



Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's  
Sharad Institute of Technology College of Engineering  
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur  
(An Autonomous Institute)


Department: Department of Civil Engineering  
Class: T.Y. B. Tech

Rev: Course Structure/00/2021-22  
Semester: V

Course Code	Type of Course	Course	Teaching Scheme				Evaluation Scheme					Credits
			L	T	P	Total Hrs	CA1	CA2	MSE	ESE	Total	
CE501	PCC	Environmental Engineering	3	-	-	3	10	10	30	50	100	3
CE502	PCC	Design of Steel Structures	3	-	-	3	10	10	30	50	100	3
CE503	PCC	Structural Analysis-II	3	-	-	3	10	10	30	50	100	3
CE504	PEC	Elective-II	2	-	-	2	10	10	30	50	100	2
CE505	PCC	Environmental Engineering Laboratory	-	-	2	2	15	15	-	20	50	1
CE506	PCC	Building Design & Drawing Laboratory	-	-	4	4	15	15	-	20	50	2
PRJ04	PROJ	Mini Project IV	-	-	2	2	25	25	-	-	50	1
HMS05	HSMC	Aptitude Skills-III	1	-	-	1	25	25	-	-	50	1
HMS06	HSMC	Language Skills-III	-	-	2	2	25	25	-	-	50	Audit
OEXXX	OEC	Open Elective-I	3	-	-	3	10	10	30	50	100	3
<b>TOTAL</b>			<b>15</b>	<b>-</b>	<b>10</b>	<b>25</b>	<b>155</b>	<b>155</b>	<b>150</b>	<b>290</b>	<b>750</b>	<b>19</b>

\* Elective-II List:

CE 504 A	Building Services
CE 504 B	Advanced Concrete Technology
CE 504 C	Solid Waste Management
CE 504 D	Smart Cities

  
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### Environmental Engineering

CE501	PCC	Environmental Engineering	3-0-0	3 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs./week	Continues Assessment 1 : 10 Marks Continues Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

**Pre-Requisites:** Basic Civil Engineering

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Assess the water quantity required for a community or the society.
CO2	Arrive at expected population for the design period of water treatment components.
CO3	Have the knowledge on water contaminants, testing of water and water-borne diseases.
CO4	Apply the water treatment concept and methods.
CO5	Understand the collection and characteristics of waste water.
CO6	Understand the proper way of waste water disposal.

### Course Content

<b>Unit 1: Water Demand</b> Importance of water, role of environmental engineer, sources of water, water demand, design flow, design period, factors affecting population and water consumption, variation in demand – hourly, daily, monthly and annual, and effect of variation in demand on design of water supply components.	[05]
<b>Unit 2: Water Quality and Conveyance</b> Physical, chemical, biological characteristics, Indian standard for quality of potable and wholesome water, water-borne diseases, hydraulics of conduits, laying and jointing of pipelines, testing of pipe lines, designing of rising main, type of valves, types of pumps.	[05]
<b>Unit 3: Water Treatment and Distribution system</b> <b>Aeration:</b> Necessity, methods, removal of taste and odor, design of aeration fountain <b>Slow Mixing and Flocculation:</b> Design of flocculation chamber, mean velocity gradient, design of clari-flocculator, plate settler and tube settler <b>Sedimentation:</b> Suspended Solids, settling velocity, discrete, flocculant, zone settling, compression settling, types of sedimentation tanks, surface loading, detention time, inlet and outlet arrangements, tube settlers. <b>Coagulation:</b> Necessity, coagulant dosage, choice of coagulants, optimum pH <b>Rapid Mixing:</b> Necessity, gravitational, mechanical, pneumatic devices <b>Filtration:</b> Theory of filtration, filter materials, types of filters, components, working and cleaning of filters <b>Disinfection:</b> Theory of disinfection, factors affecting, efficiency of disinfection, types of disinfectants, break point chlorination, bleaching powder estimation	[10]

