Syllabus Book

3rd Year B. Tech.
Civil Engineering

P P Savani University

School of Engineering

Department of Civil Engineering

Effective From: 2019-20

Authored by: P P Savani University

P P SAVANI UNIVERSITY

SCHOOL OF ENGINEERING

TEACHING & EXAMINATION SCHEME FOR THIRD YEAR B.TECH. CIVIL ENGINEERING PROGRAMME

Sem.	Course Code	Course Name	Offered by	Teaching Scheme					Examination Scheme						
				Contact Hours				Credit	Theory		Practical		Tutorial		Total
				Theory	Practical	Tutorial	Total		CE	ESE	CE	ESE	CE	ESE	
5	SECV3011	Soil Mechanics & Foundation Engineering	CV	3	2	0	5	4	40	60	20	30	0	0	150
	SECV3022	Indeterminate Structural Analysis	CV	4	0	1	5	5	40	60	0	0	50	0	150
	SECV3030	Concrete Technology	CV	3	2	0	5	4	40	60	20	30	0	0	150
	SECV3040	Environmental Engineering	CV	3	2	0	5	4	40	60	20	30	0	0	150
	SECV3051	Hydrology & Water Resource Management	CV	3	0	0	3	3	40	60	0	0	0	0	100
	SEPD3010	Professional Communication & Soft Skills	SEPD	1	2	0	3	2	40	60	20	30	0	0	150
		Elective-I	CV					3							100/150
	SECV3910	Summer Training						4							100
						Total	**30**	**29**							**1050/1100**
6	SECV3062	Structural Design – I	CV	4	0	1	5	5	40	60	0	0	20	30	150
	SECV3070	Basics of Transportation Engineering	CV	3	2	0	5	4	40	60	20	30	0	0	150
	SECV3082	Irrigation & Hydraulic structures	CV	3	0	0	3	3	40	60	0	0	0	0	100
	SECV3090	Estimation & Costing	CV	4	0	1	5	5	40	60	20	30	0	0	150
	SECV3101	Water & Waste Water Engineering	CV	3	2	0	5	4	40	60	20	30	0	0	150
	SEPD3020	Corporate Grooming & Etiquette	SEPD	1	2	0	3	2	0	0	50	50	0	0	100
	Elective-II							3							150
						Total	**30**	**30**							**950**

Offered from Sem.	Course Code	Course Name	Offered By	Teaching Scheme					Examination Scheme						
				Contact Hours				Credit	Theory		Practical		Tutorial		Total
				Theory	Practical	Tutorial	Total		CE	ESE	CE	ESE	CE	ESE	
5	SECV3620	Software Tools in Structural Analysis	CV	2	2	0	4	3	0	0	100	0	0	0	100
	SECV3630	Civil Engineering Material Testing & Market Survey	CV	1	4	0	5	3	0	0	100	0	0	0	100
	SECV3512	Advanced Structural Mechanics	CV	3	0	0	3	3	40	60	0	0	0	0	100
	SECV3521	Engineering Environmental Sustainability	CV	2	0	1	3	3	40	60	0	0	20	30	150
	SECV3531	Environmental Laws for Engineers	CV	3	0	0	3	3	40	60	0	0	0	0	100
	SECV3541	Experimental Methods in Construction Materials & Research	CV	3	0	0	3	3	40	60	0	0	0	0	100
	SECV3551	Urban Planning	CV	2	0	1	3	3	40	60	0	0	20	30	150
6	SECV3561	Computational Watershed Hydrology	CV	3	0	0	3	3	40	60	0	0	0	0	100
	SECV3572	Environmental Geotechnology	CV	3	0	0	3	3	40	60	0	0	0	0	100
	SECV3581	Hydrology & Climate Change	CV	3	0	0	3	3	40	60	0	0	0	0	100
	SECV3592	Prestressed Concrete	CV	3	0	0	3	3	40	60	0	0	0	0	100
	SECV3602	Soil Dynamics	CV	2	0	1	3	3	40	60	0	0	20	30	150
	SECV3612	Soil Improvement Techniques & Geotextile Engineering	CV	3	0	0	3	3	40	60	0	0	0	0	100

CONTENT

Semester 5

Semester 6

Electives

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3011
Course Name: Soil Mechanics & Foundation Engineering
Prerequisite Course(s): Geology & Geotechnical Engineering (SECV2060)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	00	04	40	60	20	30	00	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- understand about the shear and compaction parameters of soil.
- understand the basic properties and strength nature of various soils and their settlement behavior in foundations.
- understand about the stress distribution in soil.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Soil Compaction** Theory of compaction, Factors affecting compaction, Laboratory compaction tests, Effect of compaction on soil properties, Placement water content, Placement layer thickness, Field control of compaction, Proctor's needle, Methods of compaction used in field.	06	14
2.	**Shear Strength of Soil** Mohr's strength theory, Mohr- coulomb's strength theory, Modified Mohr coulomb's theory, Shear parameters, Test: Direct shear test, Unconfined compression test, lab. Vane shear test, Triaxial compression test, Shear tests based on drainage conditions.	08	18
3.	**Consolidation of Soil** Compressibility of soils, Definitions and mechanism of consolidation Spring analogy, Void ratio and effective stress relation, Related indices, Assumptions of Terzaghi's one dimensional consolidation theory, Time factor, one dimensional consolidation tests, Laboratory and theoretical time curves, Determination of	08	18

	pre-consolidation pressure, Estimation of consolidation settlement and rate of settlement for uniform pressure increment in a clay layer.		
Section II			
Module No.	Content	Hours	Weightage in %
1.	**Earth Pressure** Types of lateral earth pressure, Rankine's and Coulomb's earth pressure, Theory and their application for determination of lateral earth pressure under different conditions, Rebhann's and Culmann's Graphical methods of determination of lateral earth pressures.	08	18%
2.	**Shallow Foundation** Introduction of shallow foundation, Requirements of shallow foundation, Location and depth of shallow foundation, Terminologies, Bearing capacity of shallow foundation, settlement of shallow foundation,	08	18%
3.	**Pile Foundation** Introduction of Pile foundation, Uses of pile, Types of piles, Selection of pile, pile driving, pile load capacity in compression, static pile load formula, Load test on piles, Dynamic pile formula, Group action of piles, Negative skin friction, Laterally loaded piles.	07	14%

List of Practical:

Sr. No	Name of Practical	Hours
1.	Proctor Compaction Test	02
2.	CBR Test	02
3.	Consolidation /Oedometer test	02
4.	Direct Shear Test	02
5.	Unconfined Compression Test	02
6.	Demonstration of Triaxial test	02
7.	Free swell potential	02
8.	Tutorials on shear strength of Soil	02
9.	Tutorials on Consolidation of Soil	02
10.	Tutorials on Earth Pressure	04
11.	Tutorials on Shallow foundation	04
12.	Tutorials on Pile Foundation	04

Text Book(s):

Title	Author/s	Publication
Soil Mechanics & Foundation Engineering (SI Units)	V. N. S. Murthy	Sai Kripa Technical Consultants, Bangalore

Reference Book(s):

Title	Author/s	Publication
Basic and applied soil mechanics	Gopal Ranjan, Rao A.S.R	New age int. (p) ltd.
Principles of Geotechnical Engineering	Das Braja M.	Thomson Asia Pvt. Ltd
Soil Mechanics and Foundation Engineering	P. Purushothama Raj	Pearson Education

Web Material Link(s):

- https://nptel.ac.in/courses/105103097/
- https://nptel.ac.in/courses/105103097/25
- https://www.aboutcivil.org/soil-mechanics.html
- https://www.brighthubengineering.com/structural-engineering/44795-what-is-soil-mechanics/
- https://www.britannica.com/science/soil-mechanics

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/drawing/test consists of 15 marks during End Semester Exam.
- Viva/ Oral performance consists of 15 marks during End Semester Exam.

Course Outcome(s):

After completion of the course, the student will be able to

- analyses soil parameters based on application and need of project site.
- understand about the soil testing procedures, experimentation techniques and related issues. simulation of mechanics on soil as a material to understand its behavior before failure and estimating its permissible values.
- understand the details of foundations, its selection procedures as per soil conditions and various modifications available for various degrees of loads.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3022
Course Name: Indeterminate Structural Analysis
Prerequisite Course(s)s: Strength of Materials (SECV2011), Determinate Structural Analysis (SECV2051)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
04	00	01	05	40	60	00	00	50	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- analyze the indeterminate structures.
- quickly chose a method for analysis.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction** Review of basic concepts -Static and kinematic indeterminacy.	02	03
2.	**Analysis of Statically Indeterminate Structures by Displacement Methods** Review, development of slope-deflection equations for beams, frames without and with side sway, concept of stiffness, moment distribution method and applications plane truss with and without side sway, multistoried frames with side sway, beams with and without support settlement.	12	20
3.	**Influence Lines for Statically Indeterminate Structures** Moving loads and its effects on structural members, influence lines for beams, influence lines for simple trusses, Muller-Breslau principle.	07	12
4.	**Analysis of Statically Indeterminate Structures by Force Method** Introduction to force method, application to beams, trusses, frames, three moment equations, temperature stress, lack of fit and settlement of supports.	09	15

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Analysis of Statically Indeterminate Structures by Direct Stiffness Method** Application to beams, plane frames, truss, errors in analysis and fabrication of trusses because of temperature changes.	11	18
2.	**Analysis of Statically Indeterminate Structures by Flexibility Method** Introduction, axes and coordinates, flexibility matrix, analysis of continuous beams and plane trusses using system approach, analysis of simple orthogonal rigid frames using system approach with static indeterminacy ≤ 3.	12	20
3.	**Approximate Methods of Indeterminate Structural Analysis** Indeterminate trusses, industrial frames, building frames.	07	12

List of Tutorials:

Sr. No.	List of Tutorials	Hours
1.	Static and Kinematic Indeterminacy	1
2.	Slope deflection and Moment Distribution	2
3.	Influence lines for beams and trusses	2
4.	Force method for beams and trusses	2
5.	Direct stiffness for beams, plane frames, Truss	3
6.	Flexibility Method	3
7.	Approximate Methods	2

Text Book(s):

Title	Author/s	Publication
Theory of Structures	S. Ramamrutham	Dhanpat Rai Publishing company
Structural Analysis	Devdas Menon	Narosa Publication
Matrix Methods of Structural Analysis	Dr. A. S. Meghre & S. K. Deshmukh	Charotar Publishing house Pvt. Ltd.

Reference Book(s):

Title	Author/s	Publication
Elementary Structural Analysis	S. Utku, C.H. Norris and J.B. Wilbur	McGraw Hill Book Company
Indeterminate Structural Analysis	C.K. Wang	McGraw Hill Book Company
Matrix Framed Structures.	W. Weaver and J.M. Gere	CBS Publishers, Delhi
Structural Analysis.	R.C. Hibbeler	Pearson Education Asia publication

Web Material Link(s):

- https://nptel.ac.in/courses/105101086/
- https://nptel.ac.in/courses/105105109/

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Tutorial(s):

- Continuous Evaluation consists of performance of tutorials which will be evaluated out of 10 marks for each tutorial and average of the same will be converted to 30 marks.
- MCQ based test consists of 10 marks.
- Internal viva consists of 10 marks.

