 yard dash (150 feet)
	400 m. Run	(Male and Female)	
Part B	High Jump or Pole Vault	(Male and Female)	Standing Vertical Jump
	Long Jump	(Male and Female)	
	Triple Jump	(Male and Female)	
Part C	12.5 Km. Cross Country	(Male)	Cooper's Test (12 minutes run and walk test)
	5 Km. Cross Country	(Female)	
	1500 m. Run	(Male)	
Part D	Rope Climbing	(Male)	Medicine Ball put for male and Sit Ups test for female
	Chin Ups/Flex Arm hang	(Male and Female)	
	Sit Ups	(Male and Female)	
	Push Ups and Modified push ups	(Male and Female)	



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Semester – I/II

2300116: Physical Education and Sports

1. Optional Activities:

The Scheme: Optional Activities (Opt any Two, out of which one from individual event and one from team event)

A student shall have to participate in two types of physical activities viz.

Group (A) - Optional Activities (Opt any Two, out of which one from individual event and one from team event)

Name of Individual Event	Individual Events Test for Evaluation
Gymnastics	Flex arm Hang Test for Girls Vertical Reach Test for Boys
Judo	Pushups and 12 Minutes run and walk test
Malkhamb/Rope Malkhamb	Flex arm Hang Test for Girls Vertical Reach Test for Boys
Table Tennis	Eye-hand Coordination Test
Tennis	Dyer's Tennis Test
Weight Lifting and Power Lifting	Sit ups, Pushups, Standing Vertical Jump
Wrestling	Pushups and 12 Minutes run and walk test
	Sit and Reach Test
Name of Team Event	Team Events Test for Evaluation
Basketball	Johnson's Basketball Test
Football	Mc Donald's Soccer Skill Test
Hockey	SAI Hockey Skill test
Kabaddi	6X10 M. Shuttle Run Test
Kho –Kho	6X10 M. Shuttle Run Test
Volleyball	SAI Volleyball Skill test



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech (Civil Engineering) (2023 Pattern)

UG Certificate Course Work(Exit Course)

EC141: Basics of Civil Engineering for Construction

Teaching Scheme:	Credits	Examination Scheme	
Theory: --	Th:--	Theory	CIA: --
Practical: 06Hours/Day for 3 weeks	Practical: 04		End-Sem:--
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	100

Course Objectives: The student should be able to

1. Familiarize with different construction materials such as concrete, steel, bricks, and aggregates. Understand their properties, testing, and proper usage in construction.
2. Introduce various construction techniques used in civil engineering projects, such as masonry, formwork, concreting, and steel reinforcement.
3. Develop skills in measurement and surveying techniques used on construction sites, including distance measurement, leveling, and setting out.
4. Understand Construction tools and equipment used in the field, such as concrete mixers, scaffolding, and earthmoving machinery.

Course Outcomes:

On completion of the course, learner will be able to–

CO1:Identify various construction materials used in civil engineering projects, such as concrete, steel, and aggregates.

CO2:Explain the properties and applications of different construction materials in specific engineering tasks.

CO3:Apply knowledge of material properties to select appropriate materials for specific construction tasks.

CO4:Analyze construction site layouts and identify potential challenges or hazards.



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech (Civil Engineering) (2023 Pattern)

UG Certificate Course Work(Exit Course)

EC141: Basics of Civil Engineering for Construction

Module 1:Basic Terms and Facts13Hrs	CO
Development Length part, Lapping of Rebars, Lapping of Column Rebars, Lapping of Beam Rebars, Bent Up Bars, Characteristic Strength of Concrete, Plotting the Results for the Characteristic Strength, Grade of Concrete Introduction, Ratio for Grade of Concrete, Uses of different grades of concrete, Concrete Cover Introduction, Reasons for Providing Cover Blocks, How to provide concrete cover, Clear cover for different structural members, Weight of the Rebar Introduction, Formula for Rebar Weight Calculation	CO1 to CO4
Module 2:Measuring Area of Land 13Hrs	CO1 to CO4
Measuring Area of Irregular Land using Tape, Measuring Area of Land using AutoCAD, Measuring Area of Land using Google Earth	
Module 3:Building Foundation13Hrs	CO1 to CO4
Deep Foundation, Isolated Foundation, Combined and Mat Foundation, Strap Foundation	
Module 4:Structural Members13Hrs	CO1 to CO4
One Way Slab, Two Way Slab, Short Column, Beams	
Module 5Buildings13Hrs	CO1 to CO4
Torsion in Buildings, Plinth Level and Plinth Height, Tie Beam, Concrete Bands in Masonry Brick Walls	
Module 6:Concrete and Concrete Works13Hrs	CO1 to CO4
Nominal Mix v/s Design Mix of Concrete, How to Find Number of Bags of Cement for Concreting Works, Construction tools and equipments	
Module 7 Levelling 12Hrs	CO1 to CO4
Concept of Levelling, Datum and Mean Sea Level, Reduced Level, Sights in Levelling, Simple Levelling, Benchmarks, Differential Levelling	

Text Books:

1. Basic Civil Engineering by S.S. Bhavikatti
2. Basic Civil Engineering by SatheeshGopi
3. Basic Civil Engineering by B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain
4. Basic Civil and Mechanical Engineering by S. Ramamrutham
5. Civil Engineering Materials and Construction Practices by N. Krishna Raju
6. Civil Engineering Materials, Tests & Practices by M.L. Gambhir



SANDIP FOUNDATION'S
SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

MAHIRAVANI, TRIMBAK ROAD, TAL & DIST: NASHIK-422213, MAHARASHTRA, INDIA

B. Tech Civil Engineering

Semester – III

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)				Examination Scheme				Total Marks
				L	T	P	C	Formative Assessment CIA		Summative Assessment ESE		
								Theory	Lab	Theory	Lab	
1	PC	2314201	Fluid Mechanics	3	--	--	3	50	--	50	--	100
2	PC	2314202	Mechanics of Structures	3	--	--	3	50	--	50	--	100
3	PC	2314203	Building Technology & Architectural Planning	2	--	--	2	25	--	50	--	75
4	PC	2314204	Fluid Mechanics Laboratory	--	--	2	1	--	--	--	25 ^a	25
5	PC	2314205	Testing of Materials Laboratory	--	--	2	1	--	25	--	25 ^a	50
6	OE	2314206	Open Elective-I	3	--	--	3	50	--	50	--	100
7	IC (HSSM)	2300201	Principles of Managements	2	--	--	2	25	--	50	--	75
8	IC (VEC)	2300202	Industrial Psychology	2	--	--	2	25	--	50	--	75
9	IC (MD)	2300203	Multidisciplinary –Design Thinking	1	--	2	2	25	25	--	25 ^a	75
10	IC (CEP)	2300204	Community Engagement Project	--	--	4	2	--	25	--	25 ^a	50
11	SDC	2314701	Planning of Structures	--	--	2	--	--	--	--	--	--
12	EEC	2314801	Concrete Mix Design using Software (EMMA etc..)	--	--	--	--	--	--	--	--	--
TOTAL				16	00	12	21	250	75	300	100	725
Open Elective I												
7	OE	2314206A	Pollution Abatment and Control	3	--	--	3	50	--	50	--	100
7	OE	2314206B	Engineering Economics & Financial Management	3	--	--	3	50	--	50	--	100
Value Added Course												
13	VAC	VAC141	AutoCAD	-	--	2	1	--	25	--	--	25



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314201:Fluid Mechanics

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3 hrs/week	Th:03	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite :Engineering Physics, Engineering Mathematics and Engineering Mechanics		Pract:	--
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. To understand conceptually the properties of fluid, fluid statics, fluid kinematics and fluid dynamics,dimensional analysis, open channel flow . 2. Apply principles of continuity, mass, momentum and energy as applied to fluid at rest as well as for fluid flow in open channel. 3. To apply fundamental principles of fluid mechanics for the solution of practical Civil Engineering problems. 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Understand the use of Fluid Properties, concept of Fluid statics, basic equation of Hydrostatics, measurement of fluid pressure,</p> <p>CO2: Understand the concept of fluid kinematics with reference to Continuity equation and fluid dynamics with reference to Modified Bernoulli's equation and its application to practical problems of fluid flow</p> <p>CO3: Understand the concept of Dimensional analysis using Buckingham’s π theorem, Similarity & Model Laws and boundary layer theory and apply it for solving practical problems of fluid flow.</p> <p>CO4: Understand the concept of laminar flow and turbulent flow and flow through pipes and itsapplication to determine major and minor losses and analyse pipe network.</p> <p>CO5: Understand the concept of open channel flow and uniform flow and and make the use of Chezy’s and Manning’s formulae for uniform flow computation and design of most economical channel section.</p> <p>CO6: Understand the concept of depth-Energy relationshipsin open channel flow, Understand the concept of gradually varied flow in open channel and fluid flow around submerged objects, compute GVF profile</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314201: Fluid Mechanics

Unit 1: Properties of Fluids and Fluid Statics	7hrs	CO
<p>a) Properties of Fluids: Definition of fluid and fluid mechanics: examples and practical applications classification of fluids: Real and Ideal, , physical properties of fluids: mass density, specific weight, specific volume, relative density, viscosity, Newton’s law of viscosity, Dynamic and kinematic viscosity, cohesion, adhesion, surface tension, capillarity.</p> <p>b) Fluid Statics: Basic equation of hydrostatics, concept of pressure, pressure head, Pascal’s Law, measurement of pressure (absolute, gauge), principle of manometers: Balancing liquid Column, total pressure and centre of pressure: on plane horizontal, vertical, inclined surfaces: practical applications</p>		CO1
Unit 2: Fluid Kinematics and Dynamics		7hrs
<p>a) Fluid Kinematics Eulerian and Lagrangian approach, velocity and acceleration, and their components in Cartesian co-ordinates, Classification of flows, stream line, stream tube, path line, streak line, control volume. Equation of continuity for 3-D flow in Cartesian co-ordinates, components of rotation, velocity potential, stream function and flow net.</p> <p>b) Fluid Dynamics: Forces acting on fluid mass in motion, Euler’s equation of motion along a streamline and its integration to get Bernoulli’s equation and its limitations, Modified Bernoulli’s equation, concept of HGL and TEL, Application of Bernoulli’s equation to measure discharge and velocity of flow: Venturi meter, Orifice meter, Rotameter and Pitot tube.</p>		CO2
Unit 3: Dimensional Analysis and Laminar Flow		7hrs
<p>a) Dimensional Analysis and Model Studies Dimensional homogeneity, dimensional analysis using Buckingham’s π theorem method, geometric, kinematic and dynamic similarity, important dimensionless Numbers (Reynolds No., Froude No., Euler No., Mach no. and Weber No) and their significance, Model Laws (Reynold’s law and Froude’s Law)</p> <p>b) Laminar Flow Characteristics of laminar flow, laminar flow through a circular pipe: Hagen Poiseuille equation</p>		CO3
Unit 4: Turbulent Flow and Flow through Pipes		7hrs
<p>a) Turbulent Flow through Pipes Characteristics of turbulent flow, instantaneous velocity, temporal mean velocity, scale of turbulence and intensity of turbulence, Prandtl’s mixing length theory, velocity distribution equation, variation of friction factor for laminar flow and for turbulent flow, resistance to flow in smooth and rough pipes, friction factor for commercial pipes, Moody’s diagram.</p> <p>b) Flow through pipes: Energy losses in pipe flow, Equation for major loss and minor losses in pipe, flow through pipes in simple and compound pipe, pipes in series, parallel, Dupit’s equation, Introduction to siphon.</p>		CO4
Unit 5: Uniform flow in open channels		7hrs
<p>a) Introduction to Open channel flow: Classification of channels, channel flows and geometric elements of channel, Basic governing equations of Channel flow viz. continuity equation, energy equation and momentum equation, One dimensional approach, Velocity distribution in open channel flow.</p> <p>b) Uniform flow in open channels: Uniform flow formulae: Chezy’s and Manning’s formulae; Factors affecting Manning’s roughness coefficient; Important terms pertaining to uniform flow, Uniform flow computations. Most efficient channel sections: rectangular, triangular and trapezoidal.</p>		CO5



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314201: Fluid Mechanics

Unit 6: Gradually Varied Flow (GVF) in Open Channel Flow	7hrs	
a) Depth-Energy Relationships in Open Channel Flow: Specific energy and Specific force diagram, Depth discharge Diagram, Critical depth, Conditions for occurrence of critical flow; Froude's number, flow classification based on it. b) Gradually Varied Flow (GVF) in Open Channel Flow: Theory and Computation Basic Assumptions of GVF; Dynamic equation of GVF - Alternative forms; Classification of channel bed slopes, Various GVF profiles, Methods of GVF computations: Direct Step method. (mention of other method)		CO6

Text books

1. Hydraulics and Fluid Mechanics including Hydraulic Machine by Dr P. N. Modi & S. M. Seth Pub: Standard book house, Delhi-6
2. Flow in Open Channels by K Subramanya, Pub: Tata McGraw Hill, New Delhi
3. A Text Book on Fluid Mechanics and Hydraulic Machines by Sukumar Pati Pub: McGraw Hill, New Delhi

Reference books

1. Engineering Fluid Mechanics by R. J. Garde and A.J Mirajgaonkar, Pub: SCITECH Publications (India) Pvt. Ltd, Chennai
2. Fluid Mechanics and its Applications, Vijay Gupta, Santosh K Gupta, New Age international pvt. Ltd, New Delhi,
3. Fluid Mechanics, Fundamentals and applications by Yunus. A Cengel and John.MCimbala, McGraw Hill International, New Delhi.
4. Fluid Mechanics by Streeter, Wylie and Bedford – Pub: McGraw Hill International, New Delhi.
5. Open Channel Hydraulics by Ven Tee Chow, Pub: McGraw- Hill Book Company- Koga.
6. A Text Book of Fluid Mechanics and Hydraulic Machines- by Dr. R K Rajput Pub: S Chand and Co Ltd. New Delhi



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314202: Mechanics of Structures

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3 hrs/week	Th:03	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite :Engineering Physics, Engineering Mathematics and Engineering Mechanics		Pract:	--
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. To study various types of stresses for determinate structural members. 2. To learn concept of Shear Force and Bending Moment Diagram for determinate beams. 1. 3. To learn the concept of slope and deflection for determinate structural members. 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Understand concept of stress-strain and determine different types of stress, strain in determinate, indeterminate homogeneous and composite structures.</p> <p>CO2: Calculate shear force and bending moment in determinate beams for different loading Conditions and illustrate shear force and bending moment diagram.</p> <p>CO3: Explain the concept of shear and bending stresses in beams and demonstrate shear and bending stress distribution diagram.</p> <p>CO4: Use theory of torsion to determine the stresses in circular shaft.</p> <p>CO5: Analyze axially loaded and eccentrically loaded column.</p> <p>CO6: Determine the slopes and deflection of determinate beams and trusses.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314202: Mechanics of Structures

Unit 1: Simple Stresses and Strains	7hrs	CO
a) Materials used in construction and their nature, Hook's Law, Stress-Strain Diagram for elastic, plastic materials and brittle material, Concept of axial stresses (compression, tension), strains (linear, lateral, shear and volumetric), Elastic constants and their relations. Stresses and strains due to change in temperature. b) Stresses, strains and deformations in determinate and indeterminate structures for homogeneous and composite structures under concentrated loads and temperature changes.		CO1
Unit 2: Shear Force and Bending Moment Diagram	7hrs	
Concept of shear force and bending moment. Relation between shear force, bending moment and intensity of loading. Shear force and bending moment diagrams for determinate beams due to concentrated, uniformly distributed, uniformly varying loads and couples. Bending moment and loading diagram from given shear force diagram..		CO2
Unit 3: Shear and Bending Stresses	7hrs	
a) Shear stresses in beams: concept of shear, complementary shear, derivation of shear stress formula, shear stress distribution for various cross sections, maximum and average shear stress for circular and rectangular sections. b) Bending stresses in beams: theory of simple or pure bending, assumptions, derivation of flexure formula, bending stress distribution diagrams, Moment of Resistance of cross-section.		CO3
Unit 4: Torsion of Circular Shafts	7hrs	
Torsion of circular shafts: theory of torsion, assumptions, derivation of torsion formula. Stresses, strains and deformations in determinate and indeterminate shafts of hollow, solid, homogeneous cross-sections subjected to twisting moments. Power transmitted by shafts.		CO4
Unit 5: Axially and Eccentrically Loaded Columns	7hrs	
a) Axially loaded columns: concept of critical load and buckling, Euler's formula for buckling load with hinged ends, concept of equivalent length for various end conditions, Rankine's formula, safe load on column and limitations of Euler's formula. b) Direct and bending stresses for eccentrically loaded short column and other structural components such as retaining walls, dams, chimneys, etc. Effect of lateral force and self-weight. Resultant stress diagrams due to axial loads, uni-axial, and bi-axial bending. Concept of core of section for solid and hollow rectangular and circular sections.		CO5
Unit 6 : Slope and Deflection of Beams and Trusses	7hrs	
Slope and deflection of determinate beams by Macaulay's method and Strain energy method, Castigliano's first theorem. Joint displacement of determinate trusses by Unit load method.		CO6

Text books

- Mechanics of Structures Vol. I & II by S. B. Junnarkar and Dr. H. J. Shah, Twenty second edition, Charotar Publishing House Pvt Ltd.
- Strength of Materials by R. Subramanian, Oxford University Press.
- Strength of Materials by S. S. Ratan, Tata McGraw Hill.

Reference books

- Elements of Strength of Materials by Timoshenko and Young, East-West Press Ltd.
- Strength of Materials by F.L. Singer and Andrew Pytel, Harper and Row Publication.
- Mechanics of Materials by Beer and Johnston, McGraw Hill Publication.
- Introduction to Mechanics of Solids by E.P. Popov, Prantice Hall Publication.
- Mechanics of Materials by Gere & Timoshenko, CBC publisher.
- Elementary Structural Analysis by Norris, Wilbur and Utku, Tata McGraw Hill Publisher.
- Intermediate Structural Analysis by R. C. Hibbler, Pearson Education Publishers.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314203:Building Technology & Architectural Planning

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2hrs/week	Th:02	Theory	CIA: 25
Practical: --	Practical: --		End-Sem:50
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--
Course Objectives: <ol style="list-style-type: none">1. To study different types of materials, byelaws and Architectural aspects used in construction for civil engineering projects.2. To plan different building units, Town planning parameters and safety of buildings.			
Course Outcomes: On completion of the course, learner will be able to– CO1: Identify types of building and basic requirements of building components. CO2: Make use of Architectural Principles and Building byelaws for building construction. CO3: Plan effectively various types of Residential Building according to Building byelaws. CO4: Make use of Architectural drawing in Planning of Building.			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314203:Building Technology &Architectural Planning

Unit 1: Introduction to Building types, Material and Component 7hrs	CO
Classifications of Buildings, Properties, types & use of Brick, stone, cement, aggregate, steel, glass, fiber etc. Ecofriendly Materials, Substructure, Superstructure, Foundation classification, Doors and Windows, stone masonry and brick masonry, Arches and Lintels, Roofing & Flooring.	CO1
Unit 2: Construction Technique 7hrs	CO2
Construction procedure, supervision. Form work and casting procedure for reinforced concrete columns, R.C.C. beams, R.C.C. slabs, slip form work, Underpinning, IS specification and tests, Sound & thermal insulation.	
Unit 3: Building bye laws 7hrs	CO3
Necessity of bye-laws, plot sizes, road width, open spaces, floor area ratio (F.A.R.), concept of V.P.R. Marginal distances, building line, control line, height regulations, room sizes, Area calculations (built-up area, carpet area etc.), Rules for ventilation, lighting, Vertical circulation, Sanitation and Parking of vehicles. Minimum Standard Dimensions	
Unit 4: Introduction to Architectural drawing 7hrs	CO4
Principles of Building Planning and Principles of Architectural design relation between form and function, utility, aesthetics, Concept of Line plan, Developed Plan, Elevation, Section, Selection of scales for various drawings, dimensioning, abbreviations, and symbols as per IS 962, Elements of perspective drawings, parallel and angular perspective of small building elements.	

Text Books

1. Building Construction by B.C. Punmia, Laxmi Publications.
2. Building Materials by S.V.Deodhar, Khanna Publication.

Reference Books

1. Building Materials by S. K. Duggal, New Age International Publishers.
2. Building Construction by S.C. Rangwala, Charotdar Publications..
3. Building Materials Technology by Ruth T. Brantley & L. Reed Brantley, Tata McGraw Hill.
4. Building Design and construction by Frederick Merrit, Tata McGraw Hill.
5. Development plan and DCP Rules of urban local body, New Delhi, Volume 12.

IS Codes

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



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314201:Fluid Mechanics Laboratory

Teaching Scheme:	Credits	Examination Scheme	
Theory: Nil	Th:--	Theory	CIA:25
Practical: 2hrs/week	Practical: 01		End-Sem:--
Prerequisite : Nil		Pract:	--
		Oral:	25
		Termwork	--
Course Objectives: The student should be able to <ol style="list-style-type: none">1. Learn how to measure viscosity and surface tension of liquids.2. Perform calibration of venturimeter and venturiflume.3. Perform calibration of V-Notch.4. Determine Darcy Weisbach friction factor.			
Course Outcomes: On completion of the course, learner will be able to– CO1: Measure viscosity and surface tension of liquids. CO2: Perform calibration of venturimeter and venturiflume. CO3: Perform calibration of V-Notch. CO4: Determine Darcy Weisbach friction factor.			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314204:Fluid Mechanics Laboratory

Experiments	<p>The Term work shall consists of Experiments (09)</p> <p>List of Experiments</p> <ol style="list-style-type: none">1. Measurement of viscosity of fluid by Redwood/Saybolt viscometer.2. Study and Measurement of Pressure using different Pressure Measuring Devices.3. Experimental verification of Bernoulli's theorem with reference to loss of energy.4. Calibration of Venturi meter / Orifice meter.5. Determination of Darcy-Weisbach friction factor (f) for a given pipe and study of variation of f with Reynolds Number (Re).6. Measurement of Surface Tension.7. Calibration of Rectangular and Triangular Notch.8. Study of Uniform Flow Formulae for Open channel.9. Calibration of Venturiflume.	CO1- CO4
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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314205:Testing of Materials Laboratory

Teaching Scheme:	Credits	Examination Scheme	
Theory: Nil	Th:--	Theory	CIA: 25
Practical: 2hrs/week	Practical: 01		End-Sem:--
Prerequisite : Nil		Pract:	--
		Oral:	25
		Termwork	--
Course Objectives: The student should be able to <ol style="list-style-type: none">1. Perform tension, shear and impact test on metals.2. Determine flexural and abrasion strength of flooring tiles.3. Determine fineness and compressive strength of cement.4. Determine workability of concrete using various methods.			
Course Outcomes: On completion of the course, learner will be able to– CO1: Perform tension, shear and impact test on metals. CO2: Determine flexural and abrasion strength of flooring tiles. CO3: Determine fineness and compressive strength of cement. CO4: Determine workability of concrete using various methods.			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314205:Testing of Laboratory

Metals	The Term work shall consists of undermentioned Experiments 1. Tension test on mild and TMT steel. 2. Shear (Single & Double) test on mild steel. 3. Impact (Izod & Charpy) test on mild steel, aluminum, brass.	CO1
Bricks & Tiles	1. Water absorption test on bricks. 2. Compressive strength test on bricks 3. Flexural strength of flooring tiles. 4. Abrasion test of flooring tiles.	CO2
Cement	1. Fineness of cement (by sieve method) 2. Standard consistency Initial and final setting time of cement. 3. Compressive strength of cement	CO3
Concrete	1. Workability of concrete with and without admixture by slump cone, compaction factor, and or Vee-Bee Consistometer apparatus. 2. Compressive strength test of concrete on cubes by destructive and non-destructive method rebound Hammer and Quality of concrete by ultra-sonic pulse velocity (demo Video).	CO4



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem- III

2314206A: Pollution Abatement and Control

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3hrs/week	Th:03	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite: Nil		Pract:	--
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. Quantify and analyze the pollution load. 2. Analyze/design of suitable treatment for wastewater. 3. Model the atmospheric dispersion of air pollutants. 4. Selection and design of air pollution control devices. 5. Analyze the characteristics of solid waste, mining effect and its handling & management. 6. Understand the laws and measures for pollution control. 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Quantify and analyze the pollution load. CO2: Analyze/design of suitable treatment for wastewater. CO3: Model the atmospheric dispersion of air pollutants. CO4: Selection and design of air pollution control devices. CO5: Analyze the characteristics of solid waste and its handling & management. CO6: Understand the concept of environmental impact assessment and laws for pollution control</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314206A: Pollution Abatement and Control

Unit 1: Introduction	8hrs	CO
Industrial pollution, Different types of wastes generated in an industry, Different water pollutants, Air pollutants and solid wastes from industry, Their effects on living and non-living things, Environmental regulatory legislations and standards, Importance of industrial pollution abatement, Concept of sustainable development, Greenhouse gases, Global warming and climate change, Mass and energy balance with and without reaction.		CO1
Unit 2: Water Pollution	8hrs	
Identification, quantification and analysis of wastewater, Classification of different treatment methods into physico-chemical and biochemical techniques, Physico-chemical methods, General concept of primary treatment, Liquid-solid separation, Design of a settling tank, Neutralization and flocculation, Disinfection, Biological methods, Concept of aerobic digestion, Design of activated sludge process, Concept of anaerobic digestion, Biogas plant layout, Different unit operations and unit processes involved in conversion of polluted water to potable standards.		CO2
Unit 3: Air Pollution	8hrs	
Classification of air pollutants, Nature and characteristics of gaseous and particulate pollutants, Analysis of different air pollutants, Description of stack monitoring kit and high volume sampler, Atmospheric dispersion of air pollutants, Gaussian model for prediction of concentration of pollutant down wind direction, Plume and its behavior, Operating principles and simple design calculations of particulate control devices, Brief concepts of control of gaseous emissions by absorption, adsorption, chemical transformation and combustion.		CO3
Unit 4: Gaseous Pollutants	8hrs	
Sources; Emission factors and control technology. Particulate pollutants: Major sources; Effects; Emission factor and emission limits; Combustion generated pollutants and control; Particulate emission control equipment- Design and efficiency of centrifugal collectors, electrostatic precipitators, bag filters and scrubbers; Vehicular emission control.		CO4
Unit 5: Solid Waste and Effects of Mining	5hrs	
Analysis and quantification of hazardous and non-hazardous wastes, Treatment and disposal of solid wastes, Land filling, Leachate treatment, Incineration. Ill effects of mining, blasting and deforestation on the environment, human and wildlife.		CO5
Unit 6: Environment Impact Assessment and Laws to Control Pollution	5hrs	
Environment impact assessment, Its concept and constituents, Environmental audit, ISO-14000 system. Overview of Indian legislative acts for water, land and air pollution control – provisions, scope and implementation.		CO6

Textbooks

1. Deswal DS and Deswal SS “Environmental Engineering” Dhanpat Rai and Company (P) Ltd., Delhi
2. Odum EP, “Fundamentals of Ecology”, Amarind Publication Co., Delhi
3. Peavy, H.S., Rowe, D.R., and Tchobanoglous, G. Environmental Engineering, McGraw Hill International (1985).
4. Metcalf & Eddy, Wastewater Engineering, Tata McGraw-Hill Education Private Limited (2009).



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314206A: Pollution Abatement and Control

Reference books

1. Masters, G.M., Introduction to Environmental Engineering and Science, Prentice Hall off India, (2008).
2. Rao, C.S., Environmental Pollution Control Engineering, Wiley Eastern (2010).
3. De Nevers, N., Air Pollution Control Engineering, McGraw-Hill (2000).
4. Dhamija S. K. "Environmental Engineering and Management ; SK Kataria and Sons, Delhi
5. De AK, "Engineers Chemistry", New Age Publication, Delhi



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314206B:Engineering Economics& Financial Management

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3 hrs/week	Th:03	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. To apply the knowledge of accounting and financial management in civil engineering projects.
2. To prepare, appraise, evaluate, and approve financial plans and interpret financial data.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Understand basics of construction economics.

CO2: Develop an understanding of financial management in civil engineering projects.

CO3: Prepare and analyze the contract account.

CO4: Decide on right source of fund for construction projects.

CO5: Understand working capital and its estimation for civil engineering projects.

CO6: Illustrate the importance of tax planning & understand role of financial regulatory bodies.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314206B: Engineering Economics & Financial Management

Unit 1:Construction Economics	7hrs	CO
Economics: Definition, Principles, Importance in Construction industry, assets, liabilities, balance sheet, numerical on preparation balance sheet, profit & loss account, difference between microeconomics and macroeconomics, basic economic problems along with case studies. Construction economics: structure of construction industry, economics of road and buildings, irrigation and power, ports and aviation.		CO1
Unit 2: Introduction to Financial Management	7hrs	
Long- and short-term sources of finance, equity, debt government grants & alternative sources, numerical on calculation of leverage ratio, EBIT & dividend pay-out, financial market & instruments: money, market, secondary market, credit, bill & income security market; goal of financial management, key activities in financial management, role of financing institutes in construction sector: banking institutions, NBFC, housing finance institutions & others. Case study for Raising of funds.		CO2
Unit 3: Contract Costing	7hrs	
Construction financial management, role of financial manager in construction financial management, meaning and features of contract costing, types of contract and contract costing procedure, Contract account: definition, format/specimen of contract account, treatment of various items in the contract account, methods of recording and reporting site accounts between project office and head office. Case study on Contract Costing.		CO3
Unit 4: Capital Budgeting	7hrs	
Budget, types of budgets, master budgets, cost estimating and budgeting in civil engineering project, definition of capital budgeting, time value of money, simple and compound interest, numerical on computation of interest, rule of 72, process of capital budgeting, techniques of capital budgeting, economic decision making in construction project, depreciation, different methods to calculate depreciation and numerical on it, impact of depreciation in economic decision making.		CO4
Unit 5: Working Capital	7hrs	
Meaning, types of working capital, components of working capital, operating cycle, factors affecting working capital requirement, working capital management, estimation of working capital, components of working capital in Construction Company, inventory management techniques and financing resources of working capital.		
Unit 6: Taxation and Financial Regulatory Bodies	7hrs	
Introduction to direct and indirect tax, GST, impact of GST on construction industry, tax exemption for contractors, property tax: types, methods of calculation & numerical on computation of property tax, tax deductions against income from property, corporate tax planning, financial regulatory bodies: role & functions, ICRA (Information and Credit Rating Agency of India), SEBI (Security and Exchange Board of India), IRDA (Insurance Regulatory & Development Authority) and RBI (Reserve Bank of India).		



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314206B: Engineering Economics & Financial Management

Text Books

1. Engineering Economics Management, Dr. Vilas Kulkarni and Hardik Bavishi, S. Chand Publication
2. Laws for Engineers, Vandana Bhatt and Pinky Vyas, Pro Care Publisher
3. Indian Economy, Gaurav Datt and Ashwani Mahajan, S. Chand Publication
4. Industrial Organization & Engineering Economics, T. R. Banga and S. C. Sharma, Khanna Publisher

Reference Books

1. Engineering Economy, Theusen G. J. and Fabrycky W. J., 9th Edition, Prentice-Hall, Inc., New Delhi
2. Finance for Engineers: Evaluation and Funding of Capital Projects, Crundwell F. K., Springer, London
3. Construction Project Management: Theory and practice, Jha K.N., 2nd Edition, Pearson India Education Services Pvt. Ltd.
4. Financial Management, Khan and Jain, Tata McGraw-Hill Education
5. Construction Management and Accounts, Singh H, Tata McGraw Hill, New Delhi
6. Engineering Economy, Leland T. Blank and. Anthony Tarquin, McGraw Hill
7. Case studies in Finance, Burner, McGraw Hill



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) (2023 Pattern)

Sem-III

2300201: Principles of Management

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2 hrs/week	Th:02	Theory	CIA: 25
			End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. Comprehend the nature and characteristics of management, its scope, and various functional areas. 2. Recognize the importance of ethical values in managerial decision-making and actions. 3. Explore the concepts of authority, delegation, decentralization, and their impact on organizational structure. 4. Analyze the techniques of coordination in managing complex organizational tasks. 			
<p>Course Outcomes:</p> <p>On completion of the course, learner will be able to–</p> <p>CO1: Inculcate The Ability To Apply Multifunctional Approach To Organizational Objective.</p> <p>CO2: Apply Process Based Thinking And Risk Based Thinking For Managing And Improving The Functioning Of An Organization</p> <p>CO3: Examine The Inter-Relationships Between The Planning And Organising, Directing And Communicating, Controlling And Coordinating Etc.</p> <p>CO4: Develop Skills For Corrective Action Management And Continual Improvement Project Management.</p>			



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S. Y. B. Tech (Common) (2023 Pattern)

Semester: III

2300201: Principles of Management

Unit 1: Introduction to Management	7hrs	CO
Definition and scope of management, Evolution of management theories, Functions of management: planning, organizing, leading, and controlling, Managerial roles and skills, Challenges and opportunities in contemporary management, Management As A Science, Art Or Profession; Management And Administration; Difference Between management And Administration. Significance Of Values And Ethics In Management		CO1
Unit 2: Planning, Organizing and Decision Making	7hrs	
Nature, Scope, Objective And Significance Of Planning, Elements And Steps Of Planning, Decision Making Organizing Principles, Span Of Control, Line And Staff Relationship, Authority, Delegation And Decentralization. Effective Organizing, Organizational Structures, Formal And Informal Organizations, Staffing, Importance of planning in achieving organizational goals, Types of plans: strategic, tactical, operational, Process of decision making, Decision-making models and techniques, Setting objectives and formulating strategies		CO2
Unit 3: Organizing and Organizational Structure, Leading and Managing Human Resources	7hrs	
Principles of organizing, Types of organizational structures, Departmentalization and delegation of authority, Coordination and integration of activities, Formal and informal organization, The role of leadership in management, Leadership styles and their impact on organizational culture, Recruitment, Selection, Placement, Promotion, Separation, Performance Appraisal, Meaning And Nature Of Direction, Motivation theories and their application in the workplace, Communication and its importance in effective leadership, Managing diversity and fostering inclusivity.		CO3
Unit 4: Communicating, Controlling And Coordinating	7hrs	
Communication - Meaning And Importance, Communication Process, Barriers To Communication, Steps To Overcome Communication Barriers, Types Of Communication; Motivation Theories – Maslow’s Need Hierarchy Theory, Herzberg’s Two Factor Theory. Leadership – Meaning, Formal And Informal Leadership, Characteristics Of Leadership; Leadership Styles – Autocratic Style, Democratic Style, Participative Style, Laissez Faire Leadership Styles, Transition Leadership, Charismatic Leadership Style, Elements Of Managerial Control, Control Systems, Management Control Techniques, Effective Control Systems. Coordination Concept, Importance, Principles And Techniques Of Coordination, Concept Of Managerial Effectiveness.		CO4

Text Books

1. Principles of Management" by P. C. Tripathi and P. N. Reddy
2. Fundamentals of Management" by R. S. Dwivedi
3. "Management: Theory and Practice" by Kris Cole
4. "Principles of Management" by V. S. Ramaswamy and S. Namakumari
5. Essentials of Management" by Harold Koontz and Heinz Weihrich (Indian adaptation by A. Aryasri)



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S. Y. B. Tech (Common) (2023 Pattern)

Semester: III

2300201: Principles of Management

Reference Books

1. Management: Tasks, Responsibilities, Practices" by Peter F. Drucker
2. The Practice of Management" by Peter F. Drucker
3. "Management: Text and Cases" by V. S. P. Rao
4. Management: Concepts and Practices" by Tim Hannagan
5. Management: Principles and Practice" by S. K. Chakraborty and D. Chatterjee
6. Modern Management: Concepts and Skills" by Samuel C. Certo and S. Trevis Certo
7. Management: A Global and Entrepreneurial Perspective" by Heinz Wehrich, Mark Cannice, and Harold Koontz



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S. Y. B. Tech (Common) (2023 Pattern)

Sem - III

2300202:Industrial Psychology

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2hrs/week	Th:02	Theory	CIA: 25
			End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Develop an awareness of the major perspectives underlying the field of Industrial Psychology.
2. Apply the principles of human psychology to the corporate field and familiarize them with the current practices in the corporate. .
3. Develop an understanding of group dynamics, norms, and cohesiveness, enabling them to build and lead effective teams within the organization.
4. Familiarize with the field of occupational psychology and its applications in selection, placement, counseling, and training of employees.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Learn about theories of motivation and group behavior.