  
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Water softening methods: Lime-soda, ion exchange method, demineralization. Types of water distribution system, layouts, hydraulic analysis of distribution system.	
<b>Unit 4: Municipal Waste water</b> Sources of wastewater flows, components of wastewater flows, wastewater constituents, characteristic of municipal waste water, necessity of treatment of waste water, sewerage systems, concept of sewage, sullage, storm water. Grey water: Sources, characteristics, treatment, reuse.	[04]
<b>Unit 5: Treatment of Municipal Wastewater:</b> Introduction of preliminary treatment, primary treatment, secondary treatment, general layout of STP. Screens: Types, design, cleaning frequency Oil and grease chamber: Function, design Plain settling tank: Function, design considerations, types, detention period, troubles. ASTP: Function, design considerations, F/M ratio, MLSS, MLVSS, SVI, efficiency. Trickling Filters: Single stage and two stage, efficiency, design considerations. Low cost waste water treatment units: Oxidation pond, septic tank, lagoons, imhoff tanks.	[09]
<b>Unit 6: Waste water disposal:</b> Disposal by dilution: Favorable conditions, parameters to be considered, Streeter-Phelps equation, Pollution Control Boards' and EPA standards. Disposal on land: Method, land availability, type of land, design and crop suitability.	[04]

**Text Books:**

1. Garg S. K., "Water Supply Engineering", Khanna Publishers, New Delhi, Ed.35, 1977.
2. Birdi J. S. and Birdi G. S., "Water Supply & Sanitary Engineering", DhanpatRai Pub. Company, 8th edition, New Delhi, 2010
3. S.K. Garg., "Water Supply & Sanitary Engineering", DhanpatRai Publishers, New Delhi, 1990

**Reference Books:**

1. Peavy and Rowe, "Environmental Engineering", McGraw Hill Publications, 4<sup>th</sup> Ed., 2003.
2. Sharma and Kaur, "Environmental Chemistry", Goyal Publisher
3. Government Of India Publication, "Water Supply and Treatment Manual"
4. Fair and Geyr, "Environmental Engineering", McGraw Hill Publications, 6<sup>th</sup> Ed, 2009
5. Terence Mcghee, "Environmental Engineering", McGraw Hill Publications, 6<sup>th</sup> Ed., 1991
6. Viessman & Hammer, "Water Supply & Pollution Control", Pearson Publishers, 8<sup>th</sup> Ed., 2008
7. Publications by reputed organizations such as WHO, NEERI, MERI, MPCB, CWPRS.

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### Design of Steel Structures

CE502	PCC	Design of Steel Structures	3-0-0	3 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs./week	Continues Assessment 1 : 10 Marks Continues Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks


**Pre-Requisites:** Strength of Materials.

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Understand the concepts of various design philosophies
CO2	Analyze and design bolted and welded connections
CO3	Analyze and design tension members
CO4	Analyze and design compression members
CO5	Design columns and column bases
CO6	Design laterally restrained and laterally unrestrained beams

### Course Content

<b>Unit I - Introduction to Limit State Design of Steel Structures:</b> Advantages of steel as a structural material, types of structural steel, mechanical properties of steel, various rolled steel sections and their properties. Design philosophies: Working stress method, Limit state method. Type of loads and a load combination, load calculations for truss, introduction to IS Codes and specifications, IS 875 (Part 1-5), IS 800-2007.	[05]
<b>Unit II - Design of Connections:</b> <b>Bolted connections:</b> Types of bolts, behaviour of bolted joints, strength of joint, efficiency of joint, analysis and design of bolted connections. <b>Welded connections:</b> Types and properties of welds, types of joints, analysis and design of welded connections.	[06]
<b>Unit III Design of Tension Members:</b> Tension member behaviour, modes of failure, and design of single and double angle sections with connections.	[06]
<b>Unit IV Design of Compression Members:</b> Compression member's behaviour, modes of failure, classification of cross section, effective length, slenderness ratio, design strength, compression members in trusses, connection design.	[06]
<b>Unit V Design of Columns:</b> Design of columns subjected to axial load and biaxial bending, built up column sections, Laced and Battened columns. <b>Design of Column bases:</b> Design of slab base and gusseted base.	[06]
<b>Unit VI Design of beams:</b>	

  
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Civil Engineering

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Design of laterally restrained and unrestrained simply-supported beams. Design of welded plate girder. Curtailment of flange plates. [07]

**Text Books:**

1. N. Subramanian (2009), "Design of Steel Structures", Oxford University Press.14
2. Duggal S.K., "Limit state design of steel structures", Tata McGraw-Hill Publications, NewDelhi, 2nd Edition, 2014.
3. Shiyekar, M.R., "Limit state design in structural steel", PHI learning Pvt.Ltd Publications 2<sup>nd</sup> Edition 2013.
4. S.S. Bhavikatti (2012), "Design of Steel Structures by Limit State Method", I.K International Publishing House Pvt. Ltd., 3rd Edition

**Reference Books:**

1. Edwin Gaylord and Charles Gaylord (2010), "Design of steel structures", Tata McGraw HillPublishing company Ltd., New Delhi (3rd Edition)
2. Robert Englekirk (2003), "Steel structures controlling behaviour through design", John Wiley andSons.
3. Steel designer's manual (1994) 5<sup>th</sup> Edition, ELBS Publishers.
4. IS 800 (2007) General Construction in Steel - Code of Practice.
5. IS 875-1987 part 1 to 5; Code of Practice for Design Loads (other than earthquake) for building structures.
6. IS 808 (1989), Dimensions for hot rolled steel beam, column, channel and angle sections.

