DEPARTMENT OF CIVIL ENGIEERING
INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING
INDUS UNIVERSITY

ME/CVL/AUTO ENGINEERING, SEMESTER –I TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017															
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME							
								THEORY					PRACT		TOTAL
								CIE							
			L	T	P			MID	IE	ESE			CIE	ESE	
1	SH0101	Differential Calculus & Matrix Algebra	04	02	00	05	06	30	10	60			00	00	100
2	SH0002	Engineering Chemistry	03	00	02	04	05	30	10	60			40	60	200
3	ME0004	Mechanical Workshop	00	00	02	01	02	00	00	00			40	60	100
4	ME0002	Elements of Mechanical Engineering	03	00	02	04	05	30	10	60			40	60	200
5	CE0001	Computer Programming	03	00	02	04	05	30	10	60			40	60	200
6	CV0002	Engineering Mechanics	03	02	00	04	05	30	10	60			00	00	100
7	CV0001	Environmental Science	01	00	02	02	03	30	10	60			40	60	200
8	SH0102	Technical English	01	02	00	02	03	30	10	60			00	00	100
TOTAL			**18**	**06**	**10**	**26**	**34**	**210**	**70**	**420**			**200**	**300**	**1200**

DEPARTMENT OF CIVIL ENGIEERING
INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING
INDUS UNIVERSITY

ME/CVL/AUTO ENGINEERING, SEMESTER –II TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017														
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME						
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	SH0201	Integral Calculus and Linear Algebra	04	02	00	05	06	30	10	60	00	00	100
2	SH0001	Engineering Physics	03	00	02	04	05	30	10	60	40	60	200
3	EL0001	Electrical Workshop	00	00	02	01	02	00	00	00	40	60	100
4	EL0002	Elements of Electrical Engineering	03	00	02	04	05	30	10	60	40	60	200
5	ME0001	Engineering Graphics	01	06	00	04	07	30	10	60	00	00	100
6	EC0001	Basic Electronics	02	00	02	03	04	30	10	60	40	60	200
7	MT0001	Materials Science	03	00	00	03	03	30	10	60	00	00	100
8	SH0202	Business Communication and Presentation Skill	01	02	00	02	03	30	10	60	00	00	100
TOTAL			**17**	**10**	**08**	**26**	**35**	**210**	**70**	**420**	**160**	**240**	**1100**

DEPARTMENT OF CIVIL ENGIEERING
INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING
INDUS UNIVERSITY

B-TECH CIVIL ENGINEERING, SEMESTER –III TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017

SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	SH0301	DIFFERENTIAL EQUATIONS AND INTEGRAL TRANSFORMS	3	2	0	4	5	30	10	60	0	0	100
2	CV0301	FLUID MECHANICS–I	3	0	2	4	5	30	10	60	40	60	200
3	CV0302	GEOTECHNIQUES AND APPLIED GEOLOGY	2	0	2	3	4	30	10	60	40	60	200
4	CV0303	BUILDING CONSTRUCTION AND MATERIALS	3	2	0	4	5	30	10	60	0	0	100
5	CV0304	STRENGTH OF MATERIALS	3	2	2	5	7	30	10	60	40	60	200
6	CV0305	SURVEYING–I	3	0	2	4	5	30	10	60	40	60	200
7	SH0307	HUMAN VALUES AND PROFESSIONAL ETHICS	1	0	0	0	1	30	10	60	0	0	100
TOTAL			**18**	**06**	**08**	**24**	**32**	**210**	**70**	**420**	**160**	**240**	**1100**

DEPARTMENT OF CIVIL ENGIEERING
INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING
INDUS UNIVERSITY

B-TECH CIVIL ENGINEERING, SEMESTER –IV TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017													
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	SH0401	COMPLEX VARIABLES AND NUMERICAL ANALYSIS	3	2	0	4	5	30	10	60	0	0	100
2	CV0401	FLUID MECHANICS–II	3	2	0	4	5	30	10	60	0	0	100
3	CV0402	STRUCTURAL ANALYSIS-I	4	2	0	5	6	30	10	60	0	0	100
4	CV0403	CONCRETE TECHNOLOGY	3	0	2	4	5	30	10	60	40	60	200
5	CV0404	BUILDING AND TOWN PLANNING	3	2	0	4	5	30	10	60	0	0	100
6	CV0405	SURVEYING–II	3	0	2	4	5	30	10	60	40	60	200
7	CE0407	CYBER SECURITY AND INTELLECTUAL PROPERTY RIGHT	1	0	0	0	1	30	10	60	0	0	100
TOTAL			**20**	**08**	**04**	**25**	**32**	**210**	**70**	**420**	**80**	**120**	**900**

DEPARTMENT OF CIVIL ENGIEERING
INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING
INDUS UNIVERSITY

B-TECH CIVIL ENGINEERING, SEMESTER –V TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017													
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	CV0501	DESIGN OF RC STRUCTURES	4	2	0	5	6	30	10	60	0	0	100
2	CV0502	SOIL MECHANICS	3	0	2	4	5	30	10	60	40	60	200
3	CV0503	HIGHWAY ENGINEERING	3	0	2	4	5	30	10	60	40	60	200
4	CV0504	STRUCTURAL ANALYSIS-II	4	2	0	5	6	30	10	60	0	0	100
5	CV0505	ENGINEERING HYDROLOGY	3	2	0	4	5	30	10	60	0	0	100
6	CV0506	ENVIRONMENTAL ENGG-I	3	0	2	4	5	30	10	60	40	60	200
7	SH0507	TECHNICAL COMMUNICATION AND SOFT SKILL	1	0	0	0	1	30	10	60	0	0	100
TOTAL			**21**	**06**	**06**	**26**	**33**	**210**	**70**	**420**	**120**	**180**	**1000**

DEPARTMENT OF CIVIL ENGIEERING
INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING
INDUS UNIVERSITY

B-TECH CIVIL ENGINEERING, SEMESTER –VI TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017

SR NO	CODE	SUBJECTS		TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
									THEORY			PRACT		TOTAL
									CIE					
				L	T	P			MID	IE	ESE	CIE	ESE	
1	CV0601	DESIGN OF STEEL STRUCTURES		4	2	0	5	6	30	10	60	0	0	100
2	CV0602	FOUNDATION ENGINEERING		3	0	2	4	5	30	10	60	40	60	200
3	CV0603	ENVIRONMENTAL ENGG-II		3	0	2	4	5	30	10	60	40	60	200
4	CV0604	IRRIGATION AND WATER RESOURCE ENGG		4	2	0	5	6	30	10	60	0	0	100
5	CV0605	ESTIMATING AND COSTING	Elective-I	3	2	0	4	5	30	10	60	0	0	100
	CV0606	BRIDGE ENGINEERING												
	CV0613	MOOC'S												
6	CV0607	GREEN BUILDING & SUSTAINABLE DEVELOPMENT	Elective-II	3	2	2	4	5	30	10	60	0	0	100
	CV0608	TRAFFIC ENGINEERING												
	CV0609	PRESTRESSED CONCRETE												
	CV0610	AIR POLLUTION CONTROL												
	CV0611	SOIL EROSION & CONSERVATION												
	CV0612	GROUND WATER ENGINEERING												
7	SH0607	ADVANCED TECHNICAL COMMUNICATION AND SOFT SKILL		1	0	0	0	1	30	10	60	0	0	10
TOTAL				**21**	**10**	**04**	**27**	**35**	**210**	**70**	**420**	**80**	**120**	**900**

DEPARTMENT OF CIVIL ENGIEERING
INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING
INDUS UNIVERSITY

B-TECH CIVIL ENGINEERING, SEMESTER –VII TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017

SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	CV0701	EARTHQUAKE ENGG	3	0	2	4	5	30	10	60	40	60	200
2	CV0702	CONSTRUCTION PROJECT MANAGEMENT	4	2	0	5	6	30	10	60	0	0	100
3	CV0703	PROFESSIONAL PRACTICE AND VALUATION	3	0	0	3	3	30	10	60	0	0	100
4	CV0704	ADVANCED CONSTRUCTION TECHNIQUES & EQUIPMENT	3	2	0	4	5	30	10	60	0	0	100
5	CV0705	RAILWAY BRIDGE AND TUNNEL	3	0	0	3	3	30	10	60	0	0	100
6	CV0706	ENVIRONMENTAL IMPACT ASSESSMENT (EL-III)	3	2	0	4	5	30	10	60	0	0	100
	CV0707	PROJECT PLANNING & QUALITY CONTROL (EL-III)											
	CV0708	CONTRACT MANAGEMENT (EL-III)											
	CV0709	REINFORCED EARTH STRUCTURES & GEOSYNTHESIS (EL-III)											
	CV0710	REMOTE SENSING & GEO-INFORMATICS (EL-III)											
	CV0711	HYDROPOWER ENGINEERING (EL-III)											
	CV0713	ADVANCED DESIGN OF RCC STRUCTURES (EL-III)											
7	CV0712	DISASTER MANAGEMENT	1	0	0	0	1	30	10	60	0	0	100
TOTAL			**20**	**06**	**02**	**23**	**28**	**210**	**70**	**420**	**40**	**60**	**800**

DEPARTMENT OF CIVIL ENGIEERING
INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING
INDUS UNIVERSITY

B-TECH CIVIL ENGINEERING, SEMESTER –VIII TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017														
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME						
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	CV0801	Project	00	00	40	20	40	00	00	00	40	60	100
TOTAL			**00**	**00**	**40**	**20**	**40**	00	00	00	40	60	100

3RD SEMESTER

B-TECH CIVIL ENGINEERING, SEMESTER –III TEACHING & EXAMINATION SCHEME (BOS-14/06/2017) WITH EFFECT FROM JULY 2017													
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	SH0301	DIFFERENTIAL EQUATIONS AND INTEGRAL TRANSFORMS	3	2	0	4	5	30	10	60	0	0	100
2	CV0301	FLUID MECHANICS–I	3	0	2	4	5	30	10	60	40	60	200
3	CV0302	GEOTECHNIQUES AND APPLIED GEOLOGY	2	0	2	3	4	30	10	60	40	60	200
4	CV0303	BUILDING CONSTRUCTION AND MATERIALS	3	2	0	4	5	30	10	60	0	0	100
5	CV0304	STRENGTH OF MATERIALS	3	2	2	5	7	30	10	60	40	60	200
6	CV0305	SURVEYING–I	3	0	2	4	5	30	10	60	40	60	200
7	SH0307	HUMAN VALUES AND PROFESSIONAL ETHICS	1	0	0	0	1	30	10	60	0	0	100
TOTAL			**18**	**06**	**08**	**24**	**32**	**210**	**70**	**420**	**160**	**240**	**1100**

Subject: **Differential Equations and Integral Transforms**								
Program: **B. Tech Civil Engineering**				Subject Code:**SH0301**			Semester: **III**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	60	00	40	00	100

Course Outcomes:

1. To provide an ability to see differential equations as a rigorous way of modeling physical phenomena.
2. To provide an ability to derive major differential equations from physical principles.
3. To provide an ability to understand the role of initial and boundary conditions in determining the solutions of equations.
4. To provide an ability to choose and apply appropriate methods for solving differential equations.
5. To provide an ability to undertake problem identification, formulation and solution.
6. To provide an ability to calculate Laplace transforms and inverse Laplace transforms and uses them to solve differential equations (Initial value problems, Boundary value problems).
7. To provide an ability to understand various concepts of Control System -Theory using Laplace Transform.