CO2: Understanding of key concepts, theoretical perspectives, and trends in industrial psychology.

CO3: Analyze and interpret the role of motivation & Morale in behavior modification.

CO4: Analyze the impact of human engineering and physical environment on job performance and employee well-being.

CO5: Apply psychological principles in addressing work-related challenges...

CO6: Design the role of psychologists in industrial settings and appreciate their impact on employee well-being and organizational performance.



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S. Y. B. Tech (Common) (2023 Pattern)

Sem - III

2300202:Industrial Psychology

Unit 1:Introduction	6hrs	CO
The role of the psychologist in industry, the field of occupational Psychology: Study of behavior in work situation and applications of Psychological principles to problems of selection, Placement, Counseling and training		CO1
Unit 2: Design of Work Environments	7hrs	CO2
Human engineering and physical environment techniques of job analysis, Social environment: Group dynamics in Industry Personal psychology, Selection, training, placement, promotion, counseling, job motivations, job satisfaction. Special study of problem of fatigue, boredom and accidents		
Unit 3: Individual and Group Behavior	7 hrs	CO3, CO4
Introduction, Objectives, Individual Behavior, Individual Differences: Meaning, Nature, Dimensions and Values, Factors Influencing Individual Behavior, Group Behavior: Introduction, Objectives, Meaning, Definition and Advantages of Groups, Types of Groups, Group Dynamics, Group Norms Group Cohesiveness		
Unit 4: Morale, Motivation& Counseling	8hrs	CO5, CO6
Morale: Meaning, Types and Aspects, Characteristics of High and Low Morale and Essential and Psychological Requirements for High Morale, Introduction, Objectives, Meaning, Importance and Types of Motivation in Industry, Monetary and Non-Monetary Incentives, Fatigue, Boredom and Monotony: Meaning, Causes and Remedies, Introduction, Objectives, Counseling: Meaning, Significance, Types and Process, Employee Health, Safety and Security, Industrial Accidents: Accident Proneness and Prevention		

Text Books

1. Tiffin, J and Mc Cormic E.J., Industrial Psychology, Prentice Hall, 6th Edn., 1975.
2. Mc Cormic E.J., Human Factors Engineering and Design, McGraw Hill, 4th Edn.,1976.
3. Mair, N.R.F., Principles of Human relations
4. Gilmer, Industrial Psychology
5. Ghiselli & Brown, Personnel and Industrial Psychology.
6. Myer, Industrial Psychology.
7. Dunnete, M.D., Handbook of Industrial and Organizational Psychology.
8. Blum & Taylor, Industrial Psychology

Reference books

1. Miner J.B. (1992) Industrial/Organizational Psychology. N Y : McGraw Hill.
2. Blum & Naylor (1982) Industrial Psychology. Its Theoretical & Social Foundations CBSPublication.
3. Aamodt, M.G. (2007) Industrial/Organizational Psychology : An Applied Approach
4. (5 th edition) Wadsworth/Thompson : Belmont, C.A.Blum M.L. Naylor J.C., Horper& Row, IndustrialPsychology, CBS Publisher, 1968
5. Luthans, Organizational Behaviour, McGraw Hill, International, 1997
6. Morgan C.t.,KingR.A.,JohnRweisz & JohnSchoples, Introduction to Psychology, McHraw Hill, 1966
7. Schermerhorn J.R.Jr., Hunt J.G &Osborn R.N., Managing, Organizational Behaviour, John Willy



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) (2023 Pattern)

Sem-III

2300203: Design Thinking

Teaching Scheme:	Credits	Examination Scheme	
Theory: 1hrs/week	Th:01	Theory	CIA: 25
Practical: 2 hrs/week	Practical: 01		ESE:--
Prerequisite :		Pract:	--
		Oral:	25
		Termwork	25
<p>Course Objectives:</p> <p>The student should be able to</p> <ol style="list-style-type: none"> 1. Learn design thinking concepts and principles 2. Use design thinking methods in every stage of the problem 3. Learn the different phases of design thinking 4. Apply various methods in design thinking to different problems 			
<p>Course Outcomes:</p> <p>On completion of the course, learner will be able to</p> <p>CO1. Define key concepts of design thinking</p> <p>CO2. Practice design thinking in all stages of problem solving</p> <p>CO3. Apply design thinking approach to real world problems</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) (2023 Pattern)

Sem-III

2300203:Design Thinking

Unit 1 Introduction, Understand, Observe and Define The Problem 7hrs	CO
Why Design? - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project. Search field determination - Problem clarification - Understanding of the problem - Problem analysis - Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs	CO1 CO2 CO3
Unit 2 Ideation, Prototyping, Testing and Implementation 7hrs	CO
Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Startup Method for Prototype Development - Visualization and presentation techniques. Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking	CO1 CO2 CO3

TEXT BOOKS :

1. Christian Mueller-Roterberg, Handbook of Design Thinking - Tips & Tools for how to design thinking.
2. Designing for Growth: a design thinking tool kit for managers By Jeanne Liedtka and Tim Ogilvie.
3. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation by Tim Brown.

REFERENCES:

1. Johnny Schneider, "Understanding Design Thinking, Lean and Agile", O'Reilly Media, 2017.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press, 2009.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011
4. <http://ajjuliani.com/design-thinking-activities/>
5. <https://venturewell.org/class-exercises>

LIST OF EXPERIMENTS:

1. Case study on understanding of the design thinking problems.
2. Case study on observations of the parameters of design thinking problems.
3. Case study on defining design thinking problems.
4. Case study on description of customer needs of the parameters of design thinking problems.
5. Case study of ideation phase of solving design thinking problems
6. Case study of prototyping phase of solving design thinking problems
7. Case study of testing phase of solving design thinking problems
8. Case study of implementation phase of solving design thinking problems



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) (2023 Pattern)

Sem-III

2300204 : Community Engagement Project

Teaching Scheme:	Credits	Examination Scheme	
Theory: --	Pr:02	Theory	CIA: --
Practical: 4 hrs/week			End-Sem:--
		Pract:	--
		Oral:	25
		Termwork	25

Course Objectives: The student should be able to

1. sensitize the students to the living conditions of the people in the surroundings.
2. bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability.
3. make students aware of their inner strength and help them to find new /out of box solutions to the social problems.
4. make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
5. help students to initiate developmental activities in the community in coordination with public and government authorities.
6. develop a holistic life perspective among the students by making them to study culture, traditions, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Course Outcomes:

On completion of the course, learner will be able to–

CO1:Survey for the development of the community.

CO2:Interpret the social issues that confront the vulnerable / marginalized sections of the society.

CO3:Build team for societal change.

CO4:Create an opportunity to familiarize themselves with urban / rural community they live in.

CO5:plan activities based on the focused groups.

CO6:implement the ways of transforming the society through systematic programmeimplementation.



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S.Y. B. Tech (Common) (2023 Pattern)

Sem-III

2300204 : Community Engagement Project

PROCEDURE

Students in a group (Maximum 5) can take up a planned community work for minimum of 50 hours. Evaluation of student's work will be based on the planning, execution and documentation of work, and a viva-voce by Departmental panel.

A group of students could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, so as to enable them to commute from their residence and return back by evening or so.

The Community Service Project is a twofold one

- i. First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. For ex., a student of Arts will focus on socio-economic conditions, social survey and about the Government's social security schemes. This should not be viewed as a duplication of work by the Village or Ward volunteers; rather, it could be another primary source of data.
- ii. Secondly, the student/s could take up a project work related to following domains.
 - a. Agriculture
 - b. Health
 - c. Marketing and Cooperation
 - d. Animal Husbandry
 - e. Horticulture
 - f. Fisheries
 - g. Sericulture
 - h. Revenue and Survey
 - i. Natural Disaster Management
 - j. Irrigation
 - k. Law & Order
 - l. Excise and Prohibition
 - m. Mines and Geology
 - n. Energy

The assessment is to be conducted for 50 marks. The number of credits assigned is 2. Later as per the present practice the marks are converted into grades and grade points to include finally in the SGPA and CGPA.

The weightings shall be:

Project Report	50%
Presentation	50%



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314701:Planning of Structures

Teaching Scheme:	Credits	Examination Scheme	
Theory: 0hrs/week	Th:--	Theory	CIA: --
Practical: 2hrs/week	Practical: 02		End-Sem:--
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. Study different byelaws and Architectural aspects used in construction for civil engineering projects. 2. Use principles of architectural planning and understand futuristic need of users. 3. Understand and demonstrate planning strategy with reference to different acts, guidelines, norms. 4. Plan different building units, Town planning parameters and safety of buildings. 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Make use of Architectural Principles and Building byelaws for building construction.</p> <p>CO2: Plan effectively various types of Residential Building forms according to their utility, functions with reference to National Building Code.</p> <p>CO3: Plan effectively various types of Public Buildings according to their utility functions with reference to National Building Code.</p> <p>CO4: Make use of Principles of Planning in Town Planning, Different Villages and Safety aspects.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314701: Planning of Structures

1. Floor Plan/ Typical floor plan with construction notes, schedule of openings, of any type of building, Plan, Elevation and Section on separate sheet (Full Imperial sheet).	CO1- CO4
2. Developing typical floor plan drawing exercise completed in assignment number 5, using CAD and Printout of the same.	
3. Layout/ Site plan indicating water supply and drainage line (with area statement, make max. four students in one group).	
4. Document collection: Different sanction forms and at least six brochures of building materials.	
5. Assignment on Dimension standards of Residential building and Public building.	
6. Draw the detail plan of any one residential building and any two Public Buildings.	
7. Assignment on research and compare the new 2020 UDCPR building rules with the old ones and identify the changes and their implications on building construction in Maharashtra.	
8. Assignment on Plumbing materials used in building construction.	
9. E- learning: https://maharera.mahaonline.gov.in with its report (Group work).	
10. Site Visit: Green Building, Salient features like materials used/technology etc, benefits, planning concepts of Green Building (site selection, orientation, sun path and wind diagram etc.)	



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314801: Concrete Mix Design using Software(EMMA)

Teaching Scheme:		Credits		Examination Scheme	
Theory: --		Th:--		Theory	CIA: --
Practical:2hrs/Week		Practical:--			End-Sem:--
				Pract:	--
				Oral:	--
				Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. Familiarize with the properties and characteristics of cement, aggregates, water, and admixtures used in concrete mixtures. 2. know various factors, such as water-cement ratio, aggregate grading, and admixture dosage, affect the properties of fresh and hardened concrete. 3. use relevant codes, standards, and guidelines governing concrete mix design, such as ACI (American Concrete Institute), ASTM (American Society for Testing and Materials), IS (Indian Standards). 4. Assess concrete workability using tests like slump, flow, and compacting factor, and design mixes with appropriate workability for specific applications. 					
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Recall the basic properties of concrete materials, including cement, aggregates, water, and admixtures.</p> <p>CO2: Identify the different methods used for concrete mix proportioning, such as ACI and DOE methods.</p> <p>CO3: Understand the relationship between water-cement ratio, strength, and durability in concrete mixes.</p> <p>CO4: Apply concrete mix proportioning methods to design mixes for various applications and exposure conditions.</p> <p>CO5: Create sustainable and eco-friendly concrete mixes by incorporating recycled materials and optimizing mix design.</p>					



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S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

2314801: Concrete Mix Design using Software(EMMA)

Module 1:Concrete Mix Design and Properties of Concrete Materials	2Hrs	CO
Overview of concrete mix design process, Importance of proper mix design for achieving desired concrete properties, Understanding the properties of cement, aggregates, water, and admixtures, Influence of material properties on concrete performance.		CO1 to CO5
Module 2:Requirements of Concrete Mix Design and Concrete Mix Proportioning	3Hrs	
Identifying project-specific requirements for concrete strength, workability, durability, etc., Codes and standards governing concrete mix design, Different methods of proportioning concrete mixes (ACI, DOE, IS Code etc.), Determining the proportions of cement, aggregates, and water for a target mix.		CO1 to CO5
Module 3:Workability, Consistency and Strength and Durability Considerations	3Hrs	
Evaluating and measuring concrete workability using slump, flow, and other tests, Adjusting mix proportions to achieve desired workability, Understanding the relationship between water-cement ratio, strength, and durability, Designing mixes for different exposure conditions (e.g., marine, aggressive environments).		CO1 to CO5
Module 4:Admixtures and Supplementary Cementitious Materials, Quality Control and Testing	3Hrs	
Types and functions of chemical and mineral admixtures, Incorporating supplementary cementitious materials (fly ash, slag, silica fume) in mix design, esting fresh and hardened concrete properties (slump, compressive strength, etc.), Quality control procedures during batching and casting.		CO1 to CO5
Module 5Sustainable Mix Design	4Hrs	
Eco-friendly and sustainable concrete mix design practices, Minimizing environmental impact through material optimization.		CO1 to CO5
Module 6:Mix Design using Software (EMMA)	13Hrs	
Data Input, Proportioning, Optimization, Quality Control, Result Analysis, Adjustments and Fine-Tuning, Documentation:		CO1 to CO5

Text Books:

1. Design of Concrete Mixes by P.C. Aïtcin and V.M. Malhotra
2. Concrete Mix Design, Quality Control, and Specification by Ken W. Day
3. Properties of Concrete by A.M. Neville and J.J. Brooks
4. Concrete Technology: Theory and Practice by M.S. Shetty
5. Concrete Mix Design, Formulation, and Performance by P.K. Mehta and P.J.M. Monteiro



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-III

VAC141: Auto Cad

Teaching Scheme:	Credits	Examination Scheme	
Theory: --	Th:--	Theory	CIA: --
Practical:2 hrs/week	Audit Course		End-Sem:--
		Pract:	--
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. use of Auto cad, basic drawing Fundamentals in various civil engineering applications, especially in building drawing.\ 2. Know the basic commands and tools necessary for professional 2D drawing and drafting using AutoCAD 3. learn to take data and transform it into graphic drawings. Students able to learn basic engineering drawing formats 			
<p>Course Outcomes: On completion of the course, learner will be able to</p> <p>CO1: Understand CAD software and basic functions</p> <p>CO2: Evaluate plans of Single storied building & multistoried buildings</p> <p>CO3: Develop different sections at different elevations</p> <p>CO4: Develop section and elevation for single and multistoried buildings using CAD software.</p>			

	SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE S.Y. B. Tech(Civil Engineering) (2023 Pattern) Sem-III VAC141: Auto Cad
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Module 1: Introduction to Computer Aided Drawing	7Hrs	CO
1. State the applications and advantages of CAD 2.State the features of CAD as drafting package 3.State the hardware requirements to run CAD		CO1 to CO4
Module 2 Basic menus in Computer Aided Drawing	7Hrs	
1. Identify component of the drawing screen. 2. Apply the methods of selecting/entering commands to start new drawing 3. Execute CAD commands by selecting from menus, tool bars and entering Commands on Command line. 4. Set the limits of the drawing to get the needed working area. 5. Apply the ‘setting commands’ Grid, Snap, & Ortho Commands. 6. Apply display And View commands		CO1 to CO4
Module 3 Drawing Commands and Edit Command	7Hrs	
1. Prepare a simple drawing file using basic commands. 2. Apply ‘Draw commands’. 3. Explain the applications of Edit commands 4. Modify existing drawing. 5. Apply modify commands.		CO1 to CO4
Module 4 Dimensioning Commands	7Hrs	
1. Dimension the given figures.		CO1 to CO4

Text Books:

1. Auto Cad 2005 by George, Omura B. Robert Callori, BPB Publisher
2. Auto Cad 2005 Instant by George Omura B. Robert Callori, BPB Publications
3. Auto Cad 2007 Bible by Famkline, Wiley Publications
4. Working With AutoCAD by Ajit Singh, Tata McGraw Hills Publications



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

MAHIRAVANI, TRIMBAK ROAD, TAL & DIST: NASHIK-422213, MAHARASHTRA, INDIA

B. Tech Civil Engineering

Semester – IV

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)				Examination Scheme				Total Marks
				L	T	P	C	Formative Assessment CIA		Summative Assessment ESE		
								Theory	Lab	Theory	Lab	
1	PC	2314207	Structural Analysis	3	--	--	3	50	--	50	--	100
2	PC	2314208	Geotechnical Engineering	3	--	--	3	50	--	50	--	100
3	PC	2314209	Survey	2	--	--	2	25	--	50	--	75
4	PC (MD)	2314210	Concrete Technology	2	--	--	2	25	--	50	--	75
5	PC	2314211	Survey Laboratory	--	--	2	1	--	--	--	25 ^a	25
6	PC	2314212	Geotechnical Engineering Lab.	--	--	2	1	--	--	--	25 ^a	25
7	OE	2314213	Open Elective-II	2			2	25	--	50	--	75
8	IE (VEC)	2300205	First Level Course in Foreign Language	2	--	--	2	25	--	50	--	75
9	IC (HSSM)	2300206	Industrial Economics	2	--	--	2	25	--	50	--	75
10	SDC (VSEC)	2314702	Surveying of Area Using Modern Tools	--	--	2	1	--	25	--	--	25
11	EEC	2314802	Effective Communication Certificate (Udemy / Coursera)	--	---	--	--	---	--	--	--	--
12	IC (AEC)	2300207	Industrial Work Study	2	--	--	2	25	--	50	--	75
TOTAL				18	00	06	21	250	25	400	50	725
First Level Course in Foreign Language (Any One)												
8	IE (VEC)	2300205A	German Language	2	--	--	2	25	--	50	--	75
8	IE (VEC)	2300205B	French Language	2	--	--	2	25	--	50	--	75
Open Elective II												
7	OE	2314213A	Global Climatic Changes & Disaster Management	2			2	25	--	50	--	75
7	OE	2314213B	Environmental Impact Assessment	2			2	25	--	50	--	75
Value Added Course												
13	VAC (VSEC)	VAC142	3D Max / GoogleSketchup	--	--	2	1	--	25	--	--	25
Course Work (for Exit Criterion to UG Diploma)												
Minor Project				--	--	--	2	--	50	--	--	50
Internship (2 Weeks)				--	--	--	2	--	50	--	--	50



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314207: Structural Analysis

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3hrs/week	Th:03	Theory	CIA: 50
Practical:	Practical: 01		End-Sem:50
Prerequisite: Fundamentals of Physics, Mathematics, Engineering Mechanics and Mechanics of Structures		Pract:	--
		Oral:	--
		Termwork	--
Course Objectives: The student should be able to <ol style="list-style-type: none"> 1. This subject will build on the concepts from Engineering Mechanics and Mechanics of Structures. 2. This will create a foundation for analyzing real life structures by imparting knowledge about various methods involved in the analysis of indeterminate structures. 			
Course Outcomes: On completion of the course, learner will be able to– <p>CO1: Understand the basic concept of static and kinematic indeterminacy and analysis of Indeterminate beams..</p> <p>CO2: Analyze redundant trusses and able to perform approximate analysis of multi-story multi-bay frames.</p> <p>CO3: Implement application of the slope deflection method to beams and portal frames.</p> <p>CO4: Analyze beams and portal frames using moment distribution method.</p> <p>CO5: Determine response of beams and portal frames using structure approach of stiffness matrix method.</p> <p>CO6: Apply the concepts of plastic analysis in the analysis of steel structures.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314207: Structural Analysis

Unit 1: Fundamentals of structure and analysis of redundant beams.	7hrs	CO
a) Types and classification of structures based on structural forms, concept of indeterminacy, static and kinematics degree of indeterminacy. b) Analysis of propped cantilever, fixed beam and continuous beams with indeterminacy up to second degree by strain energy method.		CO1
Unit 2: Analysis of redundant pin jointed frames and multi-storied multi-bay 2-D rigid jointed frames.	7hrs	CO2
a) Analysis of redundant trusses by unit load method for external loading, lack of fit, sinking of support and temperature changes (indeterminacy up to second degree). b) Approximate methods of analysis of multi-storied multi-bay 2-D rigid jointed frames by Cantilever method and Portal method.		CO2
Unit 3: Slope-Deflection Method.	7hrs	CO3
a) Slope-deflection equations, equilibrium equation of Slope-deflection method, application of Slope deflection method to beams with and without joint translation and rotation, yielding of support, application to non-sway rigid jointed rectangular portal frames, shear force and bending Moment diagram. b) Sway analysis of rigid joint rectangular single bay single storey portal frames using Slope deflection method. (Involving not more than three unknowns)		CO3
Unit 4: Moment Distribution Method.	7hrs	CO4
a) Stiffness factor, carry over factor, distribution factor, application of Moment distribution method of analysis to beams with and without joint translation and yielding of support, application to non-sway rigid jointed rectangular portal frames, shear force and bending moment diagram. b) Sway analysis of rigid jointed rectangular single bay single storey portal frames using Moment distribution method (Involving not more than three unknowns).		CO4
Unit 5: Stiffness method.	7hrs	CO5
a) Fundamental concepts of flexibility and stiffness, relation between them. Stiffness method of analysis- Structure approach only. Application to beams (Involving not more than three unknowns). b) Application of Stiffness structure approach to rigid jointed rectangular portal frames (Involving not more than three unknowns).		CO5
Unit 6: Plastic Analysis of Structure.	7hrs	CO6
True and idealized stress-strain curve for mild steel in tension, stress distribution in elastic, elasto-plastic and plastic stage, concept of plastic hinge and collapse mechanism, static and kinematic methods of analysis, upper bound, lower bound and uniqueness theorem. Plastic modulus of section, Plastic moment, shape factor. Plastic analysis of determinate and indeterminate beams, single bay single storied portal frame.		CO6

Text Books

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



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314207: Structural Analysis

Reference Books

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



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314208: Geotechnical Engineering

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3hrs/week	Th:03	Theory	CIA: 50
Practical: 2 hrs/week	Practical: 01		End-Sem:50
Prerequisite: Engineering Mechanics		Pract:	--
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. To study the various phase diagrams and derive various phase relationships of the soil. 2. To study various methods for determination of permeability of soils. 3. To study the compaction of soil and stress distribution in soil. 4. To find and measure the shear strength parameters in soil. 5. To study the earth pressure theories and determination of earth pressure. 6. To study the methods of factor of safety against the slope stability. 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Determine index characteristics of soil.</p> <p>CO2: Determine permeability and seepage from the soil mass</p> <p>CO3: Understand the compaction for soil and calculate stress distribution in soil.</p> <p>CO4: Determination of shear strength parameter for the soil.</p> <p>CO5: Determination lateral earth pressure of soil.</p> <p>CO6: Determination factor of safety for stability of slope.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314208: Geotechnical Engineering

Unit 1: Properties of soil	7hrs	CO
Introduction–Types of soils, their formation and deposition, Index Properties of Soil: Basic definitions; phase relations; physical and engineering properties of soil and method of their determination. Consistency of soil. Classification of Soils- Indian standard soil system.		CO1
Unit 2: Permeability and Seepage	7hrs	
Permeability- Darcy’s law, Factors affecting permeability, Determination of permeability by laboratory and field tests. Permeability for layered soils. Seepage- Seepage through soil, Quick Sand Condition, Capillary Phenomena, and General flow equation. Flow Net- properties and application. Flow Net construction for flow under sheet pile and earthen dam.		CO2
Unit 3: Compaction and Stress distribution	7hrs	
Compaction of Soil: Soil compaction phenomenon, Factors affecting compaction. Dry density and moisture content relationship. Zero air voids line, Effect of compaction on soil structure. Laboratory compaction tests and field compaction- equipment and methods for cohesive and non-cohesive soils. Stress distribution: Introduction, stresses due to loads. Boussinesq’s equation, Westergaard’s equation, Isobars, Pressure bulb.		CO3
Unit 4: Shear Strength	7hrs	
Introduction, stress at a point and Mohr’s stress circle; Mohr-Coulomb Failure criterion. Measurement of Shear Strength, drainage conditions-UU, CU and CD tests and their relevance to field problems.		CO4
Unit 5: Lateral Earth Pressure	7hrs	
Earth pressure on vertical wall, earth pressure with movement of wall, earth pressure at rest, Rankine’s theory, lateral earth pressure due to submerged backfill, backfill with uniform surcharge, backfill with sloping surface, Coulomb's theory.		CO5
Unit 6: Stability of Slopes	7hrs	
Slope classification, slope failure, modes of failure. Finite and Infinite slope in cohesive and cohesion less soil, slope stability analysis methods, slope failure hazardous.		CO6

Text Books

1. Gopal Ranjan and A S Rao Basic and Applied Soil Mechanics 2nd Ed. 2000 New Age International Publisher, New Delhi.
2. B. C. Punmia Soil Mechanics and Foundation Engineering 17th Ed. 2020 Laxmi Publishing New Delhi
3. P. C. Varghese Foundation Engineering 9th Ed. 2012 Asoke K. Ghosh, PHI Learning Private Limited

Reference Books

1. Principles of Geotechnical Engineering by Braj M. Das, Cengage Learning.
2. Geotechnical Engineering by P. Purushothma Raj, Tata Mc Graw Hill.
3. Geotechnical Engineering by Principles & Practices by Donald. P. Coduto, Pearson Education.
4. Basic and Applied Soil Mechanics by Gopal Ranjan and A. S. R. Rao, New age International.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314209:Survey

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2hrs/week	Th:02	Theory	CIA:25
Practical: --	Practical: --		End-Sem:50
Prerequisite: Basic Introduction to Civil Engineering field		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Describe the function of surveying in civil engineering construction.
2. Identify and calculate the errors in measurements and to develop corrected values for differential level, horizontal distances and angles for open or closed traverses.
3. Perform traverse calculations; determine latitudes, departures, and coordinates of control points and balancing errors in a traverse.
4. Work as a team member on a surveying party to achieve a common goal of accurate and timely project completion.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Define and Explain basics of plane surveying and differentiate the instruments used for it.

CO2: Express proficiency in handling surveying equipment and analyse the surveying data from these equipment.

CO3: Describe different methods of surveying and find relative positions of points on the surface of earth.

CO4: Articulate advancements in surveying such as space based positioning systems.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314209: Survey

Unit 1: Compass and Levelling	7hrs	CO
<p>a) Definition and Importance of Surveying; Principles of Surveying,</p> <p>b) Definition, objective, and fundamental classification of surveying (Plane and Geodetic), concept of Scale, Ranging, Chaining, Offsetting and Traversing. Construction and use of prismatic compass, Concept of bearing & types of bearings such as Whole Circle Bearing, Quadrantal Bearing, meridian and their types, local attraction and correction for local attraction, dip, declination and calculation of true bearings, including numerical of all types.</p> <p>c) Equipment required for plane table surveying, uses, advantages and disadvantages and errors in plane table surveying. Methods of plane table Survey Radiation, intersection, traversing and resection</p> <p>d) Introduction to levelling, Types of levelling, Types of benchmarks, Study and use of dumpy level, auto level, digital level and laser level in construction industry, principal axes of dumpy level, testing and permanent adjustments reciprocal levelling, curvature and refraction corrections, distance to the visible horizon. Collimation Plane Method, Rise & Fall Method</p>		CO1
Unit 2: Theodolite Surveying	7hrs	CO
<p>a) Study of vernier transit 20" theodolite, uses of theodolite for measurement of horizontal angles by repetition and reiteration, vertical angles, measurement of deflection angles using transit theodolite and magnetic bearing, prolonging a line, lining in, and setting out an angle with a theodolite. Fundamental axes of theodolite: testing and permanent adjustments of a transit theodolite.</p> <p>b) Theodolite traversing – computation of consecutive and independent co-ordinates, adjustment of closed traverse by transit rule and Bowditch's rule, Gale's traverse table. Checks, omitted measurements, area calculation by independent co-ordinates.</p>		CO2
Unit 3: Tacheometry and Contouring	7hrs	CO
<p>a) Tacheometry – applications and limitations, principle of stadia tacheometry, fixed hair method with vertical staff to determine horizontal distances and elevations of points, finding tacheometric constants. Tacheometric contouring. Numerical.</p> <p>b) Contouring– Definition of Contours, Characteristics of Contours, Contour Patterns for various natural features, direct and indirect methods of contouring, uses of contour maps, study and use of topo-sheets, profile levelling and cross-sectioning and their applications.</p>		CO3
Unit 4: Construction Survey & Modern Techniques such as Space Based Positioning System (SBPS)	7hrs	CO
<p>a) Introduction to construction survey, establishing of horizontal and vertical controls, setting out of buildings, maintaining verticality of tall buildings, survey for open traverse (roadway, railways, drainage lines, water lines, canals), Setting out of a bridge, Determination of the length of the central line and the location of piers. Setting out of a tunnel – Surface setting out and transferring the alignment underground.</p> <p>b) Introduction to SBPS, SBPS systems - GPS, GLONASS, Galileo, GAGAN, BeiDou and their features, Segments of SBPS (Space, Control and User), applications of SBPS in surveying.</p>		CO4



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314209: Survey

Text Books

1. Surveying and Levelling Vol. I and Vol. II by T. P. Kanetkar and S. V. Kulkarni, Pune Vidyarthi Griha Prakashan.
2. Surveying, Vol. I & II by Dr. B. C. Punmia, Ashok K. Jain, Arun K. Jain, Laxmi Publications.
3. Plane Surveying & Higher Surveying by Dr A. M. Chandra, New age international publishers New Delhi.

Reference Books

1. GPS Satellite Surveying—Alfred Leick—Wiley.
2. Principles of Geographical Information System—Burrough-- Oxford University Press.
3. Surveying—M. D. Saikia—PHI Learning Pvt .Ltd. Delhi.
4. Advanced Surveying -Total Station, GIS and Remote Sensing by Satheesh Gopi, R. Sathikumar and N. Madhu , Pearson publication
5. Surveying & levelling by R. Subramanian, Oxford Publication.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314210 : Concrete Technology

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2hrs/week	Th:02	Theory	CIA: 25
Practical: --	Practical: --		End-Sem:50
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. To know properties of various ingredients of concrete and concept of mix design.
2. To learn the behaviour and properties of concrete in fresh and hardened state.
3. To understand special concrete and their applications.
4. To understand the durability aspects and preventive measures to enhance the life of concrete

Course Outcomes:

On completion of the course, learner will be able to–

CO1:Able to select the various ingredients of concrete and its suitable proportion to achieved desired strength.

CO2:Able to check the properties of concrete in fresh and hardened state.

CO3:Get acquainted to concreting equipment's, techniques and different types of special concrete.

CO4:Able to predict deteriorations in concrete and get acquainted to various repairing methods and techniques.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314210 : Concrete Technology

Unit 1: Introduction to Ingredients of Concrete and Concrete Properties.	6hrs	CO
a) Cement and Aggregate– Manufacture, chemical composition, hydration property, physical and mechanical properties, classification, types and application of cement, tests on cement, Classification of aggregate, physical and mechanical properties of aggregate, deleterious materials in aggregate, alkali-aggregate reaction, Fineness and gradation of aggregates using sieve analysis, tests on aggregates.		CO1
b) Water and Admixtures–Quality standard of water for use in concrete, admixture, classification and its types like accelerators, retarders, plasticizers, super plasticizers, mineral admixtures like fly ash, silica fume, ground granulated blast furnace slag etc..		
Unit 2: Fresh Concrete and Hardened Concrete	8hrs	
a) Properties of Fresh Concrete - Nominal mix grades, Water-cement ratio, Manufacturing process of fresh concrete, batching, mixing, transportation, compaction, curing of concrete, curing methods, temperature effect, heat of hydration, maturity rule, workability and factors affecting workability, cohesion and segregation.		
b) <i>Test on Fresh Concrete</i> - Workability by slump cone, compaction factor, Vee-Bee consistometer and flow table apparatus, Effect of admixture on workability of concrete and optimum dosage of admixture by Marsh cone test.		CO2
c) Properties of Hard 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		
d) <i>Test on Hard Concrete</i> - 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 3: Concrete Mix Design	6hrs	
a) Concrete Mix Design– 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		CO3
b) Methods of Mix Design: IS code method and DOE method (with and without mineral admixture)		
Unit 4: Concrete Equipment and Repairs in Concrete	6hrs	
a) 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.		CO4
b) 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		



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314210 : Concrete Technology

Textbooks

1. Concrete Technology by M. S. Shetty, S Chand, New Delhi-110055.
2. Concrete Technology by M. L. Gambhir, Tata McGraw-Hill.
3. Concrete technology by A. M. Neville, J.J. Brooks, Pearson.

Reference books

1. Concrete Technology by A. R. Shantakumar, 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.
5. Concrete Mix Design by A. P. Remideos, Himalaya Publishing House.
6. Concrete Structures, Repair, Rehabilitation and Retrofitting by J. Bhattacharjee, CBS Publishers & Distributors Pvt. Ltd.
7. Durability Design of Concrete Structures, by A. Sarja and E. Vesiari, E & FN Spon Publication, 1996.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314211: Survey Laboratory

Teaching Scheme:	Credits	Examination Scheme	
Theory: 0hrs/week	Th:--	Theory	CIA: --
Practical: 2hrs/week	Practical: 01		End-Sem:--
Prerequisite : Nil		Pract:	--
		Oral:	25
		Termwork	--

Course Objectives: The student should be able to

1. Understand conventional and modern methods of surveying.
2. Develop ability to transform basic concept of surveying to field practice.
3. Interpret plans and maps for planning and setting out works.
4. Understand modern surveying techniques for mapping.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Understand the basic principles of surveying for vertical, horizontal, linear, and angular measurements.

CO2: Determine the relative position of objects or points on the earth, measuring the distance and angle between different objects, and preparing a map or plan to represent an area on a horizontal plane.

CO3: Understand conventional and modern surveying methods and develop the ability to transform basic surveying concepts into field practice.

CO4: Impart practical knowledge in the field of measuring distances, directions, angles, determining R.L.'s areas, and volumes.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314211: Survey Laboratory

a) Perform any Six Experiments out of 1 to 10 and projects are mandatory:

1. Measurement of magnetic bearings of sides of a triangle or quadrilateral, correction for local attraction and calculations of true bearings using prismatic compass.
2. Plane table survey consisting of both Radiation and Intersection method. Actual mapping of small structure like an area map from central commanding area / small building using combination of both methods.
3. Finding horizontal distance and vertical elevation using a Tacheometer.
4. Simple and differential levelling with at least three change points using digital level.
5. Measurement of horizontal angles (by repetition method) and vertical angles using 1" and 20" Vernier Transit Theodolite. Setting the required horizontal and vertical angles.
6. Setting out a building from a given foundation plan (minimum six co-ordinates).
7. Spatial database creation by using GIS software like Google earth or any other.

CO1- CO4

b) Projects:(Minimum Two)

1. Road project using Auto level for a minimum length of 100 m including fixing of alignment, profile levelling, cross-sectioning, plotting of L section and Cross Section. (One full imperial sheet including plan, L-section and any three typical Cross-section.
2. Tachometric contouring project on hilly area with at least two instrument stations about 60 m to 100 m apart and generating contours using both methods, manual as well as using any suitable software such as Autodesk land desktop, Auto-civil, Foresight etc. (minimum contour interval 1meter).




SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314108:Geotechnical Engineering Lab

Teaching Scheme:		Credits		Examination Scheme	
Theory: --		Th:00		Theory	CIA: --
Practical: 2hrs/week		Practical: 01			End-Sem:--
Prerequisite: Nil				Pract:	--
				Oral:	25
				Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. To study the various phase diagrams and derive various phase relationships of the soil. 2. To study various methods for determination of permeability of soils. 3. To study the compaction of soil and stress distribution in soil. 4. To find and measure the shear strength parameters in soil. 5. To study the earth pressure theories and determination of earth pressure. 6. To study the methods of factor of safety against the slope stability. 					
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Determine index characteristics of soil.</p> <p>CO2: Determine permeability and seepage from the soil mass</p> <p>CO3: Understand the compaction for soil and calculate stress distribution in soil.</p> <p>CO4: Determination of shear strength parameter for the soil.</p> <p>CO5: Determination lateral earth pressure of soil.</p> <p>CO6: Determination factor of safety for stability of slope.</p>					

	SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE S.Y. B. Tech(Civil Engineering) (2023 Pattern) Sem-IV 2314108:Geotechnical Engineering Lab
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The term work shall consist of a journal giving details of at least 10 out of 12 of the following experiments. Sr. No 14 and 15 are compulsory.

Pr. No.	Topic
1.	Water content determination by any two methods a) Oven drying method, b) Infrared moisture method, c) calcium carbide method
2.	Specific gravity determination by Pycnometer /density bottle.
3.	Sieve analysis, particle size determination and classification of soil using various codes.
4.	Determination of Consistency limits and their use in soil classification using various codes.
5.	Determination of Field density of soil by a) Core cutter b) Sand Replacement and c) Clod method
6.	Determination of coefficient of permeability of soil by a) Constant head and b) Variable head method.
7.	Determination of Compaction Characteristic of soil using Standard/Modified Proctor test.
8.	Determination of shear strength of soil using Direct shear test apparatus.
9.	Determination of shear strength of soil using Unconfined compression test apparatus.
10.	Determination of shear strength of soil using Vane Shear test apparatus.
11.	Determination of shear strength of soil using Triaxial test apparatus
12.	Estimate the shear strength parameters from standard penetration test
13.	Study of Bore log Test and draw the soil profile with its significance.
14.	Study of any soil investigation report of any construction project and write report about interpretation of index properties of soil.
15.	Assignments on the following topics (any two): a) Rebhann's and Cullman's graphical method for determination of earth pressure. b) Solution of problems on shear strength parameters using graph. c) Flow net construction for sheet pile or earthen dam.

Note: Performance based oral examination on the above Term Work

Text Books:

Sr. No.	Authors	Title	Edition	Year	Publication
1	Gopal Ranjan and A S Rao	Basic and Applied Soil Mechanics	2 nd Ed.	2000	New Age International Publisher, New Delhi
2	B. C. Punmia	Soil Mechanics and Foundation Engineering	17 th Ed.	2020	Laxmi Publishing Co
3	B. J. Kasmalkar	Geotechnical Engineering	2 nd Ed.	1991	Pune Vidyarthi GrihaPrakashan



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314108:Geotechnical Engineering Lab

References Books:

Sr. No.	Authors	Title	Edition	Year	Publication
1	V. N. S. Murthy	Soil Mechanics and Foundation Engineering	3 rd Ed.	2018	C. B.S. Publications
2	J.E. Bowles	Foundation Analysis and Design	5 th Ed.	2001	McGraw-Hill Book Company
3	W C Teng	Foundation Design	1st Ed	1962	Prentice Hall PTR, 1962



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314213A: Global Climatic Changes & Disaster Management

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2hrs/week	Th:02	Theory	CIA: 25
Practical: --	Practical: --		End-Sem:50
Prerequisite: Nil		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. To provide understanding of climate change
2. To comprehend the approaches for mitigating climate change.
3. To provide a systematic knowledge base on disaster typology, risk, vulnerability, their impacts and concerns to growing hydro-met disasters.
4. To comprehend on approaches and measures of disaster management, preparedness and response, and related policies, law and methods

Course Outcomes:

On completion of the course, learner will be able to–

CO1:To study the evolution of climate science and climate change.

CO2:To understand the mitigation measures and risk adaptation for climate change.

CO3:To develop a sound understanding of disaster risk and related underlying factors, their impacts,

CO4:To appreciate and comprehend on approaches and measures of disaster management, preparedness and response, and related policies, law and methods



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314213A: Global Climatic Changes & Disaster Management

Unit 1: Introduction to Climate Change	8hrs	CO
Climate change, climate variability and implications on disaster risk; Climatic extreme events and disasters–global, regional and national scenario, predictions and projections. Climate change effects on disaster vulnerabilities environmental & land/geography, social-economic, health, infrastructure, systems, etc; Recent hydro-met disasters. Climate change issues for human security, national security, trans-boundary disasters and conflicts. United Nations Framework Convention on Climate Change (UNFCCC), Background to the Convention and its aims, Kyoto Protocol and the Flexibility Mechanisms, Emission trading.		CO1
Unit 2: Mitigation Measures for Climate Change	4hrs	CO2
Mitigation: Mitigation and policy evaluation, Strategies and technology options, Climate change case studies. Adaptation: Adaptation and policy evaluation, Strategies and technology options, Case studies of adaptation, Evaluation of the effectiveness of approaches in managing climate change risk, Effectiveness of policy approaches in reducing climate change and variability risk.		CO2
Unit 3: Introduction to Disaster management	6hrs	CO3
Environment-development and disasters; Disaster typology and classification; Basic concepts and terminologies- Hazard, Risk, Vulnerability, Disaster, Mitigation, DRR and its evolution, DRM, Emergency, Response, Relief; Resilience, Reconstruction, Recovery; Hydro meteorological and related disasters; Disaster vulnerability of the region/country.		CO3
Unit 4: Disaster Risk Mitigation, Management and Preparedness	10hrs	CO4
Disaster management journey and paradigm shift; Approaches in disaster management–Engineering centric, CBDP, Indent management, ecoDRR, etc. Structural and non-structural measures of mitigation–for hydro-met disasters, extremes and health risks–International and national policy frameworks and guidelines. Tools and Methods in Disaster Risk Management: Hazard, risk and vulnerability analysis; Legislations, Codes & Standards, Risk sensitive land use planning, Safety auditing, Role of EIA/SEA, REA of Disasters, Situation analysis, Incident response system, Environmental economics & DRR, Recovery framework. Crisis management; Issues in Urban, Rural and Industrial disaster risks management w.r.t. climate change.		CO4

Textbooks

1. Jon Hovi, Olav Stokke and GeirUlfstein (eds) 2005, “Implementing the Climate Regime: International Compliance”, Earthscan.
2. F. Yamin (ed), 2005., “Climate Change and Carbon Markets: A Handbook of Emission Reduction Mechanisms”, Earthscan.
3. Rajib Shaw and R.R. Krishnamurthy (2009). Disaster Management: Global Challenges and Local Solutions. Universities Press (India) Pvt. Ltd.
4. Ross Prizzia (2015). Climate Change and Disaster Management. Sentia Publishing, USA.
5. Anil K Gupta, S S Nair, S Chatterji and Florian B-Lux (2013). Disaster Management and Risk Reduction. Narosa Publishing New Delhi.



Reference books

1. Anil K Gupta, S SNair and V K Sharma (2018). Disaster Risk and Impact Management, Astral Publishing, New Delhi.
2. Anil K Gupta, Jane Eters and Ilona Porche (2011). Adaptation in Disaster Risk Management. The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and Govt of India MoEFCC.
3. Anil K Gupta, S Singh, S A Wajih (2017). Urban Resilience and Sustainability Through Peri-urban Ecosystem. Rockefeller Foundation, USA and GEAG India.
4. Anil K Gupta, S Singh, S Katyal and S AWajih (2016). Prime Minister's Agenda 10: India's Disaster Risk Management: Roadmap to Climate Resilient and Sustainable Development. CDKN – UK, ISET USA and GEAG India.
5. Anil K Gupta, S Singh, S Katyal and S AWajih (2016). Climate Resilient and Disaster Safe Development: Process Framework. CDKN UK, ISET USA.
6. Anil K Gupta, S S Nair (2014). Mainstreaming Climate Change Adaptation and Disaster Risk Reduction into District Level Development Plans. CDKN UK, ISET USA and NIDM India.
7. Anil K Gupta, S S Nair (2013). Environmental Legislation for Disaster Risk Management. The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and NIDM India.
8. Anil K Gupta, S S Nair (2012). Environmental Extremes - Disaster Risk Management: Addressing Climate Change. NIDM New Delhi, India.
9. <http://drought.unl.edu/Portals/0/docs/international/India%20Drought%20Manual%202016.pdf>
10. G. Boylr, B. Everest and J. Ramage (eds), 2003, “Energy Systems and Sustainability: Power for a Sustainable Future”, Oxford.
11. Climate Change 2007, “Mitigation of Climate Change, Summary for Policymakers”, IPCC. Available at: <http://www.ipcc.ch/SPM040507.pdf>.
12. Climate Change 2007, “Impacts, Adaptation and Vulnerability, Summary for Policymakers”, IPCC. Available at: <http://www.ipcc.ch/SPM13apr07.pdf>.
13. Climate Change, “The Physical Science Basis”, IPCC. Available at: <http://ipccwg1.ucar.edu/wg1/wg1-report.html>.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314213B: Environmental Impact Assessment

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2hrs/week	Th:02	Theory	CIA: 25
Practical: --	Practical: --		End-Sem:50
Prerequisite: Nil		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. To provide a basic understanding of the EIA process.
2. To introduce students to the legal, economic, social, administrative and technical process of preparing and/or evaluating environmental impact documents.
3. To provide knowledge of impacts prediction and clearance.
4. To demonstrate the environment management with actual case studies.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Be aware of the environmental legislations- policies of the country and of international environmental conventions and protocols.

CO2: Identify the environmental attributes and their impacts to be considered for the EIA study.

CO3: Evaluate the methodology to predict the impacts and thus gain knowledge of EIA clearance.

CO4: Formulate the methodology Environmental Management and evaluation study of actual cases.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314213B: Environmental Impact Assessment

Unit 1: Introduction to Environment Management and EIA	4hrs	CO
Concepts of Environmental Impact Assessment: Environment; Environmental Impacts; Environmental Impact Analysis; Environmental Impact Assessment and Environmental Impact Statement; EIA- As an Integral Part of The Planning Process		CO1
Unit 2: Assessment of Impacts	10hrs	
Environment attributes: air; water; noise; land and soil. Description of the Baseline Environment: Purposes for defining the Environmental Setting; Selection of parameters, Monitoring of physical environmental parameters, Collection and interpretation of baseline data for various environmental attributes Anticipated Environmental Impacts and Mitigation Measures: Analysis of Alternatives; Environmental Monitoring Programme; Environmental Protection acts, Rules and Standards, EIA guidelines; Additional studies; Project Benefits; Environmental Cost Benefit Analysis		CO2
Unit 3: Prediction and Clearance of Impacts on Environment	7hrs	
Prediction and Methods of Assessment of Impacts on Various aspects of Environment; Application of various models for the Prediction of impact on Air Environment, Water Environment, Noise Environment and Land; Procedure for EIA Clearance: EIA review and screening; state level screening, clearance from DOE and MOEF.		CO3
Unit 4: Environmental Management	7hrs	
Environmental Management: Preventive policy of environment, waste minimisation, conservation of water and energy, use of renewable, sources, pollution audit, pollution control strategy, disposal of treated effluents, solid waste disposal concept of green cities, green belt development – Case history.		CO4

Textbooks

1. Wathern P., "Environmental Impact Assessment: Theory and Practice", Routledge Publishers, 1990
2. Marriott B., "Environmental Impact Assessment: A Practical Guide", McGraw-Hill Publication, 1997
3. Shrivastava A.K., Baxter Nicola, Grimm Jacob, "Environmental Impact Assessment", APH Publishers, 2003
4. Anjaneyulu Y., Manickam Valli, "Environmental Impact Assessment Methodologies", CRC Press 2011
5. Glasson J., Therivel Riki, Chadwick Andrew, "Introduction to Environmental Impact Assessment", Oxford Brookes University 2012/ 4th edition

Reference books

1. Jain, R.K., Urban, L.V. and Stacey, G.S., Environment Impact Analysis, Von Nostrand Reinhold Company.
2. Lawrence, David P., Environmental Impact Assessment (Practical Solutions to Recurrent Problems), Wiley International, New Jersey.
3. MoEF, GoI, Environment Impact Assessment, Impact Assessment Division, January 2001 (Manual).
4. Water (Prevention and Control of Pollution) Act 1974. Air (Prevention and Control of Pollution) Act 1981.
5. Trivedi, P.R., Natural Resources Conservation, APH Publishing Corporation, New Delhi.
6. Westman, Walter E., "Ecology, Impact Assessment and Environment Planning" John Wiley and Sons, Canada, 1985.
7. https://onlinecourses.nptel.ac.in/noc22_ar07/preview



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) (2023 Pattern)

Sem-IV

2300205A : German Language

Teaching Scheme:		Credits		Examination Scheme	
Theory: 2 hrs/week		Th:02		Theory	CIA: 25
Practical: Nil					End-Sem:50
				Pract:	--
				Oral:	--
				Termwork	--
Course Objectives: The student should be able to					
<ol style="list-style-type: none">1. Understand grammar & structure of the German language and use it in daily basic conversations and communication2. Speak and write German language3. Critically think in German					
Course Outcomes:					
On completion of the course, learner will be able to–					
CO1: do the proper pronunciation of the sounds of the German language					
CO2: understand a basic vocabulary					
CO3: comprehend the basic grammatical structures.					
CO4: understand German that is spoken at a moderate conversational speed andthat deals with everyday topics and will be able to engage in simple conversations in everyday situations.					
CO5: demonstrate that they can think critically, read& write with a basic knowledge of non-technical German					



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) (2023 Pattern)

Sem-IV

2300205A : German Language

Module 1: Introduction	7Hrs	CO
Greetings , Introduction To Basic Phonetics; Writing System; Tones; Spelling Rules ,□Introducing Oneself And Others , Talk About Family and Family Members, Express□likes and dislikes , Hobbies, Asking For Personal Information ,Talking About Date,□Month, Year, Talking About Time ,Talking About Age		CO1
Module 2: Grammar	7Hrs	CO1 , CO2, CO3
Alphabet- Numerals - Nominal Classifiers – Sentences with Adjectival Predicate – Names of□Countries and places- Personal Pronoun- Interrogative Sentences - Structural Particle - Verbs and□Verb Conjugation – Articles- Singular and Plural- Prepositions – Negative articles – Ja/Nein and□W-Fragen (Yes/No and W- Questions) - Negation – Adjective- Possessive Article – Nominative□and Accusative cases – Writing notes, SMS and filling up forms- Listen and Understand□Telephonic Conversation and Conversations at specific places- Songs and Quiz		
Module3: Oral Communication	7Hrs	CO4, CO5
Stellungnahme (Taking a particular stance on a given topic)/ Debate/□Discussions/ Interview/ Role play/ group discussion/ Narration,□interview skills etc.		
Module4:Writing Communication	7Hrs	CO1 & CO5
Writing skills: Formal and Informal letters, Email, SMS blogs, Essays,□Report, Article, statistical Analysis, book/Film review etc		

Text Books:

1. Kraft, Wolfgang S. Deutsch Aktuell 1, 7th edition (2017). St. Paul: EMC/ParadigmPublishing. ISBN 978-0-8219-8076-7
2. Kraft, Wolfgang S. Deutsch Aktuell 1 Workbook, 7th edition (2017). St. Paul:EMC/Paradigm Publishing. ISBN 978-0-8219-8078-1

Reference books:

1. Funk, Hermann u.a. (hrsg.): Studio D A1. Deutsch AlsFremdsprache. Kurs Und Übungsbuch.Cornelsen and GOYAL SaaB. , 2009.
2. Funk, Hermann, u.a. (hrsg.): Studio D A1. Deutsch AlsFremdsprache. Sprachtraining. Cornelsenand GOYAL SaaB. , 2009.
3. Hirschfeld, Ursula, Reinke, Kerstin, Stock, Eberhard (hrsg.): Phonothekintensiv. München.Langenscheidt, 2007.
4. Studio 21 A1 Glossardeutsch-englisch, CornelsenVerlag, Berlin, 2013.
5. Tangram aktuell 1, Max HueberVerlag, Ismaning 2005 and GOYAL Publishers, Delhi2005.
6. Swick, Ed: Complete German Grammar.Mcgraw-Hill Publ. Comp. New York City, 2012.
7. Evans, Richard J.: Rereading German History, 1800-1996. From Unification to
8. Reunification.Routledge.London& New York, 1997.
9. Fraser, Catherine C. & Hoffmann, Dierk O. (hrsg.): Pop Culture in Germany! Media, Art andLifestyle.ABC-CLIO.England, 2006.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) (2023 Pattern)

Sem-IV

2300205B : French Language

Teaching Scheme:		Credits	Examination Scheme	
Theory: 2 hrs/week		Th:02	Theory	CIA: 25
Practical: Nil				End-Sem:50
			Pract:	--
			Oral:	--
			Termwork	--
Course Objectives: The student should be able to <ol style="list-style-type: none">1. Understand grammar & structure of the French language and use it in daily basic conversations and communication2. Speak and write French language3. Critically think in French				
Course Outcomes: On completion of the course, learner will be able to– CO1: do the proper pronunciation of the sounds of the French language CO2: understand a basic vocabulary CO3: comprehend the basic grammatical structures. CO4: understand French that is spoken at a moderate conversational speed andthat deals with everyday topics and will be able to engage in simple conversations in everyday situations. CO5: demonstrate that they can think critically, read& write with a basic knowledge of non-technical French				



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) (2023 Pattern)

Sem-IV

2300205B : French Language

Module 1: Introduction	7Hrs	CO
Greetings , Introduction To Basic Phonetics; Writing System; Tones; Spelling Rules , Introducing Oneself And Others , Talk About Family and Family Members, Express likes and dislikes, Hobbies, Asking For Personal Information ,Talking About Date, Month, Year, Talking About Time, Talking About Age		CO1
Module 2: Grammar	7Hrs	
Alphabet- Numerals - Nominal Classifiers – Sentences with Adjectival Predicate – Names of Countries and places- Personal Pronoun- Interrogative Sentences - Structural Particle - Verbs and Verb Conjugation – Articles- Singular and Plural- Prepositions – Negative articles – Negation – Adjective- Possessive Article – Nominative and Accusative cases – Writing notes, SMS and filling up forms- Listen and Understand Telephonic Conversation and Conversations at specific places- Songs and Quiz		CO1, CO2, CO3
Module3:Oral Communication	7Hrs	
Stellungnahme (Taking a particular stance on a given topic)/ Debate/ Discussions/ Interview/ Role play/ group discussion/ Narration, interview skills etc.		CO4, CO5
Module4:Writing Communication	7Hrs	
Writing skills: Formal and Informal letters, Email, SMS blogs, Essays, Report, Article, statistical Analysis, book/Film review etc		CO1, CO5

Text Books:

1. Alter Ego, A1 (ISBN: 9782011554208); Publisher: Hachette; Author: Annie Berthet, Catherine Hugot et al.; Published: 2006;
2. Alter Ego, A1 – Cahier d'activités - A1 (ISBN: 9782011558114); Publisher: Hachette; Author:Annie Berthet, Catherine Hugot et al.; Published: 2006

Reference books:

1. Écho (2e edition), A1 (ISBN: 9782090385885); Publisher: CLE International; Authors: Jacky Girardet, Jacques Pecheur; Published: 2013
2. Écho (2e edition), A1 - Cahier personnel d'apprentissage (ISBN: 9782090385892); Publisher: CLE International; Authors: Jacky Girardet, Jacques Pecheur; Published: 2013.



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S. Y. B.Tech. (Common) (2023 Pattern)

Sem - IV

2300206:Industrial Economics

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2hrs/week	Th:02	Theory	CIA: 25
			End-Sem:50
		Pract:	--
		Oral:	--
		Term work	--

Course Objectives: The student should be able to

1. Upon completion of the course, students will gain comprehensive knowledge of industrial organization, serving as a cornerstone for exploring various interconnected fields within the industry.
2. Students will develop a profound understanding of how firms interact within the economy, encompassing areas such as business strategy, corporate finance, marketing, international trade, banking, and organizational economics.
3. The course will offer insights into the historical progression of industrial economies, with a primary focus on contemporary advancements in studying firms' behavior.
4. By the end of the curriculum, learners will be equipped with a holistic perspective on industrial organization, paving the way for exploration into numerous other disciplines linked to the industrial sector.

Course Outcomes:

On completion of the course, learner will be able to–

- CO1: Including its definition, scope, and economic significance in various sectors.
- CO2: recognize the importance of studying Industrial Economics and its role in economic analysis, decision-making, and influencing diverse fields such as marketing, finance, and international trade.
- CO3: analyze the interplay between economic development and industrialization, as well as the impact of industrialization on the agricultural sector.
- CO4: identify and assess key factors influencing industrial development, considering socioeconomic and political influences on industrial growth.
- CO5: comprehend the dynamics of competition and cooperation among firms, their implications on industrial outcomes, and the strategies like mergers, takeovers, and acquisitions.
- CO6: analyze industrial location decisions, determine the determinants of industrial location, and evaluate theories like Weber's and Florence's to understand industrial location patterns.



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) (2023 Pattern)

Sem-IV

2300206:Industrial Economics

Unit 1 - Introduction to Industrial Economics	7Hrs	CO
Definition of Industrial Economics and its scope of study, Understanding the industrial sector's economic significance, Importance of Industrial Economics, Need and Significance of Studying Industrial Economics, Role of Industrial Economics in Economic Analysis, Economic Development, Agricultural Development, and Industrialization, Interplay between Economic Development and Industrialization, Impact of Industrialization on Agricultural Sector, Factors Influencing Industrial Development, Analysis of Key Factors Affecting Industrial Growth, Socioeconomic and Political Factors in Industrial Development.		CO1, CO2
Unit 2- Industrial Decisions and Market Structure	7Hrs	
Competition and Cooperation in Industries, The concept of Competition and Cooperation among Firms, Implications of Different Approaches on Industrial Outcomes, Firm Behavior and Market Outcomes, Understanding Firm Behavior under Different Market Structures, Relationship between Firm Behavior and Market Outcomes, Cartels, Collusion, Mergers, Takeovers, and Acquisitions, Overview of Cartels and Collusion in Industries, Merger, Takeover, and Acquisition Strategies.		CO3, CO4
Unit 3- Price Competition and Pricing Strategies	7Hrs	
Factors Influencing Pricing Decisions, General Considerations for Pricing Decisions in Various Industries, Market Conditions and Pricing Strategies, Pricing under Perfect & Imperfect Competition: Theoretical Perspectives, Pricing Strategies in Perfectly Competitive Markets, Pricing Challenges in Imperfectly Competitive Markets, Pricing Procedures and Methods in Practice, Practical Approaches to Pricing Decisions, Comparative Analysis of Pricing Methods, Pricing in Public Enterprises, Pricing Policies and Practices in Public Sector Enterprise, Economic and Social Implications of Public Enterprise Pricing, Price Wars: Theories and Empirical Evidence, Theoretical Explanations of Price Wars, Empirical Evidence and Impact on Industries		CO5
Unit 4 - Non-Price Competition and Product Differentiation	7Hrs	
Non-Price Competition and Product Differentiation, Understanding Non-Price Competition and Product Differentiation, Importance of Product Differentiation in Competitive Markets, Horizontal Product Differentiation, Analysis of Horizontal Product Differentiation and Consumer Behavior, Case Studies and Examples, Brand Proliferation as an Entry Deterrence Strategy, The Role of Brand Proliferation in Deterring New Entrants, Evaluation of Effectiveness and Challenges, Vertical Product Differentiation, Explanation of Vertical Product Differentiation and its Implications, Comparison with Horizontal Differentiation, Price Discrimination: First-, Second-, and Third-Degree Price Discrimination.		CO6

Text Books:

1. "Modern Small Industry in India" -R. K. Vepa
2. "Problems of Accountability of Public Enterprises in India" -M. P. Srivastava
3. "Economic Development Perspectives, Vol. 3, Public Enterprises and Performance" -Binode Mohanty
4. "Public Enterprises in India - Principles and Performance" - V. K. L. Srivastava



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S.Y. B. Tech (Common) (2023 Pattern)

Sem-IV

2300206:Industrial Economics

Reference Books / Reading:

1. "Industrial Economics - Issues and Perspectives" - Paul R. Ferguson and Glenys J. Ferguson
2. "The Economics of Industrial Organization" - William G. Shepherd
3. "Modern Small Industry for Developing Countries" - E. Staley and R. Morse
4. "Indian Growth and Stagnation - The Debate in India" - A. V. Desai



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314702: Surveying of Area Using Modern Tools

Teaching Scheme:	Credits	Examination Scheme	
Theory: 0hrs/week	Th:--	Theory	CIA: --
Practical: 2hrs/week	Practical: 01		End-Sem:--
Prerequisite : Nil		Pract:	25
		Oral:	--
		Termwork	--
Course Objectives: The student should be able to <ol style="list-style-type: none">1. Understand the modern surveying techniques and instruments.2. Interpret the modern surveying measurements.3. Execute the ground as well as aerial mapping.			
Course Outcomes: On completion of the course, learner will be able to– CO1: Summarize the concepts of astronomical and hydrographic surveying. CO2: Analyze use of modern surveying instruments in the field. CO3: Execute GPS and the associated software for different applications in civil engineering. CO4: Use Total Station in the field of civil engineering land survey.			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314702: Surveying of Area Using Modern Tools

a) Perform any Six Experiments out of 1 to 9 and projects are mandatory:

1. Measurement of distances, angles, gradient and distance between two inaccessible points using total station.
2. Study of the modern instruments used in hydrographic surveying.
3. Measurement of horizontal and vertical angles using 1" theodolite and digital theodolite.
4. Solution of three-point problem using analytical and graphical method.
5. Measurement of air base distance using mirror stereoscope.
6. Measuring the height of a tower using total station.
7. Setting up stakes for marking the foundation of a building on ground using total station.
8. Demonstration of the use of unmanned aerial vehicle (UAV).
9. Measuring the GPS coordinates of ground control points in a mapping survey using any GNSS system.

CO1- CO4

b) Projects:(Minimum Two)

1. Total Station Traversing.
2. Preparing a topographic map using total station and appropriate mapping software.
3. Mapping a given area using a differential GPS.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314802: Effective Communication Certificate (Udemy / Coursera)

Teaching Scheme:	Credits	Examination Scheme	
Theory: --	Th:--	Theory	CIA: --
Practical:2hrs/Week	Practical:--		End-Sem:--
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Make the effective verbal and nonverbal communication
2. Effective written communication
3. Effective Organizational Communication

Course Outcomes:

On completion of the course, learner will be able to–

- CO1:** Define the fundamental principles of effective communication.
- CO2:** Summarize the main elements of successful verbal and nonverbal communication.
- CO3:** Demonstrate effective public speaking skills in various contexts.
- CO4:** Analyze real-life communication scenarios to identify strengths and weaknesses.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

2314802: Effective Communication Certificate (Udemy / Coursera)

Module 1: The little things
Hair and clothing style, eyes and face expressions, body style and language
Module 2: Dealing with peoples
Dealing with peoples- words are affecting your sales, words that are not use, Language for communication
Module 3: Mindset
Importance of mindset, understanding of people millionaire mindset, That Sinking Feeling
Module 4: Wrapping
Wrapping- Conversing the people by communications, presentation.



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) (2023 Pattern)

Sem-IV

2300207:Industrial Work Study

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2hrs/week	Th:02	Theory	CIA: 25
Practical: --	Practical: --		End-Sem:50
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--
Course Objectives:			
1. To teach students about how to measure work, optimize methods and fix pay accordingly.			
Course Outcomes:			
On completion of the course, learner will be able to–			
CO1: Explain different method study procedures and can implement them for optimizing work approaches.			
CO2: Evaluate the work content and can fix standard time for performing work.			
CO3: Analyze the data through work sampling.			
CO4: Design the plans for fixing incentive and wages based on performance.			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE
S.Y. B. Tech (Common) (2023 Pattern)
Sem-IV
2300207:Industrial Work Study

Units			
Unit 1	Method Study	7 Hrs	CO
Purpose of work study, its objectives, procedure and applications; method study definition and basic procedure, selection of job, various recording techniques like outline process charts, flow process charts, man machine charts, two handed process charts, string diagram, flow diagram, multiple activity chart, simo, cyclographs and chrono-cyclographs; critical examination, development, installation and maintenance of improved method; principles of motion economy and their application in work design; micro motion study, memo motion study and their use in methods study.			CO1
Unit 2	Work Measurement	7 Hrs	CO2
Introduction & definition, objectives and basic procedure of work measurement; application of work measurement in industries; time study: basic procedure, equipment needed, methods of measuring time, selection of jobs, breaking a job into elements; numbers of cycles to be timed; rating and methods of rating, allowances, calculation of standard time.			CO2
Unit 3	Work Sampling	7 Hrs	CO3
Basic procedure, design of work sampling study, conducting work sampling study and establishment of standard-time.			CO3
Unit 4	Job Evaluation and Incentive Schemes	7 Hrs	CO4
Starlight line, Tailor, Merrick and Gantt incentive plans, Standard data system; elemental and non-elemental predetermined motion systems, work factors system; Methods, Time Measurement (MTM), MOST			CO4

Text Books

1. Barnes RM; Motion and Time Study; Wiley Publications.
2. Currie RM; Work study; BIM publications.

Reference Books

1. Mynard; Hand book of Industrial Engineering.
2. Telsang, M.; Industrial Engineering and Production Management, S. Chand Publishers.
3. ILO; work-study; International Labour Organization.




SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-IV

VAC 142 : Google Sketchup

Teaching Scheme:		Credits		Examination Scheme	
Theory: --		Th:--		Theory	CIA: --
Practical:2 hrs/week		VAC-- 1			End-Sem:
				Pract:	--
				Oral:	--
				Termwork	25
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. Understand the interface and basic tools of 3ds Max software. 2. Learn to create and manipulate 3D objects using various modeling techniques. 3. Gain proficiency in texturing, lighting, and rendering 3D scenes. 4. Apply learned skills to create professional-quality 3D models and animations for various architecture and construction industry. 					
<p>Course Outcomes: On completion of the course, learner will be able to</p> <p>CO1: Demonstrate proficiency in using the 3ds Max interface and basic tools to create 3D models and scenes.</p> <p>CO2: Apply various modeling techniques to create complex 3D objects and environments.</p> <p>CO3: Create realistic textures and lighting effects to enhance the visual quality of 3D scenes.</p> <p>CO4: Collaborate with others to complete projects that demonstrate proficiency in 3ds Max software.</p>					

 SANDIP <small>FOUNDATION</small>	SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE S.Y. B. Tech(Civil Engineering) (2023 Pattern) Sem-IV VAC 142 : Google Sketchup
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Module 1: Introduction to 3ds Max	7Hrs	CO
<ul style="list-style-type: none"> • Overview of the 3ds Max interface and basic tools • Creating and manipulating 3D objects using various modeling techniques • Applying textures and materials to 3D objects • Lighting and rendering a basic 3D scene 		CO1 to CO4
Module 2: Advanced Modeling Techniques	7Hrs	CO
<ul style="list-style-type: none"> • Creating complex 3D objects using advanced modeling techniques • Working with modifiers to modify and refine 3D models • Creating detailed environments using terrain modeling and scattering tools • Creating realistic textures and materials using advanced mapping techniques 		CO1 to CO4
Module 3: Animation and Rigging	7Hrs	CO
<ul style="list-style-type: none"> • Creating and animating characters using rigging tools • Animating objects using keyframe animation and procedural animation techniques • Working with the timeline and animation controls to create complex animations • Using particle systems and dynamics to create dynamic and interactive animations 		CO1 to CO4
Module 4: Advanced Features and Project Work	7Hrs	CO
<ul style="list-style-type: none"> • Exploring advanced features such as simulations, cloth, and hair • Applying learned skills to complete a final project that demonstrates proficiency in 3ds Max software • Collaborating with classmates to complete a group project that combines modeling, texturing, lighting, and animation techniques • Preparing a portfolio of professional-quality 3D models and animations for use in various industries. 		CO1 to CO4

Text Books:

1. "3ds Max 2021: A Comprehensive Guide" by Prof. Sham Tickoo and CADCIM Technologies
2. "Autodesk 3ds Max 2021: A Detailed Guide to Modeling, Texturing, Lighting, and Rendering" by CADArtifex
3. "3ds Max Modeling for Games: Insider's Guide to Game Character, Vehicle, and Environment Modeling" by Andrew Gahan
4. "Mastering Autodesk 3ds Max 2021" by Kelly L. Murdock



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) (2023 Pattern)

Sem-IV

Minor Project (Exit Course)

Teaching Scheme:		Credits	Examination Scheme	
Theory: --		Practical:02	Theory	CIA: --
Practical: --				End-Sem:--
			Pract:	50
			Oral:	--
			Termwork	--
Course Objectives: The student should be able to				
1. develop ability for the application of fundamental principles and elementary techniques which have been learnt, in developing solutions for real life engineering problems.				
Course Outcomes:				
On completion of the course, learner will be able to–				
CO1: Identify an open ended problem in area of engineering.				
CO2: Identify the methods and materials required for the project work.				
CO3: Formulate and implement innovative ideas for social and environmental benefits.				
CO4: Analyze the results to come out with concrete solutions.				
CO5: Write technical report of the project apart from developing a presentation.				



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) (2023 Pattern)

Sem-IV

Minor Project (Exit Course)

PROCEDURE

This subject will be offered to the students who are will to exit second year engineering and opt for UG Diploma after the 4th semester.

Minor Project is an exit course requirement wherein under the guidance of a faculty member, a student is required to do an innovative work with application of knowledge earned while undergoing various courses and laboratories in the course of study.

Minor Project envisages that a student will acquire the ability to use a wide range of the skills learned during their course of study. A student is required to carry out the project work related to Engineering, under the guidance of a faculty member and/or the supervisor of the concerned industry/institute/organization.

The individual student has to undertake the project.

Duration: Minor Project to be completed within one month duration for the respective semester/Exit Course. It is to be assessed and evaluated at the end of 4th semester.



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

MAHIRAVANI, TRIMBAK ROAD, TAL & DIST: NASHIK-422213, MAHARASHTRA, INDIA

B. Tech Civil Engineering

Semester – V

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)				Examination Scheme				Total Marks
				L	T	P	C	Formative Assessment CIA		Summative Assessment ESE		
								Theory	Lab	Theory	Lab	
1	PC	2314301	Environmental Engineering-I	3	--	--	3	50	--	50	--	100
2	PC	2314302	Design of Steel Structures	3	--	--	3	50	--	50	--	100
3	PC	2314303	Remote Sensing and GIS	2	--	--	2	25	--	50	--	75
4	PC	2314304	Design of Steel Structures Laboratory	--	--	2	1	--	-	--	25 ^a	25
5	PC	2314305	Environmental Engineering-I Laboratory	--	--	2	1	--	--	--	50 ^b	50
6	PC	2314306	Remote Sensing and GIS Laboratory	--	--	2	1	--	25	--	--	25
7	PE	2314307	Program Elective-I	4	--	--	4	50	--	50	--	100
8	OE	2314308	Open Elective III	3	--	--	3	50	--	50	--	100
9	SDC (MD)	2314703	Advanced MS Excel	--	--	2	1	--	25	--	--	25
10	EEC (MD)	2314803	Structural Foundation Analysis (SkyfiLabsetc.)	--	--	2	1	--	--	--	50 ^b	50
TOTAL				15	00	10	20	225	50	250	125	650
Open Elective III												
8	OE	2314308A	Building Construction Materials	3	--	--	3	50	--	50	--	100
8	OE	2314308B	Air and Noise Pollution and Control	3	--	--	3	50	--	50	--	100
Value Added Course												
11	VAC (MD)	VAC143	Revit Architecture	1	--	2	2	--	50	--	--	50
Honors/Minor Courses (Metro Construction)												
1	HM	2314391	Surveying in Metro Construction	4	--	--	4	50	--	50	--	100
2	HM	2314392	Surveying in Metro Construction-Lab	--	--	2	1	--	50	--	--	50
Program Elective I:												
1. Foundation Engineering(2314307A)						2. Open Channel Flow (2314307B)						



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T. Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem- V

2314301: Environmental Engineering - I

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3hrs/week	Th:03	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite: Nil		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. understand importance of water infrastructure with respect to needs of various users.
2. discuss and demonstrate the principles of water treatment plant and layout.
3. inculcate and impart design principles and working of WTP components.
4. interpret need of contemporary issues in water treatment.