Course Outcome(s):

After completion of the course, the student will be able to

- apply equilibrium and compatibility equations to determine response of indeterminate structures.
- determine displacements and internal forces of statically indeterminate structures by classical, iterative and matrix methods.
- determine internal forces and reactions and indeterminate structures subjected to moving loads.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3030
Course Name: Concrete Technology
Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	00	04	40	60	20	30	00	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- understand basics of modern concrete.
- use mineral and chemical admixtures.
- understand the material properties of concrete with emphasis on its durability.
- design the required concrete mix based on the field conditions.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Cement** Production, composition and properties, cement chemistry, types of cements, special cements.	03	07
2.	**Aggregates** Mineralogy, properties, tests and standards.	05	11
3.	**Chemical and Mineral Admixtures** Water reducers, air entrainers, set controllers, specialty admixtures structure properties, and effects on concrete properties, introduction to supplementary cementing materials and pozzolans, fly ash, blast furnace slag, silica fume, and metakaolin - their production, properties, and effects on concrete properties, other mineral additives - reactive and inert.	06	13
4.	**Concrete Mix Design** Basic principles, IS method, ACI method, new approaches based on rheology and particle packing.	07	16
5.	**Concrete Production & Fresh Concrete** Batching of ingredients, mixing, transport and placement. Consolidation, finishing, and curing of concrete, initial and final set - significance and measurement. Workability of concrete and its measurement.	02	03

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Engineering Properties of Concrete** Compressive strength and parameters affecting it, tensile strength - direct and indirect, modulus of elasticity and Poisson's ratio, stress strain response of concrete.	05	11
2.	**Dimensional Stability and Durability** Creep and relaxation - parameters affecting, shrinkage of concrete - types and significance, parameters affecting shrinkage, measurement of creep and shrinkage**.**	06	13
3.	**Durability of Concrete** Introduction to durability, relation between durability and permeability, chemical attack of concrete, corrosion of steel rebars, other durability issues**.**	07	16
4.	**Special Concretes** Properties and Applications of: High strength - high performance concrete, reactive powder concrete, lightweight, heavyweight, and mass concrete, fibre reinforced concrete, self-compacting concrete, shotcrete, other special concretes.	04	10

List of Practical:

Sr. No.	Name of Practical/Tutorial	Hours
1.	Fineness of Cement	02
2.	Soundness of Cement	02
3.	Slump cone test	02
4.	Compaction factor test	02
5.	Vee Bee Consistometer test	02
6.	Flow table test	02
7.	Compressive strength Tests	02
8.	Split Tensile Test	02
9.	Mix design	06
10.	Youngs Modulus and Poissons Ratio of concrete	04
11.	Rebound Hammer Test	02
12.	Ultrasonic Pulse Velocity Test	02

Text Book(s):

Title	Author/s	Publication
Concrete Technology	A.M. Neville and J.J. Brooks	ELBS
Concrete Technology	M.S. Shetty	S. Chand

Reference Book(s):

Title	Author/s	Publication
Concrete Structure, Material and Properties	P.K. Mehta	Prantice Hall Inc.
Cement based composites: Materials, Mechanical Properties and Performance	A.M. Brandt	E & FN Spon

Web Material Link(s):

- https://onlinecourses.nptel.ac.in/noc18_ce20/preview
- https://onlinecourses.nptel.ac.in/noc18_ce21/preview

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/drawing/test consists of 15 marks during End Semester Exam.
- Viva/Oral performance consists of 15 marks during End Semester Exam.

Course Outcome(s):

After completion of the course, the student will be able to

- thoroughly understand the concrete production process.
- understand how each additive affects the properties of the concrete.
- design a required concrete mix.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3040
Course Name: Environmental Engineering
Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	00	04	40	60	20	30	00	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- design various units of a water treatment plant.
- identify the physical, chemical and biological characteristics of sewage.
- estimate sewage and storm water discharge and thereby design sewer pipeline and storm water drain.
- design modern and low-cost wastewater treatment plants.
- characterize solid wastes and methods of their collection and transportation.
- manage solid wastes using different techniques.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction** Man and Environment: Overview (socio-economic structure & occupational exposures), Scope of Environmental Engineering, pollution problems due to urbanization & industrialization	05	11
2.	**Air Pollution** **Causes of air pollution** Types & sources of air pollutants, Climatic & Meteorological effect on air pollution concentration, Formation of smog and fumigation **Analysis of Air Pollutants** Collection of Gaseous Air Pollutants, Collection of Particulate Pollutants, Analysis of Air Pollutants like: Sulphur dioxide – Nitrogen oxide – Carbon monoxide – Oxidants &Ozone – Hydrocarbons – Particulate Matter. **Methods & Approach of Air Pollution Control** Controlling smoke nuisance – Develop air quality criteria and	08	13

	practical emission standards – Creating zones suitable for industry based on micrometeorology of air area – Introducing artificial methods of removal of particulate and matters of waste before discharging to open atmosphere		
3.	**Water Sources Origin of waste water** Types of water pollutants and their effects **Different Sources of Water Pollution** Biological Pollution (point & non-point sources) – Chemical Pollutants: Toxic Organic & Inorganic Chemicals – Oxygen demanding substances – Physical Pollutants: Thermal Waste – Radioactive waste – Physiological Pollutants: Taste affecting substances – other forming substances **Water Pollution & Its Control** Adverse effects on: Human Health & Environment, Aquatic life, Animal life, Plant life — Water Pollution Measurement Techniques – Water Pollution Control Equipment & Instruments – Indian Standards for Water Pollution Control.	10	26
Section II			
Module No.	Content	Hours	Weightage in %
1.	**Soil Pollution** Liquid & Solid Wastes, Domestic & Industrial Wastes, Pesticides Toxic, Inorganic & Organic Pollutants, soil Deterioration, Poor Fertility, Septicity, Ground Water Pollution, Concentration of Infecting Agents in Soil.	05	12
2.	**Noise Pollution & Control** Noise Pollution, Intensity, Duration – Types of Industrial Noise – Ill effects of Noise – Noise Measuring & Control – Permissible Noise Limits.	04	9
3.	**Municipal Solid Waste Management** Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse, recycle, energy recovery, treatment and disposal). Industrial waste minimization: Volume and strength reduction of industrial wastes, need, strategies and methods of neutralization, equalization and proportioning, zero waste discharge and concept of good house-keeping.	10	22
4.	**Environmental Legislations, Authorities & Systems** Air & Water Pollution Control Acts & Rules (Salient Features only) – Functions of State / Central Pollution Control Boards – Environmental Management System: ISO 14 000 (Salient Features only)	03	7

List of Practical:

Sr. No	Name of Practical	Hours
1.	Measurement of pH for water & Waste water	02
2.	Introduction to Standards, Sampling, Collection and Preservation of samples	04
3.	Measurement of conductivity for water & waste water	02
4.	Determination of acidity for water & waste water	02
5.	Determination of hardness by EDTA method	02
6.	Determination of residual chlorine.	02
7.	Determination of optimum coagulant dose by jar test	02
8.	Determination of sulphate content	02
9.	Determination of chlorides content	02
10.	Determination of fluoride content	02
11.	Determination of suspended, settle able, volatile and fixed solids	02
12.	Determination of turbidity by using nephelometer	02
13.	Water microorganism analysis	02
14.	Presumptive test for coliform bacteria	02

Text Book(s):

Title	Author/s	Publication
Elements of Environmental Engineering	K. N. Duggal	S. Chand & Company Publications
Environmental Engineering Vol. I	S. K. Garg	Khanna Publisher, New Delhi

Reference Book(s):

Title	Author/s	Publication
Waste Water Engineering	Punamia & Jain	Laxmi Publications (P) Ltd., New Delhi.
Environmental Engineering	Pevy	McGraw-Hill Publishing Company Ltd.
Solid Waste Treatment and Disposal	G. Tchabanoglous	McGraw-Hill Publishing Company Ltd.

Web Material Link(s):

- https://en.wikipedia.org/wiki/Environmental_engineering
- https://www.conserve-energy-future.com/sources-effects-methods-of-solid-waste-management.php
- https://en.wikipedia.org/wiki/Waste_management
- https://www.slideshare.net/dushyantchhatrola/quantity-and-quality-of-water-for-supply-in-town-city
- http://www.who.int/water_sanitation_health/dwq/monograph42.pdf

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/drawing/test consists of 15 marks during End Semester Exam.
- Viva/Oral performance consists of 15 marks during End Semester Exam.

Course Outcome(s):

After completion of the course, the student will be able to

- know the basics, importance, and methods of water supply.
- study the various sources and properties of water.
- understand the various methods of conveyance of water.
- learn the objectives and methods of water treatment and to study the features and function of different water treatment units.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV 3051
Course Name: Hydrology and Water Resources Management
Prerequisite Course(s): Fluid Mechanics (SECV2030)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	00	00	03	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- develop understanding about precipitation, infiltration, evapotranspiration, hydrograph, capacity of reservoir.
- enable the students for estimation of runoff, infiltration, evaporation, floods and reservoir capacity.
- create understanding about features of various types of dam.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction** Hydrologic cycle, Climate and water availability, Water balances, Precipitation Forms, Classification, Variability, Measurement, Data analysis, Evaporation and its measurement, Evapotranspiration and its measurement, Penman Monteith method, Infiltration, Factors affecting infiltration, Horton's equation and Green Ampt method.	08	18
2.	**Hyetograph and Hydrograph Analysis** Hyetograph, Runoff, drainage basin characteristics, Hydrograph concepts, assumptions and limitations of unit hydrograph, Derivation of unit hydrograph, S- hydrograph, Flow duration curve, Groundwater and it's Occurrence, Darcy's law, Well hydraulics, Well losses, Yield, Pumping and recuperation test.	08	18
3.	**Reservoir and Dams** Types, Site selection criteria and investigation, Zones of storage, Safe yield, Reservoir capacity, Reservoir sedimentation and control, Introduction and types of dams, spillways and ancillary works, Site assessment and factors affecting selection of type of dam, Information about major dams and reservoirs of India.	07	14

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Hydroelectric Power** Low, Medium and High head plants, Power house components, Hydel schemes.	04	10
2.	**Flood Management** Indian rivers and floods, Causes of floods, Alleviation, Leeves and floodwalls, Floodways, Channel improvement, Flood damage analysis. **Hydrologic Analysis:** Design flood, Flood estimation, Frequency analysis, Flood routing through reservoirs and open channels.	08	18
3.	**Drought Management and Water Harvesting** Definition of drought, Causes of drought, measures for water conservation and augmentation, drought contingency planning. Water harvesting: rainwater collection, small dams, runoff enhancement, runoff collection, ponds, tanks.	10	22

Text Book(s):

Title	Authors	Publication
Hydrology and Water Resources Engineering	Garg S.K.	Tata McGraw Hill, New Delhi
Hydrology and Water Resources Engineering	R.K. Sharma and T.K. Sharma	Dhanpat Rai Publications

Reference Book(s):

Title	Authors	Publication
Engineering Hydrology	Subramanya, K.,	Tata McGraw Hill, New Delhi.
Textbook of Fluid Mechanics and Hydraulic Machines	R. K. Bansal	Laxmi Publications
Hydrology – Principles, Analysis and Design	Raghunath, H.M.	Wiley Eastern Ltd., New Delhi
Groundwater Hydrology	Todd, D.K.	John Wiley & Sons
A Textbook of Hydrology	Dr. P.Jaya Rami Reddy	University Science Press
Engineering Hydrology	C.S.P. Ojha, R, Berndtsson and P. Bhunya	Oxford University Press, New Delhi

Web Material Link(s):

- https://nptel.ac.in/courses/105104103/
- http://www.nptelvideos.in/2012/11/water-resources-engineering.html
- http://www.groundwatermanagement.org

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

Aftercompletion of the course, the student will be able to

- compute infiltration rate and capacity.
- measure runoff from a catchment.
- compute mean precipitation from a catchment.
- calculate peak flood flow.
- determine reservoir capacity using mass curve.
- compute dependable flow using flow duration curve for the requirement of irrigation, power generation etc.
- understand idea about reservoir sedimentation and its control.
- understand measures of water conservation to battle drought.