CONTENTS

UNIT-I

Ordinary Differential Equations with applications: [11hours]

Revision of ordinary differential equation: Introduction of Mathematical Modeling, Basic Definitions, First Order First Degree Differential Equations, Variable Separable equation, Homogeneous Equation, Exact Differential Equations, Reduction of Non-exact Differential Equations to exact form using Integrating Factors, First Order Linear Differential Equation, Bernoulli Equation, Applications: Orthogonal Trajectories, Simple Electric Circuits, Solution of Linear differential equations of higher order with constant coefficients, complimentary function and particular integral.

UNIT-II

Ordinary and Partial Differential Equations with applications[12hours]

Method of variation of parameters, Method of Undetermined coefficients, Linear differential equations with variable coefficients (Cauchy's and Legendre forms), Simultaneous linear differential equations, Bessel and Legendre functions, Application of Linear differential equation - Application ofDeflection of Beams, Electric circuits, Series Solution of Ordinary Differential Equations – Power series method, Formation of Partial differential equations, Directly Integrable equations, Method of separation of variables, solution of one dimensional wave equation, heat equation and Laplace equation.

UNIT-III

Laplace transforms: [10hours]

Relation between Laplace and Fourier Transform, Definition, Linearity property, Laplace transforms of elementary functions, Shifting theorem, Inverse Laplace transforms, Laplace transforms of derivatives and integrals, Convolution theorem, Application of Laplace transform in solving ordinary differential equations, Laplace transforms of periodic, Unit step and impulse functions.

UNIT-IV

Fourier series, Fourier Integrals, Fourier Transforms and Z-Transforms[12hours]

Fourier series, Drichlet's conditions, Euler's formula, Fourier expansion of periodic functions, Fourier series of even and odd functions, Half range Fourier series, Fourier integral theorem (only statement), Fourier sine and cosine integrals, Complex form of Fourier integral, Fourier transforms, Fourier sine and cosine transforms, Introduction to Z-transforms:Definition and Standard Z-transforms, Linearity Property, dumping Rule and some standard results, Some useful Z-transforms.

1. Text books:

1. Erwin Kreyszig: Advanced Engineering Mathematics (8th Ed.) , Wiley Eastern Ltd., New Delhi.

2. Reference Books:

1) B. V. Ramana: Higher Engineering Mathematics, McGraw Hill, New Delhi.
2) Dr. B.S. Growl: Higher Engineering Mathematics, Khanna Publishers, New Delhi.
3) R K Jain, S R K Iyengar: Advanced Engineering Mathematics. Third Edition, Narosa Publishing House
4) Merel C Potter, J L Goldberg: Advanced Engineering Mathematics (3rd Ed.), Oxford India Publication.
5) Murray Spiegel: Advanced Mathematics for Engineering & Science: (Schaum's Outline Series),Tata – McGraw Hill Publication

3. Digital resources

An online NPTEL courses (http://freevideolectures.com/blog/2010/11/130-nptel-iit-online-courses/)

Subject: **Fluid Mechanics-I**								
Program: **B. Tech Civil Engineering**				Subject Code: **CV0301**			Semester: **III**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	24/60	24/60	16/40	16/40	200

Course Objectives:

- Provide fundamental knowledge of fluids.
- Develop basic understanding of Fluid properties.
- Give the knowledge of behavior of Fluid under various conditions.

CONTENTS

UNIT-I

Properties of Fluid: [4 hours]

Introduction, Types of Fluid, Fluid properties, thermodynamics properties, compressibility and bulk modulus, surface tension and capillarity

Fluid static [8 hours]

Pressure and its measurement; Pascal's law; hydrostatic pressure, atmospheric, absolute, gauge and vacuum pressure; Pressure measurement through Piezometer and Manometer, Total pressure, intensity of pressure, centre of pressure, Pressure on horizontal, vertical, inclined and curved surface, Floating Bodies, Buoyancy and centre of buoyancy, meta centre and meta centre height, Condition of equilibrium of floating and submerged body, determination of meta-centric height by experimental and Analytical method, stable and unstable equilibrium, pressure in case of accelerated rigid body motion.

UNIT-II

Fluid Kinematics[6 hours]

Types of fluid motion, methods of describing fluid flow -Langrangian and Eulerian method, In viscid flows, velocity and acceleration, flow rate, Continuity equation, Potential flows, flow lines, velocity potential and stream function, Flownet its characteristic and utility, circulation and vorticity, Vortex flow - forced vortex flow, free vortex flow, equation of motion for vortex flow, equation of forced vortex flow and free vortex flow.

Fluid Dynamics [7 hours]

Equations of motion Euler and Bernoulli's equations of motion, application of Bernoulli's Equation, momentum of fluid in motion, momentum equation and momentum correction factor, Application of momentum equation, forces on a pipe bend, free jets

UNIT-III

Measurement of Flow [10hours]

Orifice & Mouth piece Classification, hydraulic coefficients, experimental determination of hydraulic coefficient, discharge through all types of office & mouthpiece, time of emptying the tank through orifice and mouthpiece Notches and Weirs Classification, discharge through various types of Notches and weirs, time of emptying a reservoir or a tank with notches & weirs Venturimeter Nozzles and bend meter.

UNIT-IV

Fundamentals of Laminar and Turbulent Flows[10hours]

Reynolds experiment, critical Reynolds number and its determination, laminar flow through pipes and Hagen-Poiseuille equation, stokes law, measurement of viscosity, causes, characteristics and factors affecting turbulence, types of turbulence, shear and pressure relationships, Darcy-Weisbach equation for turbulent flow through pipe, shear stress velocity distribution in pipes.

Flow Through Pipes: Introduction, Major and minor losses of energy in pipes, hydraulic gradient, total energy line, Pipes in series and parallel, flow through branched pipes, Hydraulic transmission of power, Water hammer and its effect

Course Outcomes:

- Apply fundamental principles of fluid mechanics for the solution of practical civil engineering problems of water conveyance in pipes, pipe networks, and open channels.
- Know basics of fluid kinematics and dynamics and their applications.
- To study various fluid flow measuring devices.

Text Books:

1. Bansal.R.K,"A text book of Fluid Mechanics and Hydraulic Machines", ISBN: 978-81-224-3647-1Laxmi Publication private Ltd golden house, New Delhi.
2. Modi P N and Seth S M, "Hydraulics and Hydraulic Machines", ISBN-10: 8189401262Standard Book House, NaiSarak New Delhi, 2000.

Reference Books:

1. Jain A K, "Fluid Mechanics including Hydraulic Machines", Khanna Publishers,ISBN: 9788174091947, New Delhi, 2000.
2. RangaRaju K. G., Flow through Open channel, ISBN 0-07-058833-3, Tata McGraw-Hill Publishing Company Ltd, New Delhi,1997.
3. Subramanya K. "Flow in Open Channels", ISBN (13): 978-0-07-008695-1, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 1998.

Web resources:

1. A Lecture on Fluid Mechanics (NPTEL- http://nptel.ac.in/courses/105101082/1)

MOOCs:

1. Introduction to fluid mechanics-https://www.mooc-list.com/tags/fluid-mechanics

List of Experiments:

Experiment. No.	Title	Learning Outcomes
1	Introduction to Laboratory, Lab Manual and Lab components	Basic Knowledge of Fluid mechanics lab Various measurements
2	To study buoyancy and floatation	Principle of venturimeter and floatation
3	To determine the meta-centric height	Student will understand the stability and un-stability of floating body
4	Verification of Bernoulli's theorem	They will understand the energy conservations of fluids flowing in a pile
5	Verification of relationship between energy loss and velocity and determination of friction factor for a pipe	Significance of surface friction on fluid flow.
6	Reynolds experiment: Establishment of laminar, transition & turbulent flows	They will understand types of flows and determination of Reynolds number
7	Calibration of rectangular notches	They will understand the discharge through notches and its uses.
8	Calibration of triangular notches	They will understand the discharge through notches and its uses.
9	Determination of the co-efficient of discharge, velocity and contraction	They will understand the coefficient used for various measurement.
10	Verification of law of hydrostatic pressure	They will understand how the hydraustatic forces acting on a submerged objects
11	Calibration of orifice meter	Use of orifice meter and its discharge measurement.
12	Calibration of venturimeter	Use of venturimeter and its discharge measurement.
13	Study of a pitot-tube	They will get how the pitot tube is used for fluid velocity measurement

Subject: **Geotechniques and Applied Geology**								
Program: **B.Tech Civil Engineering**				Subject Code: **CV0302**			Semester: **III**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
2	0	2	3	24/60	24/60	16/40	16/40	200

Course Objectives:

1. Prepare Civil Engineering students for a career inGeotechniques and Applied Geology.
2. Basic knowledge and understanding in the most central part of Applied Geology including rocks, minerals and types of soil.

COURSE CONTENTS

UNIT-I

Fundamentals of Geology **[7 hours]**

Introduction to Geology: Introduction, Basics of the earth, parts of the earth, Branch of geology, Scope of Engineering Geology.
Geological work of Natural agencies: Introduction, Definition: Weathering, Erosion, And Denudation. Types of weathering, Factors affecting weathering, Products of weathering. Geological work of Wind (Erosion, Sediment transport and deposition) and water (River profile and geological Work) and its engineering considerations.

UNIT-II

Rocks and minerals **[10 hours]**

Structural Features of Rocks: Introduction, types of Rocks and rock classification and its formation cycle.**Faults**: Terminology, Classification, Effects of Faulting. **Folds**: Parts of Folds and terminology, Classification and position of axial plane.
Engineering properties of rocks and laboratory measurement: Rocks as Materials for construction: Building stones, Road materials. Rocks as sites for construction: Laboratory test, in-situ test.
Site Improvement in Rocks: Introduction, Grouting, Backfilling and Site reinforcement, Rock Bolting, Soil Stabilization.
Minerals: Introduction, Properties of Minerals: Physical Properties, Optical Properties

UNIT-III

Earthquakes and geotechniques [6hours]

Earthquake: Introduction, terminologies, types of seismic waves, classification of earthquakes, causes of earthquakes, effects of earthquakes, Recording of an earthquakes, Earthquake zoning of India and other continents, Earthquake problems in India, Tsunami: engineering consideration, tsunami warning system.

Geotechniques: Introduction to types of soils and its formation, Geotechnical Engineering, its scope and limitations.

Basics of Soil Properties and simple Tests: Introduction to 2-Phase & 3-Phase diagrams, Volumetric Relationships, Volume-Mass Relationships, Volume-Weight Relationships and their correlations. Water Content, Specific Gravity, Mass Density, Relative Density and determination of each. Illustrative Examples and Problems.

UNIT-IV

Particle Size Analysis and Plasticity [7hours]

Characteristics of Soils: Introduction, Sieve Analysis, Stoke's Law, Theory of Sedimentation Analysis, Hydrometer method, Limitation of Sedimentary analysis, Particle size distribution and its uses, Plasticity of Soils, Consistency limits: Liquid Limit, Plastic Limit, Shrinkage Limit and its determination, Shrinkage parameters, Plasticity liquidity and consistency indices, Flow index, sensitivity, thixotropy, activity of soils, uses of consistency limits. Illustrative examples and problems.

Soil Classification Systems: Introduction, Particle size classification, Classification Systems, AASHTHO, USC, IS Classification, Field Identification.

Course Outcome:

1. Understand the role of Applied Geology in the design and construction process of underground openings in rocks.
2. Be able to apply Geological concepts and approaches on rock engineering projects.
3. Be able to use the Geological literature to establish the geotechnical framework needed to properly design and construct heavy civil works rock projects.
4. Be able to understand the concepts of Geotechniques as a basic requirement for soil mechanics.
5. To be able to apply Geotechniques in basic problems related to construction.