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### Structural Analysis-II

CE503	PCC	Structural Analysis-II	3-0-0	3 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs./week	Continues Assessment 1 : 10 Marks Continues Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

**Pre-Requisites:** Strength of Materials, Structural Analysis-I

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Determine the deflection for indeterminate beam by consistent deformation method.
CO2	Develop the Shear force and Bending Moments for indeterminate beams by Clapeyron's three moment theorem.
CO3	Develop the Shear force and Bending Moments for indeterminate beams by Moment Distribution Method.
CO4	Construct the shear force and bending moment for indeterminate beam by slope deflection method
CO5	Construct the shear force and bending moment for beam by Flexible Matrix Method
CO6	Analyze the beams and frames by Stiffness Matrix Method

### Course Content

<b>Unit 1:</b> <b>Concept of Structural Analysis</b> Types and Classification of structure based on structural forms, Concept of indeterminacy and degree of freedom-Static and Kinematic. <b>Method of consistent deformation</b> Propped cantilever with uniform section, Fixed beam- FEM and reactions for standard cases of loading.	[08]
<b>Unit 2: Clapeyron's three moment theorem</b> Introduction, Application to continuous beam, sinking of support and beam with different M.I.	[06]
<b>Unit 3: Moment Distribution Method</b> Introduction, applicable to continuous beam, sinking of support, beam with different M.I., portal frames- with and without sway.	[06]
<b>Unit 4: Slope and Deflection Method</b> Introduction, Analysis of continuous beams (Up to two spans), Sinking of supports, Portal frame without sway.	[06]
<b>Unit 5: Flexibility Matrix Method</b> Flexibility coefficient, Development of flexibility matrix, Compatibility equations, Applications to propped cantilever fixed beam and continuous beam. (Degree of S.I. $\leq 2$ )	[06]



**Unit6: Stiffness Matrix Method**

Stiffness coefficient, Development of stiffness matrix, Equilibrium equation, Applications to beams and portals. (Degree of K.I.  $\leq 2$ )

[06]

**Text Books:**

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

**Reference Books:**

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

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A) Building Services

CE504A	PEC	A) Building Services	2-0-0	2 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs./week	Continues Assessment 1 : 10 Marks Continues Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

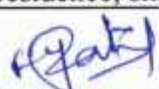
**Pre-Requisites:** Building material construction, maintenance.

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Explain the Plumbing system in buildings
CO2	Identify the drainage systems in buildings
CO3	Interpret the electrification and its importance in buildings.
CO4	Discuss on importance of fire safety system in construction
CO5	Understand the mechanical system required in building services.
CO6	Evaluate the potential of rain water and green building for buildings.

Course Content

<b>Unit 1: Plumbing system</b> <b>Requirement, Storage and distribution of water in building premises</b> – Determination of Sizing of Water tanks, Static water storage requirements (Fire Tank), Collection and Storage systems. <b>Types of Pumps required and applications</b> - Storage and Distribution in High rise buildings,. <b>Pipes and its network</b> - Materials used for Pipes - Joinery - Installation methods of Various control valves and their applications. Types of Taps, Faucets, Fittings and advanced proprietary systems used in baths, kitchen and WC units, Provisions, Installations and applications of above.	[06]
<b>Unit 2: Drainage system</b> Types of drainage system like two pipe system, One pipe system, vents and its requirement, Introduction to various sanitary fittings with necessary knowledge of provisions to be made and their Installations (Wash basins, Sinks, Bathing units, Water Closets (Indian, European and Anglo Indian), Urinals). Selection criteria and variations in Installing and provisions to be made for same. Assembling, combining and coordinating them in washing, bathing and WC units. Study of various types of traps with their working and applications. - All types of traps and their installation.	[05]
<b>Unit 3: Electrical Services in Building</b> <b>Basics of electricity</b> - Technical terms and symbols for electrical installations and ISI specifications for accessories of wiring, Earthing and its types, Types of insulation, electrical layout for residence, small work shop, show room, school building, etc.	[04]