P P Savani University
School of Engineering

Centre for Skill Enhancement & Professional Development

Course Code: SEPD3010
Course Name: Professional Communication & Soft Skills
Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
01	02	00	02	00	00	50	50	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- understand multifaceted Professional Speaking Process.
- learn the writing etiquettes for professional purposes.
- gain basic knowledge, skills and the right attitude to succeed in future professional working environment.
- develop confidence, enhance their professional communication ability in civilized, harmonized manner.
- sharpen communication skills with reference to organizational structure.
- expose themselves to the modern modes of communication.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Self-Management & Career Building** • Self-Evaluation, discipline and criticism • SWOT analysis to identify personal strength/ weakness • Planning & Goal setting • MBTI test for self-analysis • Profiling on Online Platforms	01	07
2.	**Interpersonal Organizational Communication** • Interpersonal Behavioral Skills • Understanding empathy and comprehend other's opinions/ points of views, Managing Positive and negative emotions • Healthy and Unhealthy expression of emotions. • Mutuality, Trust, Emotional Bonding and handling situation in interpersonal relationship	04	25

3.	**Professional Communication (Speaking) - I** • Professional Communication and Rhetorics • Art of Telephonic Conversation • Public Speaking	03	18
Section II			
1.	**Professional Communication (Speaking) – II** • Group Discussion (Concept, importance, Methods, Dos and Don'ts, Paralinguistic and Nonverbal Etiquettes) • Personal Interview (Concept, Importance, Methods, Dos and Don'ts, Type, Paralinguistic and Nonverbal Etiquettes)	03	20
2.	**Professional Communication (Writing)** • Cover Letter and Resume Building • E mail writing • Report Building • Technical/ Academic Writing (Reference/ citation/ plagiarism)	04	30

List of Practical:

Sr. No	Name of Practical	Hours
1.	SWOT analysis & Profiling	04
2.	MBTI Test	02
3.	Interpersonal Organizational Communication	02
4.	Group Discussion	04
5.	Personal Interview	04
6.	Cover Letter and Resume	06
7.	E mail and Report Writing	04
8.	Technical Academic Writing	04

Reference Book(s):

Title	Author/s	Publication
Professional Communication	Sheekha Shukla	2010, WordPress
Professional Communication Skills	Rajesh Kariya	Paradise Publication, Jaipur
Soft Skills and Professional Communication	Petes S. J., Francis.	Tata McGraw-Hill Education, 2011
Effective Communication and Soft Skills	Nitin Bhatnagar	Pearson Education India
Behavioural Science: Achieving Behavioural Excellence for Success	Dr. Abha Singh	John Wiley & Sons, 2012
The Hard Truth about Soft Skills	Klaus, Peggy, Jane Rohman & Molly Hamaker	London: Harper Collins

Course Evaluation:

Practical

- Continuous Evaluation consists of performance of practical to be evaluated out of 10 marks for each practical and average of the same will be converted to 30 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/drawing/test/submission consists of 25 marks during End Semester Exam.
- Viva/Oral performance consists of 25 marks during End Semester Exam.

Course Outcome(s):

After completion of the course, the student will be able to

- understand the importance self-analysis for career building.
- learn tactics of communication in professional/ organizational ambience.
- master the art of conversation and public speaking.
- expose themselves for placement processes.
- develop writing etiquettes pertaining to placement and organizational context.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3910
Course Name: Summer Training
Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
00	00	00	02	00	00	100	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- have first-hand experience the real time situations in industrial scenario.
- get familiar with engineering applications in industrial spectrum
- learn to adapt themselves in professional scenario

Outline of the Course:

Sr. No	Content
1.	Selection of Companies
2.	Company Information collection
3.	Report Writing
4.	Presentation & Question-Answer

Course Evaluation:

Sr. No.	Evaluation criteria	Marks
1	Actual work carried & Report Submission	50
2	Final Presentation & Question-Answer session	50
	Grand Total:	**100**

Course Outcome:
After completion of the course, the student will be able to

- apply their theoretical knowledge into reality.
- learn to adapt the workplace situations when they will be recruited.
- be prepared for the real-world situations in their future.

Report Writing Guidelines

A. Report Format:

1. Title Page (to be provided by the respective supervisor)

The title page of the project shall give the following information in the order listed:

- Full title of the project as approved by the Mentor;
- The full name of the student/Group of students with enrollment number;
- The qualification for which the project is submitted;
- The name of the institution to which the project is submitted;
- The month and year of submission.

2. Project Certification Form
   [The form should be duly filled signed by the supervisors.]
3. Acknowledgements
   [All persons (e.g. supervisor, technician, friends, and relatives) and organization/authorities who/which have helped in the preparation of the report shall be acknowledged.]
4. Table of Contents/Index with page numbering
5. List of Tables, Figures, Schemes
6. Summary/abstract of the report.
7. Introduction/Objectives of the identified problem
8. Data Analysis and Finding of Solution
9. Application of the identified solution
10. Future Scope of enhancement of the Project and Conclusion
11. "Learning during Project Work", i.e. "Experience of Journey during Project Duration"
12. References(must)
13. Bibliography
14. Annexures (if any)

B. Guideline for Report Formatting:

- Use A4 size page with 1" margin all sides
- Header should include Project title and footer should contain page number and enrollment numbers
- Chapter Name should be of Cambria font, 20 points, Bold
- Main Heading should be of Cambria font, 14 points, Bold
- Sub Heading should be of Cambria font, 12 points, Bold
- Sub Heading of sub heading should be of Cambria font, 12 points, Bold, Italic
- Paragraph should be of Cambria font, 12 points, no margin at the start of the paragraph
- Line spacing for all content – 1.15, before - 0, after - 0
- No chapter number for references
- Before chapter 1, give page numbers in roman letter

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3062
Course Name: Structural Design-I
Prerequisite Course(s): Strength of Materials (SECV2011), Concrete Technology (SECV3030)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
04	00	01	06	40	60	00	00	50	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- understand basics of modern concrete.
- understand various design philosophy to be used in the design of structural elements.
- understand the behavior of various elements under different loading conditions.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**General Features of Reinforced Concrete** Introduction, design loads, materials for reinforced concrete and code requirements. design philosophy – limit state design principles. philosophy of limit state design, principles of limit states, factor of safety, characteristic and design loads, characteristic and design strength.	07	12
2.	**Principles of Limit State Design and Ultimate Strength of R.C. Section** General aspects of ultimate strength, stress block parameters for limit state of collapse, ultimate flexural strength of singly reinforced rectangular sections, ultimate flexural strength of doubly reinforced rectangular sections, ultimate flexural strength of flanged sections, ultimate shear strength of RC sections, ultimate torsional strength of RC sections, concepts of development length and anchorage, analysis examples of singly reinforced, doubly reinforced, flanged sections, shear strength and development length.	08	13
3.	**Flexure and Serviceability Limit States** General specification for flexure design of beams-practical requirements, size of beam, cover to reinforcement-spacing of	07	12

	bars. general aspects of serviceability-deflection limits in IS: 456 – 2000-calculation of deflection (theoretical method), cracking in structural concrete members, calculation of deflections and crack width.		
4.	**Design of Beams** Design procedures for critical sections for moment and shears. anchorages of bars, check for development length, reinforcement requirements, slenderness limits for beams to ensure lateral stability, design examples for simply supported and cantilever beams for rectangular and flanged sections.	08	13
Section II			
Module No.	Content	Hours	Weightage in %
1.	**Design of Slabs** General consideration of design of slabs, rectangular slabs spanning one direction, rectangular slabs spanning in two directions for various boundary conditions. design of simply supported, cantilever and continuous slabs as per IS: 456 – 2000.	09	15
2.	**Design of Columns** General aspects, effective length of column, loads on columns, slenderness ratio for columns, minimum eccentricity, design of short axially loaded columns, design of column subject to combined axial load and uniaxial moment and biaxial moment using SP – 16 charts.	06	10
3.	**Design of Footings** Introduction, loads for footing, design basis for limit state method, design of isolated rectangular footing for axial load and uniaxial moment, design of pedestal.	08	13
4.	**Design of Stair Cases** General features, types of stair case, loads on stair cases, effective span as per IS code provisions, distribution of loading on stairs, design of stair case with waist slabs.	07	12

List of Tutorial(s):

Sr. No.	Name of Tutorial	Hours
1.	Loads and Strength	2
2.	Ultimate strength of RC Section	4
3.	Flexure and Serviceability Limit States	4
4.	Design of Beams	6
5.	Design of Slabs	4
6.	Design of Columns	4
7.	Design of Footings	4
8.	Design of Stair Cases	2

Text Book(s):

Title	Author(s)	Publication
Reinforced concrete Design	Pillai and Menon	TMH Education Private Limited

Reference Book(s):

Title	Author(s)	Publication
Limit State Design of Reinforced concrete	P.C. Varghese	PHI Learning Private Limited
Fundamentals of Reinforced concrete Design	M. L. Gambhir	PHI Learning Private Limited
Reinforced concrete Design	S. N. Shinha	TMH Education Private Limited

Web Material Link(s):

- https://nptel.ac.in/courses/105105105/
- https://nptel.ac.in/downloads/105105105/

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Tutorial:

- Continuous Evaluation consists of performance assessment in 15 tutorials which will be evaluated out of 30 marks each and average of the same shall be considered.
- MCQ based test consists of 10 marks.
- Internal viva consists of 10 marks.

Course Outcome(s):

After completion of the course, the student will be able to

- design basic structural elements like slab, beams, columns and foundation etc. using steel and concrete as materials.
- design basic structural elements slab, beams, columns and foundation etc. using limit state approach.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3070
Course Name: Basics of Transportation Engineering
Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	00	04	40	60	20	30	00	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- comprehend basic requirements of highway.
- understand highway development and planning.
- comprehend basic concepts and components of railways, bridges, docks and harbour.
- understand design of the railway track geometry.
- get idea about concepts of tunneling.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Highway Engineering** Introduction: Importance and different mode of transportation and its scope, characteristics of road transport, scope of highway engineering.	06	12%
2.	**Highway Development and Planning** Historical development of road construction, highway development in India, necessity of highway planning, classification of roads, planning surveys and interpretation.	06	12%
3.	**Railway Engineering** Introduction: History, Indian railways, recent developments, different gauges, requirements of an ideal alignment.	06	12%
4.	**Railway components** rails, sleepers, ballast, types of sleepers and ballast.	07	14%
Section II			
Module No.	Content	Hours	Weightage in %
1.	**Geometric design of Track** Gradients, grade compensation on curves, circular curves, super	06	12%

	elevation, safe speed on curves, transition curves, compound curves, extra clearance and widening of gauge on curves, vertical curves.		
2.	**Bridge Engineering** Introduction**:** History, components, classification, types, requirements. Culverts and causeway: Layout plan, advantages and disadvantages, site suitability and selection criteria.	06	12%
3.	**Tunnelling** Classification of tunnels, Site Investigation & Planning Location of bridges and tunnels, Criteria for selection of site – Alignment – Hydrological, geological & Geotechnical investigations.	08	16%
4.	**Docks and Harbors Engineering** General, classification, requirements, planning and different components of port.	06	10%

Text Book(s):

Title	Author/s	Publication
Highway Engineering	Dr. S.K. Khanna and Dr. C.E. G. Justo	Khanna Publishers
Harbors, Dock and Tunnel Engineering	R. Srinivasan	Tata McGraw Hill Publication
Bridge Engineering	Rangwala	Charotar Publishing House
Railway Engineering	Satish Chandra and M.M. Agrawal	Oxford University Press

Reference Book(s):

Title	Author/s	Publication
Highway Engineering	L.R. Kadiyali	Khanna Publishers, New Delhi
Principles, Practice & Design of Highway Engineering	S.K. Sharma	S. Chand & Co., New Delhi.
Roads, Railways, Bridges and Tunnels Engineering	Ahuja T.D. and Birdi G. S	Standard Book House,Delhi
Bridge Engineering	Ponnuswamy S.	Tata McGraw Hill Publication, New Delhi

Web Material Link(s):

- https://nptel.ac.in/courses/105103097/
- https://nptel.ac.in/courses/105103097/25

List of Practical:

Sr. No	Name of Practical	Hours
1.	California Bearing Ratio (CBR) Test	04
2.	Aggregate crushing Test	02
3.	Aggregate Impact Test	02
4.	Flakiness Index and Elongation Index Test for Aggregate	02
5.	Los Angeles Abrasion Test / Deval Abrasion Test	02
6.	Marshall stability test on Bitumen mix.	02

7.	Specific gravity and Water Absorption test for Aggregate.	02
8.	Penetration test for Bitumen.	02
9.	Softening point test for Bitumen.	02
10.	Ductility test for Bitumen.	02
11.	Flash and Fire Point test for Bitumen.	04
12.	Specific gravity test for Bitumen	02
13.	Viscosity Test for Bitumen.	02

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/drawing/test consists of 15 marks during End Semester Exam.
- Viva/ Oral performance of 15 marks during End Semester Exam.