Text Books:

1. Engineering and general geology by Parbin Singh, ISBN 9789350142677, 3rd Editions

Reference Books:

1. Engineering Geology: D venkat Reddy 9788125919032, 8125919031; Edition: 1st Edition, 2010; Pages: 672

Web resources:

1. Geology and Geophysics - http://guides.lib.lsu.edu/geol
2. Engineering Geology - https://www.journals.elsevier.com/engineering-geology

3. NPTEL - http://nptel.ac.in/courses/105105106/

MOOCs:

1. Geological Engineering - https://www.mooc-list.com/tags/geological-engineering
2. Mining Engineering - https://www.mooc-list.com/instructor/stephen-fityus

List of Experiments

Experiment. No.	Title	Learning Outcomes
1	Identification and Description of Physical Properties of Minerals	Students will understand the physical properties of civil engineering materials
2	Identification and Description of Geotechnical Characteristics of Rocks IS: 123 (1975)	they will identify the different types of rocks
3	Study of Tectonic Features of India.	They will understand the geological and tectonic features of India
4	Study of Lineament And Fault/Shears of Maharashtra	They will understand faults and shear of regions
5	Study of Principal Litho- logical Groups of India	
6	Study Epicenters of India & Surrounding Areas	They will get the idea of Epicenters and surroundings area.
7	Study of Convective Current Mechanism for Engineering Continental Drift	They will get how the Engineering Continental Drift flow
8	Study of parts of fold.	They will get the idea of fold
9	Study of parts of fault	They will get the idea of fault
10	Study of mineral availability in India	They will understand the mineral available in India.
11	Study of seismic zoning of India.	They will study the seismic zones in India
12	Study of Sections across Asia.	They will understand the sectional division of Asia
13	Study of profile of River Narmada.	They will study the profile of Narmada River
14	Study of lithosphere of earth.	Study of lithophere
15	Study of different layers of atmosphere.	They will get the idea of different layers of atmosphere
16	To determine specific gravity of rock aggregate.	They will understand the specific gravity of rock

Subject: **Building Construction and Materials**								
Program: **B.Tech Civil Engineering**			Subject Code: **CV0303**			Semester: **III**		
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60	0	16/40	0	100

Course Objectives:

1. Explore career options in the building construction industry.
2. Develop sound safety practices.
3. Demonstrate desirable work habits.
4. To have safe and professional work practices.

COURSE CONTENTS

UNIT-I

[9 hours]

Introduction: Overview of construction practices, theory and methods. **Subsurface Investigation:** Objectives, methods of boring like wash boring, percussion etc.,

Shallow Foundations: Necessity, types, setting out, excavation, construction, failures of foundation and remedial measures.

UNIT-II

[12 hours]

1. **Masonry Construction :**
   a. Stone masonry: Technical terms, lifting appliances, joints, types –random (un-coursed) rubble, coursed rubble, dry rubble masonry, Ashlar masonry- Ashlar fine, chamfered fine.
   b) Brick masonry: Technical terms, bonds in brick work- English bond, single & double Flemish bond, garden wall bond, raking bond, Dutch bond
   c) Composite masonry: Stone facing with brick backing, brick facing with concrete backing.
   d) Hollow concrete blocks and construction
   e) Cavity walls: Brick cavity walls, position of cavity at foundation, roof and at opening levels.
   f) Lintels & arches: Lintels – types, construction. Arches – technical terms, types – brick arches, rough, axed, stone arches, flat – semi circular.
2. **Plain and Reinforced Concrete Construction:** Pre-cast and cast-in-situ Construction.

3. **Doors and Windows :**

a) Doors: Location, technical terms, size, types, construction, suitability.
b) Windows: Factors affecting selection of size, shape, location and no. of windows, types, construction, suitability, fixtures and fastenings.
c) Ventilators: Ventilators combined with window, fan light.

UNIT-III

[12 hours]

Stairs and Staircases: Definition, technical terms, requirements of good stair, fixing of going and rise of a step, types of steps, classification, example – stair planning, elevators, escalators.
Floorings : Introduction, essential requirements of a floor, factors affecting selection of flooring material, types of ground floors, brick, flag stone, tiled cement concrete, granolithic, terrazzo, marble, timber flooring, upper floor- timber, timber floor supported on RSJ flag stone floor resting on RSJ, jack arch
Floor, reinforced concrete floor, ribbed floor, pre cast concrete floor.
Roofs and Roof Coverings: Introduction, requirements of good roof technical terms, classification, types of roof coverings for pitched roof. A.C. sheet roofs – fixing of A.C. sheets, laying of big six sheets, G.I. Sheets roofs, slates, flat roof – advantages, dis-advantages, types of flat terraced roofing.
Wall Finishes: Plastering, pointing and painting.

UNIT-IV

[12 hours]

Temporary Works: Timbering in trenches, types of scaffoldings, shoring, underpinning
Special Treatments: Fire resistant, water resistant, thermal insulation, acoustical construction and anti-termite treatment.
Building Materials: Introduction, Building materials like bricks, stones, lime, timber, mortar, cement, concrete, sand, aggregate, Paints and varnishes, glass, metals, plastic and many more (Classification, Uses, Properties, Requirements, Characteristics)

Course Outcomes:

1. Learn and use the terms common to the Building Industry.
2. Identify and use safely hand and power tools commonly used in the Building Industry.
3. Able to understand and utilize basic principles used in Building Construction.
4. Improve construction layout skills.

Text Books:

1. B.C Punmia' Building Construction, ISBN: 978813180428, Edition: Eleventh 2016 Pages: 692
2. 'S. C. Rangwala' Building Construction, ISBN : 97893850390413, 3rd Edition : 2017

Reference Books:

1. Arora and Bindra," A Textbook of Building Construction",ISBN: 978813054863Dhanpat Rai& Sons, New Delhi.

Web resources:

1. Building Construction http://wbdg.org/ccb/ccb.php
2. Building Construction http://www.construction.com/
3. Building Construction http://www.thomasnet.com/

MOOCs: Modern building design https://www.mooc-list.com/tags/construction

Subject: **Strength of Materials**								
Program: **B. Tech Civil Engineering**			Subject Code: **CV0304**				Semester: **III**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	2	5	24/60	24/60	16/40	16/40	200

Course Objectives:

1. To provide the basic concepts and principles of strength of materials.
2. To give an ability to calculate stresses and deformations of objects under external loadings.
3. To give an ability to apply the knowledge of strength of materials on engineering applications and design problems.

CONTENTS

UNIT-I

Simple Stress and Strain: [11hours]

Introduction to axial and Normal Stresses (Tensile, Compressive, Shear and thermal), Introduction to Strains (Linear, Shear, Lateral, Thermal and Volumetric Strains), Elastic Constants (Modulus of Elasticity, Poisson's ratio, modulus of rigidity, bulk modulus), Relationship between (E, G & K), Analysis of stress and strain for uniform, composite bars and prismatic bars.

UNIT-II

Shear Force and Bending Moment: [12hours]

Statically Determinate Beams: Relationship between Loading, Shear Force and Bending Moment, Shear force and bending moment diagrams for beams subjected to loads (concentrated loads, uniformly distributed loads, uniformly varying loads and their combinations)

Stress in Beams:

Bending Stresses in Beams: Introduction, theory of pure bending, section modulus, beam of uniform strength, relationship between moment of resistance, bending stress, moment of inertia, and radius of curvature and modulus of elasticity.

UNIT-III

Torsion: [11hours]

Introduction, pure torsion formula, analysis of strength and stiffness criteria of solid and hollow circular shaft, Shaft in Series and Parallel, Combination of Torsion and Bending.

Shear Stresses in Beams: Horizontal shear stress, Shear stress distribution across beam sections, distribution of Shear stress for standard sections.

UNIT-IV [11 hours]

Principal Stress and Strain: Introduction, Principle stresses and strains, Normal, Tangential and Resultant Stress by Analytical and Graphical Method (Mohr's circle Method) Principal stresses and Principal Strains.

Stresses in thin and thick cylinders: Introduction, lame's equation. Numerical problems on thin cylindrical and spherical shells, thick cylinder and compound cylinders.

Course Outcomes

1. Understand the concepts of stress and strain at a point as well as the stress-strain relationships for homogenous, isotropic materials.
2. Calculate the stresses and strains in axially-loaded members, circular torsion members, and members subject to flexural loadings.
3. Calculate the stresses and strains associated with thin-wall spherical and cylindrical pressure vessels.
4. Design simple bars, beams, and circular shafts for allowable stresses and loads.

Text Books

1. Dr. R. K. BansalA textbook of strength of materialsEdition :Sixth 2017 ISBN :9788131808146
2. BogdanSkalmierski, Mechanics and Strength of Materials, Volume 1, ISBN: 9781483102559

Reference Books

1. R.K.Rajput, Strength of Material' S.Chand publication, Volume 01 ISBN 9789385676314

Web resources

1. Material Science - http://www.istl.org/02-spring/internet.html
2. Strength of Material - https://en.wikibooks.org/wiki/Strength_of_Materials
3. Strength of Material - http://nptel.ac.in/courses/105105108

MOOCs

1. Mechanics of Material - https://www.mooc-list.com/tags/materials
2. Mechanics of Materials I: Fundamentals of Stress & Strain and Axial Loading- https://www.mooc-list.com/course/mechanics-materials-i-fundamentals-stress-strain-and-axial-loading-coursera
3. Structures - https://www.mooc-list.com/tags/structures

List of Experiments

Experiment. No.	Title	Learning Outcomes
1	Introduction to Laboratory, Lab Manual and Lab components.	Students will learn about the basics of experiments
2	To study the Brinell hardness testing machine & perform the Brinell hardness test.	They will understand the hardness value performed.
3	To study the Rockwell hardness testing machine & perform the Rockwell hardness test.	They will understand the hardness value performed.
4	To study the impact testing machine and perform the impact Test(Izod test)	They will determine the impact test sustain by steel/iron sheet
5	To study the impact testing machine and perform the impact Tests(Charpy test)	They will determine the impact test sustain by steel/iron sheet
6	To study the universal testing machine (UTM) and perform the tensile test.	They will understand the tensile strength by UTM.
7	To perform double shear test on given specimen.	Understanding about the shear strength
8	To perform compression test on Timber.	They will determine the compression strength on timber
9	To perform torsion test on mild steel.	They will understand the torsion test on mild steel rod
10	To perform Beam Deflection and Beam Bending.	They will understand the bending moment theory.

Subject: **Surveying–I**								
Program: **B.Tech Civil Engineering**				Subject Code: **CV0305**			Semester: **III**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	24/60	24/60	16/40	16/40	200

Course Objectives:

1. To understand the importance of surveying in the field of civil engineering
2. To study the basics of linear/angular measurement methods like chain surveying, compass surveying
3. To study the significance of plane table surveying in plan making
4. To know the basics of leveling and theodolite survey in elevation and angular measurements
5. To understand tachometric surveying in distance and height measurements

CONTENTS

UNIT-I

[13hours]

Introduction and Overview of Surveying : Introduction, Objective of surveying, Basic principles of surveying, classification, plans and maps, scales, units of measurements, plotting.

Measurement of Distance: Chain Surveying: Introduction, Methods of Measuring Distance, different chain types, Errors in chaining, chain surveying, Field work, plotting chain surveying data, Numerical problems.

UNIT-II

[11hours]

Measurement of Directions: Compass surveying: Introduction, Magnetic bearing, compass, designation of bearings, calculations of included angles from bearings, traversing with chain and compass, local attraction, plotting and adjusting a traverse, numerical problems.

Measurements of Elevations – Levelling: Introduction, Terminology, direct method of levelling, temporary adjustments of level, reduction of levels, other methods of levelling, curvature and refraction, field problems in levelling, precision and errors in levelling.