Course Outcomes:

On completion of the course, learner will be able to–

- CO1:** Define identify, describe reliability of water sources, estimate water requirement for various sectors.
- CO2:** Ascertain and interpret water treatment method required to be adopted with respect to source and raw water characteristics.
- CO3:** Design various components of water treatment plant and distribution system.
- CO4:** Understand and compare contemporary issues and advanced treatment operations and process available in the market, including packaged water treatment plants.
- CO5:** Design elevated service reservoir capacity and understand the rainwater harvesting.
- CO6:** Understand the requirement of water treatment plant for infrastructure and Government scheme.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T. Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem- V

2314301: Environmental Engineering - I

Unit 1: Basics of Water Supply Engineering	7hrs	CO
Introduction to water supply scheme: importance of water infra structure and introduction to water infrastructure in India, data collection required for implementing water supply schemes, components and layouts. Design periods, factors affecting design periods. Quantity: rate of water consumption for various purposes like domestic, industrial, institutional, commercial, fire demand and water system losses, factors affecting rate of demand, population forecasting, including numerical. Quality: physical, chemical, radioactivity and bacteriological characteristics, heavy metals. Standards as per IS 10500-2012.		CO1
Unit 2: Principles of Water Treatment	7hrs	
Water treatment: principles of water treatment operations and processes, water treatment flow sheets with respect to various sources, criteria for site selection for WTP. Aeration: principle and concept, necessity, methods, removal of taste and odour, design of aeration fountain. Sedimentation: plain and chemical assisted, principle, efficiency of an ideal settling basin, types of sedimentation, settling velocity, types of sedimentation tanks, design of plain sedimentation tank, introduction and design of tube settlers		CO2
Unit 3: Design of Water Treatment Plant	7hrs	
Coagulation and flocculation: necessity of coagulation, principle of coagulation, common coagulants alum and ferric salts, introduction to other coagulant aids like bentonite clay, lime stone, silicates and polyelectrolytes etc, introduction to natural coagulants, concept of mean velocity gradient and power consumption, design of flocculation chamber, design of clariflocculator. Filtration: theory of filtration, mechanism of filtration, filter materials, types: rapid, gravity, pressure filter, multimedia and dual media filters, components, under-drainage system, working and cleaning of filters, operational troubles, design of rapid sand gravity filters.		CO3
Unit 4: : Introduction to Advanced Water Treatment Methods	7hrs	
Disinfection: mechanism, factors affecting disinfection, types of disinfectants, types and methods of chlorination, break point chlorination, bleaching powder estimation. Water softening methods and demineralization: lime-soda, ion-exchange, R. O. and electro dialysis, fluoridation and defluorination, introduction to advanced water treatment systems (nano technology), introduction to desalination and various methods of desalination		CO4
Unit 5: Water Distribution System, Rainwater Harvesting and GIS	7hrs	
Water distribution system: system of water supply: continuous and intermittent system, different distribution systems and their components, ESR: design of ESR capacity, wastage and leakage of water: detection and prevention. Rainwater harvesting: introduction, need, methods and components of domestic rainwater harvesting system. Design of roof top rainwater harvesting system, use of GIS and drone technology in water management: source, treatment and distribution		CO5
Unit 6: Water Treatment Plant for Infrastructure	7hrs	
Introduction to Packaged WTP in townships, large commercial buildings, educational institutes, necessity (on-site water treatment), WTP for swimming pools, Building plumbing: introduction to various types of home plumbing systems for water supply and waste water disposal, high rise		CO6



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T. Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem- V

2314301: Environmental Engineering - I

building plumbing, pressure reducing valves, break pressure tanks, storage tanks, building drainage for high rise buildings, various kinds of fixtures and fittings used for water saving such as water saving aerators, Government of India initiatives such as SMART city mission and AMRUT mission for improvement of infrastructure sector, service level benchmarks in urban infrastructure and introduction to Jal Jeevan Mission and its implication in rural India.

Textbooks

1. Water Supply Engineering, S. K. Garg, Khanna Publishers, New Delhi.
2. Water Supply and Sanitary Engineering, G. S. Birdie and J. S. Birdie, Dhanpat Rai Publishing Company, New Delhi.
3. Environmental Engineering-1: Water Supply Engineering, B. C. Punmia, Ashok Jain and Arun Jain. Laxmi Publications (P) Ltd.

Reference books

1. Environmental Engineering, Peavy and Rowe, McGraw Hill Publications.
2. Optimal Design of Water Distribution Networks, P. R. Bhave, Narosa Publishing House.
3. Rainwater Harvesting: Making Water Every Body's Business, Centre for Science and Environment.
4. Environmental Remote Sensing from Regional to Global Scales, Ed. Giles Foody, Wiley
5. Water Supply Engineering, Harold Eaton Babbit & James Joseph Doland, Tata McGraw Hill.
6. Environmental Engineering Laboratory Manual, B. Kotain and Dr. N. Kumarswamy, NEERI, Nagpur.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314302: Design of Steel Structures

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3hrs/week	Th:03	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite: Fundamentals of Engineering Mechanics, Mechanics of Materials and Structural Analysis		Pract:	--
		Oral:	--
		Termwork	--
Course Objectives: The student should be able to <ol style="list-style-type: none"> 1. This course is designed to provide understanding of IS code provisions, fundamentals of structural steel design and its applications for design of various components. 2. Students should be able to understand components of steel structures and its arrangements 3. Student should be able to design beams, columns, column footings, roof trusses, gantry girder and plate girders 			
Course Outcomes: On completion of the course, learner will be able to– <p>CO1: Demonstrate knowledge about the types of steel structures, steel code provisions and design of the adequate steel section subjected to tensile force.</p> <p>CO2: Determine the adequate steel section subjected to compression load and design of built up columns along with lacing and battening. CO3: Design eccentrically loaded column for section strength and column bases for axial load and uniaxial bending.</p> <p>CO3: Design of laterally restrained and unrestrained beam with and without flange plate using rolled steel section</p> <p>CO4: Analyze the industrial truss for dead, live and wind load and design of gantry girder for moving load.</p> <p>CO5: Understand the role of components of welded plate girder and design cross section for welded plate girder including stiffeners and its connections.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314302: Design of Steel Structures

Unit 1: Unit I: Design Philosophy and Tension Members	7 hrs	CO
Types of steel structures, the chemical composition of structural steel, grades of structural steel, various rolled steel sections, relevant IS specifications such as IS:800-2007, IS:808-1989, IS:875 part I to III, SP: 6(1), SP: 6(6), SP:38, IS: 4000-1992, IS 816–1969, Philosophy of limit state design for strength and serviceability, the partial safety factor for load and resistance, various design load combinations. Tension member: various cross sections such as solid threaded rod, cable and angle sections limit strength due to yielding, rupture and block shear, design of tension member using single and double angle sections and design of connection.		CO1
Unit 2: Design of Compression Members and Columns	7 hrs	
Buckling classification, buckling curves, classification of cross, effective length for compression members and columns, design compressive stress, design of compression member of trusses using single and double angle section and design of connections. Design of axially loaded column using rolled steel section, design of built-up column, lacing and battening and its connections. Cantilever method and Portal method.		CO2
Unit 3: Eccentric Loaded Columns and Column Bases.	7 hrs	
Design of eccentrically loaded column providing uniaxial and biaxial bending for section strength, Design of column bases: slab base, gusseted base and moment resistant base for axial load and uni-axial bending		CO3
Unit 4: Design of Flexural Members	7 hrs	
Design bending strength, laterally restrained and unrestrained beams, design of laterally restrained beams using single rolled steel section with and without flange plate, curtailment of flange plates, low and high shear, check for web buckling, web crippling and deflection. Design of laterally unrestrained beams using single rolled steel section, check for and deflection		CO4
Unit 5: Design of Industrial truss and Gantry Girder	7hrs	
Roof truss: assessment of dead load, live load and wind load, design of purlin, design of members of a truss, detailing of typical joints and supports. Design of gantry girder: selection and design of cross section check for moment capacity, buckling resistance, bi-axial bending, serviceability and fatigue strength.		CO5
Unit 6: Design of Welded Plate Girder	7 hrs	
Concept of plate girder, components of welded plate girder, intermittent weld, design of cross section, curtailment of flange plates, end bearing, load bearing, and intermediate stiffeners, design of connection between flange & web plate and web plate & stiffeners, check for shear buckling of web, shear capacity of end panel and serviceability condition..		CO6

Text Books

1. Limit State Design of Steel Structures, S K Duggal, Tata McGraw Hill Education, New Delhi
2. Design of Steel Structure by Limit State Method as per IS: 800- 2007, Bhavikatti S S, I. K. International publishing house, New Delhi
3. Design of Steel Structures, K. S. Sai Ram, Pearson, New Delhi



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314302: Design of Steel Structures

Reference Books

1. Design of Steel Structure, N Subramanian, Oxford University Press, New Delhi
2. Limit State Design in Structural Steel, M. R. Shiyekar, PHI, Delhi
3. Fundamentals of structural steel design, M L Gambhir, Tata McGraw Hill Education Private limited, New Delhi.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314303:Remote Sensing & GIS

Teaching Scheme:		Credits		Examination Scheme	
Theory: 2 hrs/week		Th:02		Theory	CIA: 25
Practical: --		Practical: --			End-Sem:50
Prerequisite :Nil				Pract:	--
				Oral:	--
				Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. To comprehend fundamentals and principles of RS and GIS techniques. 2. To develop skills of Image processing and GIS. 					
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: know the concept of remote sensing it's components, working & different applications .</p> <p>CO2: Demonstrate the knowledge of remote sensing and sensor characteristics.</p> <p>CO3: Analyze the RS data and image processing to utilize in civil engineering</p> <p>CO4: know the concept of GIS & its applications.</p>					



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-V

2314303:Remote Sensing and GIS

Unit 1: Introduction to Remote Sensing and Sensor	7hrs	CO
Definition, history and development of remote sensing technology, RS platforms, elements of remote sensing for visual interpretation viz. tone, shape, size, pattern, texture, shadow and association, applications in civil engineering/town planning, electromagnetic radiation (EMR) and electromagnetic spectrum, sensor classification, applications of sensor, concept of Swath & Nadir, resolutions.		CO1
Unit 2: Resolutions, GPS & GNSS	7hrs	
Introduction to spatial resolution, spectral resolution, radiometric resolution and temporal resolution, Introduction to GNSS and Types, IRNSS, GPS, GPS components, differential GPS, types of GPS tracking, application of GNSS in surveying, mapping and navigation		CO2
Unit 3: Image Processing and Analysis	7hrs	
Digital image, visual image interpretation, image interpretation keys, concept of spectral signatures curve, digital image processing, pre-processing and post processing, digital image classification (supervised & unsupervised). Digital elevation model (DEM)		CO3
Unit 4: Fundamentals of GIS and Applications	7hrs	
Definition, spatial and non-spatial data, data inputs, data storage and retrieval, data transformation, Introduction to cloud computing (types & applications), data reporting, advantages of GIS, essential elements of GIS hardware, software GIS data types, applications of land use and land cover pattern, application in urban planning, applications in irrigation planning and scheduling, application in smart cities planning and development		CO4

Text Books

1. Principles of Remote Sensing, Panda B C, Viva Books Private Limited.
2. Remote Sensing & Geographical Information System, M. Anji Reddy, BS Publications.

Reference Books

1. Remote Sensing and Image Interpretation, Lillesand Thomas M. and Kiefer Ralph, John Wiley.
2. Remote Sensing & Digital Image Processing, John R. Jensen, Department of Geography University of South Carolina Columbia.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-V

2314304: Design of Steel Structures Laboratory

Term Work	<ol style="list-style-type: none">Four full imperial size hand drawn drawing sheets consists of steel structural detailing of 16 sketches based on the syllabusDesign of industrial building including roof truss, purlin, bracings, gantry girder, column, column base and connections. Analysis of truss by using suitable software and cross check manually. Use of spreadsheet may be for design of gantry girder. Three full imperial size hand drawn drawing sheets present the design details.Design of welded plate girder: design of cross section, curtailment of flange plates, stiffeners and connections. One full imperial size drawing sheet used to present the design details using any suitable software. OR Design of building including primary and secondary beams, column, column base and connections. Analysis of building by using any suitable software and design manual. One full imperial size drawing sheet used to present the design details using any suitable software.Compulsory two site visits based on industrial steel structure and welded plate girder Report should contain structural details with sketches	CO1- CO4
Site Visit	Report of one site visit.	CO1- CO4

Note: For term work, the group size should not be more than five students and each group should have different design data.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314304: Design of Steel Structures Laboratory

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2 hrs/week	Th:02	Theory	CIA: --
Practical: --	Practical: --		End-Sem:--
Prerequisite :Nil		Pract:	--
		Oral:	--
		Termwork	25
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. Familiarize students with relevant design codes and standards used in the design of steel structures, such as IS 800 : 2000 2. analyze and design steel structures, including beams, columns, trusses, and frames, under various loading conditions (e.g., dead loads, live loads, wind loads, seismic loads). 3. Use computer-aided design (CAD) software and structural analysis tools commonly used in the industry to model and analyze steel structures. 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Identify the different types of steel structural elements commonly used in construction.</p> <p>CO2: Interpret the behavior of steel members under different loading conditions and support types.</p> <p>CO3: Apply design codes and principles to analyze and design simple steel structural elements, such as beams and columns.</p> <p>CO4: Evaluate the behavior of steel frames and trusses under different loading conditions using experimental data.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T. Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem- V

2314314: Environmental Engineering- I Laboratory

Teaching Scheme:		Credits		Examination Scheme	
Theory: --		Th: --		Theory	CIA: --
Practical: 2hrs/week		Practical: --1			End-Sem:--
Prerequisite: Nil				Pract:	50 M
				Oral:	--
				Termwork	--
Course Objectives: The student should be able to <ol style="list-style-type: none">1. Perform experiments to determine the value of different parameters in water samples.2. Decide the suitability of water samples for drinking purpose.3. Understand the working of different units of water treatment plant.					
Course Outcomes: On completion of the course, learner will be able to– CO1: Develop skills in performing experiments to determine the value of different parameters in water samples. CO2: Decide the suitability of water samples for drinking purpose. CO3: Understand the working of different units of water treatment plant.					



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T. Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem- V

2314305: Environmental Engineering- I Laboratory

A. Practical	CO
<p><i>Term work consists of a journal containing the following experiments, assignments, and site visit report. Note: Sr. No. 01 to 06, 09 and 10 are compulsory and any one from Sr. No. 07 and 08 practical. The practical examination will be based on the term work.</i></p> <p>List of Experiments</p> <p>01 Determination of pH of various samples such as drinking water, prepared acidic and alkaline samples, other samples such as soft drink / tea etc</p> <p>02 Determination of Alkalinity of raw water and other samples such as prepared sample, soft drinks and tea etc.</p> <p>03 Total hardness and its components in raw water.</p> <p>04 Determination of chlorides in water</p> <p>05 Determination of chlorine demand and residual chlorine.</p> <p>06 Determination of turbidity and optimum dose of alum.</p> <p>07 Determination of sodium or potassium or calcium using flame photometer.</p> <p>08 Determination of fluorides or iron contents in water</p> <p>09 Determination of Most Probable Number (MPN)</p> <p>10 Exercise on design of water distribution network using any suitable software such as EPANET / tools (total pipe length @ 10 km and minimum 10-12 nodes)</p>	CO1 and CO2
B. Assignments	
<p>01 Study of water intake structures.</p> <p>02 Complete design of WTP using appropriate software/Program/excel spread sheet etc</p>	CO3
C. Site Visit	
<p>01 Site visit to a water treatment plant</p>	CO3



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Common) (2023 Pattern)

Sem-V

2314306: Remote Sensing & GIS Laboratory

Teaching Scheme:	Credits	Examination Scheme	
Theory: 0hrs/week	Th:--	Theory	CIA: --
Practical: 2hrs/week	Practical: 01		End-Sem:--
Prerequisite : Nil		Pract:	25
		Oral:	-
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. Analyse the basic components of GIS 2. Select the type of remote sensing technique / data for required purpose. 3. Identify the earth surface features from satellite image. 4. Identify the different features from imageries 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Classify the maps. CO2: Identify and rectify mapping inaccuracies. CO3: Map the features with GPS CO4: Prepare thematic maps.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech(Common) (2023 Pattern)

Sem-V

2314306: Remote Sensing & GIS Laboratory

Experiments	<ol style="list-style-type: none">1. Installation of Q-GIS/Arc GIS2. Study of fundamental tools of software for data processing.3. Geo-tag using Google earth/ base map.4. Geo-reference using Google earth/ base map.5. Import and export data GIS software to the Auto-CAD or Revit software and mention all the necessary steps used.6. Digitize the given part of toposheet using software & attribute.7. Generation of thematic maps.8. Land use classification using RS data.	CO1- CO4
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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314307A: Foundation Engineering

Teaching Scheme:	Credits	Examination Scheme	
Theory: 4 hrs/week	Th:04	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite: Geotechnical Engineering		Pract:	--
		Oral:	--
		Term work	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. To study methods of subsurface investigation and criteria for selection of foundation. 2. To determine the bearing capacity of soil using strength and settlement criteria. 3. To analyse and design shallow foundation (isolated, combined, raft) based on settlement and strength criteria. 4. To study the pile foundation with respect to installation, load carrying capacity, in-situ tests. 5. To estimate the primary and secondary consolidation settlement and pre-consolidation pressure. 6. To study foundation on soft soils and ground improvement techniques. 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Understand the sub-surface investigation and methods of it.</p> <p>CO2: Estimate the bearing capacity of soil</p> <p>CO3: Design the shallow foundation and settlement criteria.</p> <p>CO4: Estimate load carrying capacity of pile foundation.</p> <p>CO5: Calculate consolidation settlement of soil.</p> <p>CO6: Understand the foundation for soft soil.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314307A: Foundation Engineering

Unit 1: Subsurface Investigations for Foundations	7hrs	CO
Soil Investigation stages, criteria's, spacing/depth of boreholes, disturbed/undisturbed soil sampling, methods of sample collection, geophysical exploration, electrical resistivity method, preparation of borehole logs and final report.		CO1
Unit 2: Bearing Capacity	7hrs	CO2
Rankine's analysis, types of bearing capacity failures, Terzaghi, Meyerhof, Skempton and IS Methods, Effect of water table on bearing capacity, plate load test, static cone test and standard penetration test.		CO2
Unit 3: Shallow foundations	7hrs	CO3
Permissible total and differential settlement, Presumptive Safe bearing pressure, settlement of footing, design of combined footings, eccentrically loaded footings. Analysis and design of raft based on settlement and bearing capacity criteria.		CO3
Unit 4: Consolidation of soils	7hrs	CO4
Spring Analogy, consolidation of laterally confined soil, Estimation of primary Consolidation Settlement, Time rate of consolidation; Consolidation test and determination of void ratio, volume change, Coefficient of consolidation, coefficient of permeability; Estimation of pre-consolidation pressure; secondary consolidation		CO4
Unit 5: Pile Foundation	7hrs	CO5
Introduction, load transfer mechanism, types of piles and their function, factors influencing selection of pile, Method of installation in cohesive and granular soils, piles subjected to vertical loads- pile load carrying capacity from static formula, dynamic formulae (ENR and Hiley), Pile load test (IS 2911). Pile group: carrying capacity, efficiency and settlement. Negative skin friction		CO5
Unit 6: Foundation for Soft soil	7hrs	CO6
Foundation for Soft Soils: Characteristics of soft soil, foundation considerations, foundation construction methods. Ground Improvement- Soil Stabilization- mechanical modification, Hydraulic modification, chemical modification, Modification by admixtures, stabilization using industrial wastes, grouting, applications of geo-synthetics in bearing capacity improvement.		CO6

Text Books

1. Gopal Ranjan and A. S. Rao, Basic and Applied Soil Mechanics, 2nd Ed., 2000, New Age International Publisher, New Delhi.
2. B. C. Punmia, Soil Mechanics and Foundation Engineering, 17th Ed., 2020, Laxmi Publishing, New Delhi
3. P. C. Varghese, Foundation Engineering, 9th Ed., 2012
4. Asoke K. Ghosh, PHI Learning Private Limited



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314307A: Foundation Engineering

Reference Books

1. Principles of Geotechnical Engineering by Braj M. Das, Cengage Learning.
2. Geotechnical Engineering by P. Purushothma Raj, Tata Mc Graw Hill.
3. Geotechnical Engineering by Principles & Practices by Donald. P. Coduto, Pearson Education.
4. Basic and Applied Soil Mechanics by Gopal Ranjan and A. S. R. Rao, New age International.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314307B: Open Channel Flow

Teaching Scheme:		Credits	Examination Scheme	
Theory: 4hrs/week		Th:04	Theory	CIA: 50
Practical: --		Practical: --		End-Sem:50
Prerequisite : Fluid Mechanics			Pract:	--
			Oral:	--
			Termwork	--
Course Objectives: The student should be able to				
<ol style="list-style-type: none"> 1. comprehend types of open channel and their behaviors. 2. identify types of channels. 3. enable the students to apply the basic principles of flow to design different types of channels 				
Course Outcomes:				
On completion of the course, learner will be able to–				
CO1: Explain types of flow in open channel, velocity and pressure distribution.				
CO2: Explain specific energy, compute uniform flow, critical flow, section factor and conveyance of channel and its transitions.				
CO3: Analyze and design of artificial channels with rigid boundary				
CO4: Classify various flow profiles and compute gradually varied flow profiles				
CO5: Comprehend hydraulic jump, its types and compute initial and sequent depth in case of various channels				
CO6: Analyze rapidly varied and unsteady flow in various hydraulic structures and its applications				



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314307B:Open Channel Flow

Unit 1:Basic Flow Concepts	9hrs	CO
Types of channels, classification of flows, basic equations, velocitydistribution, velocity coefficients, pressure distribution.		CO1
Unit 2:Energy and momentum principles	9hrs	
Specific energy, critical flow, section factor forcritical flow computation, first hydraulic exponent, computation of critical flow, specificforce, specific force, channel transition		CO2
Unit 3:Uniform flow in rigid boundary channels	10hrs	
Shear stress distribution, velocity distributionin turbulent flow, Chezy's equation, Manning's equation, conveyance of a channel, sectionfactor for uniform flow computation, second hydraulic exponent, computation of uniformflow		CO3
Unit 4:Gradually varied flow	9hrs	
Differential equation of GVF, classification and analysis of flowprofiles, computation of GVF		CO4
Unit 5: Hydraulic jump	9hrs	
Types of jump, general equation for jump in prismatic channels, jump inhorizontal and slopping rectangular channels, location of hydraulic jump		CO5
Unit 6:Rapidly varied flow	10hrs	
Flow over sharp crested weir, spillways, flow under sluice gate		CO6

Text Books

1. Flow in Open Channel by K Subramanya
2. Open channel flow by M.Hanif Chaudhry.

Reference Books

1. 1.V.T Chow, Open Channel Hydraulics, Mc Graw Hill, 2009.
2. 2.Rajesh Srivastava, Flow through open channels, Oxford higher education



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-V

2314308A: Building Construction Materials

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3 hrs/week	Th:03	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. Understand the fundamental principles of building construction, including the various types of building materials and their properties. 2. Evaluate the performance of building materials in terms of durability, sustainability, and safety. 3. Apply knowledge of building codes and regulations to ensure compliance with safety standards. 4. Apply critical thinking skills to solve problems related to building construction and materials. 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Identify types of building and basic requirements of building components.</p> <p>CO2: Explain types of masonry, formwork, casting procedure and necessity of underpinning and scaffolding.</p> <p>CO3: Elucidate different types of flooring and roofing materials.</p> <p>CO4: Describe types of doors, windows, arches and lintel.</p> <p>CO5: Illuminate means of vertical circulation and protective coatings.</p> <p>CO6: Explain different materials especially eco-friendly materials and safety measures to be adopted at any construction site.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-V

2314308A: Building Construction Materials

Unit 1: Introduction to Building Construction and Masonry	7hrs	CO
<p>a) Introduction to building construction- definition, types of building as per national building code. Substructure- shallow & deep foundation and their suitability. failure of foundation and its causes & setting out, layout of foundation in black cotton soil, damp proof course, basement construction, its repair and maintenance, plinth filling & soling, underpinning.</p> <p>b) Masonry- Stone masonry- Principal terms, types of stone masonry, pointing- purpose & types. Brick masonry- characteristics of good building bricks, IS specification & tests, classification of bricks-silica, refractory, fire and fly ash bricks. Brick work types of bonds- English, Flemish, Header, Stretcher, construction procedure, supervision, opening in walls, mortar preparation.</p>		CO1
Unit 2: Block Masonry and Form work	7hrs	CO2
<p>a) Block masonry: hollow, solid and cavity wall construction and dry wall. Reinforced brick masonry: applications, advantages, materials required and construction procedure. Composite masonry- types, advantages, applications, materials required and construction procedure.</p> <p>b) Form work and casting procedure for reinforced concrete columns, R.C.C. beams and girders, R.C.C. slabs, curing methods, precast concrete construction and joints in concrete work.</p>		CO2
Unit 3: Flooring and Roofing Materials	7hrs	CO3
<p>a) Flooring materials- materials, tests and IS Specifications, ground and upper floors, functional requirement of flooring, varieties of floor finishes and their suitability, construction details for concrete, tiles and stone flooring. Types of flooring: timber flooring, cement concrete flooring, mosaic flooring ceramic flooring, terrazzo flooring or cast in situ terrazzo flooring, tiled flooring, rubber flooring, cork flooring, epoxy asphalt flooring or mosaic asphalt flooring, filler joist floor, jack arch floor, hollow block and rib floors.</p> <p>b) Roofing materials: galvanized iron pre-coated aluminum sheets, fiber sheets, and Mangalore tiles. Roof construction: types and their suitability, method of construction, types of trusses, types of shell structure, space and frame structure, fixing details of roof covering.</p>		CO3
Unit 4: Doors, Windows, Arches and Lintels	7hrs	CO4
<p>a) Doors and windows: definition of technical terms, installation of doors and window frames and their size specifications, fixtures and fastenings. Types of doors: glazed or sash doors, plastic doors, flush doors, louvered doors, collapsible doors, revolving doors, rolling steel doors, sliding doors, swing doors, folding doors. Types of windows: casement window, double hung window, pivoted window, sliding windows, louvered or Venetian window, metal window, sash or glazed window, bay window, corner window, dormer window, gable window, skylight window, circular window, mosquito proof window, curtain wall window. Ventilators: purpose and types.</p> <p>b) Arches and lintels: principle of arch action, types of arches, method of arch construction, centrifugal and renewal. Lintels: necessity and types, chajja or weather shade- necessity and types. Protective coatings: plastering types (lime plaster, cement plaster, gypsum plaster used in spray fire proofing, plaster of Paris) and application, mortar painting and varnishing, types and application, white washing, distempering, oil paints. Scaffolding- Purpose, types, suitability. Wall cladding: materials, method, wall papering and glazing work.</p>		CO4
Unit 5: Vertical Circulation and Safety in Construction	7hrs	CO5
<p>a) Vertical circulation: consideration in planning, design and construction, staircase: types, materials, fire resisting materials, design of stair, and details of ramps. Ladders, lifts, and escalator. Types of staircase: straight stairs open well stairs, quarter turn stairs, half turn stairs, turning stairs, dog-legged stairs, circular stairs, geometrical stairs, bifurcated stairs, and spiral stairs.</p>		CO5



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-V

2314308A: Building Construction Materials

b) Safety in construction: safety on site, storage of materials, construction safety, prevention of accidents, fire proof construction. Repairs and maintenance: addition, and alteration, strutting and shoring.	
Unit 6: Miscellaneous Materials	7hrs
a) Miscellaneous materials: properties, types and uses of following materials, lime, polymers, plastic types, mastic, gypsum, ferro-crete, clay tiles and glazed wares, artificial stones. Timber: types and properties, seasoning, testing, aluminum and alloys. b) Glass: uses, types and properties, application and ingredients, manufacturing process and market forms, Glass claddings, Aluminum composite panel cladding. Ceramic product: ceramic sanitary application, water closet, urinals, tabs, washes basins, their common sizes, pipes and fitting. Eco-friendly materials: eco-friendly decorating materials, eco-friendly flooring, thatch, bamboo, linoleum, cork etc.	CO6

Text Books

1. Engineering Economics Management, Dr. Vilas Kulkarni and Hardik Bavishi, S. Chand Publication
2. Laws for Engineers, Vandana Bhatt and Pinky Vyas, Pro Care Publisher
3. Indian Economy, Gaurav Datt and Ashwani Mahajan, S. Chand Publication
4. Industrial Organization & Engineering Economics, T. R. Banga and S. C. Sharma, Khanna Publisher

Reference Books

1. Engineering Economy, Theusen G. J. and Fabrycky W. J., 9th Edition, Prentice-Hall, Inc., New Delhi
2. Finance for Engineers: Evaluation and Funding of Capital Projects, Crundwell F. K., Springer, London
3. Construction Project Management: Theory and practice, Jha K.N., 2nd Edition, Pearson India Education Services Pvt. Ltd.
4. Financial Management, Khan and Jain, Tata McGraw-Hill Education
5. Construction Management and Accounts, Singh H, Tata McGraw Hill, New Delhi
6. Engineering Economy, Leland T. Blank and. Anthony Tarquin, McGraw Hill
7. Case studies in Finance, Burner, McGraw Hill



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-V

2314308B: Air and Noise Pollution and Control

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3hrs/week	Th:03	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite: Nil		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. To provide general understanding of air and noise quality and its impact on the environment and human health
2. To study the fate and transport of air pollutants and measurement techniques of air pollutants and noise pollution
3. To discuss the different control methods and design principles for gaseous and particulate pollutant, and noise pollution

Course Outcomes:

On completion of the course, learner will be able to–

CO1: understand the atmosphere, air pollution, and air pollution standards.

CO2: compare the particulate pollutants, their sources and mitigation measures.

CO3: illustrate gaseous pollutants, their sources and mitigation measures.

CO4: Evaluate efficiency of various air pollution control devices used for particulate removal.

CO5: understand noise pollution and its sources.

CO6: explain the effects and mitigation measures for noise pollution



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-V

2314308B: Air and Noise Pollution and Control

Unit 1: Introduction to Air Pollution	7hrs	CO
Structure of the atmosphere; Natural and anthropogenic sources of pollution; Atmospheric sources, sinks, transport; Indoor air pollution; Effects on health and environment; Air pollution: gases and particulate matter; Air quality standards; Primary and secondary pollutants; Criteria pollutants, ambient and source standards, air quality indices, visibility.		CO1
Unit 2: Particulate Pollutants	7hrs	
Particulate pollutants; measurement and control methods; Control of particulate air pollutants using gravitational settling chambers, cyclone separators, wet collectors, fabric filters (Bag-house filter), electrostatic precipitators (ESP).		CO2
Unit 3: Gaseous Pollutants	7hrs	
Gaseous Pollutants; Measurement and control methods; Control of gaseous contaminants: absorption, adsorption, condensation and combustion; Control of sulphur oxides, nitrogen oxides, carbon monoxide, and hydrocarbons; Vapour-liquid and vapour-solid equilibria; Diffusion, Fick's law and interfacial mass transfer.		CO3
Unit 4: Air Quality Management	7hrs	
Automotive emission controls, fuel quality, diesel particulate filters, catalytic convertors. Air quality management: Point, line and area sources; Inventory; Influence of meteorology - wind rose diagrams, stability, mixing height, topography, dispersion modelling, monitoring.		CO4
Unit 5: Noise Pollution	7hrs	
Sources of noise – Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels; plane, point and line sources, multiple sources; outdoor and indoor noise propagation; psychoacoustics and noise criteria, Measurement of Noise; Noise indices.		CO5
Unit 6: Effects and Control of Noise Pollution	7hrs	
Characterization of Noise from Construction, Mining, Transportation and Industrial Activities, Airport Noise –General Control Measures – Effects of noise pollution – auditory effects, non-auditory effects. Noise Menace Prevention and Control of Noise Pollution – Control of noise at source, control of transmission, protection of exposed person – Control of other types of Noise Sound Absorbent		CO6

Textbooks

1. C. S. Rao, Environmental Pollution Control Engineering, Wiley Eastern Limited, 2006.
2. M. N. Rao, H. V. N. Rao, Air pollution, Tata McGraw Hill Pvt Ltd, New Delhi, 2017
3. Dr. Y. Anjaneyulu, Air Pollution and Control Technologies, Allied publishers Pvt.Ltd., 2019.
4. G.K. Nagi, M.K. Dhillon, G.S. Dhaliwal, Commonwealth Publishers, Noise Pollution.
5. S.M. Khopkar, Environmental pollution analysis, New Age International Publications



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech(Civil Engineering) (2023 Pattern)

Sem-V

2314308B: Air and Noise Pollution and Control

Reference books

1. Noel De Nevers, "Air pollution control Engineering", McGraw Hill International Edition, McGraw Hill Inc, New Delhi, 2000.
2. Air Pollution act, India, 1987
3. Peterson and E.Gross Jr., Hand Book of Noise Measurement, 7th Edition, 1974
4. Mukherjee, "Environmental Pollution and Health Hazards", causes and effects, 1986.
5. Antony Milne, Noise Pollution: Impact and Counter Measures, David & Charles PLC, 1979.
6. Kenneth wark, Cecil F.Warner, Air Pollution its Origin and Control, Harper and Row Publishers, New York, 1998.



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314703: Advanced MS Excel

Teaching Scheme:		Credits		Examination Scheme	
Theory:--		Th:--		Theory	CIA: --
Practical:2 hrs/week		Pr-- 1			End-Sem:
				Pract:	25
				Oral:	--
				Termwork	--
Course Objectives: The student should be able to <ol style="list-style-type: none">1. Navigate the Excel interface and tools.2. Understand the Excel functions and formulas.3. Create and modify spreadsheets in Excel.4. Using Excel to solve real-world problems and achieve business goals.					
Course Outcomes: On completion of the course, learner will be able to CO1: Understand the basic and advanced Excel functions and formulas. CO2: Create charts, graphs, and pivot tables using Excel. CO3: Troubleshoot common issues in Excel spreadsheets. CO4: Use Excel to streamline workflows and improve productivity.					



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314703: Advanced MS Excel

Module 1: Introduction to MS Excel	7Hrs	CO
<ul style="list-style-type: none">• Overview of Excel interface and tools• Basic and advanced Excel functions and formulas• Creating and modifying spreadsheets in Excel• Best practices for data entry and organization in Excel		CO1 to CO4
Module 2:Data Analysis and Visualization	7Hrs	CO1 to CO4
<ul style="list-style-type: none">• Using Excel for data analysis and visualization• Creating charts, graphs, and pivot tables using Excel• Advanced data analysis techniques in Excel		
Module 3:Advanced MS Excel	7Hrs	CO1 to CO4
<ul style="list-style-type: none">• Advanced Excel functions and formulas• Troubleshooting common issues in Excel spreadsheets• Using Excel to streamline workflows and improve productivity		
Module 4:Excel for Business	7Hrs	CO1 to CO4
<ul style="list-style-type: none">• Collaborating with others using Excel• Using Excel to solve real-world problems and achieve business goals• Best practices for using Excel in a business environment		

Text Books:

1. Excel 2021 Bible by Michael Alexander and Richard Kusleika
2. Excel 2021 All-in-One For Dummies by Greg Harvey
3. Microsoft Excel 2021 Step by Step by Curtis Frye
4. Excel 2021 Power Programming with VBA by John Walkenbach
5. Excel 2021 Formulas by Michael Alexander and Richard Kusleika



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314803: Structural Foundation Analysis

Teaching Scheme:		Credits		Examination Scheme	
Theory: --		Th:--		Theory	CIA: --
Practical: 2 hrs/week		Pr- 01			End-Sem: --
				Pract:	50
				Oral:	--
				Termwork	--
Course Objectives: The student should be able to					
1. Understanding foundation analysis fundamentals					
2. Proficiency in Skyfi software					
3. Analyzing real-world foundation problems					
4. Designing safe and efficient foundation					



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314803: Structural Foundation Analysis

Module 1: Introduction to Structural Foundation Analysis

Overview of structural foundations and their importance in building design and construction.