Course Outcome(s):

After completion of the course, the student will be able to

- understand about highway planning and its classification.
- know about importance and working of different traffic control devices.
- conduct different types of Traffic Surveys.
- explain the reasons of accidents and their preventive measures.
- design of traffic signals at intersections and rotary intersection.
- aware of various traffic regulation and control devices.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3082
Course Name: Irrigation & Hydraulic Structure
Prerequisite Course(s)s: Fluid Mechanics (SECV 2030), Hydrology & Water Resource Management (SECV 3051)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	00	00	03	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- understand the basic types of irrigation methods, irrigation standards and crop water assessment.
- study the different aspects of design of hydraulic structures such as energy dissipaters, head and cross regulators, canal falls, and structures involved in cross drainage works.
- understand the analysis of seepage and hydraulic jump into design different types of dams.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction** Irrigation - necessity - Types of irrigation - Methods of supplying water - Assessment of irrigation water - Consumptive use and its determination - water requirement of various crops - Duty - Delta - Base period and crop period, Principal Indian crops, Gross command area, Culturable command area, Intensity of irrigation, Duty and delta relation, Introduction to various methods of application of irrigation water, Irrigation efficiency, assessment of irrigation water.	10	22
2.	**Diversion Works** Different stages of a river and their flow characteristics, Weir and barrages, Various parts of a weir and their functions, Exit gradient, Principles of weir design on permeable formations - Bligh's creep theory and Khosla's theory.	06	14
3.	**Storage and Outlet works** Types of earthen dams, Seepage in earth dams, Gravity dams, Forces acting on a gravity dam, Rock-fill dams, Spillways, Types of spillways, Spillways gates and energy dissipation works.	06	14

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Distribution Works** Modes of conveying irrigation water- Types of irrigation canals contour canal, ridge canal, side sloping canals, Canal sections- filling, cutting, partial cutting and partial filling, Balanced depth, Canal FSL, Capacity factor and Time factor, L-section, Losses of canal water, Silting and scouring of canals, Method of design of unlined section of irrigation canal, Silt theories, Lined canals, Design of lined canal, Link canals.	11	22
2.	**Regulating and Cross Drainage Works** Canal falls, Cross drainage works, Types of cross drainage works, Canal escapes, Head regulator and Cross regulator, Silt ejector, Flow meters - Parshall flume, Irrigation outlets and types of outlets.	08	18
3.	**Water Logging** Definition, causes, Reclamation, Drainage principles and practice, Indian case study and prevention.	04	10

Text Book(s):

Title	Author/s	Publication
Irrigation and Hydraulics Structures	Garg, S.K.	Khanna Publishers

Reference Book(s):

Title	Author/s	Publication
Irrigation and Water Power Engineering	Punmia, B.C.	Standard Publishers
Irrigation, Water Power & Water Resources Engineering	Dr. K. R. Arora	Standard Publishers Distributors
Irrigation Engineering	S.K. Mazumder	Tata McGraw-Hill Publishing Company
Principles and Practice of Irrigation Engg.	Sharma, S.K.	S. Chand & Co.

Web Material Link(s):

- https://onlinecourses.nptel.ac.in/noc18_ar07/

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After completion of the course, the student will be able to

- understand the irrigation methods and duty-delta relation for crops.
- calculate Net Irrigation Requirement (NIR), Field Irrigation Requirement (FIR) and Gross Irrigation Requirement (GIR).
- calculate the pressure at key points of sheet piles and floor thickness for a weir/barrage using Khosla's theory.
- plot seepage line of earthen dam with corrections at entry and exit.
- calculate forces on gravity dam.
- design a lined irrigation canal.
- understand functions of regulating and cross drainage works.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3090
Course Name: Estimation & Costing
Prerequisite Course(s): -

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
04	00	01	05	40	60	20	30	00	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- realize how individual components add up costs
- understand how construction costs can be optimized

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Estimation and Modes of Measurement** Types of estimate and Data required, Overhead charges, contingencies, water charges, provisional sum, prime cost, provisional quantities, spot items, day work, General rules for the measurements and its units of different items of civil engineering work, Quality and duties of good estimator.	07	12
2.	**Specifications of Civil Works** Importance specification, Types of specification, Principle of writing specification, Specification of Earthwork in Excavation, cement concrete, Brick masonary, R.C.C. Work, Plastering Work, Painting, Flooring.	09	15
3.	**Rate Analysis of Civil Works** Task Work and influencing factors, Labour required for different works and Labour rates, Market rates of construction materials, Schedule of Rates (SOR) Rate analysis and factors affecting it rate analysis , Rate analysis for earthwork in excavation, C.C.Work, Brick masonry Work, R.C.C. Work, Plastering, flooring work.	14	23

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Estimation of Civil Works** Methods of detailed estimation, One/ two room building, Two storied buildings (RCC footings, Column, beams, slab) RCC retaining wall/ Culverts, Methods of calculating earthwork quantities for roads and canals.	17	28
2.	**Valuation of Civil Engineering projects** Cost, Price and Value, Types of property and Objects of valuation Depreciation and Obsolescence, Different forms of Value Valuation tables and Valuation methods for property and land Types of rents and fixing standard rents.	13	22

Text Book(s):

Text Book	Author	Publication
Estimating and Costing in Civil Engg.	B.N.Dutta	Ubspd, New Delhi
Estimating and Costing in Civil Engg.	S.C.Rangwala	Charotar Publication, Anand, Gujarat

Reference Book(s):

Title	Author/s	Publication
Estimation and Costing	M.C Chakraborti	Chakraborti (2006)

Web Material Link(s):

- https://nptel.ac.in/courses/105104161/6
- https://nptel.ac.in/courses/105103023/35

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of tutorial which will be evaluated out of 10 marks for each tutorial and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Quiz/drawing/test consists of 15 marks during End Semester Exam.
- Viva/ Oral performance of 15 marks during End Semester Exam.

Course Outcome(s):

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

- explain types of estimate and duties of an estimator.
- undertake rate analysis of civil engineering works.
- determine the rates of various items of civil works.
- calculate estimated cost of civil construction projects.
- evaluate the actual value of any property.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3101
Course Name: Water & Waste Water Engineering
Prerequisite Course(s): - Environmental Engineering (SECV3040)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	00	04	40	60	20	30	00	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to
- test raw water as per the standard practices.
- prepare lay out plan and maintain water distribution and sewer-networks.
- maintain the pipe-network for water supply and Sewage disposal effectively.
- plan and implement house plumbing work effectively.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Planning for Water Supply System** Public water supply system, Planning, Objectives, Design period, Population forecasting, Water demand, Sources of water and their characteristics, Surface and Groundwater, Impounding Reservoir Well hydraulics, Development and selection of source, Water quality, Characterization and standards, Impact of climate change.	08	17
2.	**Conveyance of Water** Types of pipes used for conveyance, Pipe joints, Laying of Pipes, Distribution system, Types of valves, Types of Meters, Pipe fittings and fixtures, Necessity, Methods to prevent leaks, Measures for conservation of water.	06	15
3.	**Water Distribution and Supply to Buildings** Requirements of water distribution, Components, Service reservoirs, Functions and drawings, Network design, Economics, Appurtenances, operation and maintenance, Methods. Principles of design of water supply in buildings, House service connection, Systems of plumbing, and drawings of types of plumbing.	09	18

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Sanitation System** Introduction, Objective of sewage disposal, Methods of sewage collection, Conservancy system, Water carriage system, Classification of Drains, Sewer section, Sewer joint, Manhole, Flushing tank, Catch basin, Laying of sewer, Hydraulic testing of sewer pipe, Maintenance of sewer, Procedure for maintenance of sewerage system, Causes of trouble and odor, Sewer cleaning operations, Explosives in sewers, Safety measures for sewer-men.	08	18
2.	**Waste Water Engineering** Physical, chemical and biological characteristics of sewage. Generation and collection of wastewaters, sanitary, storm and combined sewerage systems, Quantities of sanitary wastes and storm water. Design of sewerage system. Characteristics of sewage, Sampling of sewage, Treatment of sewage, B.O.D. Test, C.O.D. test, Methods of sewage disposal.	08	18
3.	**House Plumbing** Plumbing terms, Plumbing tools, Pipes and pipe fittings, Fixing and jointing pipes and accessories, Traps, House drainage plant, Plumbing practice and operations, Safety and precautions, Sanitary fittings.	06	14

List of Practical:

Sr. No	Name of Practical	Hours
1	Introduction to standards, collection and preservation of samples, sampling techniques and laboratory equipment	02
2	Determine Turbidity of water sample	02
3	BOD test for water and waste water	02
4	COD test for water and waste water	02
5	Determination of D.O. by Winkler's methods	02
6	Design septic tank	04
7	Visit water treatment plant & Making visit report	02
8	Visit Sewage treatment plant & Making visit report	02
9	Treatability study of domestic wastewater	02
10	Determination of dose of chemicals for removal of hardness of given water sample	02
11	Determination of langelier's saturation index	02
12	Prepare Sketches	06

Text Book(s):

Title	Author/s	Publication
Text book of water supply & Sanitary Engg.	S. K. Hussain	Oxford & IBH
Water supply & Sanitary Engg.	Vazirani & Chandola	Khanna Publishers

Reference Book(s):

Title	Author/s	Publication
Water and Waste water Engineering	Gorden, Fair & Gayer Okun	John Willey & Sons
A Text book of water supply engineering	V.N. Gharpure	Allied Book Stall, Baroda
Water supply and Sanitary Engineering	J S Birdie	Dhanpat Rai and Sons Publication, New Delhi

Web Material Link(s):

- https://en.wikipedia.org/wiki/Water_supply_network
- https://www.isws.illinois.edu/iswsdocs/wsp/ppt/MAC_12_10_07.pdf
- http://www.allianceforwaterefficiency.org/uploadedFiles/Resource_Center/Library/United_States/Rhode_Island/RI-water-efficiency-and-management-rules.pdf
- http://ecoursesonline.iasri.res.in/mod/page/view.php?id=2571

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/drawing/test consists of 15 marks during End Semester Exam.
- Viva/Oral performance consists of 15 marks during End Semester Exam.

Course Outcome(s):

After completion of the course, the student will be able to

- select appropriate treatment to raw water useful for domestic as well as construction purpose.
- maintain the pipe-network for water supply and sewage disposal effectively.
- calculate and estimate the impurities present in water used for domestic as well as construction works.
- prepare lay out plan and maintain water distribution and sewer-networks.
- test raw water as per the standard practices.
- plan and implement house plumbing work effectively.

P P Savani University
School of Engineering

Centre for Skill Enhancement & Professional Development

Course Code: SEPD3020
Course Name: Corporate Grooming & Etiquette
Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
01	02	00	02	00	00	50	50	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- learn corporate and professional structure and mannerisms.
- acquire self-development skills to balance casual and formal situation.
- polish their personal skills for apt behavior in the context of corporate structure.
- develop adequate Skill set required for the workplace.
- become aware about the professional etiquettes and tactics to follow them.

Course Content:

Section – I			
Module No.	Content	Hours	Weightage in %
1.	**Corporate Grooming** • Introduction to corporate culture • Corporate Expectations • Need of Self-Grooming to the Corporate Expectations • Understanding and importance of Professionalism	03	25
2.	**Personal Skills** • Behavioral skills • Language Skills • Knowledge Skills • Problem Solving Skills • Developing professional attitude	04	25
Section – II			
1.	**Management Skills** • Self-management • Time management • Work life balance	04	25
2.	**Organizational Etiquettes** • General Workplace Etiquettes • Presentation Etiquettes • Meeting Etiquettes	04	25

List of Practical:

Sr. No.	Name of Practical	Hours
1.	Corporate Grooming (Video session/ Role Play/ Skit)	04
2.	Personal Skills (Games/ Quiz/ Activities)	08
3.	Management Skills (Management Activities/ Video Sessions)	06
4.	Organizational Etiquettes (Case Study/ Activities/ Video Sessions)	06
5.	Computer Assisted Activities of Corporate Grooming	06

Reference Book(s)

Title	Author/s	Publication
Grooming and Etiquette for Corporate Men and Women	John Chibaya Mbuya	2009
Effective Communication Skills for Public Relations	Andy Green	Kogan Page, 2006
Personality Development and Soft Skills	Barun Mitra	Oxford University Press, 2016
The EQ Edge: Emotional Intelligence and Your Success	Stein, Steven J. & Howard E. Book	Wiley & Sons, 2006.
Cross Cultural Management: Concepts and Cases	Madhavan	Oxford University Press, 2016
Corporate Grooming and Etiquette	Sarvesh Gulati	Rupa Publications India Pvt. Ltd., 2012
Behavioural Science: Achieving Behavioural Excellence for Success	Dr. Abha Singh	John Wiley & Sons, 2012

Course Evaluation:

Practical:

- Continuous Evaluation consists of performance of practical to be evaluated out of 10 marks for each practical and average of the same will be converted to 30 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/drawing/test/submission consists of 25 marks during End Semester Exam.
- Viva/Oral performance consists of 25 marks during End Semester Exam.