UNIT-III

[11hours]

Measurements of Elevations – **Contouring:** Introduction, characteristics of contours, methods of contouring, preparing of contouring maps, uses of contour maps.
Computation of Areas and volumes: Introduction, Area of a traverse, determining areas from plans, partitioning of land. Volume from cross section, Prismoidal correction, curvature correction, capacity of reservoirs, formulas, numerical problems.
Applications of Minor Instruments: Principles and Uses of Planimeter, Abney Level, Tangent, Clinometers, Box Sextant, Pantograph

UNIT-IV

[10hours]
Plane table Surveying : Introduction, setting up plane table, methods, two-point and three point problems, errors in plane tabling, advantages and disadvantages.
Setting out Works: Introduction, instruments and methods, laying out buildings, setting out culverts, bridges and tunnels.

Course Outcomes

1. Carry out preliminary surveying in the field of civil engineering applications such as structural, highway engineering and geotechnical engineering.
2. Plan a survey, taking accurate measurements, field booking, plotting and adjustment of traverse.
3. Use various conventional instruments involved in surveying with respect to utility and precision.
4. Plan a survey for applications such as road alignment and height of the building
5. Undertake measurement and plotting in civil engineering.

Text Books

1. Surveying and Levelling by N.N. Basak, Tata McGraw-Hill Education, 1994, ISBN 9780074603994

Reference Books

2. Surveying Vol.I, II and III by Dr. B.C. Punamia, Laxmi Publications, 2005 - 602 pages, ISBN 9788170080800

Web resources

1. Surveying - http://www.scopesurveying.com.au
2. CEPT - http://cept.ac.in/labs/surveying-leveling
3. NPTEL - http://nptel.ac.in/courses/105107122/16
4. Surveying and Mapping - http://www.gps.gov/applications/survey

MOOCs

1. Surveying - https://www.mooc-list.com/categories/engineering
2. Surveying and leveling - https://www.mooc-list.com/tags/engineering

List of Experiments:

Experiment. No.	Title	Learning Outcomes
1	Introduction to civil engineering surveying laboratory	Basic knowledge of surveying lab
2	Chain and tape survey	Understanding the linear measurements
3	Compass surveying (Prismatic Compass)	Understanding the angular measurements
4	Compass surveying (Surveyors' Compass)	Understanding the angular measurements
5	Compass and Chain-Tape survey	Understanding the measurement of area
6	To determine the reduced levels of points using dumpy level	They will determine height of instrument and RL level of ground
7	Profile leveling and cross sectional leveling using dumpy level.	They will draw a profile leveling along road c/s
8	Contour surveying	They will prepared a contours map
9	Application of Minor instruments like Plannimeter, Abney level etc.	They will understand what are the uses of minor instruments use in surveying
10	Plane table surveying	principle, instruments, setting up the plane table, methods of plane tabling
11	Setting out works- distances, angles	They will understand to setting out work doing on the field
13	Setting out positions of column centers of a multi storey building	They will understand to setting out the positions of a building work on the ground.

Subject:**Human Values and Professional Ethics**								
Program:B.Tech. ALL				Subject Code**:SH0307**				**Semester: III**
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
1	0	0	0	24/60	0	16/40	0	100

Course Objectives:

- To create an awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

CONTENTS

Unit 1

Values and Self Development [4 hours]

Social Values and individual Attitudes, Work ethics, Indian vision of Humanism, Moral and non moral valuation, Standards and principles, Value judgments. Importance of cultivation of values, Sense of duty, Devotion, Self reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National unity, Patriotism, Love for nature, Discipline.

Unit 2

Personality and Behavior Development [4 hours]

Soul and scientific attitude. Goad and scientific attitude, positive thinking, integrity and discipline, punctuality, love and kindness. Avoiding fault, finding. Free from anger, Dignity of labor, Universal brotherhood and religious tolerance, True friendship, Happiness vs. suffering love for truth. Aware of self destructive habits, Association and cooperation, doing best, saving nature.

Unit 3

Character and Competence [3 hours]

Science vs. God, Holy books vs. Blind faith, Self management and good health, Science of reincarnation, Equality, Nonviolence, Humility, Role of women, All religions and same message, Mind your mind, Self control, Honesty, Studying effectively.

Unit 4

Engineering Ethics **[4 hours]**

Senses of 'Engineering Ethics', variety of moral issues, types of inquiry, moral dilemmas, moral autonomy, Kohlberg's theory, Gilligan's theory, consensus and controversy, models of professional roles, theories about right action, self interest, customs and religions, uses of ethical theories, Valuing time, Co-operation and commitment, Code of ethics, Sample codes – IEEE, ASCE, ASME and CSI.

Text Books

1. Chakraborty, S. K., Values and Ethics for Organization Theory and Practice, ISBN: 019 565623 7 Oxford University Press, New Delhi, 2001
2. Gaur R. R., Sangal R., Bagaria G. P., A foundation course in Value Education, ISBN 10: 8174467815 2009.

Reference Books

3. Govindrajan M., Natrajan S. and Senthil Kumar V. S., Engineering Ethics (including Human Values), Prentice hall of India Ltd., New Delhi, 2004.
4. Frankena, W. K., Ethics, Prentice Hall of India, New Delhi, 1990.
5. Dhar P. L., Gaur R. R., Science and Humanism, Commonwealth Publishers, 1990.
6. TripathyA. N., Human Values, New Age International Publishers, 2003.
7. Seebauer E. G. and Robert L. Berry, Fundamentals of Ethics for Scientists andEngineers, Oxford University Press, 2000.
8. Banerjee B. P., Foundations of Ethics and Management, Excel Books, 2005.
9. Bajpai B. L., Indian Ethos and Modern Management, New Royal Book Company, 2004.

4TH SEMESTER

B-TECH CIVIL ENGINEERING, SEMESTER –IV TEACHING & EXAMINATION SCHEME (BOS-14/06/2017) WITH EFFECT FROM JULY 2017													
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
								THEORY			PRACT		TOTAL
								CIE					
			L	T	P			MID	IE	ESE	CIE	ESE	
1	SH0401	COMPLEX VARIABLES AND NUMERICAL ANALYSIS	3	2	0	4	5	30	10	60	0	0	100
2	CV0401	FLUID MECHANICS–II	3	2	0	4	5	30	10	60	0	0	100
3	CV0402	STRUCTURAL ANALYSIS-I	4	2	0	5	6	30	10	60	0	0	100
4	CV0403	CONCRETE TECHNOLOGY	3	0	2	4	5	30	10	60	40	60	200
5	CV0404	BUILDING AND TOWN PLANNING	3	2	0	4	5	30	10	60	0	0	100
6	CV0405	SURVEYING–II	3	0	2	4	5	30	10	60	40	60	200
7	CE0407	CYBER SECURITY AND INTELLECTUAL PROPERTY RIGHT	1	0	0	0	1	30	10	60	0	0	100
TOTAL			**20**	**08**	**04**	**25**	**32**	**210**	**70**	**420**	**80**	**120**	**900**

Subject:**Complex Analysis and Numerical Methods**								
Program: **B. TechCIVIL ENGINEERING**			Subject Code:**SH0401**				Semester: **IV**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	60	00	40	00	100

1. **Course outcomes:**

   After completion of this course students will be able to gain knowledge about following

   - To provide an ability to understand, interpret and use the basic concepts: complex number, analytic function, harmonic function, Taylor and Laurent series, singularity, residue, conformal mapping, meromorphic function.
   - To provide an ability to prove certain fundamental theorems about analytic functions, e.g. Cauchy's integral formula
   - To provide an ability to determine the images of curves under simple complex mappings.
   - To provide an ability to determine the stability of certain dynamical systems using complex functions.

CONTENTS

UNIT-I

Complex Analytic Functions: [11hours]

Complex Numbers, Demoivere's Theorem, Roots of Complex Numbers, Elementary complex functions, Complex planes, Curves in complex planes, Concept of neighborhood in The complex plane, Analytic function, Cauchy- Riemann equations (Cartesian and polar forms – without proof), Harmonic functions, conformal mappings, some standard conformal transformations.

UNIT-II

Interpolation [12hours]

Finite differences and Interpolation: Finite differences Forward, Backward & Central difference operators and difference tables. Interpolation, Interpolation Formulae with equal intervals: Newton's forward, Newton's backward, Central difference interpolation by Stirling's formulae

Interpolation Formulae with unequal intervals: Lagrange's & Newton's divided difference interpolation**Numerical Integration:** Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule.
Numerical differentiation: Using Newton's forward and backward interpolation formula

UNIT-III

Numerical Methods: Basic Errors. **[12hours]**

Solution of Algebraic and Transcendental Equations: Bisection method, Regula-Falsi method, Newton-Raphson method, Convergence condition for these methods.
Numerical methods in Linear Algebra: Gauss-Jacobi, Gauss-seidel method
Largest Eigen values and corresponding Eigen vectors: By power method
Numerical Solutions of ordinary differential equations: Taylor's Method, Euler's Method, Improved Euler Method (Heun's Method), Runge-Kutta method of order four

UNIT-IV

Complex Integration: [10hours]
Complex integration, Cauchy's integral theorem and Cauchy's integral formula (without proof), Singularities, Taylor's and Laurent's series, Cauchy-Residue theorem, Residues & Contour integration, Applications of residue to evaluate real integrals.

2. Text books

1) Erwin Kreyszig: Advanced Engineering Mathematics (8^{th} Edition) Wiley Eastern Ltd., New Delhi (1999).

3. Reference Books

1) R. V. Churchill and J. W. Brown: Complex variables and applications (7^{th} Edition), McGraw-Hill (2003)
2) B. V. Ramana: Higher Engineering Mathematics, McGraw Hill, New Delhi (2008).
3) Merel C Potter, J L Goldberg: Advanced Engineering Mathematics (3rd Edition) Oxford India Publication (2005).
4) Dr. B.S. Growl: Higher Engineering Mathematics, Khanna Publishers, New Delhi (2000).
5) R K Jain, S R K Iyengar: Advanced Engineering Mathematics. Third Edition, Narosa Publishing House (Reprint2014).

4. Digital learning resources

Free online Mathematics (http://freevideolectures.com/blog/2010/11/130-nptel-iit-online-courses/)

Subject: **Fluid Mechanics-II**								
Program: **B. TechCIVIL ENGINEERING**				Subject Code:**CV0401**			Semester**: IV**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60	0	16/40	0	100

Course Objectives

1. Provide fundamental knowledge of fluid.
2. Develop basic understanding of Fluid properties.
3. Give the knowledge of behavior of fluid under various conditions.

CONTENTS

UNIT-I

Dimensional Analysis and Similitude : [5 hours]

Fundamental dimensions, Physical Quantity and Dimensions, dimensional homogeneity, Buckingham's pi-theorem, non- dimensional numbers and their physical significance; Geometric, kinematic and dynamic similarities, model laws, model testing and its analysis, scale effects, undistorted and distorted models.

Boundary Layer Analysis: [5 hours]

Assumptions and concept of Boundary layer theory, boundary layer thickness, displacement momentum and energy thickness, laminar and turbulent boundary layer on flat plate, laminar sublayer, smooth and rough boundaries, local and average friction coefficient and separation and control.

UNIT-II

Uniform flow in open channel: [4 hours]

Development of uniform flow, resistance law, factors affecting Manning's roughness coefficient, conveyance, section factor for uniform flow computations, computation of uniform flow, efficient channel sections, hydraulic exponent for uniform flow computations.

Specific Energy: [5 hours]

Specific energy Equation, Specific Energy curve and its limitations, critical depth and section factor for critical flow computations, open channel flow transitions. Introduction to RVF, Types of Hydraulic Jumps, Characteristics of Hydraulic Jump. Derivation & Numerical based on above topic.

Basic concepts of open channel flow: [5 hours]
Introduction, Open channel flow v/s pipe flow, classification of open channel flow based on space and time criteria, velocity distribution and pressure distribution in open channel, continuity equation, momentum equation and energy equation in open channel.

UNIT-III

Gradually varied flow: [7 hours]
Introduction, Assumptions in GVF analysis, dynamic equation of GVF, classification of channel slopes, GVF profiles, its identification and computation. Derivation & Numerical based on above topic.