Types of foundations: shallow foundations (footings) and deep foundations (piers, piles).

Geotechnical investigations and soil properties affecting foundation design.

Loads and load combinations acting on foundations (dead load, live load, wind load, earthquake load, etc.).

Introduction to Skyfi software and its capabilities in structural foundation analysis.

Module 2: Foundation Design and Analysis using Skyfi Software

Overview of Skyfi software and its user interface.

Input data preparation: creating and importing the building model, defining material properties, and selecting foundation types.

Modelling various foundation types: isolated footings, strip footings, mat foundations, and pile foundations.

Applying loads and load combinations in the software.

Analyzing the foundation using finite element analysis (FEA) or other relevant methods.

Interpreting and verifying the analysis results.

Module 3: Structural Design Considerations and Code Compliance

Design principles for different types of foundations.

Capacity design and safety factors.

Foundation design for different soil conditions and building types.

Local building codes and standards relevant to foundation design and analysis.

Evaluating the foundation design for code compliance using Skyfi software.

Module 4: Advanced Topics and Case Studies

Soil-structure interaction analysis.

Foundation underpinning and retrofitting techniques.

Advanced modeling techniques in Skyfi software for complex structures.

Case studies of real-world projects where Skyfi software was used for foundation analysis.

Practical considerations and challenges in foundation analysis and design using the software.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE
T.Y. B. Tech (Civil Engineering) (2023 Pattern)
 Sem-V
 VAC143: Revit Architecture

Teaching Scheme:		Credits		Examination Scheme	
Theory: 1hr/week		Th:01		Theory	CIA: --
Practical:2 hrs/week		Pr:01			End-Sem:--
				Pract:	50
				Oral:	--
				Termwork	00


Course Objectives: The student should be able to

1. Understand the fundamental principles of Building Information Modeling (BIM) and how it relates to Revit Architecture.
2. Develop proficiency in using Revit Architecture software to create and modify 3D building models.
3. Learn how to use Revit Architecture tools for creating floor plans, elevations, sections, and schedules.
4. Develop skills in using Revit Architecture for creating and managing building components such as walls, roofs, doors, and windows.
5. Learn how to use Revit Architecture for creating and managing families of building components.

Course Outcomes:

On completion of the course, learner will be able to

- CO1:**Demonstrate the ability to create and manage families of building components, including walls, roofs, doors, and windows.
- CO2:**Use Revit Architecture tools for creating and managing parametric families, including nested families and shared families.
- CO3:**Develop an understanding of how to use Revit Architecture for creating custom families of building components.
- CO4:**Use Revit Architecture for collaborating with other professionals in the building industry, including architects, engineers, and contractors.

 SANDIP FOUNDATION	SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE T.Y. B. Tech (Civil Engineering) (2023 Pattern) Sem-V VAC143: Revit Architecture
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Module 1: Introduction to Revit Architecture 7Hrs	CO
<ul style="list-style-type: none"> • Overview of BIM and Revit Architecture • User interface and navigation • Creating and modifying basic building elements • Introduction to families and components 	CO1 to CO4
Module 2: Advanced Building Elements 7Hrs	
<ul style="list-style-type: none"> • Advanced building elements such as stairs, railings, and curtain walls • Creating custom families of building components • Managing and organizing building components using groups and filters • Collaboration with other professionals using Worksharing 	CO1 to CO4
Module 3: Building Documentation 7Hrs	
<ul style="list-style-type: none"> • Creating and managing construction documents, schedules, and specifications • Advanced documentation tools such as tags, keynotes, and legends • Creating custom templates and views for documentation • Collaboration with other professionals using BIM 360 	CO1 to CO4
Module 4: Analyzing Building Performance 7Hrs	
<ul style="list-style-type: none"> • Introduction to energy analysis in Revit Architecture • Sustainable design principles and practices • Analyzing building performance using Revit Architecture tools • Collaboration with other professionals using Autodesk Insight 	CO1 to CO4

Text Books:

1. "Mastering Autodesk Revit 2022" by Lance Kirby, Marcus Kim, and Edward Hutchinson
2. "Revit Architecture 2022 for Designers" by Douglas R. Seidler
3. "Autodesk Revit 2022 Architecture: Fundamentals" by ASCENT - Center for Technical Knowledge
4. "Revit Architecture 2022: A Comprehensive Guide" by Prof. Sham Tickoo
5. "Autodesk Revit 2022 Architecture: Conceptual Design and Visualization" by ASCENT - Center for Technical Knowledge



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314391 : Surveying in Metro Construction

Teaching Scheme:	Credits	Examination Scheme	
Theory: 4hrs/week	Th:04	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. Provide an overview of metro systems, their components, and the importance of accurate surveying in their construction 2. Establish precise horizontal and vertical alignments for metro tracks and tunnels. 3. Focus on surveying methods used in tunneling, including tunnel alignment, cross-section monitoring, and deformation analysis. 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Recall the historical development of metro rail systems and their significance in urban transportation.</p> <p>CO2: Identify the key components of a metro system, such as stations, tracks, trains, signaling systems, and power supply.</p> <p>CO3: Apply engineering principles to design metro station layouts and track alignments that optimize passenger flow and operational efficiency.</p> <p>CO4: Design a comprehensive project plan for a new metro line, considering various factors such as route selection, station locations, and construction sequencing.</p> <p>CO5: Design an efficient ticketing system that minimizes queues and waiting times for passengers.</p> <p>CO6: Assess the overall functionality and usability of the metro station based on user feedback and operational performance.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314391 : Surveying in Metro Construction

Unit 1: History and General Features of Indian Metro Railway	7hrs	CO
Developments in Indian Metro Railway in India. The first rapid transits system in India was Kolkata Metro. Kolkata Metro, Delhi Metro, Bengaluru Metro, Mumbai Metro, Jaipur Metro		CO1
Unit 2: Developments in Indian Metro	7hrs	
Developments in Indian Metro Railways, Different Modes of Transport, Organization of Indian Metro Railways, Indian Metro Railway Finances and their Control, Commission of Metro Railway Safety, Long-term Corporate Plan of Indian Metro Railways, General Features of Indian Metro Railways, Important Statistics of Indian Metro Railways.		CO2
Unit 3: Alignment of Metro Railway Lines	7hrs	
Importance of Good Alignment, Basic Requirements of an Ideal Alignment, Selection of a Good Alignment. Engineering Surveys and Construction of Metro Railway Need for Construction of a New Metro Railway Lines, Preliminary Investigations for a Metro Railway, Traffic Survey, Reconnaissance Survey, Preliminary Survey, Preliminary Engineering-cum-traffic Survey, Final Location Survey, Modern Surveying Techniques for Difficult Terrain, Construction of New Lines of Metro Railway		CO3
Unit 4: Track and Track Stresses	7hrs	
Requirements of a Good Track, Maintenance of Permanent Way, Track as an Elastic Structure, Forces Acting on the Track Tunnel Railways.		CO4
Unit 5: Requirements for Metro -Station	7hrs	
Metro Railway Stations and Yards, Purpose of a Metro Railway Station, Selection of Site for a Metro Railway Station, Facilities Required at Metro Railway Stations, Requirements of a Passenger Metro Railway Yard, Classification of Metro Railway Stations, Station Platforms, Main Building Areas for different Types of Metro Stations.		CO5
Unit 6: Construction of New Metro Railway Lines and Track Linking of Metro Railway Tunnelling	7hrs	
Necessity/Advantages of a Tunnel, Tunnel Alignment and Gradient, Size and Shape of a Tunnel, Methods of Tunnelling, Ventilation of Tunnels, Lighting of Tunnels, Drainage of Tunnels , Shaft of Tunnels, Lining of Tunnels, Maintenance of Railway Tunnels, Safety in Tunnel Construction.		CO6

Text Books

1. Metro Rail Projects in India: A Study in Project Planning Book by M. Ramachandran
2. Urban rail transit construction technology demonstration project: Guangzhou Metro Line Paperback – January 1, 2000 by LU GUANG LIN. CHEN SHAO ZHANG (Author)



Reference Books

1. The Metro Railway Corporation and Maintenance ACT 2002
PART A – Act
Indian Railway Board Act, 1905
The Railways Act, 1989
Railway Protection Force Act, 1957
PART B – Codes
Indian Railways Administration and Finance an Introduction
Indian Railways Code for the Accounts Department Part - I
Indian Railways Code for the Accounts Department Part – II
Indian Railways Establishment Manual Volume-I
Indian Railways Establishment Manual Volume-II
Indian Railway Commercial Manual Volume-I



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314392 : Surveying in Metro Construction-Lab

Teaching Scheme:	Credits	Examination Scheme	
Theory: --	Th:--	Theory	CIA: --
Practical: 2hrs/week	Practical: 01		End-Sem:--
Prerequisite : Nil		Pract:	50
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Familiarize students with various surveying instruments used in metro construction, such as total stations, theodolites, levels, and GPS equipment.
2. Train students to conduct alignment surveys to determine the precise horizontal and vertical positions of the metro route, including station locations and track alignment.
3. Learn to perform topographic surveys of the metro construction site to map the existing natural and man-made features, including buildings, roads, utilities, and other structures.
4. Emphasize safety protocols while conducting surveying activities in a metro construction environment and highlight legal and ethical considerations related to land surveying.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Identify the different surveying methods employed in metro construction, such as plane table surveying, leveling, and total station surveying.

CO2: Understand the concept of geodetic datums and coordinate systems used in surveying metro projects.

CO3: Perform topographic surveys to create contour maps and site plans for the metro construction area.

CO4: Evaluate the accuracy and precision of survey measurements and identify sources of errors and corrections needed.

CO5: Critique the effectiveness of surveying procedures and recommend improvements for future metro construction projects.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-V

2314392 : Surveying in Metro Construction-Lab

<ol style="list-style-type: none"> 1. To transfer level from permanent benchmark to different location of metro project. 2. Setting out curve of metro alignment. 3. Setting out closed traverse as a reference line for metro construction. 4. Setting out of foundation for metro line. 5. Transfer of Centre line on Pile cap. 6. Metro alignment details on AutoCAD sheet. 7. Visit to completed metro project. 8. Hydrographic survey on riverbed for metro alignment. 9. GIS analysis for metro alignment. 10. Visit to ongoing Metro construction project 	<p>CO</p> <p>CO1 To CO5</p>
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MAHIRAVANI, TRIMBAK ROAD, TAL & DIST: NASHIK-422213, MAHARASHTRA,INDIA

B. Tech Civil Engineering

Semester – VI

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)				Examination Scheme				Total Marks
				L	T	P	C	Formative Assessment CIA		Summative Assessment ESE		
								Theory	Lab	Theory	Lab	
1	PC	2314309	Reinforced Concrete Design-I	3	--	--	3	50	--	50	--	100
2	PC	2314310	Advanced Concrete Technology	2	--	--	2	25	--	50	--	75
3	PC	2314311	Environmental Engineering-II	2	--	--	2	25	--	50	--	75
4	PC	2314312	Engineering Geology Lab	--	--	2	1	--	50	--	--	50
5	PC	2314313	Reinforced Concrete Design Laboratory	--	--	2	1	--	25	--	25 ^a	50
6	PC	2314314	Environmental Engineering-II Laboratory	--	--	2	1	--	--	--	25 ^a	25
7	PE	2314315	Program Elective-II	4	--	--	4	50	--	50	--	100
8	PE	2314316	Program Elective-III	4	--	--	4	50	--	50	--	100
9	IE (MD)	2301301	Numerical Methods for Engineers	2	--	--	2	25	--	50	--	75
10	SDC (VSEC)	2314704	Highway Construction Training	--	--	2	1	--	25	--	--	25
11	EEC	2314804	Geographic Information System (QGIS / Arc GIS etc..)	--	--	--	--	--	--	--	--	--
TOTAL				17	00	08	21	225	100	300	50	675
Value Added Course												
12	VAC (VSEC)	VAC144	Revit MEP / MS Project / Primavera	--	--	2	1	--	--	--	25 ^a	25
Honors/Minor Courses (Metro Construction)												
1	HM	2314393	Planning and Quantity Estimation for Metro Construction	4	--	--	4	50	--	50	--	100
Course Work (for Exit Criterion to UG Diploma)(B. Voc)												
Internship (4 weeks)				--	--	--	2	--	50	--	--	50
Program Elective II:												
1. Environmental Impact Assessment and Life Cycle Analysis (2314315A) 2. Construction Engineering Materials (2314315B)												
Program Elective III:												
1. Hydrology (2314316A) 2. Environmental Geotechnology (2314316B)												



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314309: Reinforced Concrete Design-I

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3hrs/week	Th:03	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite : Concrete Technology, Engineering Mechanics, Mechanics of Materials and Structural Analysis		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. To provide the students with basic concepts of reinforced concrete structures.
2. To analyze, design and detailing of different component of reinforced concrete structures.

Course Outcomes:

On completion of the course, learner will be able to–

- CO1:** Apply relevant IS provisions to ensure safety and serviceability of structures, understand the design philosophies and behavior of materials: steel & concrete.
- CO2:** Recognize mode of failure as per LSM and evaluate moment of resistance for singly, doubly rectangular, and flanged sections.
- CO3:** Design & detailing of rectangular one way and two-way slab with different boundary conditions
- CO4:** Design & detailing of dog legged and open well staircase
- CO5:** Design & detailing of singly/doubly rectangular/flanged beams for flexure, shear, bond and torsion.
- CO6:** Design & detailing of short columns subjected to axial load, uni-axial/bi-axial bending and their footings.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314309: Reinforced Concrete Design-I

Unit 1: Design Philosophies and Analysis	7hrs	CO
Design philosophies of RC structures: working stress method and limit state method, Limit state method: limit state of collapse, limit state of serviceability and limit state of durability, characteristic strength, characteristic load, partial safety factors. structural properties of concrete and reinforcing steel, assumptions of limit state method, strain variation diagram, stress variation diagram, design parameters for singly reinforced rectangular section, modes of failure, moment of resistance of singly and doubly reinforced rectangular section, singly reinforced flanged section.		CO1
Unit 2: Design of Slab	7hrs	
Design of one-way slab: simply supported, cantilever and continuous slabs by using IS Code coefficients, design of two way slab: simply supported, continuous and restrained.		CO2
Unit 3: Design of Staircase and Beams	7hrs	
Design of staircase: dog legged and open well, design of simply supported, cantilever beams for flexure (singly reinforced, doubly reinforced and flanged), shear, bond and torsion.		CO3
Unit 4: Design of Beams	7hrs	
Design of rectangular and flanged cross section continuous beam by using IS code coefficients and moment redistribution method.		CO4
Unit 5: Design of Column	7hrs	
Assumptions, minimum eccentricity, design of short column for axial load, design of short column subjected to combined axial load and uni-axial/biaxial bending using interaction curves.		CO5
Unit 6: Design of Footing	7hrs	
Design of isolated column footing for axial load and uni-axial bending, design of combined footing for two columns: slab type/ slab and beam type rectangular.		CO6

Text Books

1. Illustrated Reinforced Concrete Design, Dr. V. L. Shah and Dr. S. R. Karve, Structures Publications, Pune
2. Limit State Design of Reinforced Concrete, P. C. Varghese, PHI, New Delhi.

Reference Books

1. Illustrated Design of Reinforced Concrete Buildings (G+3), Dr. V. L. Shah and Dr. S. R. Karve, Structures Publications, Pune.
2. RCC Analysis and Design, Sinha and Roy, S. Chand and Co. New Delhi.
3. Design of Reinforced Concrete Structures, N. Subramanian, Oxford University Press.
4. Limit State Analysis and Design, P. Dayaratnam, Wheeler Publishing Company.
5. Comprehensive Design of R.C. Structures, Punmia, Jain and Jain, Standard Book House, New Delhi.
6. Reinforced Concrete Design, S. U. Pillai and D. Menon, Tata McGraw Hill, Delhi.
7. Design of Reinforced Concrete Structures, by M. L. Gambhir, PHI, New Delhi.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314309: Reinforced Concrete Design-I

IS Codes

1. IS 456-2000: Plain and reinforced concrete-code of practice, Bureau of Indian Standards, New Delhi
2. IS 13920-2016: Ductile design and detailing of reinforced concrete structures subjected to seismic forces - code of practice, Bureau of Indian Standards, New Delhi
3. IS 875-Part 1-1987: Code of practice for design loads (other than earthquake) for buildings and structures: Part (I) dead loads-unit weights of building materials and stored materials, Bureau of Indian Standards, New Delhi
4. IS 875-Part 2-1987: Code of practice for design loads (other than earthquake) for buildings and structures: Part (II) imposed loads, Bureau of Indian Standards, New Delhi



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314310 : Advanced Concrete Technology

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2hrs/week	Th:02	Theory	CIA: 25
Practical: --	Practical: --		End-Sem:50
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. To know properties of various ingredients of cement supplement's and concept of advanced mix design. 2. To learn the behavior and properties of concrete in fresh and hardened state. 3. To understand special concrete and their applications and to understand the durability aspects. 4. To know the importance of fiber reinforced concrete. 			
<p>Course Outcomes:</p> <p>On completion of the course, learner will be able to–</p> <p>CO1: Able to select the various ingredients of concrete and its suitable proportion to achieved desired strength.</p> <p>CO2: Able to check the properties of concrete in fresh and hardened state</p> <p>CO3: Get acquainted to concreting equipment's, techniques and different types of special concrete.</p> <p>CO4: Able to predict strength of fibre reinforced concrete.</p>			

 SANDIP FOUNDATION	SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE T.Y. B. Tech (Civil Engineering) (2023 Pattern) Sem-VI 2314310 : Advanced Concrete Technology
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Unit 1: Introduction to Supplementary Cement Material's. and Mix Design	7hrs	CO
a) Supplementary Materials - Fly ash, blast furnace slag, silica fume, rice husk ash, met kaolin, industrial waste or by-products, chemical composition and classification, effect on hydration process of Portland cement, effect on workability of concrete, effect on the properties of hardened concrete, effect on durability of concrete. b) Advanced Mix Design using spreadsheet/programming/ software for concrete mix design.		CO1
Unit 2: Chemical Admixtures	7hrs	CO2
Classification of admixtures, chemistry and mechanism, effect of admixtures on plastic properties and hardened properties of concrete, applications, specialty admixtures – viscosity modifying admixtures, corrosion-inhibiting admixtures, shrinkage-reducing admixtures.		CO2
Unit 3: Special Concrete & Concrete Durability	7hrs	CO3
a) Special concrete - Lightweight concrete and its types, foam concrete, no fines concrete, self-compacting concrete, high density concrete, fibre reinforced concrete, geo-polymer concrete and Ferro cement technique		CO3
b) Durability - Plastic shrinkage, autogenously shrinkage, drying shrinkage, mitigation strategies, transport properties of concrete, permeability, corrosion, chloride penetration, carbonation, sulphate attack and acid attack		CO3
Unit 4: Fibre Reinforced Concrete	7hrs	CO4
Types of fibres, matrix, stress transfer mechanism, steel fibre reinforced concrete (SFRC) – types of steel fibres, balling effect, effect on properties of hardened concrete, applications, slurry infiltrated fibre concrete (SIFCON) - fresh and hardened properties of SIFCON, applications, synthetic fibre reinforced concrete – types of synthetic fibres, properties of fibres, effect of fibres on properties of concrete, applications.		CO4

Textbooks

1. Concrete Technology, A.R. Santhakumar, Oxford University Press
2. Concrete Technology, Job Thomas, Cengage Publications

Reference Books

1. Properties of Concrete, A. M. Neville, Pearson Education
2. Concrete: Microstructure, Properties, and Materials, P. Kumar Mehta and Paulo J.M. Monteiro, McGraw Hill Education

IS Codes

1. IS 1199 – 1959, Methods of sampling and analysis of concrete, Bureau of Indian Standards, New Delhi
2. IS 3085 – 1965, Method of test for permeability of cement mortar and concrete, Bureau of Indian Standards, New Delhi
3. IS 14959 – 2001, Method of test determination of water soluble and acid soluble chlorides in mortar and concrete Part 2: Hardened mortar and concrete, Bureau of Indian Standards, New Delhi
4. IS 516 – 1959, Method of tests for strength of concrete, Bureau of Indian Standards, New Delhi



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T. Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem- VI

2314311: Environmental Engineering - II

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2hrs/week	Th:02	Theory	CIA: 25
Practical: --	Practical: --		End-Sem:50
Prerequisite: Environmental Engineering - I		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Understand of the sources and types of waste water, and the environmental and public health impacts of untreated waste water
2. Use waste water treatment technologies, including primary, secondary, and tertiary treatment processes, and sludge handling and disposal techniques
3. design and operate waste water treatment plants, including process selection and optimization, troubleshooting, and problem-solving

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Describe the sources and types of waste water, and the environmental and public health impacts of untreated waste water

CO2: Explain the principles of conventional waste water treatment technologies, including preliminary and primary treatment systems.

CO3: Analyze the advantages and limitations of secondary treatment systems.

CO4: Design the anaerobic treatment systems and apply the sludge handling and disposal techniques



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T. Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem- VI

2314311: Environmental Engineering - II

Unit 1: Introduction to Waste Water Engineering	7hrs	CO
Wastewater, sources and types, quantitative estimation of wastewater, sewage, storm water, self-cleansing velocity and non-scouring velocity in sanitary sewer, hydraulic design of circular sanitary sewer, Wastewater characteristics: conventional and emerging contaminants (physical, chemical and biological) in domestic wastewater, treatability index, effluent discharge standards as per CPCB norms. Self-purification of natural streams: oxygen sag curve, Streeter - Phelps equation and terminology (without derivation and numerical), application and limitations.		CO1
Unit 2: Preliminary and Primary Wastewater	7hrs	
Treatment: stages, (preliminary, primary, secondary and tertiary treatment), sewage/effluent treatment plant - flow diagram, unit operation and process, preliminary and primary treatment, Screens: types, design of screen chamber, Grit chamber: control of velocity, proportional flow weir, design of grit chamber, Primary sedimentation tank: types of settling, types of sedimentation tanks, assumptions, efficiency, factors affecting efficiency, design of primary sedimentation tank.		CO2
Unit 3: Secondary Treatment: Aerobic Suspended and Attach Growth	7hrs	
Aerobic secondary treatment: Activated sludge process (ASP): Conventional plug flow ASP, hydraulic and organic loading, F/M ratio, mean cell residence time, aeration method, oxygen requirement, assumptions, design of ASP, sludge volume index, sludge recycle and rate of return sludge, operational problems and maintenance in ASP, modifications in ASP. Trickling filter: principle, different TF media & their characteristics, standard rate and high-rate filters, single stage & two stage filters, design using NRC formula, recirculation, ventilation, under drain system, operational problems, control measures.		CO3
Unit 4: Anaerobic Treatment and Sludge Management System	7hrs	
Anaerobic treatment: Septic tank: suitable conditions and situations, biological principle, method of treatment and disposal of septic tank effluent and design of septic tank. Up-flow anaerobic sludge blanket (UASB) reactor: principle, advantages & disadvantage, applications. Sludge management system: primary and secondary sludge, quantity and characteristics, principle of anaerobic digestion, stages of digestion, factors governing anaerobic digestion, design of sludge digester, sludge dewatering, sludge drying beds, sludge incineration, sludge disposal/ reuse, challenges in sludge management.		CO4

Textbooks

1. Manual on Sewerage & Sewage Treatment published by Ministry of Urban Development, New Delhi, Third Edition
2. Wastewater Treatment & Disposal, Metcalf & Eddy, McGraw Hill Education (India) Private Limited



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T. Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem- VI

2314311: Environmental Engineering - II

Reference books

1. "Wastewater Engineering: Treatment and Reuse" by Metcalf & Eddy, Inc., George Tchobanoglous, Franklin L. Burton, and H. David Stensel
2. "Principles of Water Treatment" by Kerry J. Howe and David W. Hand
3. "Advanced Biological Treatment Processes for Industrial Wastewaters: Principles and Applications" by S. Vigneswaran, S. Kandasamy, and J. K. Jegatheesan
4. "Membrane Technology for Water and Wastewater Treatment, Energy and Environment" by Alberto Figoli, Jan C. Schippers, and Enrico Drioli
5. "Advanced Oxidation Processes for Water Treatment: Fundamentals and Applications" by Mihaela I. Stefan, Ozlem Yesilnacar, and Inamuddin

IS Code

1. IS 3025: 2013, Methods of Sampling and Test (Physical, Chemical and Biological) for Water and Waste Water, Bureau of Indian Standards, New Delhi



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314312:Engineering Geology Lab

Teaching Scheme:		Credits		Examination Scheme	
Theory: 0hrs/week		Th:--		Theory	CIA: --
Practical: 2hrs/week		Practical: 01			End-Sem:--
Prerequisite: Nil				Pract:	--
				Oral:	-
				Termwork	50
Course Objectives: The student should be able to <ol style="list-style-type: none">1. get the knowledge of the physical properties of mineral and differentiate between the rocks types2. Identify the earth surface features.3. learn geomorphic features.4. identify and to enable the students to examine favorable & unfavorable conditions for the proposed construction of dams, reservoir and tunnels.					
Course Outcomes: On completion of the course, learner will be able to– CO1: Classify the minerals. CO2: Identify different types of rocks. CO3: Explain about the basic concepts of engineering geology CO4: Explain geological hazards.					



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314313: Reinforced Concrete Design Laboratory

Teaching Scheme:	Credits	Examination Scheme	
Theory: 0hrs/week	Th:--	Theory	CIA: --
Practical: 2hrs/week	Practical: 01		End-Sem:--
Prerequisite : Nil		Pract:	--
		Oral:	25
		Termwork	25

Course Objectives: The student should be able to

1. Learn how to interpret and create reinforcement drawings, ensuring proper placement and detailing of rebars in reinforced concrete elements.
2. Analyze and interpret the behavior of reinforced concrete elements subjected to bending, shear, and axial loads, and understand failure modes and safety considerations.
3. Foster teamwork skills by working collaboratively with peers during experiments, sharing knowledge, and presenting findings.
4. Develop skills in preparing comprehensive and organized lab reports, documenting the experimental procedures, observations, and results.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: List different types of reinforcement detailing used in concrete elements.

CO2: Interpret reinforcement drawings and understand their role in reinforcing concrete structures.

CO3: Apply theoretical concepts to analyze and predict the behavior of reinforced concrete elements in various load scenarios.

CO4: Analyze the failure modes of reinforced concrete elements under different loading conditions.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314313: Reinforced Concrete Design Laboratory

Design Project	<p>Design of G + 2 (residential/commercial/public) building covering all types of slabs, beams, columns, footings and staircase (first and intermediate flight) with following details.</p> <ol style="list-style-type: none">Minimum plan area of each floor shall be more than 150 m²Design of plinth and ground beams: for each type two simply supported and two continuous.Design of all slabs and beams of typical floor (first or second floor)Design of three types of columns: (a) axial load, (b) axial load with uniaxial bending, (c) axial load with biaxial bending, from terrace level to footing along with detailed load calculations.Design of two footing: (a) axial load, (b) axial load plus uniaxial bending.Design any one element by using spread sheet or use of analysis and design by suitable software.Four full imperial drawing sheets. Out of which only structural plan drawing sheet shall be drawn by using any drafting software. Schedule of slabs, beams, columns and footing can be prepared by using any drafting software.Detailing of reinforcement should be as per SP-34 & IS-13920.	CO1- CO4
Site Visit	Report of one site visit. (Building under construction)	CO1- CO4

Note: For term work, the group size should not be more than five students and each group should have different design data.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T. Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem- VI

2314314: Environmental Engineering- II Laboratory

Teaching Scheme:	Credits	Examination Scheme	
Theory: --	Th: --	Theory	CIA: --
Practical: 2hrs/week	Practical: --1		End-Sem:--
Prerequisite: Nil		Pract:	--
		Oral:	25 M
		Termwork	25 M
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. Perform experiments to determine different parameters in wastewater samples. 2. Decide the suitability of wastewater samples for disposal purpose. 3. Understand the working of different units of waterwater treatment plant. 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Develop skills in performing experiments to determine different parameters in wastewater samples.</p> <p>CO2: Decide the suitability of wastewater samples for disposal purpose.</p> <p>CO3: Understand the working of different units of waterwater treatment plant.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T. Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem- VI

2314314: Environmental Engineering- II Laboratory

A. Practical	CO
<p><i>The term work consists of a journal having details of at least 7 experiment/Exercises. Experiment No. 08, assignments and site visit are compulsory. Oral examination based on term work.</i></p> <p>List of Experiments and Exercises</p> <p>01 Determination of Dissolved oxygen in a given water and wastewater sample 02 Determination of Bio-Chemical Oxygen Demand in a given wastewater sample 03 Determination of Chemical Oxygen Demand in a given wastewater sample 04 Determination of solids -Total solids, suspended solids, volatile solids, settleable solids and non-settleable solids in a given wastewater sample 05 Determination of Sludge Volume Index in a given wastewater sample 06 Determination of Electrical Conductivity in a given wastewater sample 07 Determination of Phosphates by spectrophotometer in a given wastewater sample 08 Computer aided design of Sewage Treatment Plant (STP) OR Effluent Treatment Plant (ETP) of Sugar/ Dairy/Distillery Industry using suitable software (e.g., ASIM, STOAT) or excel sheets</p> <p>List of Assignments</p> <p>09 Brief report on sewer materials, choice of materials, testing of sewer pipes.. 10 Brief report on sewer appurtenances.</p>	CO1 and CO2
B. Site Visit	
01 Visit to domestic / Industrial wastewater treatment plant & its detailed report	CO3



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314315A:Environmental Impact Assessment and Life Cycle Analysis

Teaching Scheme:	Credits	Examination Scheme	
Theory: 4hrs/week	Th:04	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite: Environmental Engineering		Pract:	--
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. Learn the basic importance of environment and sustainable development. 2. Learn the purpose and role of EIA in the decision-making process. 3. Provide knowledge on the strengths of EIA in regard to environmental management. 4. Understand environmental management and pollution control 5. Identify environmental hotspots of a product life cycle or a process; 6. Interpret LCA results to support decision making 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Understand environmental and sustainable development in civil engineering construction. CO2: Understand the purpose of EIA and its use. CO3: Application of EIA in civil engineering works. CO4: Environmental management skills and remedial measure against pollution. CO5: Understand LCA and its uses for civil engineering. CO6: Application of LCA in various civil engineering projects.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314315A:Environmental Impact Assessment and Life Cycle Analysis

Unit 1: Introduction to Environment and sustainable development	9hrs	CO
Introduction To Environment: Definition, scope, components, structure and composition. Environmental quality, monitoring and base line data.		CO1
Sustainable Development: Present and future development needs; exploitation of natural resources, environmental harmony, economic efficiency and social justice. Symbiotic relationship. Concept of carrying capacity.		
Unit 2: Environmental Impact Assessment	10hrs	CO2
Environmental pollution due to increasing growth rate, population and human interaction. Water, land and air pollution.		
Introduction: Concepts of EIA methodologies – Sustainable development- Need for Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) – Evolution of EIA: Screening and scoping; Rapid EIA and Comprehensive EIA		
Unit 3:Methods of EIA	9hrs	CO3
Introduction to EIA, Criteria for the selection of EIA Methodology, General Framework for Environmental Impact Assessment, Characterization and site assessment. Environmental Risk Analysis, Definition of Risk, Matrix Method; Checklist method, Mathematical models.		
Prediction and Assessment: Public participation Fault tree analysis, Consequence Analysis; Socioeconomic aspects, measures of effectiveness of pollution control activities;		
Unit 4: Environmental Management	9hrs	CO4
Environmental Management: Preventive policy of environment, waste minimisation, conservation of water and energy, use of renewable, sources, pollution audit, pollution control strategy, disposal of treated effluents, solid waste disposal concept of green cities, green belt development – Case history.		
Unit 5: Introduction to life Cycle Assessment	10hrs	CO5
Overview of LCA, Goal and scope definition, Allocation in LCA, Inventory analysis, Impact assessment – I, Impact assessment – II, Sensitivity analysis, Interpretation & MECO matrix.		
Unit 6: Application of life cycle assessment	9hrs	CO6
Application of LCA in waste management, Application of LCA in assessing energy systems, Application of LCA in environmental certification, Application of LCA in Strategic Environmental Assessment, Life cycle management		

Text Books

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314315A:Environmental Impact Assessment and Life Cycle Analysis

Reference Books

1. Environmental Impact Assessment, by Larry Canter, 2nd edition, Mc Graw Hill Publishers
2. Judith Petts, "Handbook of Environmental Impact Assessment Vol. I & II", Blackwell Science, 1999
3. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.Katania & Sons Publication. New Delhi.
4. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314315B - Construction Engineering Materials

Teaching Scheme:	Credits	Examination Scheme	
Theory: 4 hrs/week	Th:04	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. To know properties of basic building and construction materials.
2. To learn the properties of mortar and concrete.
3. To understand process of masonry based construction.
4. To understand the difference between super and sub structure
5. To learn the importance of finishing work and fire resistance construction.

Course Outcomes:

On completion of the course, learner will be able to–

CO1:Able to select the different building material as per requirements.

CO2:Able to differentiate exact properties of mortar and concrete.

CO3:Get acquainted to importance of masonry based construction.

CO4:Able to predict role of super and sub structure in building construction.