Course Outcome(s):

After completion of the course, the student will be able to

- understand the importance of professional etiquettes and ways to improve the same.
- gain the knowledge and practice of skill sets required in corporate set up.
- learn personal management skills in the organizational context.
- develop an awareness about the corporate etiquettes.

Elective Subjects

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3620
Course Name: Software Tools in Structural Analysis
Prerequisite Course: --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	02	-	03	-	-	100	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective of the Course:
To help learners to

- Analyze structural components like beams, truss
- Understand behavior of components by changing design and loading pattern
- Design beam column slab footing according to standards

List of Theory/Practical:

Sr. No	Name of Theory/Practical	Hours
1.	Beam analysis	06
2.	Frame analysis	06
3.	Truss analysis	06
4.	Column analysis	06
5.	Slab analysis	06
6.	Staircase analysis	06
7.	Foundation analysis	06
8.	Shear wall analysis	06

Any Five practical shall be conducted

Text Book(s):

Title	Authors	Publication
Staad Pro V8i for Beginners	T.S. Sharma	Notion Press; 1 edition
Theory of Structures	S. Ramamrutham	Dhanpat Rai publishing company; ninth edition edition
Reinforced Concrete Design	Devdas Menon	McGraw Hill Education; 3 edition

Web Material Link(s):

- https://www.youtube.com/channel/UCSKDRIXmpja7b719rQhAw8Q/videos

Course Evaluation:

Theory:

Theory portion is supplementary teaching for hands on practice only.

Practical:

- Continuous Evaluation consists of performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 40 marks.
- Manual verification of the software results consists of 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 20 marks.

Course Outcomes:

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

- analyze and design components of a structure.
- understand the importance of software in civil engineering

School of Engineering

Department of Civil Engineering

Course Code: SECV3630

Course Name: Civil Engineering Material Testing & Market Survey

Prerequisite Course/s: -

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
1	4	0	3	0	0	100	0	0	0	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective of the Course:

To help learners to

- exposure to the material testing procedure.
- provide knowledge on mechanical behavior of materials.
- acquaint with the experimental methods to determine the mechanical properties of materials.
- understand the quality of materials.
- assess the likely performance of the material in a particular service condition.

Course Content:

Sr. No	Name of Practical
1.	Field test on Bricks with market survey
2.	Field test on Tiles with market survey
3.	Field test on Steel with market survey
4.	Field test on Cement with market survey
5.	Field test on Sand with market survey

6.	Labor Rate Survey with market survey
7.	Rebound Hammer test
8.	Ultrasonic Pulse Velocity test
9.	Fatigue test – Study of testing machine.
10.	Bending test on wooden beams.
11.	Standard Penetration Test
12.	Plate Load Test

Note: A minimum of 08 experiments are mandatory.

Web Material Links:

- https://www.youtube.com/watch?v=V00jYK0zSt4
- https://www.youtube.com/watch?v=MFZ18Ed4HI8
- https://www.youtube.com/watch?v=wBqv4ApVeIs
- https://www.youtube.com/watch?v=TSgiOpPTiJU
- https://www.youtube.com/watch?v=DGkA9pzLNyg
- https://www.youtube.com/watch?v=30pt2g7Y_YQ

Practical:

- Continuous evaluation consists of performance of practical which should be evaluated out of 10 for each practical in the next turn and same will be converted to 100 marks.

Course Outcome:

After learning the course the students should be able:

- To know about different civil engineering fields with an overview of building material, building construction and recent developments in civil engineering.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3630

Course Name: Civil Engineering Material Testing & Market Survey
Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
01	04	00	03	00	00	100	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- exposure to the material testing procedure.
- provide knowledge on mechanical behavior of materials.
- acquaint with the experimental methods to determine the mechanical properties of materials.
- understand the quality of materials.
- assess the likely performance of the material in a particular service condition.

Course Content:

Sr. No	Name of Practical
1.	Field test on Bricks with market survey
2.	Field test on Tiles with market survey
3.	Field test on Steel with market survey
4.	Field test on Cement with market survey
5.	Field test on Sand with market survey
6.	Labor Rate Survey with market survey
7.	Rebound Hammer test
8.	Ultrasonic Pulse Velocity test
9.	Fatigue test – Study of testing machine.
10.	Bending test on wooden beams.
11.	Standard Penetration Test
12.	Plate Load Test

Note: A minimum of 08 experiments are mandatory.

Web Material Link(s):

- https://www.youtube.com/watch?v=V00jYK0zSt4
- https://www.youtube.com/watch?v=MFZ18Ed4HI8
- https://www.youtube.com/watch?v=wBqv4ApVeIs
- https://www.youtube.com/watch?v=TSgiOpPTiJU
- https://www.youtube.com/watch?v=DGkA9pzLNyg
- https://www.youtube.com/watch?v=30pt2g7Y_YQ

Practical:

- Continuous evaluation consists of performance of practical which should be evaluated out of 10 marks for each practical and same will be converted to 100 marks.

Course Outcome(s):

After completion of the course, the student will be able to:

- know about different civil engineering fields with an overview of building material, building construction and recent developments in civil engineering.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3512
Course Name: Advanced Structural Mechanics
Prerequisite Course(s)s: Engineering Mechanics (SECV1030), Strength of Material (SECV2011)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	00	00	03	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- have a good grasp of all the fundamental issues in these advanced topics in structural analysis.
- have a good understanding of how standard software packages function.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Review of Basic Concepts in Structural Analysis** Structural elements (structural elements, joints and supports, stability, rigidity and static indeterminacy, kinematic indeterminacy), loads (direct actions, indirect loading), response (equilibrium, compatibility, force-displacement relations) levels of analysis, analysis of statically determinate structures (trusses, beams, frames), applications of principle of virtual work and displacement-based and force-based energy principles, deriving stiffness and flexibility coefficients.	03	06
2.	**Review of Analysis of Indeterminate Structures** Force methods: Statically indeterminate structures (method of consistent deformations, theorem of least work). Displacement Methods: Kinematically indeterminate structures (slope-deflection method, moment distribution method).	04	09
3.	**Matrix Concepts and Matrix Analysis of Structures** Matrix, vector, basic matrix operations, rank, solution of linear simultaneous equations, eigenvalues and eigenvectors, coordinate systems, displacement and force transformation matrices, Contra-gradient principle, element and structure stiffness matrices, Element and structure flexibility matrices, equivalent joint loads, stiffness and flexibility approaches.	06	13

4.	**Matrix Analysis of Structures with Axial Elements** Introduction: Axial stiffness and flexibility, stiffness matrices for an axial element (two d.o.f), plane truss element (four d.o.f) and space truss element (six d.o.f), One-dimensional axial structures: Analysis by conventional stiffness method (two d.o.f per element) and reduced element stiffness method (single d.o.f),Analysis by flexibility method, Plane trusses: Analysis by conventional stiffness method (four d.o.f per element) and reduced element stiffness method (single d.o.f),Analysis by flexibility method, Space trusses: Analysis by conventional stiffness method (six d.o.f per element) and reduced element stiffness method (single d.o.f).	10	22
Section II			
Module No.	Content	Hours	Weightage in %
1.	**Matrix Analysis of Beams and Grids** Conventional stiffness method for beams: Beam element stiffness (four d.o.f), generation of stiffness matrix for continuous beam, dealing with internal hinges, hinged and guided-fixed end supports, accounting for shear deformations, Reduced stiffness method for beams: Beam element stiffness (two d.o.f), dealing with moment releases, hinged and guided-fixed end supports, Flexibility method for fixed and continuous beams: Force transformation matrix, element flexibility matrix, solution procedure, (including support movements), Stiffness method for grids: Introduction, torsional stiffness of grid element and advantage of torsion release, analysis by conventional stiffness method using grid element with six d.o.f, analysis by reduced stiffness method (three d.o.f per element).	08	18
2.	**Matrix Analysis of Plane and Space Frames** Conventional stiffness method for plane frames: Element stiffness (six d.o.f), generation of structure stiffness matrix and solution procedure, dealing with internal hinges and various end conditions, Reduced stiffness method for plane frames: Element stiffness (three d.o.f), ignoring axial deformations, dealing with moment releases, hinged and guidedfixed end supports, Flexibility method for plane frames: Force transformation matrix, element flexibility matrix, solution procedure (including support movements), Ignoring axial deformations, Stiffness method for space frames: Introduction, element stiffness matrix of space frame element with 12 d.o.f and 6 d.o.f, coordinate transformations, analysis by reduced stiffness method (six d.o.f per element).	06	14
3.	**Analysis of Elastic Instability and Second-Order Effects** Effects of axial force on flexural stiffness: Review of buckling of ideal columns, Flexural behaviour and stiffness, measures for		

	beam-columns - braced and unbraced, under axial compression, Solution by slope deflection method: Slope deflection equations for prismatic beam columns using stability functions, Modifications for pinned and guided-fixed-end conditions, Fixed end moments in beam-columns, Solution by matrix method: Stiffness matrix for prismatic beam, column element, estimation of critical elastic buckling loads, second-order analysis.	06	13
4.	**Introduction to Finite Element Method:** Introduction, Discretisation of a structure, Displacement functions, Truss element, Beam element, Plane stress and Plane strain, Triangular elements.	02	05

Text Book(s):

Title	Author/s	Publication
Advanced Structural Analysis	Devdas Menon	Narosa Publishing House
Matrix Analysis of Structures	Asslam Kassimali	Brooks/Cole Publishing Co., USA.

Reference Book(s):

Title	Author/s	Publication
Structural Analysis	Devdas Menon	Narosa Publishing House, 2008.
Structural Analysis: A Unified Classical and Matrix Approach	Amin Ghali, Adam M Neville and Tom G Brown	Sixth Edition, 2007, Chapman & Hall.

Web Material Link(s):

- https://nptel.ac.in/courses/105106050/1

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After completion of the course, the student will be able to

- explore and understand advanced topics like Finite Element Method.
- create advanced programs for analysis.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3521
Course Name: Engineering Environmental Sustainability
Prerequisite Course(s): Environmental Science (SECV1010)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	00	01	03	40	60	00	00	20	30	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- create proper understanding about Constitutional provision for Environmental Protection.
- provide the information about various Environmental Laws and their evolution in India.
- make students aware about the major Acts and Rules for preventing and controlling the pollution.
- provide the information about Notifications under Environmental Protection Act.
- provide the knowledge about Regulation and Control rules and also about management and handling rules.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Principles of Sustainable Development** History and emergence of the concept of Sustainable Development, Environmental issues and crisis, Resource degradation, Greenhouse gases, Desertification, Social insecurity, Industrialization, Globalization and Environment.	03	10
2.	**Sustainable Development and International Contribution** Components of sustainability, Complexity of growth and equity, International Summits, Conventions, Agreements, Transboundary issues, Action plan for implementing sustainable development, Moral obligations and Operational guidelines.	06	20
3.	**Socio-economic Sustainable Development Systems** Socio-economic policies for sustainable development, Strategies for implementing eco-development programs, Sustainable development through trade, Economic growth, Carrying Capacity, Public participation, The National Green Tribunal Act, 2010.	06	20

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Agenda for Future Global Sustainable Development** Role of developed countries in the sustainable development of developing countries, Demographic dynamics and sustainability, Integrated approach for resource protection and management.	05	17
2.	**Types of Energy** (Conventional, Non-Conventional and Renewable) Alternative energy sources, Economics and sustainability Introduction.	04	13
3.	**Regulation and Control rules** Regulation and Control rules for Noise Pollution, Regulation and Control rules for Ozone depleting substances. **Management and Handling rules** Management and Handling rules for bio medical waste, Management and Handling rules for plastic waste, Management and Handling and transboundary movement rules for Hazardous waste.	06	20

List of Tutorial(s):

Students have to write 10 questions from each module within the 15 Hours.