  
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<b>Unit 4: Fire safety</b> Causes of fire in buildings. Fire detecting and various extinguisher systems. Working principles of various fire protection systems. Safety against fire in residential and public buildings (multistoried building), National building code (NBC) provision for fire safety. Fire resisting materials and their properties, Fire resistant construction, Procedure for carrying out fire safety inspection of existing buildings. Provision for evacuation.	[04]
<b>Unit 5: Machineries in Buildings</b> Introduction of mechanical services <b>Lift:</b> Definition, Types of Lifts, Design Considerations, Location, Sizes, Component parts <b>Elevators &amp; Escalators:</b> Different types of elevators and Escalators, Freight elevators, Passenger elevators, Hospital elevators, Uses of different types of elevators Escalators. <b>Air Conditioning:</b> Definition, Purpose, Principles, Types of Air Conditioners, (Central type, Window Type, Split Unit)	[05]
<b>Unit6: Lightening and Ventilation</b> <b>Lightening-</b> Basics of lightening, Types of lightening (Natural and Artificial),theory of light and colour, Luminous flux. <b>Ventilation-</b> Basics of ventilation, needs and types of ventilation. Concept of rain water harvesting,Concept of Green Buildings, Components of Green Building, Components of Grey Water System, Management of Grey Water System Solar Power System.	[06]

**Text Books:**

1. Jain V.K., "Automation Systems in Smart and Green Buildings", ISBN NO: 978-81-7409- 237-3
2. Sandeep Mantri., "A to Z of practical building construction and its management" ISBN - 13978-8176849692
3. S.P.Bag., "Fire service in India: History, Detection ,Protection, Management" ,ISBN-8170995981.
4. Building Services and Equipments by Ashok L. Chhatre.
5. R. Udaykumar ; A text book on Building Services; Eswar Press, Chennai.
6. P. S. Gahlot ; Building repair and Maintenance Management ; CBS Publishers & Distribution(P) Ltd

**Reference Books:**

1. NBC 2005, National Building Code of India, Parts I, IV, VIII and IX, B.I.S. New Delhi.
2. Handbook on Water supply and Drainage - BIS SP 35 1987 .
3. IS12183 (Part I):1987 code of practice for plumbing.
4. 2008 UPC (Uniform plumbing code I )-India.
5. Handbook on Water supply and Drainage - BIS SP 35 1987.
6. IPC 2018 (International Plumbing Code).
7. Building Services Handbook - Fred Hall & Roger Greeno.
8. National Building Code of India 2016-Volume 2 , Bureau of Indian Standards

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**B) Advanced Concrete Technology**

CE504B	PEC	B) Advanced Concrete Technology	2-0-0	2 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs./week	Continues Assessment 1 : 10 Marks Continues Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks


**Pre-Requisites:** Concrete Technology

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Illustrate the concept of High Performance Concrete
CO2	Elaborate the concept of Self-Compacting Concrete
CO3	Explain the concept of Mass Concrete
CO4	Elaborate the concept of Roller Compacting Concrete
CO5	Explain the concept of Light Weight Aggregate Concrete
CO6	Make use of Pozzolans in Concrete

**Course Content**

<b>Unit 1: High Performance Concrete</b> Introduction, Classification, General Field Environment, Durability And Performance Grades, Standard Test Procedure, Performance Enhancement, Application Of High Performance Concrete.	[06]
<b>Unit 2: Self Compacting Concrete</b> Requirements For SCC, Initial Mix Composition, Production And Placing, Mix Design, Test Methods, Complexities Involved In Making SCC, New Generation Plasticizers, Indian Scenario Of SCC	[06]
<b>Unit 3: Mass Concrete</b> Materials For Mass Concrete, Properties Of Mass Concrete, Mix Design, Massive Structural Reinforced Concrete	[04]
<b>Unit 4: Roller Compacted Concrete</b> Introduction To RCC, Initial Mix Composition, Production And Placing, Mix Design, Applications Of RCC, Introduction To RCC Pavements: Applications, Constructions In RCC.	[04]
<b>Unit 5: Light Weight Aggregate Concrete</b> Natural Aggregate, Artificial Aggregate, Physical And Mechanical Characteristics Of Aggregate, Factor Influencing The Strength And Density Of Light Weight Aggregate Concrete, Properties Of Light Weight Concrete, Design Of Light Weight Concrete, Proportioning Of Light Weight Aggregate Concrete.	[06]

  
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**Unit 6: Use of Pozzolans in Concrete**

Introduction, Pozzolans as Cement Replacement, Types of Pozzolans, Use of Pozzolans in Concrete.