CO5: Able to understand safety in the building construction.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314315B - Construction Engineering Materials

Unit 1: Introduction to Basic Building and Construction Materials (Type I)	9hrs	CO
a) Aggregate: Classification, Physical and mechanical properties, soundness, alkali-aggregate reaction, thermal properties of aggregate b) Bricks and Masonry Blocks: Types, properties and field and laboratory tests to evaluate quality c) Cement & Lime: classification, properties: types, Portland cement, chemical composition of raw material, bogue compounds, hydration of cement, role of water in hydration, testing of cements. d) Fly ash: properties and use in manufacturing of bricks and cement.		CO1
Unit 2: Introduction to Basic Building and Construction Materials (Type II)	9hrs	
a) Building stone: classifications, properties and structural requirements; b) Wood and Wood products: Introduction to wood macrostructure, sap wood and heart wood, defects and decay of timber, seasoning and preservation of timber, fire resisting treatment, introduction to wood products- veneers, plywood's, fibre board, particle board, block board, batten boards. c) Metals: Steel: Important properties and uses of Iron (Cast iron, wrought iron and steel), Important tests on steel rebar, aluminium and copper. d) Bitumen: types, properties and tests. e) Classifications Doors and Windows: Types, materials used		CO1
Unit 3: Mortar, Admixtures and Concrete	10hrs	
a) Concrete & Mortar: Types and tests on mortars, Production, mix proportions and grades of concrete, fresh, mechanical and durability properties of concrete, factors affecting properties of concrete, tests on concrete, b) Admixtures & Special concrete: light weight concrete, high density concrete, vacuum concrete, shotcrete, steel fibre reinforced concrete, polymer concrete, Ferro cement, high performance concrete, self-compacting concrete.		CO2
Unit 4: Masonry Based Construction	9hrs	
a) Brick Masonry: types of bonds, relative merits and demerits of English, Single Flemish and Double Flemish bond. b) Stone Masonry: General principles, classification of stone masonry and their relative merits and demerits,		CO3
Unit 5: Introduction to Super Structure and Sub Structure	9 hrs	
a) Super Structure – different building components, structural element like beams, columns, slabs etc. their basic requirement. Arches: Terminology and types b) Sub Structure - Foundation: purpose, types of foundation- shallow, deep, pile, raft, grillage foundation. Cavity wall: components and construction.		CO4
Unit 6: Finishing, Services and Special constructions	10 hrs	
a) Wall Finishes: Plastering, pointing, distempering and painting: Purpose, methods, defects and their solutions. Vertical communication: Stairs: Terminology, requirements of good staircase, classification; ramps, lifts and escalators. Damp proofing: causes, effects, prevention and treatments, b) Fire resistant construction: Fire resistant properties of common building materials, requirements for various building components.		CO5



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314315B - Construction Engineering Materials

Reference Book

1. A Text-Book of Building Construction, S. P. Bindra and S. P. Arora, Dhanpat Rai Publications
2. Building Materials and Construction, Jena and Sahu, Mc. Graw Hill.
3. Materials for Civil and Construction Engineers, Mamlouk and Zaniewski, Pearson
4. Building Materials and Building Construction, by P C Verghese
5. Building Construction, by B. C. Punmia, , LaxmiPublicaton



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314316A:Hydrology

Teaching Scheme:	Credits	Examination Scheme	
Theory: 4hrs/week	Th:04	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite :Fluid Mechanics		Pract:	--
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. To impart the knowledge of Hydrologic cycle. 2. To introduce students to different government organizations 3. To make students aware about precipitation, runoff, runoff hydrographs and streams gauging 4. To impart knowledge of Ground water hydrology. 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Understand Hydrologic Cycle. CO2: Understand government organizations, apply & analyze precipitation & its abstractions. CO3: Get knowledge about Evaporation & Infiltration CO4: Get knowledge about Runoff CO5: Understand Stream gauging CO6: Understand Ground water hydrology.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314316A:Hydrology

Unit 1: Introduction to Hydrology	9hrs	CO
Definition of Hydrology, Practical applications of hydrology, different divisions of hydrology, Hydrologic cycle, Types & forms of precipitation, precipitation measurement, rain gauge Network, site selection for rain gauge stations,		CO1
Unit 2: Brief introduction of government organizations	9hrs	
IMD, CWPRS, MERI, CDO, Hydrology Project Division, NIH, CWC, Consistency test, presentation of rainfall data, mass rainfall curves, hyetograph, point rainfall, mean precipitation over an area, arithmetic mean method, Thiessen's polygon, isohyets method, concepts of depth-area-duration analysis, frequency analysis, frequency of point rainfall, intensity-duration curves, maximum intensity-duration		CO2
Unit 3: Evaporation & Infiltration	10hrs	
Evaporation- elementary concepts, factors affecting, measurement of evaporation, transpiration, evapotranspiration, modified Penman method - process and measurement, infiltration: introduction, infiltration capacity, infiltrometer, Horton's method and infiltration indices		CO3
Unit 4: Runoff	9hrs	
Introduction, factors affecting runoff, rainfall-runoff relationships and empirical techniques to determine runoff, Runoff hydrograph: Introduction, factors affecting flood hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph theory, S-curve hydrograph, uses and limitations of unit hydrograph, synthetic hydrograph		CO4
Unit 5: Stream Gauging	9hrs	
Selection of site, discharge measurement by velocity-area method, introduction to advance techniques/equipment used in gauge discharge measurements such as radar, current meter, ADCP (acoustic doppler current profiler).		CO5
Unit 6: Ground Water Hydrology	10hrs	
Occurrence and distribution of ground water, specific yield of aquifers, movement of ground water, Darcy's law, permeability, safe yield of basin, hydraulics of wells under steady flow condition in confined and unconfined aquifers, specific capacity of well, tube wells, open wells and their construction.		CO6

Text Books

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

Reference Books

1. A Textbook of Hydrology, Dr. P. Jaya Rami Reddy, USP Publisher.
2. Water Resources and Water Power Engineering, P. N. Modi, Standard Book House.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314316B:Environmental Geotechnology

Teaching Scheme:	Credits	Examination Scheme	
Theory: 4 hrs/week	Th:04	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite: Geotechnical Engineering		Pract:	--
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. Understand the water clay interaction. 2. Analyse the soil index properties. 3. Characterization of solid waste and soil contamination concentration & type. 4. Monitor and analyse quality of contaminates ground water 5. Suggest the steps to remediation of soil and groundwater 6. Design of landfill sites and liners. 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Basic clay mineralogy and water holding theory. CO2: Determine basic index geo-environmental properties. CO3: Characterize the solid wastes and its types. CO4: Analyses the quality of contaminates of water. CO5: Suggest the remedial measures to avoid the ground contamination. CO6: Design clay liners and landfill sites.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314316B:Environmental Geotechnology

Unit 1: Basic Geotechnical Engineering	8hrs	CO
Environmental cycles – Soil and water – Environmental interaction relating to geotechnical problems – Effect of pollution on soil – water behaviour. Origin, nature and distribution of soil – Description of individual particle – Soil fabric and structure-Gravitational and surface forces – Intersheet and interlayer bonding in the clay minerals – Basic structural units of clay minerals – Isomorphous substitution – Kaolinite mineral – Montmorillonite mineral – Illite mineral – Electric charges on clay minerals – Ion exchange capacity – Diffused double layer – Adsorbed water – Soil structure – Methods for the identification of minerals.		CO1
Unit 2: Index Geo-environmental properties	8hrs	
Effect of drying on Atterberg limits – Shrinkage, swelling and cracking characteristics of soil – Electrochemical characteristics of soil-water system – Sensitivity of soil to environment – Soil-water-air interaction – Activity, sensitivity, causes of sensitivity – Influence of exchangeable cations, pH and organic matter on properties of soils – Permeability of soils – Hydraulic conductivity of different types of soils – Darcy’ s law and its validity – Factors affecting permeability.		CO2
Unit 3:Solid Waste Management	10hrs	
Sources, types and composition of different wastes – Characteristics and classification of hazardous wastes – Generation rates – Potential problems in soils due to contaminants. Ground water flow – Sources of ground water contamination – Contaminant transport – Pollution of aquifers by mining and liquid wastes – Ground water pollution downstream of landfills – Transport mechanisms.		CO3
Unit 4: Waste & Contaminants	8hrs	
Wastes and Contaminants: sources of wastes-types of wastes- composition of different wastes- characteristics and classification of hazardous wastes- generation rates- ground water contamination- sources of ground water contamination- transport mechanisms-potential problems in soils due to contaminants.		CO4
Unit 5: Disposal and containment technics	10hrs	
Disposal and containment technics: Criteria for selection of sites for waste disposal- hydrological aspects of selection of waste disposal sites- disposal facilities- subsurface disposal technics-disposal systems for typical wastes.		CO5
Unit 6: Liners system	8hrs	
Liners and covers for waste disposal – rigid and flexible liners – Leachate and gas collection system – Engineered landfills (including basal liner and cover liner systems) – components – design criteria. Hydrological design for ground water pollution control. Soil contamination and remediation technology for both ground and aquifers.		CO6



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314316B:Environmental Geotechnology

Text Books

1. Mitchell, J (1976), “Fundamentals of soil behaviour”, John Wiley and sons, New York
2. Lambe, T. W & Whitman, R. V (1979), “Soil Mechanics “, John Wiley and Sons, New York.
3. Gopal Ranjan & A.S.R Rao (1991), “Basic and Applied Soil Mechanics, Wiley Eastern Ltd., New Delhi.
4. Ramanatha Iyer T. S (2000), “Soil Engineering Related to Environment”, LBS centre.

Reference Books

1. Zheng C., “Applied Contaminant Transport Modeling”, John Wiley & sons, First edition
2. Daniel, B.E., Geotechnical Practice for waste disposal, Chapman and Hall, London, 1993.
3. Fried, J.J., Ground Water Pollution, Elsevier, 1975.
4. Wentz, C.A., Hazardous Waste Management, McGraw Hill, Singapore, 1989.
5. Hsai-Yang Fang, “Introduction to Environmental Geotechnology”, CRC Press, New York
6. Proceedings of the International symposium of Environmental Geotechnology (Vol.I and II), Environmental Publishing Company, 1986 and 1989.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2301301: Numerical Methods for Engineers

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2 hrs/week	Th:02	Theory	CIA: 25
Practical: --	Practical: --		End-Sem:50
Prerequisite: Basic Introduction to Civil Engineering field, Engineering Mathematics.		Pract:	--
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. Analyze the data for a given problem and formulate mathematical model. 2. Optimize linear programming problems. 3. Apply the knowledge for optimization for Civil Engineering Projects. 4. Analyze the data for a given problem and represent in the mathematical and statistical form. 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Solve the problems related to stochastic programming.</p> <p>CO2: Optimize transportation and assignment problems.</p> <p>CO3: Understand the basic concepts of Statistics and perform statistical data analysis.</p> <p>CO4: Carry out correlation and regression analysis for the given data.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem- VI

2301301: Numerical Methods for Engineers

Unit 1: Stochastic Programming	7hrs	CO
Sequencing: n jobs through 2, 3 and M machines, queuing theory: elements of queuing system and its operating characteristics, waiting time and ideal time costs, Kendall's notation, classification of Queuing models, single channel Queuing theory: Model I (Single channel Poisson Arrival with exponential services times, Infinite population (M/M/1): (FCFS/ /), simulation: Monte Carlo simulation.		CO1
Unit 2: Linear programming & Replacement Model	7hrs	
a) The transportation model and its variants, assignment model and its variants. b) Replacement of items whose maintenance and repair cost increase with time ignoring time value of money.		CO2
Unit 3: Introduction to Statistics	7hrs	
Statistical methods: introduction, collection, classification and representation of data, various databases related to civil engineering applications (like hydrological, structural audit, etc) measures of central value (mean, median, mode), measures of dispersion, skewness, moment, Kurtosis.		CO3
Unit 4: Correlation and Regression	7hrs	
Correlation analysis, regression analysis, coefficient of correlation, probable error, single and multiple regression, sample examples to be developed through data collected in unit iii and carry out correlation regression analysis for the same.		CO4

Text Books

1. Operations Research, Premkumar Gupta and D. S. Hira, S. Chand Publications.
2. Engineering Optimization, S. S. Rao, New Age International (P) Ltd.
3. Higher Engineering Mathematics, B. S. Grewal, Publisher: Khanna Publishing House.
4. Statistical Methods, S. P. Gupta, Sultan and Chand Sons.

Reference Books

1. A System Approach to Civil Engineering Planning & Design, Thomas K. Jewell- Harper Row Publishers.
2. Operations Research, Hamdy A. Taha, Pearson Publication.
3. Probability and Statistics for Engineers, Richard A Johnson.
4. An Introduction to Statistical Methods and Data Analysis Student Solutions Manual, R. Lymann Ott and Michael Longnecker, Jackie Miller.
5. Statistical Methods, Rudolf Freund William Wilson, Academic Press USA.
6. Fundamentals of Statistics, S C Gupta, Himalaya Publishing House.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTER

T. Y. B. Tech (Civil) (2023 Pattern)

Sem- VI

2314704: Highway Construction Training

Teaching Scheme:	Credits	Examination Scheme	
Theory: --	Th:00	Theory	CIA:--
Practical: 2hrs/week	Practical: 1		End-Sem:--
Prerequisite: Nil		Pract:	25
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. Understand the importance of highways and their design principles (Comprehension) 2. Analyze the different types of materials used in highway construction and their properties (Analysis) 3. Select and operate various types of equipment used in highway construction safely and effectively (Application) 4. Apply the techniques learned in earthwork and grading, pavement construction, drainage and stormwater management, and traffic control and safety to construct highways effectively and efficiently (Application) 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Plan and design highways based on the principles learned in the course (Synthesis)</p> <p>CO2: Evaluate the appropriate materials for use in highway construction and ensure their quality control and testing (Evaluation)</p> <p>CO3: Select and operate various types of equipment used in highway construction safely and effectively (Application)</p> <p>CO4: Apply the techniques learned in earthwork and grading, pavement construction, drainage and stormwater management, and traffic control and safety to construct highways effectively and efficiently (Application)</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTER

T. Y. B. Tech (Civil) (2023 Pattern)

Sem- VI

2314704: Highway Construction Training

Unit 1: Introduction to Highway Construction	14hrs	CO
Overview of highway construction, its importance and types of highways, Highway design and planning principles, surveying and environmental considerations, Materials used in highway construction, their properties, quality control and testing, Highway construction equipment, their types, selection, operation, maintenance and safety considerations		CO1
Unit 2: Highway Construction Techniques	14hrs	
Earthwork and grading principles, excavation, embankment construction and soil stabilization techniques, Pavement construction techniques for flexible and rigid pavements, pavement design principles and types of pavements, Drainage and stormwater management techniques, importance of drainage and types of drainage systems, Traffic control and safety principles, traffic control devices and techniques, safety considerations for workers and motorists.		CO2

Textbooks

1. "Highway Engineering" by Martin Rogers and Bernard Enright
2. "Highway Construction and Inspection" by J. Paul Guyer
3. "Highway Materials, Soils, and Concretes" by Harold Atkins and Thomas Kennedy
4. "Construction of Highway Bridges and Structures" by Richard M. Barker and Jay A. Puckett



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T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem- VI

2314804 : Geographic Information System

Teaching Scheme:	Credits: --	Examination Scheme	
Theory: 00	Th:--	Theory	CIA: --
Practical:--	Practical: --		End-Sem:--
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--
Course Objectives: <ol style="list-style-type: none">1. To get the knowledge of Remote Sensing & GIS.2. To learn GIS application.3. To know the Role of Geographic Information System in Urban & Regional Planning4. To get the information of Bhuvan Portal.			
Course Outcomes: <p>On completion of the course, learner will be able to–</p> <p>CO1: Understand Remote sensing & GIS.</p> <p>CO2: Understand Applications of GIS in Urban Planning.</p> <p>CO3: Understand Role of Geographic Information System in Urban & Regional Planning.</p> <p>CO4: Use of Bhuvan Portal.</p>			



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T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem- VI

2314804 : Geographic Information System

Module	Topic	CO
Module 1	Essentials of Remote Sensing & GIS	CO1 to CO4
Module 2	Applications of GIS in Urban Planning	
Module 3	Fundamentals of Geospatial Technology	
Module 4	Introduction to QGIS & laterization in QGIS	
Module 5	Role of Geographic Information System in Urban & Regional Planning	
Module 6	Remote sensing for Urban environmental studies	
Module 7	The Interface of Bhuvan Portal, Satellite image downloading	



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

VAC144: Revit MEP

Teaching Scheme:	Credits	Examination Scheme	
Theory:--	Th:--	Theory	CIA: --
Practical:2 hrs/week	Pr: 1		End-Sem:--
		Pract:	--
		Oral:	--
		Termwork	25

Course Objectives: The student should be able to

1. Understand the fundamentals of HVAC, plumbing, and electrical design in Revit MEP.
2. Gain proficiency in creating and modifying MEP systems in Revit.
3. Collaborate with other disciplines in a BIM environment.
4. Troubleshoot common issues in Revit MEP projects.

Course Outcomes:

On completion of the course, learner will be able to

CO1:Navigate the Revit MEP interface and tools.

CO2:Understanding of HVAC, plumbing, and electrical design concepts.

CO3: Create and modify MEP systems in Revit.

CO4:Streamline the MEP design process and improve project outcomes.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

VAC144: Revit MEP

Text Books:

1. Mastering Autodesk Revit MEP by Simon Whitbread
2. Revit MEP 2021 for Beginners by CADFolks
3. Revit MEP 2021: A Comprehensive Guide for Beginners by Prof. Sham Tickoo
4. Autodesk Revit MEP 2021: Fundamentals for MEP" by ASCENT - Center for Technical Knowledge
5. Revit MEP 2021: Mechanical and Plumbing Engineering by CAD Folks



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314393: Planning and Quantity Estimation for Metro Construction

Teaching Scheme:	Credits	Examination Scheme	
Theory: 4hrs/week	Th:04	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. plan and quantity estimation process for metro construction projects.
2. provide with the knowledge and skills necessary to prepare accurate and reliable estimates for metro construction projects.
3. familiarize with the different types of metro construction projects and the challenges involved in estimating their costs.
4. critical thinking and problem-solving skills in relation to planning and quantity estimation for metro construction projects.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Understand the planning process for metro construction projects

CO2: Use quantity estimation methods to prepare accurate and reliable estimates for metro construction projects

CO3: Identify the different types of metro construction projects and the challenges involved in estimating their costs

CO4: Apply critical thinking and problem-solving skills to planning and quantity estimation for metro construction projects



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314393: Planning and Quantity Estimation for Metro Construction

Unit 1: Preparation of plans and estimates of Metro Railway	9hrs	CO
Metro railway of infrastructure; Typical Metro railway planning steps; Planning and appraisal of major Metro railway projects; Screening of project ideas; Life cycle analysis of Metro railway; Multi-criteria analysis for comparison of Metro railway construction alternatives; Procurement strategies; Scheduling and management of planning activities of construction. Preparation of plans and estimates: Preparation of Plans General procedure; preparation of plans, sizes of drawings; titles and numbering of drawings; scale of drawings; details on drawings; symbols and colours of drawings. Preparation of Estimates - Preparations of estimates – Code rules; technical details, rates and quantities; schedule of rates and price, special features of estimates; Supplementary Estimates.		CO1
Unit 2: Economic Analysis of Metro Railway Project	9hrs	
Economic Analysis of Metro Railway Project– Concepts and Applications, Principles of methodologies for economic analysis of public works, Social welfare function, indifference curves and tradeoffs, Demand curves and price elasticity's; Benefit-cost ratio and internal rate of return; Shadow pricing; Accounting for risk and uncertainty.		CO2
Unit 3: Acquisition of Land ACT of Metro Railway	10hrs	
ACT and Policies relevant of Project, Right of Fair Compensation and Transparency in Land Acquisition and resettlement and rehabilitation ACT 2013, Maharashtra guidelines and Rules for Land Acquisition.		CO3
Unit 4: Details Estimate of Metro construction projects	9hrs	
Elevated section (viaduct), Underground section by Tunnel Boring Machine (TBM) excluding station box, Underground section by Cut and Cover, Station Buildings, Elevated Station excluding viaduct (Civil work), Elevated station (E&M work including lift and escalator), Underground station (Civil work), Underground station (E&M work including ECS, TVS, Lift and Escalator), Permanent way.		CO4
Unit 5: Financial Evaluation of Metro Railway	9hrs	
Financial Evaluation - Time value of money, Investment criteria, Project cash flows – elements and basic principles of estimation, Financial estimates and projections, Cost of capital, Rate of return; Project risk analysis; Political and social perspectives of infrastructure planning; Case studies		CO3
Unit 6: Construction Contracts	10hrs	
Construction Contracts of Metro Railway Project - Contract Specifications, types of contract documents used for construction, Contract Procurement - selecting a contractor, Introduction to BOT and BOOT projects, EPC contracts		CO3

Text Books

1. Projects: Planning, analysis, selection, financing, implementation, and review, P. Chandra, Tata McGraw-Hill, New Delhi, 2009.
2. Project financing - Asset-based financial engineering, J. D. Finnerty, John Wiley & Sons, New York, 1996.
3. Infrastructure planning handbook: Planning, engineering, and economics, A. S. Goodman and M. Hastak, McGraw-Hill, New York, 2006
4. Infrastructure planning, J. Parkin and D. Sharma, Thomas Telford, London, 1999.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech (Civil Engineering) (2023 Pattern)

Sem-VI

2314393: Planning and Quantity Estimation for Metro Construction

5. Laws Relating to Building and Engineering Contracts in India, Gajaria G.T., M.M. Tripathi Private Ltd., Bombay, 1982.
6. Computer-based construction project management, T. Hegazy, Prentice Hall, New Jersey, 2002.

Reference Books

1. Project management in construction, 5th ed., S. M. Levy, McGraw Hill, New York, 2007.
2. A guide to the project management body of knowledge, PMI, 3rd ed., Project Management Institute, Pennsylvania, 1996.
3. Planning and controlling construction projects, M. Mawdesley, W. Askew and M. O'Reilly, Addison Wesley Longman Limited, Essex, 1997.
4. Value management of construction projects, J. Kelly, S. Male and D. Graham, Blackwell Publishing, Oxford, 2003.
5. Handbook of Construction Management, Joy P.K, Mac Millan Publications, 1991



SANDIP FOUNDATION'S
SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

MAHIRAVANI, TRIMBAK ROAD, TAL & DIST: NASHIK-422213, MAHARASHTRA,INDIA

B. Tech Civil Engineering

Semester – VII

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)				Examination Scheme				Total Marks
				L	T	P	C	Formative Assessment CIA		Summative Assessment ESE		
								Theory	Lab	Theory	Lab	
1	PC	2314401	Estimating & Costing	2	--	--	2	25	--	50	--	75
2	PC	2314402	Transportation Engineering	2	--	--	2	25	--	50	--	75
3	PC	2314403	Transportation Engineering Laboratory	--	--	2	1	--	--	--	25 ^a	25
4	PC	2314404	Estimating & Costing Laboratory	--	--	2	1	--	25	--	25 ^a	50
5	PE	2314405	Program Elective-IV	2	--	--	2	25	--	50	--	75
6	PC (MD)	2314406	Geosynthetics Engineering	2	--	--	2	25	--	50	--	75
7	IC (ELC)	2300401	Industry Internship	--	--	--	8	--	100	--	50 ^a	150
8	IC (ELC)	2300402	Project Stage – I	--	--	8	4	--	100	--	75 ^a	175
9	SDC	2314705	Building Hands-On Training	--	--	2	--	--	--	--	--	--
10	EEC	2314805	Estimation of Structure Using Software (QE Pro. / Revit etc..)	--	--	--	--	--	--	--	--	--
TOTAL				08	00	14	22	100	225	200	175	700
Value Added Course												
1	VAC	VAC145	STAAD Pro. / MX Road	--	--	2	--	--	--	--	--	--
Honors/Minor Courses (Metro Construction)												
1	HM	2314491	Work Method Statement Making	4	--	--	4	50	--	50	--	100
2	HM	2314492	Work Method Statement Making-Lab	--	--	2	1	--	50	--	--	50
Program Elective IV:												
1. Bridge Engineering (2314405A)						2. Contracts and Tenders(2314405B)						



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314401:Estimating & Costing

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2 hrs/week	Th:02	Theory	CIA: 25
Practical: --	Practical: --		End-Sem:50
Prerequisite: Nil		Pract:	--
		Oral:	--
		Termwork	--
Course Objectives: The student should be able to <ol style="list-style-type: none">1. Understand estimation of structures and calculate quantity of materials.2. To prepare approximate and detailed estimate of Civil Engineering works.3. To draft detailed specification and work out rate analysis according to material, labor requirements as per specified norms.			
Course Outcomes: On completion of the course, learner will be able to– CO1: Estimate the quantity of civil engineering structures. CO2: Prepare approximate and detailed value of construction. CO3: Calculate rate for materials, Labors and final cost of project.			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314401:Estimating & Costing

Unit 1: Introduction and Estimation	7hrs	CO
Definition of estimation, valuation, purpose, and data required for estimation, types, concept of item of work, different items of work of buildings, units and mode of measurement for different items of work, measurement form and abstract form (Bill of Quantities). Administrative approval and technical sanction, prime cost, provisional sum and provisional quantities, contingencies, rate analysis, lead statement, work charge establishment, centage charges, contents of S. S. R. Approximate estimate: Methods of approximate estimate of Civil Engineering works: like building, roads, irrigation, water supply & sanitary works with numerical.		CO1
Unit 2: Detailed Estimate	7hrs	
Detailed estimates: factors to be considered while preparing detailed estimate, methods of detailed estimate-PWD and Centre line method, taking out quantities for load bearing and R.C.C framed structures as per IS 1200, bill of quantities. Bar Bending Schedule: introduction to bar bending schedule and its importance, preparing bar bending schedule for RCC members of building.		CO2
Unit 3: Estimation of construction works	7hrs	
Earthwork for road construction, estimate of road/highway works, estimate of steel roof truss, estimate of a culvert, water tank (elevated storage tank).		CO3
Unit 4: Rate Analysis	7hrs	
Necessity of specifications, purpose, types, drafting detailed specifications for major items of Civil Engineering works like earthwork, PCC, Masonry (stone & brick), RCC, Plastering, flooring, painting and road, Rate Analysis: purpose, importance, factors affecting rate of an item of work, overheads, task-work, procedure for rate analysis, rate analysis for major items of civil engineering works- like earthwork, PCC, masonry-stone & brick, RCC structural elements, plastering, flooring.		CO4

Text Books

1. Textbook of Estimating and Costing (Civil), D D Kohli and R C Kohli, S. Chand & company, New Delhi.
2. Civil Engineering Contracts and Estimates, B. S. Patil, Universities press
3. A Text Book of Estimating and Costing for Civil Engineering, G.S. Birdie, Dhanpat Rai Publishing Company

Reference Books

1. Estimating and Costing in Civil Engineering: Theory and Practice, B. N Dutta and S. Dutta , 28th revised edition, CBS Publishers and distributors.
2. Estimating, Costing Specifications & valuation in Civil Engineering, M. Chakraborty.
3. Estimating and Costing, R. C. Rangwala, Charotar Publishing House Pvt Ltd, Anand.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314402:Transportation Engineering

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2hrs/week	Th:02	Theory	CIA: 25
Practical: --	Practical: --		End-Sem:50
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. To learn principles and practices of transportation planning 2. To describe traffic studies, their analysis and their interpretation. 3. To study characteristic, properties and testing procedures of highway materials and to enumerate different types of pavements and design of flexible and rigid pavement. 4. To learn Geometric Design of Cross-Sectional Elements of pavement, railways and airways and taxiways. 			
<p>Course Outcomes: On completion of the course, learner will be able to</p> <p>CO1: Understand principles and practices of transportation planning.</p> <p>CO2: Demonstrate knowledge of traffic studies, analysis and their interpretation.</p> <p>CO3: Evaluate properties of highway materials as a part of road pavement and their use in pavement design.</p> <p>CO4: Design Geometric Elements of road pavement, railways and airways and taxiways</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314402: Transportation Engineering

Unit 1: Highway Development and Planning	7hrs	CO
History, development plans, classification of roads, road patterns, road development in India: vision 2021, rural road development vision 2025, current road projects in India, highway alignment, highway project report preparation, (planning surveys & master plans based on saturation system). Problems based on saturation system.		CO1
Unit 2: Traffic Engineering and Control	7hrs	
Traffic studies on flow and speed (problems), peak hour factor, accident study, road safety audit, statistical analysis of traffic data; Microscopic and macroscopic parameters of traffic flow, fundamental relationships; Traffic signs; Signal design by Webster's method (problems); Types of intersections; Highway capacity.		CO2
Unit 3: Highway Pavements	7hrs	
Highway materials - desirable properties and tests; Desirable properties of bituminous paving mixes; Design factors for flexible and rigid pavements; Design of flexible and rigid pavement using IRC codes		CO3
Unit 4: Transportation Infrastructure	7hrs	
Geometric design of highways - cross-sectional elements, sight distances, horizontal and vertical alignments. Geometric design of railway Track – Speed and Cant. Concept of airport runway length, calculations and corrections; taxiway and exit taxiway design.		CO4

Textbooks

1. Highway Engineering, S. K. Khanna, C. E. G. Justo and A. Veeraragavan, Nem Chand and Brothers.
2. Principles and Practices of Highway Engineering, Dr. L.R. Kadiyali, Khanna Publishers Delhi
3. Principles of Highway Engineering and Traffic Analysis (4th edition), F. L. Mannering and Scott S. Washburn, Wiley India.
4. Airport Engineering, by Saxena S.C., CBS Publishers & Distributors
5. Railway Engineering, M M Agarwal and Satish Chandra

Reference books

1. A Course in Highway Engineering, S. P. Bindra, Dhanpat Rai and Sons.
2. Principles of Transportation Engineering, G. V. Rao, Tata MacGraw Hill Publication
3. Highway Engineering, Rangawala, Charotar publishing House.
4. Principles of Transportation Engineering, Partha Chakraborty and Animesh Das, Prentice Hall of India Pvt. Ltd.
5. Ashford, N., and P. H. Wright. 1992. Airport Engineering, 3rd ed. New York: John Wiley & Sons
6. Principles of Railway Engineering, Rangwala, Charotar publication.

Indian Standards and Handbooks

1. IS 1201 to 1220 - 1978, IS 73, IS 2386 part I to V
2. IRC 58, IRC37
3. Specifications for Road and Bridge works (MORTH) - IRC, New Delhi.
4. Handbook of Road Technology, Lay M. G., Gordon Breach Science, Newyork
5. Civil Engineering Handbook, Khanna S. K.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314403:Transportation Engineering Laboratory

Teaching Scheme:	Credits	Examination Scheme	
Theory: --	Th: --	Theory	CIA: --
Practical: 2hrs/week	Practical: --1		End-Sem:--
Prerequisite: Nil		Pract:	--
		Oral:	25 M
		Termwork	--
Course Objectives: The student should be able to <ol style="list-style-type: none">1. To conduct various standard tests on soil, aggregate and bitumen.2. To organise traffic surveys and collect wide variety of traffic data, subjecting them to analysis and interpretation.			
Course Outcomes: On completion of the course, learner will be able to– CO1: Perform laboratory test on subgrade soil, aggregates and bitumen. CO2: Carry out mix design for the pavements. CO3: Conduct the traffic surveys, roadside and household interviews.			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314403: Transportation Engineering Laboratory

A. Practical		CO
I. Tests on Aggregate (Any Five)		
1	Aggregate Impact Value Test	CO1, CO2
2	Aggregate Crushing Strength Test	
3	Los Angeles Abrasion Test	
4	Shape Test (Flakiness Index and Elongation Index)	
5	Specific Gravity and Water Absorption Test by basket method	
6	Stripping Value Test	
7	Soundness Test	
II. Tests on Bitumen (Any Five)		
1	Penetration Test	
2	Ductility Test	
3	Softening Point Test	
4	Flash Point & Fire Point Test	
5	Bitumen Extraction Test (compulsory)	
6	Viscosity Test (Tar Viscometer)	
7	Specific Gravity Test	
III. Tests on Aggregate Bitumen Combined: (Compulsory)		
1	Marshall Stability Test	
IV. Traffic Survey		
1	Traffic Volume Count	CO3
2	Household Survey	
B. Technical Visits		
1	Road Construction and/or RAP Site	CO1, CO2
2	Hot mix Plant with detailed report	

Indian Standards and Handbooks

1. Relevant IRC and IS Codes
2. Specifications for Road and Bridge works (MORTH) - IRC, New Delhi.



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314404: Estimating & Costing Laboratory

Teaching Scheme:		Credits		Examination Scheme	
Theory: --		Th:00		Theory	CIA: 25
Practical: 2hrs/week		Practical: 01			End-Sem: --
Prerequisite: Nil				Pract:	--
				Oral:	25
				Termwork	--
Course Objectives: The student should be able to <ol style="list-style-type: none">1. Understand estimation of structures and calculate quantity of materials.2. To prepare approximate and detailed estimate of Civil Engineering works.3. To draft detailed specification and work out rate analysis according to material, labor requirements as per specified norms.					
Course Outcomes: On completion of the course, learner will be able to– CO1: Estimate the quantity of civil engineering structures. CO2: Prepare approximate and detailed value of construction. CO3: Calculate rate for materials, labors and final cost of project.					



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314404: Estimating & Costing Laboratory

Pr. No.	Topic	CO
1.	Estimation of building (long wall and short wall method)	CO1 – CO3
2.	Estimation of building (center line method)	
3.	Analysis of rate for concrete work	
4.	Analysis of rate for brick work	
5.	Analysis of rate for plaster work	
6.	Estimate quantity of reinforcement	
7.	Preparation for approximate estimate for road project	
8.	Estimating cost of building on plinth area method	

Note: Performance based oral examination on the above Term Work

Text Books

1. Textbook of Estimating and Costing (Civil), D D Kohli and R C Kohli, S. Chand & company, New Delhi.
2. Civil Engineering Contracts and Estimates, B. S. Patil, Universities press
3. A Text Book of Estimating and Costing for Civil Engineering, G.S. Birdie, Dhanpat Rai Publishing Company

Reference Books

1. Estimating and Costing in Civil Engineering: Theory and Practice, B. N Dutta and S. Dutta , 28th revised edition, CBS Publishers and distributors.
2. Estimating, Costing Specifications & valuation in Civil Engineering, M. Chakraborty.
3. Estimating and Costing, R. C. Rangwala, Charotar Publishing House Pvt Ltd, Anand.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314405A : Bridge Engineering

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2hrs/week	Th:02	Theory	CIA: 25
Practical: --	Practical: --		End-Sem:50
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Familiarize Students with different types of Bridges and IRC standards.
2. Equip student with concepts and design of Slab Bridges, T Beam Bridges, and Box Culverts.
3. Understand concepts of design of Plate Girder Bridges.
4. Familiarize with different methods of inspection of bridges and maintenance.

Course Outcomes:

On completion of the course, learner will be able to–

- CO1:** Able to select the various design standard of bridges and IRC
- CO2:** Able to check the properties of box culverts and bridge bearings.
- CO3:** Get acquainted to slab based and T Bridges.
- CO4:** Able to design built up beams bridges and plate girder bridges.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314405A : Bridge Engineering

Unit 1: Introduction to Bridges and Terminologies.	7hrs	CO
a) Importance of site investigation in Bridge design. Different types of bridges available. History of bridges in India. Highway Bridge loading standards. Impact factor. Railway Bridge loading standards (B.G. ML Bridge) and various loads in bridges.		CO1
Unit 2: Box Culvert and Bridge Bearings	7hrs	
a) Box Culverts - General aspects. Design loads, Design of Box culvert subjected to RC class AA tracked vehicle only.		CO2
b) Bridge Bearings -General features, Types of Bearings, Design principles of steel Rocker & Roller Bearings Design of a steel Rocker Bearing, Design of Elastomeric pad Bearing.		
Unit 3: Slab Based Bridges and Bridge Foundation	8hrs	
a) Deck Slab Bridge – Introduction, Effective width method of Analysis Design of deck Slab Bridge (Simplysupported) subjected to class AA Tracked Vehicle only.		CO3
b) Beam and Slab Bridge (T- Beam Bridge): General features, Design of interior panel of slab Pigeauds method Design of a T-beam bridgesubjected to class AA tracked vehicle only.		
c) Bridge Foundation - General features, Bed Block, Materials piers & Abutments Types of piers, Forces acting onpiers Stability analysis of piers, General features of Abutments, forces acting on abutments, Stability analysis of abutments, Types of wing walls, Approaches, Types of Bridge foundations		
Unit 4: Composite and Built up Bridges	6hrs	
a) Plate Girder Bridge– Introduction, Elements of a plate girder and their design. Design of a Deck type welded plate girder, Bridge of single line B.G.		CO4
b) Composite Bridges – Introduction, Advantages, Design philosophy of Composite Bridges consisting of RCC slabover steel girders including shear connectors		

Textbooks

1. Victor D.J - Essentials of bridge Engineering, Oxford and IBH Publishers.
2. Arya and Azmani - Design of steel structures, Nemchand Publishers.
3. Design of Bridges Structure by T.R.Jagadish&M.A Jayaram Prentice Hall of India Pvt,Delhi.
4. Design of Bridges by N.KrishnamRaju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi.
5. Relevant — IRC & Railway bridge Codes.