Sr. No	Name of Tutorial	Hours
1.	Principles of Sustainable Development:	02
2.	Sustainable Development and International Contribution	02
3.	Socio-economic Sustainable Development Systems	02
4.	Agenda for Future Global Sustainable Development	02
5.	Types of Energy	01
6.	Management and Handling rules	01
7.	Prepare a detail report on any Environmental Problem	05

Text Book(s):

Title	Author/s	Publication
Environmental Law & Policy in India	Armin Rozencaranz; Shyam Divan & Marhta L	Tripathi publications, 1999

Reference Book(s):

Title	Author/s	Publication
Handbook of Environmental Laws, Guidelines, Compliance & Standards, Vol 1 & 2		Environ-Media, Karad, India, 1997
Environment and pollution Laws containing Acts & Rules	S.K Mohanty	
Water (Prevention & Control of Pollution) Act; 1974 & its amendments 1978; 1988	Das Braja M	Thomson Asia Pvt. Ltd
Air (Prevention & Control of Pollution) Act; 1981 & its amendments	P. Purushothama Raj	Pearson Education.
Environmental Protection Act; 1986 & its amendments		

Web Material Link(s):

- https://www.cmu.edu/cee/research/eess-research.html
- http://www.mdpi.com/2071-1050/4/9/2270/pdf
- https://engineering.tufts.edu/article-tags/environmental-sustainability
- https://www.rmit.edu.au/study-with-us/engineering/environmental-and-sustainable-engineering

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Tutorial:

- Continuous Evaluation consists of performance of tutorial which will be evaluated out of 10 marks for each tutorial and average of the same will be converted to 10 marks.
- A detailed report on any Environmental Problem consisting of 10 marks.
- Quiz/drawing/test consists of 10 marks during End Semester Exam.
- Viva consists of 20 marks during End Semester Exam.

Course Outcome(s):

After completion of the course, the student will be able to

- understand about constitutional provision for environmental protection information about various environmental laws and their evolution in India.
- understand about major acts and rules for preventing and controlling the pollution.
- understand about notifications under environmental protection act.
- understand the regulation and control rules and about management and handling rules.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3531
Course Name: Environmental Laws for Engineers
Prerequisite Course(s): Global Environmental Challenges & Management (SECV1050)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	00	00	03	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- understand various Environmental laws.
- understand various National and International Environmental laws.
- understand environmental Impact Policies.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction to Environmental Law** Introduction to environmental law and Overview of Environment & Law, Origin of Environmental Law, Concept of Law & Policy, Sustainable Development and Environment, Understanding Climate Change and its processes CDP, CDMs and Carbon Off Setting.	04	8
2.	**National Environmental Law and policy** **Introduction to National Environmental Laws** Environmental Law and the Indian Constitution, Other Laws and Environment (IPC, Cr.PC, Torts), Protection Act, 1986. **Law and Policy Frameworks related to Forest and Wildlife** The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 and Forest Conservation Act, 1980, Panchayats Extension to Scheduled Areas (PESA) Act 1996 Wildlife Protection Act, 1972, Coastal Regulation Zone & Coastal Regulation Management., Land Acquisition Act, 1894, Tenure & Property Rights and Community Rights, Introduction to displacement and rehabilitation, Displacement and Environment Concerns.	10	22
3.	**Environment Impact & Policy** Introduction to Environmental Impact Assessment, EIA	09	20

	Infrastructure Projects & Environment, Introduction to Environmental Public, Hearing (EPH) & Processes, Introduction to displacement and rehabilitation Displacement and Environmental Concerns. **Environmental Disasters** Introduction to Environmental Disasters, Oil Spills & Gas Leaks Marine Pollution Industrial Accidents.		
Section II			
Module No.	Content	Hours	Weightage in %
1.	**International Environmental Law and Policy** Emergence of International Environmental Law, Fundamental, Principles and Application of International Environmental Law, Introduction to Trade & Environment, Right to Environment as Human Right, International Humanitarian Law and Environment, Environment and Conflict Management, UNFCCC & Kyoto Protocol, Treaty on Antarctic & Polar Regions – 1961, UN Convention of Law of the Sea and Regional Seas Convention, Law on International Watercourses.	10	24
2.	**Introduction to Environment and IPR** Environment and IPR, Traditional Knowledge and Environment, International Convention for the Protection of New Varieties of Plants (UPOV Convention).	06	13
3.	**International Environmental Organizations and Dispute Settlement** Nature and Origin of International Environmental Organisations, (IEOs), International Environmental Organizations and Negotiations, MEAs and Dispute Settlement Mechanisms.	06	13

Text Book(s):

Title	Author/s	Publication
Environmental Law & Policy in India	Armin Rozencaranz; Shyam Divan & Marhta L Noble	Tripathi publications, 1999

Reference Book(s):

Title	Author/s	Publication
Basic and applied soil mechanics	Gopal Ranjan, Rao A.S.R	New age int. (p) ltd.
Principles of Geotechnical Engineering	Das Braja M.	Thomson Asia Pvt. Ltd
Soil Mechanics and Foundation Engineering	P. Purushothama Raj	Pearson 2) Education.

Web Material Link(s):

- http://pages.mtu.edu/~jwsuther/erdm/env_law.pdf
- https://www.crcpress.com/Environmental-Law-for-Engineers-and-Geoscientists/Aston/p/book/9781566705752
- https://onlinelibrary.wiley.com/doi/abs/10.1002/9781119304418.ch3

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After completion of the course, the student will be able to

- understand about the Constitutional provision for Environmental Protection.
- get Information about various Environmental Laws and their evolution in India.
- get knowledge of major Acts and Rules for preventing and controlling the pollution.
- get information about Notifications under Environmental Protection Act.
- get knowledge about Regulation and Control rules and also about management and handling rules.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3541
Course Name: Experimental Methods in Construction Materials & Research
Prerequisite Course(s): Building Materials & Construction Technology (SECV2020)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	00	00	03	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- develop basic understanding about operational research and methodology for construction.
- use advanced mathematical concepts to optimize and improved civil engineering problems.
- understand the link between mathematics applications to real world civil engineering problems.
- enable the students for using linear programming in civil engineering application.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Operations Research** Use of Operations Research in Civil Engineering and Managerial Decision-making process. Introduction to Optimization Techniques and their application in Engineering Planning, Design and Construction. Various models; Objective function and constraints, convex and concave functions, regions and sets.	08	18
2.	**Dynamic Programming** Multi stage decision processes, Principle of optimality, Recursive equation, Application of D.P. Non-Linear Programming: Single variable unconstrained optimization –Local & Global optima, Uni-modal Function-Sequential Search Techniques: Dichotomous, Fibonacci, Golden Section methods.	08	18
3.	**Correlation Analysis** Correlation types, co-efficient. Bi-variate Frequency Distribution, Scatter Diagram, Correlation Analysis, Practical applications in civil engineering projects. Regression Analysis: Regression and Multivariate Analysis, Multiple Regression Analysis Nonlinear Regression. Use of regression analysis in Construction Projects.	06	14

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Multivariable Optimization without constraints** The gradient vector and Hessian Matrix, Gradient techniques, steepest ascent/decent technique, Newton's Method. Multivariable optimization with equality constraints-Lagrange Multiplier Technique.	07	14
2.	**Simulation** Simulation – Types, case studies in construction using simulation Techniques, simulation software's used. Griffi's waiting line Method, Concept of Downtime Cost of Equipment, Cox and Nunally Model, Failure Cost Profile (FCP), LID.	08	18
3.	**Applications** Queuing Theory, Simulation, Sequencing model – n jobs through 2, 3 and M machines, Replacement models, Games Theory, Use of mathematical models based on probabilistic and statistical methods, Simulation in risk identification, analysis and mitigation of project risks. EOQ in civil Engineering, Sensitivity analysis, ABC analysis.	08	18

Text Book(s):

Title	Authors	Publication
Engineering Optimization Theory & Practice	S.S. Rao	Wiely, India
Engineering Optimization—Methods and Applications	Ravindran	Wiely, India

Reference Book(s):

Title	Author/s	Publication
Operations Research	J.K.Sharma	Laxmi publication
Quantitative Techniques in Management	N.D.Vohra	Tata McGraw-Hill Publishing Company
Principles of Construction Management	R.Pilcher	Tata McGraw-Hill International
Operations Management	Ravindrav, Philip & Solberg	Wiley, India
Operations Research: Principles and Practice	Hamdy A. Taha	Pearson
Principles of Operations Management	H. M. Wangner	Prentice hall
Operation Research	Hira and Gupta	S.Chand

Web Material Link(s):

- https://nptel.ac.in/courses/121106007/

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After completion of the course, the student will be able to

- apply mathematical concepts for analyzing complex data.
- demonstrate knowledge of statistical methods and queuing theory and its applications in science and construction engineering.
- demonstrate skills to use modern construction engineering tools, software and equipment.
- identify, formulate, plan and schedule construction engineering projects.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3551
Course Name: Urban Planning
Prerequisite Course(s): Building & Town planning (SECV2090)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	-	1	3	40	60	-	-	20	30	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- study the elements of physical infrastructure and its management.
- study the basic principles of urban transport planning and infrastructure.
- understand development issues.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Role of Infrastructure in Development** Elements of Infrastructure (physical, social, utilities and services); Basic definitions, concepts, significance and importance; Data required for provision and planning of urban networks and services; Resource analysis, provision of infrastructure, and land requirements; Principles of resource distribution in space; Types, hierarchical distribution of facilities, Access to facilities, provision and location criteria, Norms and standards, etc.	08	26
2.	**Metro and Mega Cities: Problems and Issues** Growth trends and processes, characteristics, problems, concepts and concerns of urban sustainability, issues related to diversity and unintended growth, economic, social and environmental sustainability, quality of life, inclusivity and equity, climate change, transit-oriented development, participatory planning. Inner city – issues and problems, approach to development.	07	24

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Planning and Management of Water, Sanitation and Storm Water** sources of water, treatment and storage, transportation and distribution, quality, networks, distribution losses, water harvesting, recycling and reuse, norms and standards of provision, institutional arrangements, planning provisions and management issues; Sanitation – points of generation, collection, treatment, disposal, norms and standards, grey water disposal, DEWATS, institutional arrangements, planning provisions and management issues. Storm water – rainfall data interpretation, points of water stagnation, system of natural drains, surface topography and soil characteristics, ground water replenishment, storm water collection and disposal, norms and standards, institutional arrangements, planning provisions and management issues.	08	26
2.	**Transport Infrastructure Planning, Management and Design:** Role of transport, types of transport systems, evolution of transport modes, transport problems and mobility issues; Urban form and Transport patterns, land 15 20 use – transport cycle, concept of accessibility; Hierarchy, capacity and geometric design elements of roads and intersections; Basic principles of Transport infrastructure design; Traffic and transportation surveys and studies, traffic and travel characteristics; Urban transport planning process – stages, study area, zoning, data base, concept of trip generation Transport, environment and safety issues; principles and approaches of traffic management, transport system management.	07	24

List of Tutorial:

Sr. No.	Name of Tutorial /Exercise	Hours
1.	**Film Appreciation (Individual Assignment):** Films related to city development and socio-economic issues will be screened for students. The purpose of these films is to educate the students' understanding of various development issues and to absorb them in the planning practice. At the end of the film, a discourse around the film will also be held. After viewing the films, each student is expected to write about its main focus, city / region context, its applicability to Indian environment by answering the given questions in not more than half a page.	04

2.	**Literature Review (Individual Assignment):** Each student is expected to read the article given from a journal / book and write a summary of not more than a page (250 words only) highlighting the problem, approach, methodology, analysis, how the author arrived at the conclusion and its relevance to Indian context. There will be a negative marking for writing the same text as in the original (that is copying from the original text given to them).	05
3.	**Area Appreciation (Group Assignment):** The aim of the area appreciation exercise is to enable the students to understand and contextualize the location of the area in relation to the city, zone and area in which the particular place is situated. This is done in relation to the socio-economic, spatial and cultural characteristics of that city, zone, location, etc. The main purpose is to make the students appreciate the locational attributes of land parcels for future development in a city. Due to the size of the area, this exercise is done in groups of students being assigned to a particular area. The following planning issues at area level should be identified: • Review of the Master Plan / Zonal / Area plan in relation to the selected areas. • Appreciation / Analysis of ward level data. • Perception of areas in terms of legal / illegal / authorized / unauthorized, Slums, Urban Aesthetics. • Social Categorizations of people - Type of population living, people's perception about area and its planning problems.	06

Text Book(s):

Title	Author/s	Publication
Urbanization and urban systems in India	R. Ramachandran (1991)	Oxford University Press

Reference Books(s):

Title	Author/s	Publication
The Urban Pattern 5th edition	Arthur B. Gallion (2003)	CBS Publisher & Distributors
Urban and Regional Development Plans Formulation & Implementation Guidelines (2014)		Ministry of Urban Affairs & Employment, Govt. of India, New Delhi
Approaches to Planning: Introducing Current Planning Theories, Concepts and Issues	Ernest R. Alexander (1992)	Philadelphia: Gordon and Breach Science Publishers

Web Material Link(s):

- http://www.nptelvideos.in/2012/11/building-materials-and-construction.html
- https://sites.google.com/a/mitr.iitm.ac.in/iitmcivil/ce2330
- http://www.vssut.ac.in/lecture_notes/lecture1424085991.pdf
- http://nptel.ac.in/courses/105102088/13
- https://www.classle.net/category/tagskeywords/civil-building-materials-and-construction

- http://www.geethanjaliinstitutions.com/engineering/coursefiles/downloads/civil/bmcp.pdf
- https://theconstructor.org

Course Evaluation:
Theory:
- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Tutorial:
- Continuous Evaluation consists of performance of Film Appreciation, Literature Review, Area Appreciation which will be evaluated out of 10 marks for each and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/drawing/test consists of 15 marks during End Semester Exam.
- Viva/Oral performance consists of 15 marks during End Semester Exam.