Rapidly Varied Flow: [3 hours]
Introduction to RVF, Types of Hydraulic Jumps, Characteristics of Hydraulic Jump. Derivation & Numerical based on above topic.

UNIT-IV

Water Turbines:[11 hours]
Impulse turbine-Reaction turbines- Significance of specific speed-Unit, quantities, Concept of performance characteristics for water turbines.

Centrifugal pumps:
Classification and selection criterion, pump applications, centrifugal pumps, classification of centrifugal pumps, Pumps in series and parallel, specific speed, Unit quantities and characteristics curves, Cavitation in turbines and pumps. Operation of a reciprocating pump. Centrifugal pumps versus reciprocating pumps, rotary displacement pumps.

Course Outcomes

1. Understand the fundamentals of Fluid Mechanics and related applications.
2. Know basics of fluid kinematics and dynamics and their applications.
3. Formulate basic equations for Fluid Engineering problems.
4. Calibrate various fluid flow measuring devices.
5. Understand the necessity and concept of dimensional analysis, boundary layer and compressible fluid flow.

Text Books

1. Fluid Mechanics and Fluid Power Engineering – D.S. Kumar– Kataria& Sons – New Delhi, ISBN, 9350143925
2. A text of Fluid Mechanics – R. K. Rajput – S. Chand & Company Ltd., Delhi, ISBN 9789385401374

Reference Books

1. Fluid Mechanics & Hydraulics Machines-R.K.Bansal-LaxmiPublications.Delhi, ISBN 9788131808153
2. Engineering Fluid Mechanics –K.L. Kumar, Eurasia Publication House, Delhi

Web resources

An introduction to Fluid Mechanics (http://nptel.ac.in/courses/112105171/)

Moocs

Free Online Fluid mechanics Video (https://www.mooc-list.com/course/fundamentals-engineering-exam-review-courserahttps://www.mooc-list.com/course/wind-waves-and-tides-alternative-energy-systems-coursera)

Subject**: Structural Analysis-I**								
Program**: B.Tech. CIVIL ENGINEERING**				Subject Code:**CV0402**			Semester: **IV**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
4	2	0	5	24/60	0	16/40	0	100

Course Objectives

1. To gain a fundamental understanding of the concepts of stress and strain by analysis of solids and structures.
2. To study engineering properties of materials, force-deformation and stress-strain relationship
3. To learn fundamental principles of equilibrium, compatibility, and force-deformation relationship, and principle of superposition in linear solids and structures
4. To analyze; determinate and indeterminate axial members, tensional members and beams to determine axial forces, torque, shear forces, bending moments, slopes and deflection.
5. To determine stress, strain, and deformation of bars, beams and springs.
6. To be able to perform structural analysis by hand computations and design axial and tensional members.

CONTENT

UNIT-I

Fundamentals **[12 hours]**

Types of statically determinate & indeterminate structures, static and kinematic indeterminacy of structure (2D and 3D elements), Maxwell's reciprocal theorems. Computation of internal forces in statically determinate structures.

Strain Energy

Resilience, proof resilience strain energy in tension, compression, shear, bending, torsion, gradual, sudden and impact loads

UNIT-II

Slope and Deflection of Determinate Beams and Plane Trusses **[8 hours]**

Relationship between slope deflection and moment of curvature, method to calculate slope and displacement of determinate structures (Double integration method, Macaulay's method, Conjugate beam method, Moment area method, Unit load Method).

UNIT-III

Influence lines for Determinate Structures **[12 hours]**

Influence lines for reactions in statically determinate structures – influence lines for member forces in pin-jointed frames – Influence lines for shear force and bending moment in beam sections – Calculation of critical stress resultants due to concentrated and distributed moving loads.

Arches

Arches as structural forms, Types of arches – Analysis of three hinged arches, parabolic and circular arches – Settlement and temperature effects.

UNIT-IV

Direct and Bending Stresses **[13 hours]**

Columns subjected to direct and eccentric loads, Maximum and minimum stresses in columns, core and kernel of section, Dams subjected to hydraulic pressure, retaining walls subjected to earth pressure and chimney subjected to wind pressure.

Columns and Struts

Introduction, short and long columns, Euler's theory on columns (Assumptions and standard cases), effective length and slenderness ratio, Rankine's formula, Numerical problems.

Course Outcomes

1. Analyze and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials.
2. Utilize appropriate materials in design considering engineering properties, sustainability, cost and weight.
3. Perform engineering work in accordance with ethical and economic constraints related to the design of structures and machine parts.

Text Books

1. Mechanics of Structures - S B Junnarkar& H J Shah Charotar Pub House ISBN 978938035899
2. R.C. Hibbeler, Structural Analysis,Prentice Hall Publishing Company, Current Edition, 6th Editions, ISBN 13: 9788131721414

Reference Books

1. Structural Analysis 1-S S BhavikattiVikasPublising House Pvt Limited, ISBN 9788125942696

Web resources

Structure Analysis II (http://nptel.ac.in/downloads/105101085/)

MOOCS

https://www.mooc-list.com/course/elements-structures-edx

Subject**: Concrete Technology**								
Program**: B.Tech CIVIL ENGINEERING**				Subject Code:CV0403			Semester: **IV**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	24/60	60	16/40	40	200

Course Objectives:

1. To understand the properties of ingredients of concrete
2. To study the behavior of concrete at its fresh and hardened state
3. To study about the concrete design mix
4. To know about the procedures in concreting
5. Tounderstand special concrete and their use

CONTENT

UNIT-I

Concrete Ingredients: [13 hours]

Cement, Chemical composition, hydration of cement, Types of cement, manufacture of OPC by wet and dry, process (flow charts only) Testing of cement – Field testing, Fineness by sieve test and Blaine's air permeability test, Normal consistency, testing time, soundness, Compression strength of cement and grades of cement, Quality of mixing water, Fine aggregate – grading, analysis, Specify gravity, bulking, moisture content, deleterious materials. Coarse aggregate – Importance of size, shape and texture. Grading of aggregates – Sieve analysis, specific gravity, Flakiness and elongation index, crushing, impact and abrasion tests.

UNIT-II

Fresh Concrete: [10 hours]

Workability- factors affecting workability, Measurement of workability – slump test, flow tests, Compaction factor and Vee-Bee consistometer tests, Segregation and bleeding. Process of manufactures of concrete: Batching, Mixing, Transporting, Placing, Compaction, Curing, Finishing. Various Chemical and Mineral admixtures.

UNIT-III

Hardened Concrete:**[12 hours]**

Factors affecting strength of Concrete, w/c ratio, gel/space ratio, maturity concept, Effect of

aggregate properties, relation between compressive strength, and tensile strength, bond strength, modulus of rupture. Elasticity – Relation between modulus of elasticity and Strength, factors affecting modulus of elasticity, Poisson , Ratio, Shrinkage – plastic shrinkage and drying shrinkage, Factors affecting shrinkage, Creep – Measurement of creep, factors affecting creep, effect of creep.

Testing of hardened concrete

Compressive strength, split tensile strength, Flexural strength, factors influencing strength test results.

UNIT-IV

Concrete Mix Design: [10 hours]

Concept of Mix design, variables in proportioning, exposure conditions, Procedure of mix design as per IS 10262-1982, Numerical examples of Mix Design.

Special Concrete:

Introduction and characteristics of high strength concrete, high performance concrete, fibre reinforced concrete, mass concrete, light weight and heavy weight concrete, Precast concrete, ready mix concrete.

Course Outcomes:

1. Test all the concrete materials as per IS code
2. Design the concrete mix using ACI and IS code methods
3. Determine the properties of fresh and hardened of concrete
4. Design special concretes and their specific applications
5. Ensure quality control while testing/ sampling and acceptance criteria

IS Codes:

1. Bureau of Indian Standards, IS 456:2000 – Plain and Reinforced Concrete – Code of Practice, 2000.
2. Bureau of Indian Standards, IS 10262:2009 - Recommended guidelines for concrete mix design.

Text Books:

1. “Concrete Technology” - Theory and Practice, M.S.Shetty, S.Chand and Company, New Delhi, 2002.

References Books:

2. “Properties of Concrete”, Neville, A.M.: ELBS, London
3. “Concrete Mix Design” - N. KrishnaRaju, Sehgal – publishers

Web resources:

Concrete Technology (http://nptel.ac.in/courses/105102012/)

List of Experiments:

Experiment. No.	Title	Learning Outcomes
1	Sieve Analysis For Coarse and Fine Aggregate	Basic Understanding on types of aggregates
2	Determination Of Aggregate Crushing Value	They will understand how to determination process of crushing value of aggregate
3	Determination Of Aggregate Impact Value	They will understand how to determination process of Impact value of aggregate
4	Shape Test For Aggregate	They will understand the concept of shape of aggregate
5	Dorry Abrasion Test / Deval Abrasion Test	They will understand how to determination process of hardness value of aggregate
6	Determination Of Specific Gravity And Water Absorption Of Aggregate	They will understand the significance of specific gravity value of aggregate.
7	Determination of Consistency of Standard Cement Paste	They will understand the physical significance of consistency of cement paste
8	Determination of Initial And Final Setting Time of Ordinary Portland Cement And Effect Of Certain Admixture	They will determine the setting time of cement.
9	Determination of Compressive Strength of Cement	They will determine the Compressive strength of cement.
10	Compaction Factor Test For Concrete	They will understand about the workability of concrete
11	Slump Test For Concrete	They will understand about the workability of concrete
12	Compression Test For Concrete Cubes	They will determine the cube strength of concrete.
13	Split Cylinder Test For Concrete	They will determine the split strength of concrete.
14	Concrete Mix Design.	They will understand the design mix concept of concrete mix design.

Subject:**Building and Town Planning**								
Program**: B.TechCIVIL ENGINEERING**				Subject Code:**CV0404**			Semester**: IV**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60	0	16/40	0	100

Course Objectives:

1. Tounderstand the concept of building planning and architecture.
2. Tounderstand the various building codes to be followed while planning a building.
3. Tohave the knowledge of various building components.

CONTENTS

UNIT- I

Building planning: **[15 hours]**

Introduction to building drawing, different types of buildings and residential building, importance of site selection-climate and its influence and orientation in building planning, principals of planning and architecture, Numerical problems.

Building Bye laws:

Introduction to building bye laws, objectives of need of building bye laws, study of General Development Control Regulation (GDCR), study of National Building Code (NBC).

Planning of Residential and Public building:

Introduction to Every component part of building and its importance in planning, planning according to the requirements of client, Funds available and Site conditions, Green building and water harvesting.

UNIT- II

Planning for Natural Disaster: **[10hours]**

Introduction, Categories of building (Seismic Zone, importance of Building and SBC of soil), and General planning and design aspects.

Preparation of working drawings:
Guidelines of preparing the drawing (Plan, Section and Elevation), Positions of various components of building, Drafting material and their utilization, Conventional signs and symbols.

Perspective drawing:
Necessity- principals and characteristics of perspective drawing, introduction to perspective elements, classification of perspective projection, distance points.

UNIT- III

Town planning: [10hours]
Introduction, Evolution of Town planning, principals and Necessity of town planning, Growth of towns.

Surveys:
General, Necessity, Collection, Types and Uses of survey, Methods adopted for collection of data, Drawings and reports.

UNIT- IV

Elements of City planning: [10hours]
Circulation, Zoning and land use, Housing, Landscape pattern, Master plan, Town Centre, Civic centers, Shopping Centre, Town Planning Schemes, CBD.

Elements of Neighborhood:
Concept, Principals, Objectives and Elements of Neighborhood Planning, Slums – General, Causes, Characteristics, Effect of slums and works on improvement.