Reference books

1. Design of Concrete Bridges by Aswini, Vazirani, Ratwani.
2. Bridge Engineering by PonnuSwamy, TATA Mcgraw Hill Company, New Delhi.
3. Design of RC Structures by B. C. Punmai, Jain & Jain, Lakshmi Publications.
4. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
5. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314405B:Contracts and Tenders

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2 hrs/week	Th:02	Theory	CIA: 25
Practical: --	Practical: --		End-Sem:50
Prerequisite: Nil		Pract:	--
		Oral:	--
		Termwork	--
Course Objectives: The student should be able to <ol style="list-style-type: none">1. Understand government procedure of contracts and tendering.2. To prepare approximate contracts of Civil Engineering works.3. To draft tender of civil engineering work as per specified norms.			
Course Outcomes: On completion of the course, learner will be able to– CO1: Execute the contracts for civil engineering works. CO2: Prepare documents for tender of civil engineering work. CO3: Calculate valuation of civil engineering project/structure.			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314405B:Contracts and Tenders

Unit 1: Introduction to Contracts and Tender process	7hrs	CO
<p>Methods of Executing Works: PWD procedure of work execution, administrative approval, budget provision, technical sanction. Methods of execution of minor works in PWD: Piecework, Rate List, Daily Labour. Introduction to registration as a contractor in PWD.</p> <p>Arbitration: Introduction to Arbitrations as per Indian Arbitration and Conciliation Act (1996) Meaning and need of arbitration, qualities and powers of an Arbitrator. (c) Brief introduction to laws related to professional liabilities</p>		CO1
Unit 2: Contracts	7hrs	
<p>Contracts: definition, objectives & essentials of a valid contract as per Indian Contract Act (1872), types of contracts, conditions of contract- defective work, subletting, etc. termination of contract, defect liability period, liquidated damages, interim payment or running account bills, advance payment, secured advance, final bill.</p>		CO2
Unit 3:Tenders	7hrs	
<p>Tenders: Definition, detailed tendering process and procedure, conditions regarding earnest money, security deposit, retention money, pre and post qualification of contractors, 3 bid, 2 bid and single bid system, qualitative and quantitative evaluation of tenders, comparative statement, pre-bid conference, acceptance/ rejection of tenders, BOT & Global Tendering, E-tendering. PWD procedure for executing, works piecework, rate list and daily labor, introduction to registration as a contractor in PWD.</p>		CO3
Unit 4:Valuation	7hrs	
<p>Introduction, valuation- purpose, types of property-real property and personal property, meaning of price, cost and value, factors affecting value, gross income, net income, outgoings, various forms of values. concept of free hold and lease hold property, depreciation, methods of calculating depreciation, obsolescence, sinking fund, years purchase, annuity. Methods of valuation of land and building: rental basis, direct comparison method, profit based method, development method, and rent fixation for building. Methods of Valuation of land: belting method of land valuation and other methods.</p>		CO4

Text Books

1. Textbook of Estimating and Costing (Civil), D D Kohli and R C Kohli, S. Chand & company, New Delhi.
2. Civil Engineering Contracts and Estimates, B. S. Patil, Universities press
3. A Text Book of Estimating and Costing for Civil Engineering, G.S. Birdie, Dhanpat Rai Publishing Company

Reference Books

1. Estimating and Costing in Civil Engineering: Theory and Practice, B. N Dutta and S. Dutta , 28th revised edition, CBS Publishers and distributors.
2. Estimating, Costing Specifications & valuation in Civil Engineering, M. Chakraborty.
3. Estimating and Costing, R. C. Rangwala, Charotar Publishing House Pvt Ltd, Anand.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314406:Geosynthetics Engineering

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2 hrs/week	Th:02	Theory	CIA: 25
Practical: --	Practical: --		End-Sem:50
Prerequisite: Engineering Mechanics and Engineering Geology		Pract:	--
		Oral:	--
		Termwork	--
Course Objectives: The student should be able to <ol style="list-style-type: none">1. To deal with the geo-synthetics as construction materials in civil engineering project.2. To introduce the manufacture, behaviour and concept of geo-synthetics.3. Applications of geo-synthetics in different civil engineering projects.			
Course Outcomes: On completion of the course, learner will be able to– CO1: Explain types of Geo-synthetic material and its application in construction industry. CO2: Define physical, engineering properties and function of geo-synthetics material CO3: Describe the application in flexible pavements, reinforced soil retaining structures CO4: Application in geo environment engineering, soil reinforcement to improve bearing capacity of soil and effect of geo-synthetics in design.			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314406:Geosynthetic Engineering

Unit 1: Introduction to Geosynthetic	7hrs	CO
An Overview of Geosynthetic in Geotechnical Engineering, Historical development, Types of geosynthetics: geotextiles, geogrids, geonets, geomembranes, geocomposites, Recent use in India, Manufacturing: Materials and Process, Raw materials: polyamide, polyester, polyethylene, polypropylene, poly vinyl chloride, Different type of geosynthetics based on manufacturing woven, monofilament, multifilament, slit filament, non-woven, Different bonding process: Mechanically bonded, Chemically bonded, Thermally bonded.		CO1
Unit 2: Properties and function	7hrs	CO
Properties of Geosynthetics PHYSICAL Properties: Mass per unit area, Thickness, Specific gravity, Hydraulic properties: Apparent open size, Permittivity, Transmissivity, Mechanical Properties: Uniaxial Tensile Strength, Burst and Puncture Strength, Soil Geosynthetic friction tests, Durability: Abrasion resistance, Ultraviolet resistance, Functions of Geosynthetics: Reinforcement, Separation, Filtration, Drainage, Barrier Functions, Confinement		CO2
Unit 3: Applications	7hrs	CO
Applications of Geosynthetics- Use of geosynthetics in roads, Use of reinforced soil in Retaining walls, Improvement of bearing capacity,		CO3
Unit 4: Applications	7hrs	CO
Applications of Geosynthetics- Geosynthetics in environmental control and landfills, Ground Improvement by geodrains, Use of Geosynthetics in lining of canals		CO4

Text Books

1. Gopal Ranjan and A S Rao Basic and Applied Soil Mechanics 2nd Ed. 2000 New Age International Publisher, New Delhi.
2. Principles of Geotechnical Engineering by Braj M. Das, Cengage Learning.
3. P. C. Varghese Foundation Engineering 9th Ed. 2012 Asoke K. Ghosh, PHI Learning Private Limited

Reference Books

1. Designing with Geo-synthetics. Vols. 1 & 2, Koerner, R. M., 6th Edition, Xlibris Corporation, USA.
2. Geo-synthetics Design and Construction Guidelines, Holtz. R. D., Christopher. B. R. and Berg. R. R. Technical Consultant, Dr. DiMaggio, U.S. Department of Transportation, Washington DC, FHWA-H1-98-038



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) (2023 Pattern)

Sem-VII

2300401: Industry Internship / Internship (Exit Course)

Teaching Scheme:	Credits	Examination Scheme	
Theory: --	Practical:08	Theory	CIA: --
Practical: --			End-Sem:--
		Pract:	--
		Oral:	50
		Termwork	100

Course Objectives: The student should be able to

1. encourage and provide opportunities for students to get professional / personal experience through internships.
2. learn to apply the technical knowledge gained from academics / classroom learning in real life/industrial situations.
3. get familiar with various tools and technologies used in industries and their applications.
4. enable students to develop professional skills and expand their professional network with the development of employer-valued skills like teamwork, communication.
5. apply the experience gained from industrial internship to the academic course completion project.
6. nurture professional and societal ethics in students.
7. understand the social, economic and administrative considerations that influence the working environment of industrial organizations.

Course Outcomes:

On completion of the course, learner will be able to–

CO1:develop professional competence through industry internship

CO2:apply academic knowledge in a personal and professional environment

CO3:build the professional network and expose students to future employees

CO4:Apply professional and societal ethics in their day to day life

CO5:become a responsible professional having social, economic and administrative considerations

CO6:make own career goals and personal aspirations.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) (2023 Pattern)

Sem-VII

2300401: Industry Internship / Internship (Exit Course)

PROCEDURE

Internships are educational and career development opportunities, providing practical experience in a field or discipline. Internships are far more important as the employers are looking for employees who are properly skilled and having awareness about industry environment, practices and culture. Internship is structured, short-term, supervised training often focused around particular tasks or projects with defined time scales.

Core objective is to expose technical students to the industrial environment, which cannot be simulated/experienced in the classroom and hence creating competent professionals in the industry and to understand the social, economic and administrative considerations that influence the working environment of industrial organizations.

Engineering internships are intended to provide students with an opportunity to apply theoretical knowledge from academics to the realities of the field work/training. The following guidelines are proposed to give academic credit for the internship undergone as a part of the Engineering curriculum.

Guidelines of 4th Semester Internship for Exit Course (2 weeks)

Duration: Internship to be completed within 2 weeks as mentioned in the structure of curriculum for the respective semester / Exit Course. It is to be assessed and evaluated in 4th semester.

Guidelines of 6th Semester Internship (4 weeks)

Duration: Internship to be completed within 4 weeks after the end of 6th Semester and before the commencement of 7th semester. It is to be assessed and evaluated in 7th semester.

Internship work Identification: Student may choose to undergo Internship at Industry / Govt. / NGO / MSME / Rural Internship/ Startup to make themselves ready for the industry.

Contacting various companies for Internship and Internship work identification process should be initiated by the students with support of training and placement cell / industry institute cell /internship cell. This will help students to start their internship work on time. Also, it will allow students to work in vacation period.

Student can take internship work in the form of online/onsite work from any of the following but not limited to:

- a. Working for consultancy/ research project
- b. Contribution in incubation/innovation/entrepreneurship cell/institutional innovation council/startups cells of institute
- c. Development of new product/business plan/registration of start-up
- d. Industry/government organization internship



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) (2023 Pattern)

Sem-VII

2300401: Industry Internship / Internship (Exit Course)

- e. Internship through Internshala
- f. In-house product development, intercollegiate, inter department research internship under research lab/group, micro/small/medium enterprise/online internship
- g. Research internship under professors, IISC, IIT's, research organizations
- h. Registered NGOs or social internships, rural internship
- i. Participate in open source development
- j. Development of Physical and/or numerical, mathematical, soft computing model
- k. Company Registration Number / Startup registration number must be produced in case of company internship.

Internship Diary/ Internship Workbook: Students must maintain Internship Diary/ Internship Workbook. The main purpose of maintaining diary/workbook is to cultivate the habit of documenting. The students should record in the daily training diary the day-to-day account of the observations, impressions, information gathered and suggestions given, if any. The training diary/workbook should be signed after every day by the supervisor/ in charge of the section where the student has been working.

Internship diary/workbook and internship report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the institute immediately after the completion of the training. Internship diary/workbook may be evaluated on the basis of the following criteria.

- i. Proper and timely documented entries
- ii. Adequacy & quality of information recorded
- iii. Organization of the information

Internship Work Evaluation: Every student is required to prepare and maintain documentary proofs of the activities done by him as internship diary or as workbook. The evaluation of these activities will be done by programme head/cell in-charge/project head/ faculty mentor or Industry Supervisor based on overall compilation of internship activities, sub-activities, level of achievement expected, evidence needed to assign the points and the duration for certain activities.

Assessment and evaluation is to be done in consultation with internship supervisor (internal and external) and a supervisor from place of internship.

Recommended evaluation parameters: Post internship internal evaluation 100 Marks and internship diary / workbook and internship report 50 Marks. Evaluation through Seminar Presentation / Viva - Voce at the Institute.

The student will present a seminar based on his training report, before an expert committee constituted by the concerned department as per norms of the institute. The evaluation will be based on the following criteria.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) (2023 Pattern)

Sem-VII

2300401: Industry Internship / Internship (Exit Course)

Depth of knowledge, communication skills, presentation skills, team work, creativity, planning & organizational skills, adaptability, analytical skills, attitude and behavior at work, societal understanding, ethics, regularity and punctuality, attendance record, log book, student's feedback from external internship supervisor

After completion of Internship, the student should prepare a comprehensive report to indicate what he has observed and learnt in the training period. The student may contact industrial supervisor/faculty mentor/TPO for assigning special topics and problems and should prepare the final report on the student's presence physically, if the student is found absent without prior intimation to the department/institute/concern authority/T & P Cell, entire training can be cancelled.

The report shall be presented covering following recommended fields but not limited to:

- i. Title/cover Page
- ii. Internship completion certificate
- iii. Internship place details: Company background-organization and activities/scope and object of the study/personal observations
- iv. Index/table of contents
- v. Introduction
- vi. Title/problem statement/objectives
- vii. Motivation/scope and rationale of the study
- viii. Methodological details
- ix. Results/analysis/inferences and conclusion
- x. Suggestions/recommendations for improvement to industry, if any
- xi. Attendance record
- xii. Acknowledgement
- xiii. List of reference (books, magazines and other sources)

Feedback from internship supervisor (external and internal): Post internship, faculty coordinator should collect feedback about student with following recommended parameters.

Technical knowledge, discipline, punctuality, commitment, willingness to do the work, communication skill, individual work, team work and leadership



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) (2023 Pattern)

Sem-VII

2300402: Project Stage – I

Teaching Scheme:		Credits	Examination Scheme	
Theory: --		Practical:04	Theory	CIA: --
Practical: 8 hrs/week				End-Sem:--
			Pract:	--
			Oral:	75
			Termwork	100
Course Objectives: The student should be able to <ol style="list-style-type: none">1. Identify the latest technical/practical challenges in the field of Engineering.2. Inculcate the ability to describe, interpret and analyze technical content.3. Develop competency of technical writing with critical thinking and develop the skill of technical writing along with presentation.4. Develop Innovative project ideas can be published as a patent.				
Course Outcomes: On completion of the course, learner will be able to– CO1: Identify the local / global problems and inference engineering solutions for it. CO2: Appraise the current Engineering research / techniques / developments / interdisciplinary areas relevant to the identified problem.. CO3: Utilize technical resources, journals etc. CO4: Evaluate technical content and draw conclusions. CO5: Demonstrate the ability to perform critical research writing, technical report and presentation.				



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) (2023 Pattern)

Sem-VII

2300402: Project Stage – I

Term Work

The Project Stage I Internal guides should prepare a continuous evaluation sheet of each individual and refer as continuous internal assessment for term work marks. Project group must comprise of minimum three and maximum five students. The project report should contain the following.

1. Introduction of the topic, its relevance to engineering, need for the study, aims and objective, limitations.
2. Literature review from reference books, journals, conference proceedings, published reports / articles / documents with conclusion. The literature review should be from published literature in the last three years.
3. Problem statement and methodology
4. Theoretical contents related to the chosen topic or case studies if applicable.
5. Concluding remarks or summary.
6. References

Project Stage I Examination: The students must prepare presentation on Project Stage I and present in presence of examiners through a viva-voce examination.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech(Common) (2023 Pattern)

Sem-VII

2314705 : Building Hands-on Training

Teaching Scheme:	Credits	Examination Scheme	
Theory: 0hrs/week	Th:--	Theory	CIA: --
Practical: 2hrs/week	Practical: --		End-Sem:--
Prerequisite: Nil		Pract:	--
		Oral:	-
		Termwork	
Course Objectives:			
<ol style="list-style-type: none"> 1. To get the knowledge of the Site measurement. 2. Identify the quality materials. 3. To learn about layout. 4. To know the information about various building elements & process. 			
Course Outcomes:			
On completion of the course, learner will be able to–			
CO1: Identify the good materials for construction.			
CO2: Understand Brickwork & plastering process.			
CO3: Understand the construction of beam, column & slab			
CO4: Understand the plumbing & painting work process.			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech(Common) (2023 Pattern)

Sem-VII

2314705 : Building Hands-on Training

<ul style="list-style-type: none">i. Site Clearance & measurementii. Layoutiii. Railingiv. Foundation Centre line markingv. Excavationvi. Foundationvii. Column & Beamviii. Brickworkix. Plasteringx. Painting & Plumbing	CO1- CO4
--	-------------

Note: The group size should not be more than five students.



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem- VII

2314805 : Estimation of Structure Using Software

Teaching Scheme:	Credits: --	Examination Scheme	
Theory: 00	Th:--	Theory	Theory: --
Practical:--	Practical: --		End-Sem:--
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--
Course Objectives: <ol style="list-style-type: none">1. Impart knowledge to prepare approximate and detailed estimate of Civil Engineering works2. To draft detailed specification and work out rate analysis according to material, labor requirements as per specified norms.3. Impart knowledge of valuation, depreciation to carry out valuation of properties			
Course Outcomes: <p>On completion of the course, learner will be able to–</p> <p>CO1: Understand concept of estimates and prepare approximate estimate for various for Civil Engineering works.</p> <p>CO2: Prepare detailed estimate of various items of work by different methods and calculate quantity of steel from Bar bending schedule.</p> <p>CO3: Apply engineering knowledge to prepare estimate for roads.</p>			



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem- VII

2314805 : Estimation of Structure Using Software

Module	Topic	CO
Module 1	Approximate estimate: Methods of approximate estimate of Civil Engineering works: like building, roads, irrigation, water supply & sanitary works with numerical.	CO1 to CO3
Module 2	Detailed estimates: factors to be considered while preparing detailed estimate, methods of detailed estimate-PWD and Centre line method, taking out quantities for load bearing and R.C.C framed structures as per IS 1200, bill of quantities. Bar Bending Schedule: introduction to bar bending schedule and its importance, preparing bar bending schedule for RCC members of building.	
Module 3	Earthwork for road construction, estimate of road/highway works.	



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTER

B. Tech(Civil Engineering) (2023 Pattern)

Sem-VII

VAC145: STAAD Pro.

Teaching Scheme:		Credits		Examination Scheme	
Theory:--		Th:--		Theory	CIA: --
Practical:2 hrs/week		Pr:--			End-Sem:--
				Pract:	--
				Oral:	--
				Termwork	--
Course Objectives: The student should be able to <ol style="list-style-type: none">1. Understand the fundamentals of Structural design in STAAD Pro.2. Gain proficiency in creating and modifying Software based designs.3. Collaborate with latest trends in software designing.4. Troubleshoot common issues in STAAD Pro. based projects.					
Course Outcomes: On completion of the course, learner will be able to CO1: Navigate the STAAD Pro. interface and tools. CO2: Understanding of STAAD Pro. and Structural design concepts. CO3: Create and modify STAAD Pro. design of Structure. CO4: Streamline the STAAD Pro. Design and analysis process and improve project outcomes.					



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTER

B. Tech(Civil Engineering) (2023 Pattern)

Sem-VII

VAC145: STAAD Pro.

Module 1: Introduction to STAAD Pro.7Hrs	CO
<ul style="list-style-type: none">• Overview of STAAD Pro. interface and tools• Fundamentals of Building design and structural design in STAAD Pro.• Creating and modifying system in STAAD Pro.	CO1 to CO4
Module 2:Structural Analysis in STAAD Pro.7Hrs	
<ul style="list-style-type: none">• Construction of basic structure with nodes• Analysis of Frames, Beams and 1-D Structure• Processing and Output of STAAD system, Result generation• Modelling for 2-D or 3-D structure with mesh and nodes	CO1 to CO4
Module 3:Design and Detailing with STAAD7Hrs	
<ul style="list-style-type: none">• Modelling of 2-D and 3-D skeletal structure with components• Load application as per IS codes• System development of the structure, Components of modelled structure• Output and result with detailed drawing.	CO1 to CO4

Text Books:

1. "STAAD.Pro V8i for Beginners" by T.S Sarma
2. "STAAD.Pro 2007 Tutorial" by L. Jolovic
3. "STAAD.Pro 2007 Advanced Training Manual" by L. Jolovic
4. "Structural Analysis and Design using STAAD.Pro" by S.S. Bhavikatti and K.G. Rajashekarappa
5. "STAAD.Pro High-Performance Concrete Design: Theory and Practice" by Srinivasan Chandrasekaran



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314491: Work Method Statement Making

Teaching Scheme:	Credits	Examination Scheme	
Theory: 4hrs/week	Th:04	Theory	CIA: 50
Practical: --	Practical:--		End-Sem:50
Prerequisite : Concrete Technology, Engineering Mechanics, Mechanics of Materials and Structural Analysis		Pract:	--
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. grasp the importance of WMS in the construction or industrial setting and how it contributes to the overall safety, productivity, and quality of work. 2. relevant local and international regulations, codes, and standards related to their industry, ensuring that the WMS complies with all legal and safety requirements. 3. tailor the WMS to suit the unique requirements of different projects, taking into account factors such as project scope, resources, and site conditions. 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Define the purpose and components of a work method statement.</p> <p>CO2: Identify the relevant safety regulations and guidelines related to work method statements.</p> <p>CO3: Develop a work method statement for a specific construction task.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314491: Work Method Statement Making

Unit 1: Introduction	9hrs	CO
<p>Brief on activities involved for construction of Metro, sequence / order of its execution. Survey: Preliminary survey – establishing route alignment, identification of hindrances and its diversion, traverse closing, setting up of Temporary Bench Marks & control points. Barricading: Erection of hard barricades and utility trenching, diversion of underground utilities. Geotechnical investigations: RQD, core recovery, Unconfined compressive strength, determining type of foundation, point load test, RMR values, SPT & N-values. Type of Bearings: Elastomeric, POT PTFE (free, guided fixed), spherical, etc. Construction chemicals: for grouting of bearings / PT ducts, segmental bonding agents, anchorage protection, old to new concrete, corrosion inhibitors, low viscosity injection grouts.</p>		CO1
<p>Unit 2: Pile Foundations</p> <p>Method statement for Pile Foundation Roles & Responsibility, Project In charge, Site Engineer, QA/QC Engineer, Safety Officer, Supervisor/Foreman, Charge hand, Inspection & Testing, Work Permits, Health, Safety And Environmental Procedures, Quality Assurance & Control, Materials, Manpower, Equipment & Tools, Work Procedure, Placing of concrete, Compacting / vibrating of concrete. Termination criteria, applicable codes and standards.</p> <ol style="list-style-type: none"> 1. Method Statement for Low Strain Integrity Test on Pile, Cross Hole Sonic Logging and dynamic load test 2. Method Statement for Initial Vertical load test, Routine vertical load test and Lateral Pile Load Test 	9hrs	CO2 CO3
<p>Unit 3: Pile cap and Open foundations</p> <p>Method statement for Excavation Method of excavation, safety measures, Construction Drags, Levels/Co-ordinates, Barricading, Workers Training, Proper Access, Lighting, Excavation protection, Machinery condition, Pumps availability, Silt traps, Sedimentation tanks, Dumper speeding, Competency of operators, Prevent mud water pumping into drains, approval, safety, quality. Ground levels, co-ordinates marked and recorded, Average depth of excavation recorded, Surveyor certified the co-ordinates and levels, Soil samples collected at 0.5m intervals, Soil is stacked away from the edge of excavation, Soil is reaching the proper dumping yard, Protection of the excavation sides is met, Strutting is at right levels, Strutting details are as per the approved drawings, The stacking soil is covered, Excavation bottom level is correct as per drawings, applicable codes and standards.</p> <ol style="list-style-type: none"> 1. Method Statement for Pile Cap 2. Method statement for Open Foundation 	10hrs	CO3
<p>Unit 4: Pier, pier arms and pier cap</p> <p>Method Statement for Pier, Purpose, Sequence of construction of Pier, Responsibilities, Project Manager, Deputy Project Manager, Engineers, Survey Engineer/Surveyor, QA/QC Manager/ QC Engineer, Chief SHE Manager, Organization Chart, Procedure for Construction of Pier, Survey, Reinforcement, Rebar Fixing of Pier starter, Fixing of drainage pipes and other fittings, Pier Shuttering, Pier Concreting, Curing, Machinery, Materials and Manpower, Materials, Safety, applicable codes and standards.</p> <ol style="list-style-type: none"> 1. Method Statement for Pier caps, Concourse Pier arm Platform Pier arm with integrated pier cap, Normal pier cap, cantilever pier cap and portal beams. 	9hrs	CO3
<p>Unit 5: Launching Girder and Casting and Erection / launching of precast segmental spans or full spans</p>	10hrs	CO3



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314491: Work Method Statement Making

1. Method Statement for Overhead Launching Girder 2. Method Statement for Underslung Segment Launcher 3. Method Statement for Load Testing of Launching Girder 4. Method Statement for Segment Casting / full span at Casting Yard 5. Method statement for erection / launching of precast spans 6. Procedure for Pre-stressing of Segment and Tendon Grouting	
Unit 6: Bearing installation and span load test	9hrs
1. Method Statement for Span Alignment 2. Method Statement for Horizontal Bearing Installation 3. Method Statement for Vertical Bearing Installation 4. Method Statement for Span load test	CO3

Text Books

1. Metro Rail in India for Urban Mobility Hardcover – 1 January 2021 by M. M. Agarwal (Author), Sudhir Chandra (Author), K. K. Miglani (Author)
2. Metro Railways (Operation and Maintenance) Act, 2002 Bare Act

Reference Books

1. METRO RAIL PROJECTS IN INDIA Hardcover – 21 October 2011 by M. Ramachandran
2. Concrete bridges – V.K.Raina



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314492 : Work Method Statement Making-Lab

Teaching Scheme:	Credits	Examination Scheme	
Theory: --	Th:--	Theory	CIA: --
Practical: 2hrs/week	Practical: 01		End-Sem:--
Prerequisite : Nil		Pract:	50
		Oral:	--
		Termwork	--
<p>Course Objectives: The student should be able to</p> <ol style="list-style-type: none"> 1. Introduce students to the purpose, importance, and components of WMS in various industries, such as construction, engineering, and manufacturing. 2. Learn about the legal and regulatory requirements related to Work Method Statements, including local and international safety standards. 3. prepare clear, concise, and comprehensive WMS that address specific work procedures and safety measures. 4. suggest and incorporate appropriate control measures in WMS to mitigate identified hazards and risks. 			
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Understand the concept and purpose of a Work Method Statement (WMS).</p> <p>CO2: Interpret and explain the importance of creating a well-structured WMS in a workplace environment.</p> <p>CO3: Create a comprehensive and accurate Work Method Statement for a given workplace scenario or task.</p> <p>CO4: Analyze complex workplace situations and determine the most suitable work methods and sequences to optimize efficiency and safety.</p>			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VII

2314492 : Work Method Statement Making-Lab

Experiments	1. Visit to Metro Construction Site and Details Report	CO
	2. Visit to Metro Construction Segment Casting at Casting Yard	
	3. Assignment on Metro Rail Project Report	
	4. Assignment on Method Statement for Lateral Pile Load Test	
	5. Assignment on Method Statement for Open Foundation	
	6. Assignment on Method Statement for Pier	
	7. Assignment on Method Statement for Launching Girder & Span Erection	
	8. Assignment on Method Statement for Fixed Support Single Box Launching Girder & Span Erection	
	9. Assignment on Method Statement for Pier Protection and Kerb Median Fixing	
	10. Assignment on Method Statement for Low Strain Integrity Test on Pile	CO1
	11. Assignment on Method Statement for Concourse Pier Cap and Platform Pier Cap	-
	12. Assignment on Method Statement for Underslung Segment Launcher	CO4
	13. Assignment on Method Statement for Horizontal Bearing Installation	
	14. Assignment on Method Statement for Vertical Bearing Installation	
	15. Assignment on Procedure for Pre-Stressing of Segment and Tendon Grouting	
	16. Assignment on Method Statement for Load Testing of Launching Girder	
	17. Assignment on Method Statement for Segment Casting at Casting Yard	
	18. Assignment on Method Statement for Road Widening Work	
	19. Assignment on Method Statement for Concrete Repair Works	
	20. Assignment on Method Statement for Span Alignment & Horizontal Bearing Installation	

Note: Any twelve Experiments with drawings and Figures



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MAHIRAVANI, TRIMBAK ROAD, TAL & DIST: NASHIK-422213, MAHARASHTRA, INDIA

B. Tech Civil Engineering

Semester – VIII

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)				Examination Scheme				Total Marks
				L	T	P	C	Formative Assessment CIA		Summative Assessment ESE		
								Theory	Lab	Theory	Lab	
1	PC	2314407	Construction Management	3	--	--	3	50	--	50	--	100
2	PC	2314408	Reinforced Concrete Design-II	3	--	--	3	50	--	50	--	100
3	PE	2314409	Program Elective V	3	--	--	3	50	--	50	--	100
4	PE	2314410	Program Elective VI	3	--	--	3	50	--	50	--	100
5	IC (ELC)	2300403	Research Methodology	4	--	--	4	50	--	50	--	100
6	IC (ELC)	2300404	Project Stage – II	--	--	8	4	--	100	--	75 ^a	175
7	SDC (MD)	2314706	Quality Assurance & Quality Control (QAQC)	--	--	4	2	--	--	--	25 ^a	25
8	EEC	2314806	Tall Building Design (Skyfi Labs etc.)	--	--	--	--	--	--	--	--	--
TOTAL				16	00	12	22	250	100	250	100	700

Value Added Course

9	VAC	VAC146	ETABS / SAP2000	--	--	2	--	--	--	--	--	--
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Honors/Minor Courses (Metro Construction)

1	HM	2314493	Tunnel Engineering	4	--	--	4	50	--	50	--	100
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Program Elective V:

1. Design of Hydraulic Structures (2314409A)

2. Irrigation Engineering (2314409B)

Program Elective VI:

1. Traffic Engineering (2314410A)

2. Repair and Rehabilitation of Structures (2314410B)



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314407: Construction Management

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3 hrs/week	Th:03	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Explain scientific methods of planning and management.
2. Demonstrates methods of manpower planning and Use various project monitoring methods.
3. Understand various construction activities and evaluating construction projects.
4. Utilize material and human resources efficiently with managerial skills interpersonal and intrapersonal skills.
5. Apply knowledge of artificial intelligence on construction project.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Understand the overview of construction sector and project life cycle.

CO2: Illustrate construction scheduling, work study and work measurement.

CO3: Calculate production rate of construction equipment.

CO4: Demonstrates resource allocation techniques and apply it for manpower planning.

CO5: Categorize the materials as per their annual usage.

CO6: Understand basics of artificial intelligence techniques in civil engineering.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314407: Construction Management

Unit 1: Introduction to Construction Management	7hrs	CO
Importance, Objectives & Functions of Management, Principles of Management, Categories of Project, Project Failure, Project- Life Cycle Concept and Cost Components, Project Management Book of Knowledge (PMBOK)- Different Domain Areas, Project management Institute and Certified Project Management Professionals (PMP). Importance of Organizational Structure in Management- Authority / Responsibility Relation, Management By Objectives (MBO). Role of construction industry in infrastructure development, components of infrastructure sector, construction industry nature, characteristics, size, structure. construction management: necessity, applications, project management consultants: role, types, selection and appointment process.		CO1
Unit 2: Construction Scheduling, Work Study and BIM	7hrs	
Construction project scheduling: definition, objectives factors affecting scheduling. WBS- Work Breakdown Structure, Gantt/ Bar chart & its Limitations, Network Planning, Network analysis, C. P. M.- . Activity on Arrow (A.O.A.), Critical Path and Type of Floats, Precedence Network Analysis (A.O.N.), Types of Precedence Relationship, P. E. R.T. Analysis. line of balance technique. Introduction to building information modelling (BIM) based on software. Work study (time and motion study): definition, objectives, process of method study, symbols, multiple activity charts, two handed process chart, string diagram.		CO2
Unit 3: Project Resources and Site Planning	7hrs	
Objectives of Materials Management- Primary and Secondary Material Procurement Procedures- Material Requirement- Raising of Indents, Receipts, Inspection, Storage, Delivery, Record Keeping- Use of Excel Sheets, ERP Software, Inventory Control- ABC Analysis. Introduction to Equipment Management- Fleet Management, Productivity Studies, Site Layout and Planning, Safety Norms- Measures and Precautions on Site, Implementation of Safety Programs.		CO3
Unit 4: Project Monitoring & Control and Value Engineering	7hrs	
Resource Allocation- Resource Smoothing and Leveling, Network Crashing, Time- Cost- Resource Optimization, Project Monitoring- Methods, Updating and Earned Value Analysis, Introduction to Use of Project Management Softwares- MS Project/ Primavera, Case study on Housing Project Scheduling for a Small Project with Minimum 25 Activities. Value Engineering: meaning of value, types of value, value analysis, value engineering and its application, energy cost escalation and its impact on infrastructure project.		CO4
Unit 5: Material Management	7hrs	
Material: introduction, need, objectives and functions and scope of material management, integrated concept of material management, material management organization, various phases of material flow system, application of each phase, role of material manager, role of material management in construction management and its linkage with other functional areas, inventory control methods, EOQ Model, stores management and control, break even analysis, concept of logistics and supply chain management, role of ERP in material management and material resource information systems.		CO5
Unit 6: Project Appraisal and Human Resource Management	7hrs	
Types of Appraisals such as Political, Social, Environmental, Techno-Legal, Financial and Economical, Criteria for Project Selection- Benefit- Cost Analysis, NPV, IRR, Pay-Back Period, Break Even Analysis [Fundamental and Application Component], Study of Project Feasibility		CO6



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314407: Construction Management

Report and Detailed Project Report (DPR). Human resource: introduction, nature and scope of human resource management, human resource in construction sector, recruitment & selection, performance evaluation and appraisal, training & development, succession planning, compensation and benefits, career planning, role of ERP in human resource management and human resource information system. Introduction to artificial intelligence technique, basic terminologies and applications in civil engineering: artificial neural network, fuzzy logic and genetic algorithm.

Text Books

1. Engineering Economics Management, Dr. Vilas Kulkarni and Hardik Bavishi, S. Chand Publication
2. Laws for Engineers, Vandana Bhatt and Pinky Vyas, Pro Care Publisher
3. Indian Economy, Gaurav Datt and Ashwani Mahajan, S. Chand Publication
4. Industrial Organization & Engineering Economics, T. R. Banga and S. C. Sharma, Khanna Publisher

Reference Books

1. Engineering Economy, Theusen G. J. and Fabrycky W. J., 9th Edition, Prentice-Hall, Inc., New Delhi
2. Finance for Engineers: Evaluation and Funding of Capital Projects, Crundwell F. K., Springer, London
3. Construction Project Management: Theory and practice, Jha K.N., 2nd Edition, Pearson India Education Services Pvt. Ltd.
4. Financial Management, Khan and Jain, Tata McGraw-Hill Education
5. Construction Management and Accounts, Singh H, Tata McGraw Hill, New Delhi
6. Engineering Economy, Leland T. Blank and. Anthony Tarquin, McGraw Hill
7. Case studies in Finance, Burner, McGraw Hill



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314408: Reinforced Concrete Design-II

Teaching Scheme:		Credits		Examination Scheme	
Theory: 3hrs/week		Th:03		Theory	CIA: 50
Practical: --		Practical: --			End-Sem:50
Prerequisite : Reinforced Concrete Design-I				Pract:	--
				Oral:	--
				Termwork	--
Course Objectives: The student should be able to <ol style="list-style-type: none">1. To provide the students with advance design concepts of reinforced concrete structures.2. To analyze, design and detail different types of reinforced concrete structures.					
Course Outcomes: On completion of the course, learner will be able to– CO1: Understand yield line theory and apply it to analyze and design slabs of different shapes having different edge conditions. CO2: Understand the concepts of ductile detailing CO3: Analyze and design of flat slab. CO4: Analyze and design of retaining walls. CO5: Analyze and design of liquid retaining structures. CO6: Analyze and design of RC frames and shear walls.					



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314408: Reinforced Concrete Design-II

Unit 1: Flat Slabs	7hrs	CO
Flat slabs, types, design methods, proportioning of flat slab, design moments, direct design method, distribution of moments, design of an intermediate panel, design of end panel, detailing of flat slab.		CO1
Unit 2: Yield Line Analysis and Design of Slabs	7hrs	
Yield line theory, assumptions, yield line patterns, characteristics of yield lines, equilibrium and virtual work method of analysis, analysis of rectangular, triangular, circular slabs with various edge and loading conditions using the yield line theory.		CO2
Unit 3: Earth Retaining Structures	7hrs	
Types of retaining walls, various backfill conditions, design of cantilever type retaining walls for different backfill conditions.		CO3
Unit 4: Liquid Retaining Structures	7hrs	
Types of liquid retaining structures, code provisions, analysis by approximate method and by using IS code method, design of circular and rectangular water tanks resting on ground.		CO4
Unit 5: Design of Shear wall and Ductile Detailing	7hrs	
Functions of shear walls, types of shear wall, code provisions, design of shear wall for given lateral loads.		CO5
Unit 6: Analysis and Design of RC Frames	7hrs	
Seismic coefficient method, substitute frame analysis, analysis of frames subjected to a load combination of gravity and lateral loads. Design of all elements of a frame subjected to combined effect of gravity and lateral loads.		CO6

Text Books

1. Advanced Reinforced Concrete Design, N Krishnaraju, CBS Publishers and Distributors
2. Reinforced Concrete Design, S Unnikrishna Pillai, Devdas Menon, McGraw Hill Publications
3. Reinforced Concrete design, Vol I and II, Dr .H. J. Shah, Charotar Publishing house.
4. Advance R. C. C. Design, S. S. Bhavikatti, New Age International Publishers
5. Reinforced Concrete Structures Vol. II, B.C. Punmia, Ashok K. Jain, Arun K. Jain, Laxmi Publications, New Delhi
6. Earthquake Resistant Design of Structures, Pankaj Agarwal and Manish Shrikhande, Prentice Hall India Learning Private Limited.