[06]

**GGBS:** Ground Granulated Blast Furnace Slag, Performance Of GGBS In Concrete, Strength Of Hardened Concrete, Heat Of Hydration, Chloride Penetration, Sulphate Attack, Permeability Of Hardened Concrete.

**Fly Ash:** Effect Of Fly Ash On Fresh Concrete, Fly Ash Particle Size, Effect Of Fly Ash On Hardened Concrete, Durability Of Concrete, High Volume Fly Ash Concrete, Expert Group Recommendation On HVFAC.

**Text Books:**

1. Concrete Technology --M.S. Shetty, S. Chand Publications.
2. Concrete Technology -- A R Santhakumar, Oxford University Press.
3. Concrete technology -- M. L. Gambhir, Tata Mcgraw Hill Publications.
4. Fiber Reinforced Cement Composite- P.N.Balguru & P.N.Shah.
5. Concrete: Micro structure, Properties and Materials-- P. Kumar Mehta and P. S. M.
5. Monteiro-- Tata Mc-Graw Hill Education Pvt. Ltd.

**Reference Books:**

1. Zongjin Li. Advanced concrete technology, John Wiley & Sons, Inc. 2011. Concrete Technology by R.S. Varshney, Oxford and IBH 2018.
2. Concrete Mix Design-A.P.Remideos--Himalaya Publishing House (ISBN-978-81-8318-996-5)
3. Concrete Mix Design---Prof. Gajanan Sabnis
4. Handbook on Advanced concrete Technology Edited by N V Nayak, A .K.Jain, Narosa Publishing House
5. John Newman B S Choo, Advanced Concrete Technology, Elsevier 2003.

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**C) Solid Waste Management**

CE504C	PCC	C) Solid Waste Management	2-0-0	2 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs./week	Continues Assessment 1 : 10 Marks Continues Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

**Pre-Requisites:** Basic Civil Engineering

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Outline the functional elements of solid waste with management.
CO2	Interpret the characteristics of MSW.
CO3	Assess the collection system and route for MSW.
CO4	Explain fundamental principles of existing and emerging technologies for the Treatment of waste and recovery of value from waste.
CO5	Classify different processes for disposal and recovery of MSW.
CO6	Solve specific problems in order to practice the role of health and safety professionals in managing hazardous materials and wastes.

**Course Content**

<b>Unit 1: Sources and Characterization</b> Definition - Sources and types of solid waste- composition and its determinants of Solid waste-factors influencing generation-quantity assessment of solid wastes-methods of sampling and characterization.	[04]
<b>Unit 2: Collection and Transport</b> Collection of Solid waste – collection services – collection system, equipments – time and frequency of collection – labour requirement – factors affecting collection – analysis of collection system – collection routes, route optimization – preparation of master schedules.	[05]
<b>Unit 3: Transfer and Transport</b> Need for transfer operation – transfer stations – types – transport means and methods – location of transport stations - Manpower requirement – collection routes: Transfer stations – selection of location, types & design requirements, operation & maintenance.	[06]
<b>Unit 4: Processing Techniques and Energy Recovery</b> Processing techniques – purposes mechanical volume reduction – necessary equipments – chemical volume reduction – incinerators – mechanical size reduction selection of equipment's, components separation – methods – drying and dewatering. Recovery of Resources, conversion products and energy recovery – recoverable materials – processing and recovery systems – incineration with heat recovery.	[08]
<b>Unit 5: Transport and Disposal</b> Treatment methods - various methods of refuse processing, recovery, recycle and reuse, composting – aerobic and anaerobic, incineration, pyrolysis and energy recovery.	[08]

  
Head of the Department  
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COLLEGE OF ENGINEERING

Yadav (Ichalkaranji) Dist. Kolhapur





Disposal methods – Impacts of open dumping, site selection, sanitary land filling – design criteria and design examples, leachate and gas collection systems, leachate treatment.	
<b>Unit6: Biomedical and Hazardous Waste</b> Biomedical Waste management – sources, treatment and disposal Hazardous Waste Management- Introduction, Sources, Classification, Physico-chemical, Chemical and Biological Treatment of hazardous waste, regulations.	[06]

**Text Books:**

1. Bhide. A. D. and Sundaresan. B. B., “Solid Waste Management”, Indian National Scientific
2. CPHEEO, "Manual on Municipal Solid waste management", Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000
3. Tchobanoglous G., “Integrated Solid Waste Management”, Tata McGraw-Hill Publishing Company Limited, 1st Edition, 1993.