Course Outcomes:

After studying this subject students will be able to:

1. Comprehend local building byelaws and provisions of National Building Code in respect ofbuilding and town planning
2. Discuss various aspects of principles of planning and architecture in planning building and mass composition
3. Explain the principles of planning and design considerations to construct earthquake resistantbuilding
4. Prepare working drawings, foundation plans and other executable drawings with proper details for residential buildings

Text Books

1. Building drawing by M.G.Shah, C.M. Kale and S.Y.Patki, 3rd editions ISBN, 0074638769, 9780074638767 Tata Mcgraw Hill, New Delhi.
2. Building planning, designing and scheduling by Gurcharan Singh, Standard Book House, New Delhi.

Reference Books:

1. Town Planning by S.C. Rangwala, **ISBN** : 8185594813, 9788185594811Charotar Publishing House, Anand.
2. General Development Control Regulations (GDCR) published by AUDA and GICEA.
3. National Building Code-2005 (NBC), New Delhi.

Web Resources:

Building Planning (https://www.slideshare.net/HitenChauhan/building-town-planning)

Subject: **Surveying-II**								
Program:**B.TechCIVIL ENGINEERING**				Subject Code:**CV0405**			Semester: **IV**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	24/60	60	16/40	40	200

Course Objectives:

1. To understand the importance of surveying in the field of civil engineering
2. To study the basics of linear/angular measurement methods like chain surveying, compass surveying.
3. To study the significance of plane table surveying in plan making
4. To know the basics of leveling and theodolite survey in elevation and angular measurements
5. To understand tachometric surveying in distance and height measurements

CONTENTS

UNIT- I

[12hours]

Theodolite surveying: Introduction, vernier theodolite, Terminology, temporary adjustments, measuring horizontal and vertical angles, theodolite traversing, errors in theodolite work, precision in linear and angular measurements, numerical problems.

Tachometry Surveying: Introduction, Basic principles of stadia tachometry, methods, field work, errors, effect of errors on distance and elevation, precision, numerical problems.

UNIT- II

[10hours]

Curve Surveying: Introduction, Types of Curves(Circular, compound, reverse, transition, spiraling compound, spiraling reverse, lemniscates, vertical), Numerical problems.

Trigonometric Leveling: Introduction, basic principles of trigonometric leveling, calculation of height and distances, refraction and curvature, axis-signal correction, determining differences in elevation, numerical problems.

UNIT- III

[13hours]

Theory of Errors and survey Adjustments : Introduction, errors , laws of weights, principle of least squares, most probable value, method of correlates, probable and distribution error, triangulation adjustment, method of equal shifts, Numerical problems.

Engineering surveys: Introduction, route surveys, longitudinal and cross-sectional leveling, topographic surveys, city surveys, underground surveys.

UNIT- IV

[10hours]

Modern surveying Instruments: introduction, electromagnetic spectrum, radar, electromagnetic distance measurement, EDM equipment, Corrections, Total stations.

Modern Methods of surveying: Introduction, remote sensing, basic concepts in remote sensing, remote sensing in India, application of RM, satellite based positioning systems, GIS and its applications.

Course Outcomes

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

1. carry out preliminary surveying in the field of civil engineering applications such as structural, highway engineering and geotechnical engineering
2. plan a survey, taking accurate measurements, field booking, plotting and adjustment of traverse
3. use various conventional instruments involved in surveying with respect to utility and precision
4. plan a survey for applications such as road alignment and height of the building
5. undertake measurement and plotting in civil engineering

Text Book

1. Surveying and Leveling by R Subramanian (Oxford publication), 2nd Editions ISBN: 9780198085423

Reference Books

1. Surveying Vol.I, II and III by Dr. B.C. Punamia
2. Surveying and Levelling Vol. I and II by T.P Kanetkar and S.V Kulkarni
3. Surveying Vol. I, II and III by Dr. K.R. Arora

Web Resources

Surveying II (http://www.aboutcivil.org/surveying-levelling%20II.html)

Engineering Survey II (http://nptel.ac.in/course.php?disciplineId=105)

List of Experiments

Experiment. No.	Title	Learning Outcomes
1	Theodolite surveying.	They will understand the angular measurements.
2	Tachometric surveying.	They will know how to calculate the height of tower/building using trigonometrically formulae.
3	Curve surveying.	They will know the setting out of work on the field.
4	Introduction to total station, components, temporary adjustments.	Demonstration of total station, and adjustments.
5	Horizontal and sloping distance measurement using total station.	They will understand the linear measurement using total station.
6	Measurement of horizontal and vertical angles using total station.	They will understand the angular measurement using total station.
7	Orientation of total station using compass and measurement of magnetic bearings.Measurement of coordinates (N, E, Z) of various points.	Student will learn about the locating the points as coordinates on an axes.

Subject: **Cyber Security and Intellectual Property Rights**								
Program: **B.Tech. Civil Engineering**			Subject Code: CE0407			Semester: I**V**		
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
1	0	0	0	60	0	40	0	100

CONTENTS

UNIT-I

Introduction: **[4 hours]**

Information Security Overview, Cyber security, Cyber security objectives and policies, Differences between Information Security & Cyber security, Cyber security Principles, Introduction of Cyber crime, Classifications of Cybercrimes.

UNIT-II

Security Threats and vulnerabilities: **[4 hours]**

Overview of Security threats, Hacking Techniques, Password Cracking, Insecure Network connections, Malicious Code, Programming Bugs, Cyber crime and Cyber terrorism, Information Warfare and Surveillance. Applicationsecurity(Database,E-mailandInternet).

UNIT-III

Overview of Security Management: **[4 hours]**

Overview of Security Management , Security Policy , Security Procedures and Guidelines , Risk Management , Security Laws**,** System Security (Desktop, email,web), **I**ntrusion Detection Systems, SecurityTechnology-FirewallandVPNs,Backup SecurityMeasures.

UNIT-IV

Cyber law- Intellectual property right: **[3 hours]**

Introduction, Objectives of Intellectual property law, Types of IPR, Advantages of IPR, IPR in India, Offences and Penalties.

Text Books

1. "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", ISBN 378-81-317-1672-4 Nina Godbole, SunitBelapur, Wiley India Publications, April, 2011

Reference Books

1. CharlesP.Pfleeger,ShariLawerancePfleeger,"AnalysingComputerSecurity",PearsonEducationIndia.
2. .K.Pachghare,"Crypto-graphyandinformationSecurity",PHI LearningPrivateLimited,DelhiIndia.
3. Dr.SuryaPrakashTripathi,RitendraGoyal,PraveenkumarShukla,"Introductionto InformationSecurityandCyberLaw"WilleyDreamtechPress.

5TH SEMESTER

B-TECH CIVIL ENGINEERING, SEMESTER –V TEACHING & EXAMINATION SCHEME (BOS-14/06/2017) WITH EFFECT FROM JULY 2017														
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME						
								THEORY			PRACT		TOTAL
			L	T	P			CIE		ESE	CIE	ESE	
								MID	IE				
1	CV0501	DESIGN OF RC STRUCTURES	4	2	0	5	6	30	10	60	0	0	100
2	CV0502	SOIL MECHANICS	3	0	2	4	5	30	10	60	40	60	200
3	CV0503	HIGHWAY ENGINEERING	3	0	2	4	5	30	10	60	40	60	200
4	CV0504	STRUCTURAL ANALYSIS-II	4	2	0	5	6	30	10	60	0	0	100
5	CV0505	ENGINEERING HYDROLOGY	3	2	0	4	5	30	10	60	0	0	100
6	CV0506	ENVIRONMENTAL ENGG-I	3	0	2	4	5	30	10	60	40	60	200
7	SH0507	TECHNICAL COMMUNICATION AND SOFT SKILL	1	0	0	0	1	30	10	60	0	0	100
TOTAL			**21**	**06**	**06**	**26**	**33**	**210**	**70**	**420**	**120**	**180**	**1000**

Subject: **Design of RC Structures**								
Program: **B.Tech. Civil Engineering**				Subject Code: **CV0501**			Semester: **V**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	4	24/60	0	16/40	0	100

Course Objectives:

1. To learn the fundamentals of reinforced concrete structural properties and behaviors.
2. To become informed about the optimum design criteria and procedures.
3. To understand the basic principles and design methods of reinforced concrete members.
4. To clarify code requirements and specifications and understand the background of code

CONTENTS

UNIT-I

[12 hours]

Introduction to Reinforced Cement Concrete (RCC): Properties of Concrete and Reinforcing Steel, Introduction to Working stress and Limit state methods, Characteristic and Design Value and Partial Safety Factors, Loads and Load Factors, Load Combinations.

Design Philosophies for Reinforced Cement Concrete (RCC): Limit State of Flexure, Design of Singly Reinforced Beams, Design of Doubly Doubly Reinforced Beams, and Concept of Flanged Beam or T-Beam.

UNIT-II

[10 hours]

Limit State of Shear: Nominal Shear Stress, Design Shear Strength of Concrete, Minimum Shear Reinforcement, Design of Shear Reinforcement, Design of Beams for Shear.
Limit State of Torsion: Reinforcement in members subjected to Torsion, Design of Beams for torsion. Bond, Development Length, Limit State of Serviceability: Deflections and Crack Width.

UNIT-III

[13 hours]

Solid Slabs: Introduction to Yield Line Theory and simple problems, One-way Slab, Simply Supported One-way Slab, Design of One Way Slab, Two Way Slabs, Simply Supported Two-Way Slab, Design of Two-Way Slab Reinforcement detailing for One way and Two Way Slabs.
Design of Staircases: Classification of Stairs, Terms Used, Design Requirement d for Stair, Design of Transversely and Longitudinally Supported Staircase.
Load Calculation: Loads on Slabs, Loading on Beams from One-way and Two-way Slab, Wall Loads and Self-weight of Beams, Unit Loads

UNIT-IV

[10 hours]

Limit State of Compression: Minimum eccentricity, Effective Length of Compression Members, Slender Limits for Columns, Design of Short axially loaded columns in compression, Members subjected to combined Axial load and Uniaxial bending, Members subjected to combined Axial Load and Biaxial bending, Design of Slender compression members
Design of Foundations: Classification of Foundations, Types of Footings, General Soil Design Consideration, General Structural Design Consideration, Transfer of Load at base of Column, Design of Axially Loaded Pad Footings, Design of Eccentrically Loaded Footings.

Course Outcomes

1. Identify the typical failure modes of RC building
2. Develop the ability to analyze and design simple reinforced concrete building frames.
3. Apply the principles, procedures and current Indian code requirements to the analysis and design
4. Assess loads, prepare layout, analyze, design and detail of various structural elements for RC framed structure

Text Books

1. Dr. B. C. Punmia, Ashok Kr. Jain, Arun Kr. Jain, 'Reinforced Concrete Structures – Volume-I', Laxmi Publication, ISBN 9788170080831
2. Dr. H. J. SHAH, 'Reinforced Concrete (Elementary Reinforced Concrete) Volume-I', Charotar Publishing House Pvt. Ltd., 10th Edition, ISBN 9788192869247.

Reference Books

1. P. C. VARGHESE, 'Limit State Design of Reinforced Concrete', Prentice Hall India (PHI), Second Edition ISBN 978-8120320390.
2. S. U. Pillai and D. Menon, Reinforced Concrete Design, Tata Mcgraw-Hill 3rd Edition, ISBN 9780070141100, 2009.
3. Use of Design Aids (Sp16) — Use of Sp34.