Reference Books

1. Design of Reinforced Concrete Structures, by Ramamrutham S, Dhanpat Rai Publications
2. Advanced Reinforced Concrete Design, P. C. Varghese, Prentice Hall of India Pvt. Ltd., New Delhi
3. Fundamentals of Reinforced Concrete, N. C. Sinha, S.K. Roy, S. Chand & Co. Ltd, New Delhi



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314408: Reinforced Concrete Design-II

Indian Standards

1. IS 1893 (Part 1): 2016, Reaffirmed in 2021, Criteria for Earthquake Resistant Design of Structures - Part 1: General Provisions and Buildings, Bureau of Indian Standards, New Delhi.
2. IS 13920: 2016 Reaffirmed in 2021, Ductile Design and Detailing of Reinforced Concrete Structures Subjected to Seismic Forces - Code of Practice (First Revision), Bureau of Indian Standards, New Delhi.
3. IS: 456-2000, Indian Standard code of practice for plain and reinforced concrete, Bureau of Indian Standards, New Delhi.
4. IS: 3370-2021, Indian Standard code of practice for concrete structures for storage of liquids, Bureau of Indian Standards, New Delhi



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314409A:Design of Hydraulic Structures

Teaching Scheme:		Credits		Examination Scheme	
Theory: 3hrs/week		Th:03		Theory	CIA: 50
Practical: --		Practical: --			End-Sem:50
Prerequisite : Engineering Mechanics, Fluid Mechanics				Pract:	--
				Oral:	--
				Termwork	--
Course Objectives: <ol style="list-style-type: none">1. To study different types of dams and instrumentation.2. To study the spillways.3. To study the stability analysis of Gravity Dam4. To study the failures and stability analysis of an earthen dam5. To study types of canal structures6. Analysis of design of diversion headwork and of Cross drainage work					
Course Outcomes: <p>On completion of the course, learner will be able to–</p> <p>CO1: Understand types of dams.</p> <p>CO2: Understand types of spillways.</p> <p>CO3: Execute stability analysis of Gravity Dam</p> <p>CO4: Illustrate the failures and analyze stability of earthen dam</p> <p>CO5: Understand the canal structures</p> <p>CO6: Analysis of the Diversion headwork and Cross Drainage work.</p>					



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314409A:Design of Hydraulic Structures

Unit 1: Introduction to Dam	7hrs	CO
<p>Introduction, historical development of dams, Classifications of Dams, different terms related to dams, selection of site of dam, factors governing selection of type of dam, classification based on purpose, classification based on material, classification based on size of project, classification based on hydraulic action, classification based on structural action, introduction of arch dam and buttress dam including classification, advantages and limitations</p>		CO1
Unit 2: Spillway	7hrs	CO2
<p>Introduction, location of spillway, different key levels and heads in spillway, spillway capacity, components of spillway, approach channel, control structure, discharge channel, energy dissipation, energy dissipation device, tail channel, classification of spillway, classification based on operation, main or service spillway, auxiliary spillway, emergency spillway, classification based on gates, gated spillway, ungated spillway, classification based on features, straight drop spillway (free overflow spillway), saddle spillway, side channel spillway, overflow or ogee spillway, chute or open channel or trough spillway, shaft or morning glory spillway, siphon spillway, conduit or tunnel spillway, stepped spillway.</p>		CO2
Unit 3: Gravity Dam	7hrs	CO3
<p>Introduction, components of gravity dam, conditions favoring gravity dam, forces acting on gravity dam, combination of loading for design, seismic analysis of dam, terms related to seismic analysis, determination of seismic forces (Zangger's method), effect of horizontal earthquake acceleration, effect of vertical earthquake acceleration, stress analysis in gravity dam (only concept no derivation), vertical or normal stress, principal stresses, shear stresses, middle third rule, modes of failure of gravity dam, elementary profile of gravity dam, concept of high and low gravity dam</p>		CO3
Unit 4: Earthen dam	7hrs	CO4
<p>Introduction, conditions favoring on earth dam, limitations of earth dam, classification of earth dam, classification based on materials, methods of construction, height; selection of type of earth dam, components of earth dam, requirements for safe design of earth dam, hydraulic (seepage) analysis, plotting of phreatic (seepage) line, homogeneous earth dam with horizontal drainage blanket, determination of seepage discharge using flow net. Composite earth dam with casing and hearting, properties of phreatic line, determination of seepage discharge through earth dam using flow net, structural stability analysis of homogeneous and zoned earth dam, forces acting on earth dam, method of stability analysis of an earth dam, procedure of analysis by Swedish slip circle method, fellenius method of locating center of critical slip circle, stability analysis for foundation, failure of earth dam, classification of failure of earth dams, hydraulic failure, seepage failure, structural failure, seepage control in earth dams, causes of seepage, seepage control measures, construction of earth dam.</p>		CO4
Unit 5: Canals	7hrs	CO5
<p>Introduction, classification of canals, classification based on alignment, classification based on soil, classification based on source of supply, classification based on discharge, classification based on lining, classification based on excavation, components of canal, data required for canal design, selection of canal alignment, design of stable canal in alluvial beds, Kennedy's theory, design of canal by Kennedy's theory, limitations of Kennedy's theory, Lacey's regime theory, design of canal by Lacey's theory, design of lined canal, canal lining, necessity of canal lining, requirement of lining material and types of lining. Canal Structures: canal falls, canal outlets, canal escapes, canal regulators</p>		CO5



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314409A:Design of Hydraulic Structures

Unit6:Diversion head works	7hrs	
Introduction, function of diversion head works, selection of sites for diversion head works, components of diversion head works, design of weir on permeable foundation, criteria for safe design of weir floor, brief introduction to Bligh and Lane's theory, Khosla's theory based on potential theory approach, Khosla's theory on independent variables, design of weirs on permeable foundations. C. D. Works: Introduction, Necessity of Cross Drainage works, Selection of site for Cross Drainage work, Selection of suitable type of C. D. works, data required for design of cross drainage work, classification of cross drainage works. Drain over canal: siphon, super passage		CO6

Text Books

1. Irrigation Engineering and Hydraulic Structures, Garg S. K, Khanna Publication..
2. Irrigation Water Power Engineering, Punmia B. C., Laxmi Publication.

Reference Books

1. Irrigation, Water Resources and Water Power Engineering, Modi P. N., Standard Book House, New Delhi..



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314409B:Irrigation Engineering

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3hrs/week	Th:03	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite : Hydrology		Pract:	--
		Oral:	--
		Termwork	--
Course Objectives: <ol style="list-style-type: none">1. To study Water requirements for crops.2. To study Irrigation methods.3. To study water related problems4. To study reservoir planning			
Course Outcomes: On completion of the course, learner will be able to– CO1: Compute water requirement for crops CO2: Explain various methods of irrigation. CO3: Understand Dam structure CO4: Understand canal irrigation CO5: Understand water logging & drainage. CO6: Explain the methods to control the level in Reservoir Planning			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314409B:Irrigation

Unit 1:Crop Water Requirement	7hrs	CO
Need and classification of irrigation- historical development and merits and demerits of irrigation-types of crops-crop season-duty, delta and base period- consumptive use of crops-estimation of Evapotranspiration		CO1
Unit 2: Irrigation Methods	7hrs	
Surface and Sub-Surface and Micro Irrigation — design of drip and sprinkler irrigation — ridge and furrow irrigation-Irrigation scheduling — Water distribution system- Irrigation efficiencies.		CO2
Unit 3:DIVERSION AND IMPOUNDING STRUCTURES	7hrs	
Types of Impounding structures — Gravity dam — Forces on a dam -Design of Gravity dams; Earth dams, Arch dams- Diversion Head works — Weirs and Barrages		CO3
Unit 4: Canal Irrigation	7hrs	
Classification of canals, Components of a canal irrigation system, Alignment of canals, Alluvial and Non-alluvial canals, Canal standards and Balancing canal depth, Canal distribution system, Design capacity of canals		CO4
Unit 5: Water Logging and Drainage	7hrs	
Causes, effects and preventive measures of water logging, Water logging and drainage of irrigated land, Subsurface drainage systems and their design -Layout of subsurface drainage system, Flowof ground water to drains and spacing of tile drains		CO5
Unit6:ReservoirPlanning	7hrs	
Introduction, term related to reservoir planning (yield, reservoir planning and operation curves, reservoir storage, reservoir clearance), investigation for reservoir planning, significance of mass curve and demand curves, applications of mass curve and demand curves, fixation of reservoir capacity from annual inflow, reservoir losses, reservoir sedimentation- Phenomenon, measures to control reservoir sedimentation, useful life of reservoir, costs of reservoir		CO6

Text Books

1. Irrigation Engineering, G.B. Deshpande
2. Irrigation Engineering, H. M. Raghunath, Wiley

Reference Books

1. Irrigation, Water Resources and Water Power Engineering, P. N. Modi.
2. Irrigation Engineering, Bharat Singh, Nem Chand & Bros., India..



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314410A:Traffic Engineering

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3hrs/week	Th:03	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite: Nil		Pract:	--
		Oral:	--
		Termwork	--
Course Objectives: The student should be able to <ol style="list-style-type: none">1. To learn principles of traffic engineering2. To describe traffic studies, their analysis and their interpretation.3. To study the advancement in the data collection methods and analysis of the results.4. To learn planning and design of various roadway facilities.5. To understand need and measures of road safety.			
Course Outcomes: On completion of the course, learner will be able to– CO1: Comprehend the basic characteristics of traffic stream at micro and macro level. CO2: Conduct traffic studies and analyse traffic data for practical applications. CO3: Analyse and interpret data collected through advanced technology for traffic modelling and simulation. CO4: Design, plan and regulate traffic operation at different intersections. CO5: Design, plan and regulate traffic operation of different roadway facilities and elements. CO6: Evaluate the causes of road accidents and carry out road safety audits.			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314410A: Traffic Engineering

Unit 1: Traffic Characteristics	6hrs	CO
Introduction, Human-vehicle-environment system, Characteristics of road users, characteristics of vehicles, Characteristics of Pedestrians, vehicular dynamics. Fundamental parameters of traffic and relationships; Time headways, temporal, spatial and flow patterns; Interrupted and un-interrupted traffic; Microscopic and macroscopic speed characteristics; Vehicular speed trajectories; Speed characteristics- mathematical distributions; Speed and travel time variations, Computation of AADT, Design Hourly Volume from Short- and Long-Term Counts.		CO1
Unit 2: Traffic Flow Measurements	6hrs	
Traffic study components, types of data; Volume studies; Speed studies; Travel time and delay studies; Intersection studies, Origin and destination studies, Pedestrian studies; Parking studies, Vehicle detection methods; Advanced methods: GPS, Instrumented Vehicles, Image Processing, Bluetooth, Infrared methods, Sample selection; Region traffic counts; Growth factors, Use of statistics in Traffic Engineering.		CO2
Unit 3: Traffic Flow Analysis	8hrs	
Differences- heterogeneous and homogeneous traffic flows, Macroscopic, Microscopic & Mesoscopic approach – Types of Flow- Traffic stream characteristics – Space – Time diagram – Relationship between speed, flow & density-Highway capacity, Level of service & capacity analysis – Shockwave theory, mixed traffic flow behavior: non-lane based movement, Heterogeneity, Applications.		CO3
Unit 4: Intersection Design	8hrs	
At-grade intersections- Principles of design – Design of Channelizing Islands, T, Y, Skewed, Staggered, Roundabout, Mini-roundabout and other forms of AT-Grade Crossings including provision for safe crossing of Pedestrians and Cyclists - Traffic signals - pre-timed and traffic actuated. Design of signal setting - phase diagrams, timing diagram – Signal co-ordination – Area traffic Control System. Grade separated interchanges their Warrants and Design Features		CO4
Unit 5: Elements of Design and Regulations	10hrs	
Geometric Design: Alignment - Cross sectional elements - Stopping and passing sight distance, Horizontal curves - Vertical curves. Design problems. Traffic regulation and control - Signs and markings - Traffic System Management, Speed, vehicle, parking, enforcement regulations, Bus Stop Location and Bus Bay Design, Design of Road Lighting. – Traffic Management techniques, one-way, tidal flow, turning restrictions etc. –TSM planning & Strategies		CO5
Unit 6: Traffic Safety	4hrs	
Principles and Practices – Safety along links - Safety at intersections. Road Safety Audit – Countermeasures, evaluation of effectiveness of counter-measures– Road safety programmes.		CO6

Textbooks

1. Drew, D.R., Traffic Flow Theory & Control, McGraw Hill, New York, 1968.
2. Kadiyali, L.R., Traffic Engineering and Transport Planning, Khanna Publishers, New Delhi, 2002.
3. Khisty C J, Lall B. Kent; Transportation Engineering-An Introduction, Prentice-Hall, NJ, 2005
4. May, A.D., Traffic Flow Fundamentals, Prentice – Hall, Inc., New Jersey, 1990.

Reference books

1. O'Flaherty C A, Highways- Traffic Planning & Engineering, Edward Arnold, UK
2. Pignataro, L.J., Traffic Engineering – Theory & Practice, John Wiley, 1985.
3. Salter, R J., Hounsel, N.D., Highway Traffic Analysis and Design, Macmillan, London, 1996.
4. Gartner N.H, Rathi A.J. and Messer C.J., Traffic Flow Theory – A Revised Monograph, Transportation Research Board, Washington, 1997.
5. McShane W R &Roess R P, Traffic Engineering, Prentice-Hall, NJ, 2010. 8. Mannering, F.L. &Kilareski, W.P., Principles of Highway Engineering and Traffic Analysis, John Wiley & Sons, 2008.
6. Wohl M. and Martin, B V., Traffic System Analysis for Engineers and Planners, McGraw-Hill, New York, 1967.
7. Matson, Smith and Hurd, Traffic Engineering, Mc-Graw Hill Book Co, 1955.
8. A. Veeraragavan, S.K. Khanna and C.E.G. Justo, Highway Engineering, Nem Chand & Brothers, 2014.

Indian Standards and Handbooks

1. Relevant IRC codes such as IRC SP 88 (latest edition), IRC 106, etc.
2. Indian Highway Capacity Manual, 2017.
3. ITE Handbook, Highway Engineering Handbook, Mc Graw - Hill.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314410B : Repair and Rehabilitation of Structure

Teaching Scheme:	Credits	Examination Scheme	
Theory:3hrs/week	Th:03	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able

1. To learn various distress and damages to concrete and masonry structures
2. To understand the importance of maintenance of structures
3. To study the various types and properties of repair materials
4. To assess the damage to structures using various tests
5. To learn the importance and methods of substrate preparation
6. To learn various repair techniques of damaged structures, with structural audit.

Course Outcomes:

On completion of the course, learner will be able to

- CO1:** Able to understand importance of repair and rehabilitation.
- CO2:** Able to check the properties different repair materials.
- CO3:** Get acquainted to damage and diagnostics of structure.
- CO4:** Able to repair structures who has become damage due to cracks.
- CO5:** Able to understand importance jacketing ad strengthening of structure.
- CO6:** Able to Perform retrofit and structural audit



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314410B : Repair and Rehabilitation of Structure

Unit 1: Introduction to Repair and Rehabilitation of Structures.	7hrs	CO
a) Introduction - Maintenance, rehabilitation, repair, retrofit and strengthening, need for rehabilitation of structures.		CO1
b) Cracks in R.C. Buildings and Maintenance - Various cracks in R.C. buildings, causes and effects, Importance of maintenance, routine and preventive maintenance.		
Unit 2: Different Repair Material's	7hrs	
a) Introduction to Repair Materials - Various repair materials, Criteria for material selection, Methodology of selection, Health and safety precautions for handling and applications of repair materials.		CO2
b) Special Mortars and Grouting Materials - Polymer Concrete and Mortar, Quick setting compounds, Gas forming grouts, Salfalumate grouts, Polymer grouts, Acrylate and Urethane grouts.		
Unit 3: Damage diagnosis and Assessment	8hrs	
Visual inspection, Non Destructive Testing using Rebound hammer, Ultra sonic pulse velocity, Semi destructive testing, Probe test, Pull out test, Chloride penetration test, Carbonation, Carbonation depth testing, Corrosion activity measurement		CO3
Unit 4: Crack Repairs	6hrs	
a) Crack Visualisation - Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Overlays, Repair to active cracks, Repair to dormant cracks.		CO4
b) Corrosion of embedded steel in concrete– Corrosion of embedded steel in concrete, Mechanism, Stages of corrosion damage, Repair of, various corrosion damaged of structural elements (slab, beam and columns)		
Unit 5: Jacketing and Strengthening	6 hrs	
a) Jacketing, Column jacketing, Beam jacketing, Beam Column joint jacketing, Reinforced concrete jacketing, Steel jacketing, FRP jacketing.		CO5
b) Strengthening, Beam shear strengthening, Flexural strengthening		
Unit 6: Retrofitting & Structural Audit	8 hrs	
a) Retrofitting - Facts of Maintenance and importance of Maintenance Need for retrofitting, retrofitting of structural member		CO6
b) Structural Audit - Introduction to Structural Audit, Objectives, Bye-laws, Importance, and various Stages involved, visual inspection, scope, coverage, limitations, Factors to be keenly observed. Aspects of audit of Masonry buildings, RC frame buildings, Steel Structures		

Textbooks

1. 1. Repair and protection of concrete structures by Noel P. Mailvaganam, CRC Press, 1991.
2. Concrete repair and maintenance Illustrated by Peter. H. Emmons, Galgotia publications Pvt. Ltd., 2001.
3. "Earthquake resistant design of structures" by Pankajagarwal, Manish shrikande, PHI, 2006.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314410B : Repair and Rehabilitation of Structure

Reference books

1. Failures and repair of concrete structures by S. Champion, John Wiley and Sons, 1961.
2. Diagnosis and treatment of structures in distress by R. N. Raikar Published by R & D
3. Centre of Structural Designers and Consultants Pvt. Ltd, Mumbai.
4. Handbook on repair and rehabilitation of RCC buildings, CPWD, Government of India.
5. Handbook on seismic retrofit of buildings, A. Chakrabartiet.al., Narosa Publishing House, 2010.



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) (2023 Pattern)

Sem-VIII

2300403:RESEARCH METHODOLOGY

Teaching Scheme:	Credits	Examination Scheme	
Theory: 4 hrs./week	Th: 04	Theory	CIA: 50
Practical: --	Practical: --		End-Sem: 50
Prerequisite :		Pract:	--
		Oral:	--
		Termwork	--
Course Objectives: The student shall able- <ol style="list-style-type: none">1. To explore the fundamental concepts in Research and comprehend the research problem.2. To explore research design and sampling.3. To describe the instrumentation schemes and its data collection methods.4. To understand the regression models, estimation theory and statistical tools.5. To draft a research papers, reports, proposal and theses in given format.6. To adopt the best practices in publication ethics and avoid the publication misconduct.			
Course Outcomes: On completion of the course, learner will– CO1: Analyze types of research methods and apply appropriate methods for defined problem. CO2: Select and apply the research design as per the need of the proposed research. CO3: Recognize static and dynamic characteristics of an instrument and predict its reliability. CO4: Evaluate the impact of statistical analysis in the mathematical model. CO5: Summarize the reported literature and write research papers, reports, and theses effectively in a proper flow by addressing the novelty and self contribution of the work done. CO6: Write a plagiarism free research document and publish in reputed journal of high quality indexing database.			



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech(Common) (2023 Pattern)

Sem-VIII

2300403: Research Methodology

Unit I : Research Methodology and Research Problem	10 hrs	CO
Definition of Research, Objectives of Research, Motivation behind Research, Types of Research, Research Approaches, Significance of Research, Research versus Research Methodology, Research and Scientific Method, Research Process, Features of a Good Research, Concept of Research Problem, Selecting the problem, necessity of defining the problem, techniques involved defining problem.		CO1
Unit II : Research Design	9 hrs	CO2
Meaning of Research Design, Necessity of Research design, Framework and Parameters of Research design, Design and Methods, Approaches of Research Design, Types of Research Designs, Principles of Experimental Design, Design of Experiments. Sampling Design: census and sample survey, implication of sample design, steps in sampling design, criteria of selecting a sampling procedure, characteristics of good sample design, types of sample design.		CO2
Unit III : Basic Instrumentation and Data Collection Methods	9 hrs	CO3
Characteristics of Instruments, Instrumentation Schemes, Indoor and outdoor Experimental Setup, Steps of Experimental Setup, Calibration of Instruments, Reliability of an Instrument. Primary Data collection, observation method, interview method, Types of Data collection methods, Secondary data collection, Scaling, Measuring Instruments and Tools in Engineering Discipline.		CO3
Unit IV: Applied Statistics	9 hrs	CO4
Elements / Types of Analysis, Measures of Central tendency, Dispersion, Skewness, Regression Analysis, Parameter Estimation, Inferential Statistics: Chi-Square Test and T-Test Analysis, Univariate, Bivariate, and Multivariate Data Analysis, Principal Component Analysis, State Vector Machines, Uncertainty Analysis, Modelling and Prediction of Performance, Multi-Scale Modelling, Sensitivity Analysis.		CO4
Unit V: Literature Survey and Research Paper/Thesis/Report/Proposal Writing	9 hrs	CO5
Conducting Background Research, Resources for Literature Survey, Reading a Scientific Paper, White Paper, and Patent, Recording and Summarizing the Findings of Literature Survey, Body of Research Papers, Reports, and Theses, Research Reports, Significance of Report writing, Use of Documentation Tools, Bibliography Tools, and Presentation Tools Useful for Writing and Presenting Paper and Theses, Types of Research Report, Steps in writing report, Layout of Reports, Format of research proposal, Individual research proposal, Institutional proposal.		CO5
Unit VI: Research and Publication Ethics	10 hrs	CO6
Publication ethics: definition, importance, standards setting initiative and guidelines (COPE, WAME etc.), conflict of interest, predatory publishers and journals, open access publication and initiatives, Plagiarism, Software tools to identify plagiarism, Technique to avoid plagiarism, Indexing database, citation databases, Impact factor of journal as per JCR, SNIP, SJR, IPP, Cite Score, Metrics: h-index, g index, i10 index, altmetrics.		CO6

Text Books

1. Dr. C. R. Kothari, "Research Methodology: Methods and Trends", 2nd Edition, New Age International Publishers.
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction", 2nd Edition, Juta & Co. Ltd., Lansdowne.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech(Common) (2023 Pattern)

Sem-VIII

2300403: Research Methodology

Reference Books

1. Vinayak Bairagi and Mousami V. Munot, "Research Methodology A Practical and Scientific Approach", CRC Press, Taylor & Francis Group.
2. Ranjit Kumar, "Research Methodology: A Step by Step Guide for Beginners", 2nd Edition, SAGE Publications.

NPTEL / MOOC Course

1. "Introduction to Research" by Prof. Prathap Haridoss (IIT Madras).
Link: https://onlinecourses.nptel.ac.in/noc21_ge03/preview
2. "Research and Publication Ethics (RPE)" by Dr. Anirban Ghosh (Netaji Subhas Open University)
Link: https://onlinecourses.swayam2.ac.in/nou22_ge73/preview



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) (2023 Pattern)

Sem-VIII

2300404 : Project Stage – II

Teaching Scheme:		Credits	Examination Scheme	
Theory: --		Practical:04	Theory	CIA: --
Practical: 8 hrs/week				End-Sem:--
			Pract:	--
			Oral:	75
			Termwork	100
Course Objectives: The student should be able to <ol style="list-style-type: none">1. Identify the latest technical/practical challenges in the field of Engineering.2. Inculcate the ability to describe, interpret and analyze technical content.3. Develop competency of technical writing with critical thinking and develop the skill of technical writing along with presentation.4. Develop competency of implementing techno commercial and viable solutions.5. Develop Innovative project ideas can be published as a patent				
Course Outcomes: On completion of the course, learner will be able to– CO1: Analyze and prepare project requirement specifications, market viability analysis. CO2: Inference minimal viable engineering solutions / projects for the local / global problems. CO3: Appraise the current Engineering research / techniques / developments / interdisciplinary areas. CO4: Demonstrate the operations of projects / solutions. CO5: Evaluate technical content and draw conclusions. CO6: Demonstrate the ability to perform critical research writing, technical report and presentation.				



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) (2023 Pattern)

Sem-VIII

2300404 : Project Stage – II

Term Work

The Project Stage II report should contain the following. Internal guides should prepare a continuous evaluation sheet for each student and refer as continuous assessment for term work marks.

1. Introduction including aim and objective
2. Review of literature
3. Problem statement and methodology
4. Concepts associated with the project topic
5. Results and discussion
6. Validation of results
7. Conclusions and future scope of work
8. References

Student's publication / achievements

In Project Work Stage II, the student shall complete the project and prepare the final report of project work in standard format duly certified for satisfactory completion of the project work by the concerned guide and Head of the Department/Institute. The final project report shall be submitted in hard bound copy as well as a soft copy. The term work of project stage II shall be assessed jointly by internal and external examiners, along with the project presentation. It is recommended that at least one publication on the project topic to be presented in a conference or published in a referred journal.

Project Stage II Examination: The students must prepare presentation on Project Stage II and present in presence of examiners through a viva-voce examination.



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314706 : Quality Assurance & Quality Control (QAQC)

Teaching Scheme:	Credits- 02	Examination Scheme	
Theory: 00	Th:--	Theory	Theory: --
Practical:04 Hours/Week	Practical: 02		End-Sem:--
Prerequisite : Nil		Pract:	--
		Oral:	25
		Termwork	--

Course Objectives: The student should be able to

1. Gain a solid understanding of quality concepts, principles, and methodologies relevant to civil engineering projects, including the distinction between quality assurance and quality control.
2. interpret and adhere to relevant industry standards, codes, and regulations applicable to civil engineering practices.
3. develop comprehensive quality plans for construction projects, detailing quality objectives, methods, and procedures to achieve desired results.
4. Develop skills in conducting inspections and testing procedures to ensure that materials, processes, and products meet specified quality requirements.

Course Outcomes:


On completion of the course, learner will be able to–

CO1: Define Quality Assurance (QA) and Quality Control (QC) in the context of civil engineering.

CO2: Explain the importance of QAQC in civil engineering projects.

CO3: Develop a QAQC plan for a specific civil engineering project.

CO4: Analyze the potential risks and challenges in QAQC implementation in civil engineering projects.

 SANDIP <small>FOUNDATION</small>	SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE B. Tech (Civil Engineering) (2023 Pattern) Sem-VIII 2314706 : Quality Assurance & Quality Control (QAQC)
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Module	Topic	CO
Module 1	Roles and Responsibilities of QA / QC Engineer – Civil	3hrs
Module 2	Introduction to ISO 9001, ISO 9004, ISO 14000, ISO 19011	4hrs
Module 3	International Codes and Standards	4hrs
Module 4	Drawings and Abbreviations	3hrs
Module 5	Excavation and Backfilling	4hrs
Module 6	Construction of Asphalt Concrete paving	3hrs
Module 7	Concreting Works	4hrs
Module 8	Pre Stressed Concrete – Bridge Girders	4hrs
Module 9	Concrete Trial Mix Test, Concrete Compressive Strength Test , Compaction (Density) Test	3hrs
Module 10	Receiving Inspection , In process Inspection & Final Inspection / Material specification	3hrs
Module 11	Control of Nonconforming of Items / Products	4hrs
Module 12	Calibration of Monitoring & Measuring Equipment	4hrs
Module 13	Preparation of Project Quality Plan	3hrs
Module 14	Preparation of Inspection Test Plans – ITP	4hrs
Module 15	Preparation of QC Procedures	3hrs
Module 16	Final QA / QC Documentation / QC Dossiers	3hrs

**CO1
to
CO4**

Text Books:

1. Basic Civil Engineering by S.S. Bhavikatti
2. Basic Civil Engineering by SatheeshGopi
3. Basic Civil Engineering by B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain
4. Basic Civil and Mechanical Engineering by S. Ramamrutham
5. Civil Engineering Materials and Construction Practices by N. Krishna Raju
6. Civil Engineering Materials, Tests & Practices by M.L. Gambhir



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314806: Tall Building Design

Teaching Scheme:	Credits: --	Examination Scheme	
Theory: 00	Th:--	Theory	Theory: --
Practical:--	Practical: --		End-Sem:--
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. understand of the fundamental principles and concepts involved in the design of tall buildings. This includes topics such as structural systems, building materials, load considerations, and architectural considerations unique to tall buildings.
2. learn how to analyze and design tall building structures to ensure safety, stability, and functionality. They will be exposed to different structural systems commonly used in tall buildings, such as reinforced concrete, steel, or composite systems.
3. familiarize themselves with relevant building codes, regulations, and industry standards that govern the design and construction of tall buildings. This knowledge is essential to ensure compliance with safety and legal requirements.
4. understand how to integrate architectural and structural design elements in tall buildings to achieve both aesthetics and structural integrity.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Define key terms and concepts related to tall buildings and their design.

CO2: Summarize the main principles and theories that govern tall building design and construction.

CO3: Apply engineering principles to analyze and design the structural components of tall buildings, such as beams, columns, and foundations.

CO4: Utilize computer-aided design (CAD) software to create preliminary designs for tall buildings.



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314806: Tall Building Design

Module	Topic	CO
Module 1	What are Tall Buildings?	CO1 to CO4
Module 2	Concrete Beam Analysis and Design	
Module 3	Steel Beam Analysis and Design	
Module 4	Frame Analysis & Design	
Module 5	Building Analysis & Design	
Module 6	Special Elements & Functions in Buildings	
Module 7	Tall Building Design	

Text Books:

1. Structural Design of High-Rise Buildings: Detailed Background, Evolution, Analysis and Design of High-Rise Multi-Storey Reinforced Concrete and Structural Steel Buildings" by Mohamed A. El-Reedy
2. Building Structures by James Ambrose and Patrick Tripeny: This comprehensive book covers various aspects of building structures



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

VAC146 : SAP2000

Teaching Scheme:	Credits- --	Examination Scheme	
Theory: --	Th:--	Theory	CIA: --
Practical:02 Hours/Week	Practical: --		End-Sem:--
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Understanding the fundamental principles and concepts of structural analysis, including the behavior of different structural elements under various loads and forces.
2. use the software's graphical user interface efficiently, including modeling, defining materials, and specifying load conditions.
3. accurate and realistic 3D models of various structures using SAP2000's modeling tools, such as defining nodes, elements, and supports.
4. Understand different analysis methods available in SAP2000, such as static, dynamic, and nonlinear analysis, to predict the response of structures under different loading scenarios.

Course Outcomes:

On completion of the course, learner will be able to–

- CO1:** understand fundamental structural analysis principles and concepts, including statics, mechanics of materials, and structural behavior.
- CO2:** use the SAP2000 software to model and analyze various types of structures, such as buildings, bridges, towers, and more.
- CO3:** create accurate and efficient 3D structural models using SAP2000, considering different types of elements like beams, columns, slabs, walls, and supports.
- CO4:** apply various types of loads, such as dead loads, live loads, wind loads, earthquake loads, etc., and perform analysis to determine the internal forces and displacements in the structure.



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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

VAC146 : SAP2000

Module	Topic	CO
Module 1	Introduction to the SAP2000 interface	3hrs
Module 2	Object based modelling of concrete and steel structures	4hrs
Module 3	Application of static loading	4hrs
Module 4	Construction sequence loading	3hrs
Module 5	Modal and response spectrum analysis	4hrs
Module 6	Linear time history analysis	3hrs
Module 7	Design and optimisation of steel and concrete structures	4hrs
Module 8	Manipulation of results	3hrs

**CO1
to
CO4**



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314493: Tunnel Engineering

Teaching Scheme:	Credits	Examination Scheme	
Theory: 4 hrs/week	Th:04	Theory	CIA: 50
Practical: --	Practical: --		End-Sem:50
Prerequisite : Nil		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. learn about different types of tunnels, such as road tunnels, railway tunnels, water supply tunnels, and underground utility tunnels. They will study the purposes and requirements of each type of tunnel.
2. gain knowledge about geological surveys and geotechnical investigations to understand the ground conditions and challenges associated with tunneling.
3. explore various tunnel construction methods, such as cut-and-cover, drill-and-blast, tunnel boring machines (TBMs).
4. Understand importance of proper ventilation and lighting systems inside tunnels to ensure the safety and comfort of users.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: List different types of tunnel construction methods and their applications.

CO2: Explain the key concepts and theories behind tunnel engineering.

CO3: Describe the geotechnical challenges associated with tunneling.

CO4: Evaluate the impact of different tunneling methods on the environment and nearby structures.



SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTER

B. Tech (Civil Engineering) (2023 Pattern)

Sem-VIII

2314493: Tunnel Engineering

Unit 1: Introduction	9hrs	CO
Scope and application, historical developments, art of tunnelling, tunnel engineering, future tunnelling considerations. Types of Underground Excavations: Tunnel, adit, decline, shaft parameters influencing location, Shape and size, geological aspects, planning and site investigations. Tunnelling Methods, Shallow tunnels, Deep Tunneling, Hard rock tunneling.		CO1
Unit 2: Tunnelling by Road headers and Impact Hammers	10hrs	CO2
Cutting principles, method of excavation, selection, performance, limitations and problems. Tunnelling by Tunnel Boring Machines: Boring principles, method of excavation, selection, performance, limitations and problems; TBM applications. Supports in Tunnels, Ground Treatment in Tunnelling, Tunnel Services: Ventilation, Lighting, drainage and pumping. Methods of Sinking Shafts, Tunnelling Hazards		CO2
Unit 3: Underground space	9hrs	CO3
Controlled blasting techniques, Tunnel Boring Machine, Twin tunnels		CO3
Unit 4: Excavation of large and deep caverns	9hrs	CO3
Underground environment, Heat and Humidity, Dust, Methods of Ventilation and Equipment		CO3
Unit 5: Lighting systems and fixtures in tunnels	10hrs	CO2
Underground space, Twin tunnels, deep tunnels		CO2
Unit 6: Submerged and Floating Tunnels	9hrs	CO2
Micro-tunnelling; Trenchless excavation Novel Excavation Techniques: Penetrating Cone Fracture, Bottom-hole pressurization, expanding cements, Diamond wire saw History of Safety movement – HIRA (Hazard Identification and Risk assessment), OSHA standards, Risk registers, Material safety data sheet (MSDS) and First Aid knowledge etc., Safety Audit,		CO2

Text Books

1. Engineering Geology & Tunnels Engineering, Jaafar Mohammed. Open source.
2. Underground Infrastructures Planning, Design, and Construction, R.K. Goel, Bhavani Singh, Jian Zhao, Butterworth-Heinemann Publishers.
3. Handbook of Tunnel Engineering Volume I: Structures and Methods B. Maidl, M. Thewes, U. Maidl, Ernst & Sohn Publishers.
4. Tunnel Engineering Handbook John O. Bickel, Thomas R. Kuesel, Elwyn H. King, Kluwer Academic Publishers.
5. Underground Infrastructures Planning, Design, and Construction R.K. Goel, Bhavani Singh, Jian Zhao, Butterworth-Heinemann Publishers.
6. Rock Mechanics Design in Mining and Tunneling by Z.T. Bieniawski. Supplementary Reading:

Reference Books

1. Technical Manual for Design and Construction of Road Tunnels - Civil Elements U.S. Department of Transportation Federal Highway Administration
2. Introduction to Tunnel Construction David Chapman, Nicole Metje and Alfred Stark, Spon Press
3. Practical Tunnel Construction, Gary B. Hemphill, Wiley Publication Supplementary Reading:
4. Tunnel Engineering Handbook, Authors: Kuesel, Thomas R., King, Elwyn H., Bickel, John
5. OSHA Standards