Course Outcome(s):
After completion of the course, the student will be able to
- understand the planning process, theory and practice and its role in planning of cities.
- appreciate of the role of historical developments in planning and its evolution and trace these influences on the current situation.
- understand the institutional mechanisms involved in urban planning.
- develop capacity to understand multiple often conflicting factors to be balanced in planning for an urban area.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3561
Course Name: Computational Watershed Hydrology
Prerequisite Course(s): Hydrology & Water resource management (SECV3050)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	00	00	03	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- understand concept of watershed management.
- evaluate Watershed Energy Balance.
- understand concept of drought management, soil erosion, rainwater harvesting and watershed modelling.
- develop concept for watershed planning.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction of Computational Watershed Hydrology** Introduction and Concept of watershed management, water in the 21st century as watershed management. Hydrology dimensional analysis and unit conversions. Watersheds and water balance, Meteorology and precipitation Interception, Watershed Energy Balance, Watershed Energy Balance ET: Evaporation & Transpiration.	10	20
2.	**Watershed Modelling** Standard modeling approaches and classification, system concept for watershed modeling, overall description of different hydrologic processes, modeling of rainfall runoff process, subsurface flows and groundwater flow.	08	18
3.	**Integrated Watershed Management and Soil Erosion Modelling** Introduction to integrated approach, conjunctive use of water resources, rainwater harvesting. Soil erosion estimation, Soil erosion.	05	12

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Runoff** Generation, Stream Networks & Hydrographs, Riparian & Hyporheic Zones, Water Quality, Ecohydrology.	05	11
2.	**Water Resource Protection/Management Areas** Strategies for identifying critical protection areas - where we need to focus our efforts. Use of field methods, computer models and geographic information systems (GIS) to map (delineate) watersheds, wetlands, wellhead protection areas and aquifer boundaries. Discussion of accepted field survey methods, verification requirements, and controversies surrounding mapping water resource boundaries.	09	21
3.	**Field Trip** Report of visit and learning outcome.	08	18

Text Book(s):

Title	Author/s	Publication
Watershed management: Guidelines for Indian Conditions	E.M. Tideman	Omega Scientific Publishers
Watershed Planning & Management	Dr. Rajvir Singh	Yash Publishing House

Reference Book(s):

Title	Author/s	Publication
Hydrology and the Management of Watersheds	Kenneth N. Brooks ,Peter F. Ffolliott	John Wiley & Sons
Hydrology and Soil Conservation Engineering	Ghanshyam Das	Prentice Hall India
Watersheds - Processes, Assessment and Management	Pau A. Debarry	John Wiley & Sons
Watershed Models	V.P. Singh & Donald K. Frevert	Taylor & Francis
Engineering Hydrology	C.S.P. Ojha, R, Berndtsson and P. Bhunya	Oxford University Press, New Delhi

Web Material Link(s):

- https://nptel.ac.in/courses/105101002/
- https://nptel.ac.in/courses/105101010/16

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After completion of the course, the student will be able to

- apply concepts in watershed management planning and designing.
- read hydrograph and calculate runoff.
- understand water quality issues, soil erosion, rainwater harvesting and watershed modeling.
- plan storm water management and drought management.
- generate computer models and able to use geographic information systems (GIS) to map watersheds.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3572
Course Name: Environmental Geotechnology
Prerequisite Course(s)s: Soil Mechanics (SECV3011), Environmental Engineering (SECV3040

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	00	00	03	40	60	00	00	20	30	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- explain the effects of pollutants in soil properties.
- awareness about the adverse effects of soil and ground water contaminants.
- analyse and apply the various techniques for remediation of the contaminant.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Soil Contamination & Contaminant's Movements in Soil** Introduction to Geo environmental engineering, Sources, production and classification of waste, Factors governing soil-pollutant interaction, Contaminant transport in sub surface, Advection, Diffusion, Dispersion.	07	15
2.	**Groundwater Contamination Water Quality Standard** Sources of contamination, Hydro chemical behavior of contaminants, Trace metals - Trace non-metals, Nitrogen, organic substances, Measurement of parameters, Velocity, Dispersivity - chemical partitioning.	09	20
3.	**Site Selection & Disposal of Waste** Characterization of land fill sites, Waste characterization, Stability of landfills, Current practice of waste disposal, Criteria for geotechnical construction on sanitary landfills, Passive containment systems-leachate contamination- land fill gases and their properties, landfill gas monitoring systems.	07	15

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Impact of Environmental Issues** Environmental effects caused by pile driving and their control, Dynamic response of soil under environmental stress, Contribution of environmental stress such as hazardous waste, Acid rain, tree cutting etc. to mechanism of landslides.	06	14
2.	**Remediation of Contaminants from Soil and Ground Water** Contaminant transformation: sorption, biodegradation, ion exchange, precipitation, Incineration, Exsitu and insitu remediation, Solidification, bio–remediation, soil washing, electro kinetics, soil heating, verification, bio venting, Ground water remediation – pump and treat, air sparging, reactive well.	08	18
3.	**Use of Geosynthetics in Geo-environmental Design** Introduction of Geosynthetics, Application of geo-synthetics in solid waste management, Uses of Geosynthetics for current Environmental issues.	08	18

Text Book(s):

Title	Author/s	Publication
Geoenvironmental Engineering: Site Remediation, Waste Containment, and Emerging Waste Management Technologies	Sharma H.D. and Reddy K.R.	John Wiley & Sons, Inc., USA, 2004.

Reference Book(s):

Title	Author/s	Publication
Geoenvironmental Engineering, Principles and Applications	Reddi L.N. and Inyang, H. I	Marcel Dekker Inc. New York, 2000
Geoenvironmental Engineering, Contaminated Soils, Pollutant Fate, and Mitigation	Yong, R. N	CRC Press, New York, 2001
Principles and Applications of Time Domain Electrometry in Geoenvironmental Engineering	Mohamed, A. M. O	Taylor and Francis, New York, 2006

Web Material Link(s):

- http://textofvideo.nptel.ac.in/105102160/lec2.pdf
- https://www.researchgate.net/publication/284754784_Environmental_geotechnology_an_Indian_perspective
- https://www.researchgate.net/publication/294491630_Environmental_issues_in_geotechnical_engineering
- https://www.issmge.org/filemanager/technical_committees/26/TC215/Environmental_Geotechnics.pdf
- https://www.icevirtuallibrary.com/doi/10.1680/envgeo.14.00047

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After completion of the course, the student will be able to

- understand the need for the solid waste management.
- analyse the soil contamination concentration and type.
- monitor and analyse quality of ground water.
- suggest the steps for remediation of soil and groundwater.
- design the landfill site.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3581
Course Name: Hydrology & Climate Change
Prerequisite Course(s): Hydrology & Water resource management (SECV3050)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	00	00	03	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- develop basic understanding about precipitation, infiltration, evapotranspiration, hydrograph, capacity of reservoir.
- create understanding about features of various types of dam.
- understand the climate system.
- being aware of the impact of climate change on society.
- understand of adaptation in relation to water and climate change.
- describe current energy politics and energy systems related to climate change.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction** Hydrologic cycle, Climate and water availability, Water balances, Precipitation**:** Forms, Classification, Variability, Measurement, Data analysis, Evaporation and its measurement, Evapotranspiration and its measurement, Penman Monteith method. Infiltration: Factors affecting infiltration, Horton's equation and Green Ampt method.	06	13
2.	**Hyetograph and Hydrograph Analysis** Hyetograph, Runoff: drainage basin characteristics, Hydrograph concepts, assumptions and limitations of unit hydrograph, Derivation of unit hydrograph, S- hydrograph, Flow duration curve. Groundwater: Occurrence, Darcy's law, well hydraulics, well losses, Yield, Pumping and recuperation test.	05	11

3.	**Reservoir** Types, Investigations, Site selection, Zones of storage, Safe yield, Reservoir capacity, Reservoir sedimentation and control. Introduction to Dams: Introduction and types of dams, spillways and ancillary works, Site assessment and selection of type of dam, Information about major dams and reservoirs of India. Hydroelectric Power**:** Low, Medium and High head plants, Power house components, Hydel schemes.	07	15
4.	**Flood Management** Indian rivers and floods, Causes of floods, Alleviation, Leeves and Floodwalls, Floodways, Channel improvement, Flood damage analysis. Hydrologic Analysis: Design flood, Flood estimation, Frequency analysis, Flood routing through reservoirs and open channels.	05	11
Section II			
Module No.	Content	Hours	Weightage in %
1.	**Introduction** Atmosphere, Weather and Climate, Climate Parameters, Temperature, Rainfall, Humidity, Wind, Global Ocean Circulation, El Nino And Its Effect, Carbon Cycle.	03	6
2.	**Elements Related to Climate Change** Green House Gases, Total Carbon Dioxide Emissions By Energy Sector, Industrial, Commercial, Transportation, Residential, Impacts, Air Quality, Hydrology, Green Space, Causes Of Global And Regional Climate Change, Changes In Patterns Of Temperature, Precipitation And Sea Level Rise, Greenhouse Effect.	06	14
3.	**Impacts of Climate Change** Effects of Climate Changes on Living Things, Health Effects, Malnutrition, Human Migration, Socioeconomic Impacts-Tourism, Industry and Business, Vulnerability Assessment-Infrastructure, Population and Sector, Agriculture, Forestry, Human Health, Coastal Areas.	06	14
4.	**Mitigating Climate Change** IPCC Technical Guidelines for Assessing Climate Change Impact And Adaptation, Identifying Adaption Options, Designing And Implementing Adaption Measures, Surface Albedo Environment reflective Roofing And Reflective Paving Enhancement Of Evapotranspiration, Tree Planting Program, Green Roofing Strategies, Energy Conservation In Buildings, Energy Efficiencies, Carbon Sequestration.	07	16

Text Book(s):

Title	Author/s	Publication
Engineering Hydrology	K. Subramanya	Tata McGraw Hill Pub. Co. New Delhi.
Climate Change – An Indian Perspective	Dash Sushil Kumar	Cambridge University Press India Pvt. Ltd

Reference Book(s):

Title	Author/s	Publication
Engineering Hydrology	C.S.P. Ojha, R, Berndtsson and P. Bhunya	Oxford University Press, New Delhi
Environmental Hydrology	Ward, A.D., Trimble, S. W	Lewis Publishers, CRC Press
Hydrology: An Environmental Approach	Watson and Burnett,	CRC Press
Earth's Climate-Past and Future	Ruddiman W. F.	Freeman W.H. And Company
Global Warming and Climate Change Vol. I and II	Velma. I. Grover	Science Publishers

Web Material link(s):

- http://en.wikipedia.org/wiki/Hydrology
- https://www.sciencedirect.com/science/article/pii/S2405880717300158
- https://en.vedur.is/about-imo/news/nr/2910
- https://en.wikipedia.org/wiki/Climate_change_mitigation
- http://thegreenplan.ie/blog/2016/6/14/elements-of-climate-change

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After completion of the course, the student will be able to

- develop an insight into carbon cycle, physical basis of the natural greenhouse effect, including the meaning of the term radiative forcing, climate change, global warming and measures to adapt and to mitigate the impacts of climate change.
- understand on the growing scientific consensus established through the IPCC as well as the complexities and uncertainties.
- plan climate change mitigation and adaptation projects including the use of alternate fuels and renewable energy.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3592
Course Name: Prestressed Concrete
Prerequisite Course(s)s: Strength of Materials (SECV2011), Concrete Technology (SECV3030)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	00	00	03	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to
- understand basics of prestressing.
- understand the Manufacturing techniques of prestressed members.
- analyze and design members under different loading and boundary conditions.