Web resources:

2. A RCC Design (www.nptel.ac.in/courses/105105105/)
3. Design of Concrete Structures (design-of-concrete-structures-spring-2004/lecture-notes/)

4. Concrete Design (https://www.vssut.ac.in/lecture_notes/lecture1424715726.pdf)

Subject: **Soil Mechanics**								
Program: **B.Tech. Civil Engineering**			Subject Code: **CV0502**				Semester: **V**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	24/60	24/60	16/40	16/40	200

Course Objectives:

1. The course will help determination of various soil parameters theoretically and experimentally based on laws of mechanics.
2. This course will provide good understanding of various index (preliminary) and engineering properties of soil.
3. This course will provide determination of soil through various methodology and application for design of shallow and deep foundation systems for various civil engineering structures.
4. The course also discusses details of foundations, its selection procedures as per soil conditions.

CONTENTS

UNIT-I

[10 hours]

Introduction and Basic Properties of Soil: Soil 3 Phase system,Volume Mass relationships, Volume weight relationships, Water content Determination, Dry density determination,Sp Gravity, Mass Density and Relative density

Soil Classification System: Particle size classification, Classification systems: AASHTO, USC, ISC, Field Identification of soil

Soil Classification: Particle size analysis: Sieve Analysis (Coarse grained soil) and Sedimentation Analysis (Fine grained soil)

a) Sieve Analysis, Particle size Distribution curve and its uses, Coefficient of Uniformity and Curvature.
b) Sedimentation Analysis: Stokes Law, Theory of Sedimentation, Hydrometer Method, Combined Sieve and Sedimentation Curve.

c) Consistency Limits: Liquid Limit and Plastic limit and its determination as per IS 2720,Shrinkage Limit and its determination, Consistency Indices, Flow and Toughness Index, Sensitivity, Thixotropy, Activity, Uses of Consistency Limits.

UNIT-II

[12 hours]

Compaction: Objective/Importance of Compaction, Difference between Standard Proctor test and Modified Proctor test and its applications, Effect of Compaction on properties of soil, Factors affecting Compaction, Methods of compaction used in the field, Significance of Placement water content and Relative compaction. Numerical for finding OMC and Dry density with the help of graphs

Consolidation: Objective of Consolidation, Initial, Primary and Secondary consolidation, Spring Analogy for Primary Consolidation, Consolidation Test and Results, Determination of coefficient of Consolidation Cv(Square root of Time fitting method, log t Method), **Pre-consolidation**: Causes and Determination.

Practical Case Studies: 2 different case studies with two different methods and Numericals (Minimum 10 covering all the subtopics)

UNIT-III

[13 hours]

Permeability: Definition and objective of permeability, Darcy's law and its validity, Determination of Coefficient of Permeability: Constant Head and Falling Head Test, Factors affecting Permeability, Field Test for Permeability (Pumping In and Pumping out test), Numerical.

Stresses due to applied load: Causes of stresses and its significance in design of various geotechnical engineering aspects, Stress Strain curve of soil, typical values of E for different soil, Geostatic stress: Vertical and Horizontal stress

Vertical stresses due to concentrated load(Boussinesq's Solution and its limitations),Isobar diagram and its relevance, Vertical stress under circular and rectangular area, Basics of Newmark's chart, Westgaard's solution to find stresses, Approximate methods to find out stresses (Equivalent point load and 2:1 load distribution method) **,**Concept of Effective stress and its significance.

UNIT-IV

[10 hours]

Shear Strength: Introduction, Mohr's Circle and characteristics of Mohr's circle, Mohr Coulomb theory and Revised Mohr Coulomb theory, Different types of shear test with its advantages and limitations: (Direct shear, Triaxial with different drainage conditions, Unconfined compressionstrength test, Vane shear test), Mohr coulomb failure criterion, Modified failure envelope, Shear characteristics of cohesive and cohesion less soil.

Concept of Liquefaction and its hazards

Course Outcomes

1. The course covers various topics like compaction, shear strength, consolidation, earth pressure, stress distribution which gives insight to students to analyze soil parameters based on application and need of project site.
2. Student will able to understand about soil testing procedures, experimentation techniques and related issues.
3. Student will learn Simulation of mechanics on soil as a material to understand its behaviour before failure and estimating its permissible values.
4. Students will learn the details of foundations, its selection procedures as per soil conditions and various modifications available for various degrees of loads.

Text Books

1. Soil Mechanics and Foundation Engineering By: Dr K.R.Arora, ISBN9788180140068, Standard Publishers Distributors, 2005

Reference Books

2. Soil Mechanics By: B.C. Punmia, Ashok Kumar Jain, 7th editions, ISBN 8170087910, 9788170087915, Firewall Media, 2005
3. Soil Mechanics and Geotechnical Engineering By: V.N.S. Murthy, ISBN 9780824708733, CRC Press, 2002

Web resources

1. Soil Mechanics (www.nptel.ac.in/courses/105103097)
2. An introduction to Soil Mechanics (http://engineering.siu.edu/civil/facilities/teaching-labs/soil-mechanics.php)

MOOCs

1. https://www.mooc-list.com/instructor/stephen-fityus

List of Practical

Experiment. No.	Title	Learning Outcomes
1	To Determine the Consolidation Characteristics of a Soil Specimen	Students will get the idea of consolidation test of soil; they will know how consolidation affects the settlement of soil.
2	To Determine Shear Parameters of Sandy Soil Using Direct Shear Test	Students will know the idea of shear strength acting on soil.
3	To determine shear strength of Cohesive soil using vane shear test.	They will calculate the shear strength determination using vane shear.
4	To Determine the Unconfined Compressive Strength of Cohesive Soil	They will know the unconfined strength test of soil.
5	To Determine the Compaction Characteristics of a Soil Sample By Proctor's Test	Students will know the basic difference between the compaction and consolidation. They will understand the proctor's compaction test.
6	To Determine the Strength of the Soil Using Triaxial Test.	They will understand the strength of soil using triaxial test.
7	To Determine the Swell Pressure of Cohesive Soil (Black Cotton Soil)	They will determine the soil pressure on black cotton soil.
8	To Determine The Swell Index of Cohesive Soil.	They will understand the swell index of cohesive soil.
9	To determine the permeability of a soil specimen by the constant head permeameter.	They will determine the permeability test of soil using constant head method.
10	To determine the permeability of a soil specimen by the falling head permeameter.	They will determine the permeability test of soil using falling head method.

Subject: **Highway Engineering**								
Program: **B.Tech. Civil Engineering**			Subject Code: **CV0503**				Semester: **V**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	24/60	24/60	16/40	16/40	200

Course Objectives:

1. To introduce students with the principles and practices of transportation engineering which focuses on traffic and transportation engineering and highway engineering.
2. To enable the students to have a strong analytical and practical knowledge of Planning, Designing and solving the transportation problems.
3. To introduce the recent advancements in the field of Sustainable Urban
4. Development, Traffic Engineering and Management, Systems Dynamics Approach to Transport Planning, Highway Design and Construction, Economic and
5. Environment Evaluation of Transport Projects.

CONTENTS

UNIT-I

[13 hours]

HighwayPlanningandDevelopment: Highway planning in India, Development, Rural and urban roads, **Road** departments in India, Road classification, Road authorities i.e. IRC, CRRI, NHAI, etc.

FieldSurveys: Reconnaissance, Aerial surveys, Location surveys, Location of bridges, Problems in rural and urban areas.

HighwayGeometricDesign: Topography and physical features, Cross section elements like carriageway **width**, formation width, right of way, etc., friction, Light reflecting characteristics, roughness, camber, sight distances, horizontal alignment, design speed, minimum radius, super-elevation, transition curve, gradients, design of summit and valley curves, software used in highway geometric design like MX-Road.

UNIT-II

[10 hours]

Road Material: Sub grade soil and its classification, CBR and Plate load test, Aggregates and their types, physical and engineering properties, Fillers, Bitumen, Characteristics, Emulsions and cutbacks, Basic tests on all materials, Bituminous Paving Mixes (Marshall Mix Design)
Bituminous Surface Treatments: Prime Coats, Tack Coats, Surface Dressing, Seal Coats, Colour Coats and Non-Skid Coats, Fog Spray, Built up Spray Grout.
Soil Stabilization: Introduction, Mechanical Soil Stabilisation, Soil-Cement Stabilisation, Soil-Lime Stabilisation, Stabilisation of soil using Bituminous Material..

UNIT-III

[12 hours]
Highway Pavements: Functions and Desirable Characteristics of Pavement, Pavement Courses, Pavement Types, Comparison of Rigid and Flexible Pavements, Factors Affecting Pavement Design, Design of Flexible pavement, Design of rigid pavement.
Low Cost Roads: Stabilized earth, Gravel roads, W.B.M. roads, High Cost Roads: bituminous roads, cement concrete roads.
Overlay Design and Construction: Need for Overlays, Different types of Overlays Design, Overlay Design by Benkelman Beam Deflection Studies.

UNIT-IV

[10 hours]

Highway Maintenance: Introduction, Pavement Failures, Maintenance of Highways, Pavement Evaluation, Strengthening of Existing Pavements.
Highway Drainage: Surface and Subsurface Drainage arrangements and design.
Roadside Developments & Administration and Finance: Arboriculture, street lighting, Financing of road projects, administration of roads, PPP models, Road safety audit.

Course Outcomes

1. Understand the factors influencing road vehicle performance characteristics and design.
2. Apply basic science principles in estimating stopping and passing sight distance requirements.
3. Understand basic traffic stream parameters and models, traffic flow models, and queuing theory.
4. Design basic horizontal alignment of the highway
5. Design of flexible pavement layers.

Text Books

1. Dr.S.K.KhannaandDr.C.E.G.Justo,"HighwayEngineering",NemChand&Bros.,ISBN: 978818524080, Roorkee.

Reference Books

1. L.R.Kadiyali, "HighwayEngineering", ISBN 9789382609858,KhannaPublishers,NewDelhi.
2. IRC–37"Guide linesforDesignofflexiblePavements",IRC,NewDelhi,2001.

3. IRC:58,2002:“GuidelinesfortheDesignofPlainJointedRigidPavementsforHighways”,IRC,New Delhi,December,2002.

Web resources

1. Transportation Engineering I (https://ocw.mit.edu/courses/transportation-courses)
2. Highway Engineering (http://nptel.ac.in/courses/105105107/)
3. An introduction to transportation engineering (https://www.civil.iitb.ac.in/tvm/1100_LnTse/401_lnTse/plain/plain.html)

MOOCs

1. (https://www.mooc-list.com/course/highway-engineering-openlearning)

List of Experiments

Experiment. No.	Title	Learning Outcomes
1	Determination of Aggregate Impact Value	Students will understand the toughness strength of aggregate
2	Determination Of Aggregate Crushing Value	Students will understand the Crushing value test of aggregate
3	Shape Test For Aggregate	They will learn about the flakiness and elongation test of aggregate
4	Dorry Abrasion Test/Deval Abrasion Test	They will understand the hardness parameter of aggregate
5	Aggregate Stripping Value Test	Students will learn about the stripping value of aggregate
6	Determination Of Specific Gravity And Water Absorption Of Aggregate	They will determine the aggregate specific value and water absorption of aggregate.
7	California Bearing Ratio Test	They will study on subgrade to find its bearing capacity
8	Penetration Test	They will understand the consistency of bitumen
9	Softening point test for Bitumen.	They will understand the how bitumen will get soften at what temperatures
10	Ductility test for Bitumen	Students will determine the hardness of bitumen materials
11	Flash and Fire Point test for Bitumen.	They will determine the temperature at which the bitumen will get burnt.
12	Specific gravity test for Bitumen	They will get the idea about the specific gravity of bitumen.
13	Marshall Stability Test on Bituminous Mixes.	They will understand the design mix of bituminous samples.

Subject: **Structural Analysis-II**								
Program: **B.Tech. Civil Engineering**			Subject Code: **CV0504**				Semester: **V**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
4	2	0	5	24/60	0	16/40	0	100

Course Objectives:

1. To extend the concepts taught in Structural Analysis I (Determinate Structures) to indeterminate structures.
2. To enable the student get a feeling of how real-life structures behave**.**
3. The purpose of this course is to introduce the concepts of Flexibility and Stiffness methods of analysis
4. To introduce the fundamentals of Structural Dynamics

COURSE CONTENTS:

UNIT-I

[10 hours]

INFLUENCE LINES FOR INDETERMINATE STRUCTURES:

Introduction – Muller Breslau Principle & its application to determinate structures – Muller Breslau Principle extension to indeterminate structures – Numericals.

BEAMS CURVED IN PLAN:

Introduction – Solving for moments – shear and torsion – Circular beams on several supports – Numericals.

UNIT-II

[11 hours]

PLASTIC ANALYSIS OF STRUCTURES:

Statically indeterminate axial problems – Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – Plastic analysis of indeterminate beams and frames – Upper and lower bound theorems.

APPROXIMATE ANALYSIS OF BUILDING FRAMES:

Introduction – Lateral Loads on Building Frames: Portal Method and Cantilever Method Problems

UNIT-III

[12 hours]

FLEXIBILITY METHOD:
Equilibrium and compatibility – Determinate Vs Indeterminate structures – Indeterminacy – Primary structure – Compatibility conditions – Analysis of indeterminate pin-jointed plane frames– continuous beams – rigid jointed plane frames (with redundancy restricted to two).

STIFFNESS METHOD:
Element and global stiffness matrices – Analysis of continuous beams – Coordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacements vectors – Analysis of pin-jointed plane frames and beams.

UNIT-IV
[12 hours]

FINITE ELEMENT METHOD:
Introduction – Discretization of a structure – Displacement functions – Truss element –Beam element – Plane stress and plane strain - Triangular elements.

NON LINEAR ANALYSIS:
Introduction to geometric and material non-linearity, basic concepts and effects of non-linear aspects on structural behavior

Course Outcomes

After learning the course the students should be able to:
1. Apply equilibrium and compatibility equations to determine response of statically determinate and indeterminate structures.
2. Determine displacements and internal forces of statically indeterminate structures by classical, iterative and matrix methods.
3. Determine internal forces and reactions in determinate and indeterminate structures subjected to moving loads.

Text Books:

1. Bhavikatti, S.S, "Structural Analysis – Vol. 1 Vol. 2", Vikas Publishing House Pvt. Ltd., New Delhi, 2008
2. Structural Analysis – II, Dr. R Vaidyanathan, Dr. P. Perumal, Laxmi Publications
3. Basic Structural Analysis – C S Reddy

Reference Books:

1. Gere, G. M. and Weaver, Jr. W., Matrix Analysis of Framed Structures, CBS Publishers.
2. Pandit& Gupta, Matrix Analysis of Structures, Tata McGraw Hill Publications (2003).
3. Structural Analysis, R C Hibler, Pearson 2012.

Web resources:

1. Lecture notes on Matrix analysis (http://www.aboutcivil.org/structural-engineering.html)
2. A courses on Structure analysis III (http://nptel.ac.in/courses/105101085/)

MOOCs:

1. (https://www.edx.org/course/elements-structures-mitx-2-01x1//)

Subject: **Engineering Hydrology**								
Program: **B.Tech. Civil Engineering**				Subject Code: **CV0505**			Semester: **V**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	2	0	5	24/60	0	16/40	0	100

Course Objectives:

1. The knowledge of hydrology is prerequisite for the irrigation engineering and also for design of hydraulic structure. So one of the objective of this course is to impart the knowledge of hydrology that deals with the occurrence, distribution, movement and properties of water on the earth
2. To impart the knowledge of various irrigation techniques , requirements of the crops
3. To learn about distribution systems for canal irrigation, design of unlined and lined irrigation canals design sediment problems associated with canal

CONTENTS

UNIT-I

[13 hours]

Introduction to Hydrology: Need Of water resources projects, Preliminary aspects of Environmental Impact Assessment of Water Resources Projects, Hydrologic cycle, scope and application, hydro-metrology, hydrologic equation, hydrologic models, water resources engineering

Precipitation and Abstractions: Mechanism of precipitation, types and forms of precipitation, characteristics of precipitation in India, measurement techniques, rain gauge network, estimation of missing data, test for consistency of rainfall record, rainfall hyetograph, rainfall mass curve, areal average rainfall, intensity duration curves, evaporation, factors affecting evaporation, evaporimeters, estimation of evaporation, transpiration, evapotranspiration, measurement of evapotranspiration, evapotranspiration equations, infiltration ,infiltration capacity, measurement of infiltration infiltration indices**.**

UNIT-II

[11 hours]

Stream Gauging: Site selection for stream gauging, direct methods of discharge measurements

Run Off And Hydrograph: Introduction, Run Off characteristics of streams, computation of runoff, rainfall-runoff relationships, components of hydrograph and factors affecting shape of hydrograph, base flow separation, effective rainfall hyetograph, unit hydrograph theory, derivation of unit hydrograph, synthetic unit hydrograph.

UNIT-III

[13 hours]

Ground Water Hydrology: Occurrence, distribution of ground water, specific yield of aquifers, movement of groundwater, Darcy's law, permeability, safe yield of a basin, compressibility of aquifer, storage coefficient, specific storage, hydraulics of wells under steady & introduction to unsteady condition in confined and unconfined aquifers, yield of wells, pumping and recuperation tests, types of tube wells.

UNIT-IV

[8 hours]

Flood: Computation of design flood using rational, empirical, unit hydrograph and flood frequency methods (Gumbel's method)

Flood Routing: Reservoir and Channel flood routing method

Course Outcomes

1. Various components of hydrologic cycle that affect the movement of water in the earth
2. Various Stream flow measurements technique
3. Students will learn the concepts of movement of ground water beneath the earth
4. They will able to understand the basic requirements of irrigation and various irrigation techniques, requirements of the crops
5. Distribution systems for canal irrigation and the basics of design of unlined and lined irrigation canals design

Text Books

1. Subramanya, K., Engineering Hydrology, ISBN 10: 1259029972 / ISBN 13: 9781259029974Tata McGraw Hill, New Delhi

Reference Books

1. Raghunath, H.M., Hydrology – Principles, Analysis and Design, 1986, ISBN 13: 9780470200360Wiley EasternLtd.
2. Raghunath, H.M., Groundwater, 1987, ISBN 0-85226-298-1 Wiley Eastern Ltd., New Delhi

Web resources

1. Engineering Hydrology (http://www.aboutcivil.org/engineering-hydrology-lectures-notes.html)

MOOC'S

1. https://www.mooc-list.com/course/water-resources-management-and-policy-coursera

Subject: **Environmental Engineering–I**								
Program: **B.Tech. Civil Engineering**			Subject Code: **CV0506**				Semester: **V**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	24/60	24/60	16/40	16/40	200

Course Objectives:

1. To explain Importance of water supply engineering
2. Identify sources of water for potable use and to Calculate water demand for future population
3. Togain an understanding of the effects of wastewater discharges on the aquatic environment
4. Toacquire an understanding of the fundamental scientific concepts and detailed technical understanding of the technologies required for domestic and industrial wastewater treatment
5. Understand the principles involved in the design and selection of appropriate unit processes

CONTENTS

UNIT-I

[11 hours]

General: Environment and its components, Water Resources, Importance of water, Suitability of water, Role of an Environmental Engineer, Historical overview.

Water Demand: Selection of Sources of water, Water Demand, Types of Water Demand, factors affecting water consumption, Fluctuations in water demand, Peak factor, Population Forecasting methods, Design flow, Design periods, Effects of variations in demand on the design capacities for various water supply components

UNIT-II

[11 hours]

Quality of Water: The hydrological cycle, Water quality parameters, types of impurities in water-Physical, Chemical and Biological, Drinking Water Standards as per BIS

Collection and Conveyance of Water: Intake structures, Jack wells, Hydraulics of conduits, selection of pipe materials, pipe joints, Head loss through Pipes, Design of gravity main and pressure main

Pumps and Pumping: Necessity of Pumping, Types of Pumps, Selection of Pumping unit, Determination of BHP of Pumps.

UNIT-III

[11 hours]

Treatment of Water: Historical overview of water treatment, Water Treatment Processes, Treatment plant for water, Selection of treatment train, selection of treatment plant site, design criteria for treatment plant units and their design.

UNIT-IV

[12 hours]

Distribution of Water: Types of Storage and distribution reservoirs,Method of distributing water, types of distribution systems and their components, Different types of Valves, Capacity and Pressure requirements, Design of distribution systems, Hydraulic analysis of distribution systems, Hardy Cross & Newton's method

Course Outcomes

1. Understand water quality concepts and their effect on treatment process selection
2. Appreciate the importance and methods of operation and maintenance of water supply systems
3. Students will able to estimate the population of a given area
4. Students will understand the principles involved in the design and selection water conveyance structures.

Text Books

1. Santosh kumarGarg, "Water Supply Engineering", Environmental Engineering (vol.1), ISBN: 8174090614, 9788174090614; Khanna Publishers

Reference Books

1. B.C.Punmia, Ashok Jain and Arun Jain, "Environment engineering-1, Water Supply Engineering", **ISBN** 978-81-7596-916-2, Laxmi Publications (P) Ltd. New Delhi
2. H.S. Peavy, D.R. Rowe and G. Tchbanoglous, "Environmental Engineering",**ISBN**: 0-7923-7700-1 McGraw Hill International Edition.

Web resources

1. A Lecture note on environmental engineering (http://nptel.ac.in/courses/103107084/)
2. Waste water engineering (https://ocw.mit.edu/...engineering/1...water...wastewater...engineering.../lecture-notes)

MOOC'S

(https://www.mooc-list.com/course/natural-attenuation-groundwater-contaminants-new-paradigms-technologies-and-applications)

List of Experiments

Experiment. No.	Title	Learning Outcomes
1	Determination of pH	They will understand that how pH value affect the quality of water.
2	Determination of Turbidity	They will get the idea of determination process of turbidity.
3	Determination of Electrical Conductivity	They will understand that how electrical conductivity affect the water quality
4	Determination of Alkalinity	They will get the idea o determination of alkalinity present in water
5	To determine the concentration of residual chlorine in the given water sample	They will know the quality of water and determination process of chlorine present in water
6	To find the amount of chlorides present in the given water sample	They will know the quality of water and determination process of chlorine present in water
7	Determination of acidity of Water	They will determine acidity of water quality
8	Determination of Hardness of water sample.	They will get the idea of hardness of water and process of removal of hardness

Subject: **Technical Communication and Soft Skills**								
Program: **B.Tech. All Branches**				Subject Code: **SH0507**			Semester: **V**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
1	0	0	0	60	0	40	0	100

Course Objectives:

- To enable students to interact with a degree of fluency and spontaneity that makes regular interaction with fluent English speakers quite possible without strain for either party.
- To understand with ease virtually everything heard or read.
- To express themselves spontaneously, very fluently and precisely, differentiating finer shades of meaning even in the most complex situations.
- To understand sentences and frequently used expressions related to areas of most immediate relevance (e.g. very basic personal and family information, shopping, local geography, employment).
- To communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters
- To understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in their field of specialization.

Course Content:

	Sr. No.	Content
Listening	1	Listening: Cloze test
	2	Listening to Talks (BBC, TED) 1
	3	Listening to Talks 2

Speaking	4	Phonetics: Sounds & Symbols & Accent Patterns
	5	Vocabulary Games: Intermediate Level
	6	Vocabulary Games: Intermediate Level
	7	Building Dialogues: Situational Conversation
	8	Role Play
	9	Group Discussion

Reading	10	How to Read effectively
	11	Reading to Remember : SQ3R

Writing	12	Grammar Intermediate: Sentence Transformation
	13	Common Errors in English
	14	Précis Writing
	15	Effective Paragraph Writing