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Introduction of Prestress Concrete** Basic Concepts, early attempts of prestressing, brief history, development of building materials, definitions, advantages of prestressing, limitations of prestressing, types of prestressing, source of prestressing force, external or internal prestressing pre-tensioning or post-tensioning, linear or circular prestressing, full limited or partial prestressing uniaxial, biaxial or multiaxial prestressing, prestressing systems and devices, pre-tensioning introduction, stages, advantages, disadvantages, devices jacks anchoring devices, harping devices, post-tensioning introduction, stages advantages disadvantages, devices, anchoring devices sequence of anchoring jacks couplers grouting constituents of concrete, aggregate ,cement, water, admixtures, hardened concrete, strength of concrete, stiffness of concrete, durability of concrete, high performance concrete, allowable stresses in concrete, hardened concrete, stress-strain curves for concrete, creep of concrete, shrinkage of concrete, properties of grout, codal provisions, prestressing steel, introduction forms of prestressing steel, types of prestressing steel, properties of prestressing steel, stress-strain	07	16

	curves for prestressing steel, relaxation of steel durability fatigue, codal provisions.		
2.	**Losses in Prestress** Notations, geometric properties, load, variable losses in prestress, elastic shortening, pre-tensioned axial members, pre-tensioned bending members, post-tensioned axial members, post-tensioned bending members, losses in prestress: friction anchorage slip force variation diagram, creep of concrete, shrinkage of concrete, relaxation of steel, total time-dependent loss.	03	07
3.	**Analysis of Members** Analysis of members, under axial load, analysis at transfer, analysis at service loads, analysis of ultimate strength, analysis of behavior, analysis of member, under flexure, analysis at service loads based on stress concept based on force concept based on load balancing concept analysis of member under flexure, cracking moment kern point pressure line. Analysis of member under flexure analysis for ultimate strength variation of stress in steel condition at ultimate limit state, analysis of rectangular sections, analysis of flanged sections, analysis of partially prestressed sections, analysis of un-bonded post-tensioned beams analysis of behavior.	07	16
4.	**Design of Members** Design of Members, calculation of demand, design of members for axial tension: design of prestressing force, analysis of ultimate strength design of member for flexure, calculation of moment demand, preliminary design, design of sections for flexure, final design, final design for type 1 members, special case design of sections for flexure, final design of type 2 members, design of sections for flexure , choice of sections, determination of limiting zone post-tensioning in stages design of sections for flexure, Magnel's graphical method detailing requirements for flexure detailing requirements for shear detailing requirements for torsion.	06	11
	Section II		
Module No.	Content	Hours	Weightage in %
1.	**Analysis and Design for Shear and Torsion** Analysis for shear, stress in an uncracked beam, types of cracks, components of shear resistance, modes of failure effect of prestressing force design for shear, limit state of collapse for shear, maximum permissible shear stress, design of transverse reinforcement, detailing requirement for shear, design for shear, general comments, design steps, design of stirrups for flange. Analysis for Torsion: introduction stresses in an uncracked beam, crack pattern under pure torsion, components of	07	16

	resistance for pure torsion, modes of failure effect of prestressing force design for torsion, limit state of collapse for torsion, design of longitudinal reinforcement, design of transverse reinforcement, design for torsion, detailing requirements general comments, design steps.		
2.	**Calculations of Deflection and Crack Width** Calculation of deflection, deflection due to gravity loads, deflection due to prestressing force, total deflection limits of deflection, determination moment of inertia limits of span-to-effective depth ratio, calculation of crack width method of calculations limits of crack width.	02	04
3.	**Transmission of Prestress** Transmission of prestress, introduction pre-tensioned members transmission length development length end zone reinforcement, transmission of prestress, post-tensioned members end zone reinforcement bearing plate.	03	07
4.	**Cantilever and Continuous Beams** Cantilever beams introduction, analysis determination of limiting zone cable profile, continuous beams, introduction analysis incorporation of moment due to reactions, pressure line due to prestressing force, continuous beams, concordant cable profile cable profiles, partially continuous beams, analysis at ultimate limit state, moment redistribution.	3	7
5.	**Special Topics** Composite sections introduction, analysis of composite sections, design of composite sections, analysis for horizontal shear transfer, one-way slabs, analysis and design ,two-way slabs, analysis features in modeling and analysis, distribution of moments to strips two-way slab checking for shear capacity, spandrel beams, anchorage devices, additional aspects compression members, analysis development of interaction diagram effect of prestressing force, circular prestressing, general analysis and design, prestressed concrete pipes, liquid storage tanks, ring beams, conclusion.	7	16

Text Book(s):

Title	Author/s	Publication
Prestressed Concrete	N. Krishna Raju	Tata Mcgraw-Hill, 3rd Edition.
Design of Prestressed concrete structures	Lin T.Y. & H. Burns	John Wiley & Sons

Reference Book(s):

Title	Author/s	Publication
Prestressed Concrete Structures	P. Dayaratnam	Oxford & IBH 5th Edition.

Web Material Link(s):

- https://nptel.ac.in/courses/105106117/
- http://www.nptelvideos.in/2012/11/prestressed-concrete-structures.html

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After completion of the course, the student will be able to

- compute stresses due to prestressing.
- assess losses in prestress, short- and long-term deflection, flexural and shear strength of beam.
- design pre-tensioned and post-tensioned beam.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3602
Course Name: Soil Dynamics
Prerequisite Course(s)s: Geology & Geotechnical Engineering (SECV2060), Soil Mechanics (SECV3011)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	00	01	03	40	60	00	00	20	30	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- give a broad perspective of the concepts and theories of soil dynamics.
- highlight the issues involved in the design of geotechnical structures in the seismic environment.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction** Scope and objective, Nature and types of dynamic loading, Importance of soil dynamics.	02	7
2.	**Vibration Theory** Vibration of elementary systems, Degrees of freedom, Undamped and damped free and forced vibrations, Forced vibrations due to support motions, Rotating mass and constant force oscillators, Non-harmonic forced vibrations; Duhamel's integral, Introduction to Fourier transform, Introduction to two and multi degrees of freedom systems Response spectra.	08	27
3.	**Dynamic Soil Properties** Stiffness, Damping and plasticity parameters of soil and their determination (laboratory testing, intrusive and non-intrusive in-situ testing), Correlations of different soil parameters, Liquefaction (basics, evaluation and effects).	05	16

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Soil Improvement Techniques** Basic concept of soil improvement due to dynamic loading, Various methods; Mitigation of liquefaction.	03	10
2.	**Dynamic Soil-Structure Interaction** Behaviour of shallow underground foundations due to dynamic loads, Response of pile foundations under dynamic loads, Design aspects for earth retaining structures subjected to dynamic loads, Slope stability due to dynamic loads, Behaviour of subgrade soil due to cyclic loads of railway, runway.	08	27
3.	**Pile Foundations** One dimensional wave equation for analysing pile driving, response of single and pile groups under dynamic loading, Pile response in liquefied sites.	04	13

Text Book(s):

Title	Author/s	Publication
Soil Dynamics	Shamsher Prakash	Mc Graw-Hill Book Company

Reference Book(s):

Title	Author/s	Publication
Principles of Soil Dynamics	Braja M. Das	PWS-KENT Publishing Company
Dynamics of Bases and Foundations	D. D. Barkan	McGraw-Hill Book Company

Web Material Link(s):

- https://nptel.ac.in/courses/105101005/
- http://wwwmdp.eng.cam.ac.uk/web/library/enginfo/textbooks_dvd_only/soilmechs/Soil Dynamics.pdf
- https://www.researchgate.net/publication/258454882_An_Introduction_to_Soil_Dynamics
- https://www.springer.com/in/book/9789048134403

List of Tutorial(s):

Students have to write 10 questions from each module within the 15 hours.

Sr. No.	Name of Tutorial	Hours
1.	Vibration theory	03
2.	Dynamic Soil Properties	03
3.	Soil Improvement Techniques	03
4.	Dynamic Soil-Structure Interaction	03
5.	Wave Propagation	03

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Tutorial:

- Continuous Evaluation consists of tutorial which will be evaluated out of 10 marks for each tutorial and average of the same will be converted to 10 marks.
- Internal viva/Presentation consists of 10 marks.
- Quiz /test consists of 15 marks during End Semester Exam.
- Viva/ Oral performance consists of 15 marks during End Semester Exam.

Course Outcome(s):

After completion of the course, the student will be able to

- design foundations and isolation systems subjected to different kinds of vibrations.
- determine dynamic properties of soils by using laboratory and non-destructive field tests.
- assess the liquefaction potential of a given site.

P P Savani University
School of Engineering

Department of Civil Engineering

Course Code: SECV3612
Course Name: Soil Improvement Techniques & Geotextile Engineering
Prerequisite Course(s): Geology & Geotechnical Engineering (SECV2060), Soil Mechanics (SECV3011)

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	00	00	03	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- understand the different types of Ground Improvement techniques.
- understand type of technique use for different soil condition.
- evaluate the different properties of Soil including different tests for best suitable technique.
- analyze the functions of geotextile and its suitability.
- design different structures using geosynthetics according to various applications.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction** Need of Ground Improvement, Different methods of Ground improvement, General Principal of Compaction: Mechanics, field procedure, quality control in field. Ground Improvement in Granular Soil: In place densification by (i) Vibrofloatation (ii) Compaction pile (iii) Vibro Compaction Piles (iv) Dynamic Compaction (v) Blasting.	08	18
2.	**Ground Improvement in Cohesive Soil** Compressibility, vertical and radial consolidation, preloading methods. Types of Drains, Design of vertical Drains, construction techniques. Stone Column: Function Design principles, load carrying capacity, construction techniques, settlement of stone column foundation.	07	14
3.	**Soil Stabilization** Lime stabilization-Base exchange mechanism, Pozzolanic reaction, lime-soil interaction, line columns, Design of Foundation on lime columns. Cement stabilization: Mechanism, amount, age and curing. Fly-ash - Lime Stabilization, Soil Bitumen Stabilization.	08	18

Section II			
Module No.	Content	Hours	Weightage in %
1.	**Geotextile** Definitions, functions, properties, and application of Geotextiles, design of Geotextile applications. **Geomembrane** Definitions, functions, properties and applications of geomembranes, design of geomembranes applications, Geotextiles associated with geomembranes, testing on geotextiles, environmental efforts, ageing and weathering.	10	22
2.	**Soil Reinforcement** Mechanism, Types of reinforcing elements, reinforcement-soil interaction, Reinforcement of soil beneath the roads, foundation. Geosynthetics and their application.	08	18
3.	**Grouting in soil** Different types and properties, desirable characteristics, grouting pressure, grouting methods.	04	10

Text Book(s):

Title	Authors	Publication
Ground Improvement Techniques	P. Purushothama Raj	Tata McGraw-Hill
Text Book On Engineering with Geotextiles	G. V. Rao and G. V. S. Rao	Tata McGraw-Hill

Reference Book(s):

Title	Author/s	Publication
Soil Mechanics	Karl Terzaghi	Chapman and Hall
Handbook on Geosynthetics and their applications	Sanjay Kumar Shukla	Thomas Telford, 2002
ASTM and Indian Standards on Geotextiles		

Web Material Link(s):

- https://nptel.ac.in/courses/105101143/
- https://onlinecourses.nptel.ac.in/noc17_ce08/
- https://nptel.ac.in/courses/105106052/

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After completion of the course, the student will be able to

- identify the type of soil improvement techniques and their relevance in geotechnical field.
- understand the mechanism of formation of different soil improvement methods.
- analyze and compute different properties of geosynthetics.
- apply the knowledge for designing the structures using Geosynthetic materials. .