**Reference Books:**

1. Peavy and Rowe, “Environmental Engineering” , McGraw Hill Publications, 4<sup>th</sup> Ed., 2003.
2. Masters G., “Introduction to Environmental Engineering and Science”, Pearson Education, 2004
3. Government Of India Publication, “Water Supply and Treatment Manual”
4. Peavy, Rowe and Tchobanoglous, “Environmental Engineering”, Tata McGraw-Hill Publishing Company Limited, 1st Edition, 1985.
5. “MSW Rules 2016”, Swachh Bharat Mission and Smart Cities Program of India.

*F. Pinto*





D) Smart Cities

CE504D	PEC	D) Smart Cities	2-0-0	2 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs./week	Continues Assessment 1 : 10 Marks Continues Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

**Pre-Requisites:** Smart Cities

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Understand the necessity of infrastructural development for smart cities
CO2	Identify components of infrastructure and Prepare infrastructure plan for smart city.
CO3	Understand smart transport system for smart cities and its application
CO4	Study of water resources systems for smart city and its application.
CO5	Develop work break down structure, scheduling and project management of smart cities
CO6	Understand National and Global policies to implement for smart city development.

Course Content

<b>Unit 1: Fundamental of smart city</b> Introduction of Smart City, Concept of smart city, Objective for smart cities, History of Smart city world and India. Need to develop smart city	[05]
<b>Unit 2: Planning and development of Smart city Infrastructure</b> Energy and ecology, solar energy for smart city, Housing, sustainable green building, safety, security, , cyber security	[05]
<b>Unit 3: Intelligent transport systems</b> Smart vehicles and fuels, GIS, GPS, Navigation system, advance traffic safety management, mobility services, E-ticketing.	[05]
<b>Unit 4: Management of water resources and related infrastructure</b> Storage and conveyance system of water, sustainable water and sanitation, sewerage system, flood management, conservation system	[05]
<b>Unit 5: Case study on Smart cities</b> A Case Study on Smart City Projects in India: An Analysis of Nagpur, Allahabad and Dehradun, Pune, Jaipur, Surat, Ahmedabad etc	[04]
<b>Unit 6: Policy for Smart city</b> Worldwide policies for smart city Government of India - policy for smart city, Mission statement & guidelines, Smart cities in India, Case studies of smart city.	[05]





**Text Books:**

1. Komninos, N., Kakderi, C., & Panori, A. (2015). "Smart Cities: Definitions, Dimensions, Performance, and Initiatives." Elsevier.
2. Charanjit Singh Shah (2015). "Smart Cities: A New Urban Vision." Sage Publications India Pvt Ltd.
3. Shyam R. Asolekar and Prakash Rao (2017). "Smart Cities and Solid Waste Management." TERI Press.
4. Rahul Tongia and V. Sridhar (2020). "Smart Shared-Mobility: Exploring the Potential in Indian Cities." Springer.
5. Arun K. Bandyopadhyay (2018). "Smart Cities in India: Challenges and Future Prospects." Springer.

**Reference Books:**

1. Smart City on Future Life - Scientific Planning and Construction by Xianyi Li
2. The Age of Intelligent Cities: Smart Environments and Innovation-for-all Strategies (Regions and Cities) by Nicos Komninos
3. Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia by Anthony Townsend
4. Mission statement & guidelines on Smart City Scheme". Government of India - Ministry of Urban Development [http://smartcities.gov.in/upload/uploadfiles/files/Smart City Guidelines\(1\).pdf](http://smartcities.gov.in/upload/uploadfiles/files/Smart%20City%20Guidelines(1).pdf)

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**Environmental Engineering Laboratory**

CE505	PCC	Environmental Engineering Laboratory	0-0-2	1 Credit
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Teaching Scheme:	Examination Scheme:
Practical: 2 hr/week	Continues Assessment 1 : 15 Marks Continues Assessment 2 : 15 Marks End Semester Exam : 20 Marks

**Course outcome:** At the end of the course, students will be able to:

CO1	Students will be able to differentiate contaminated and potable water.
CO2	Understand the importance of different parameters considered in water testing.
CO3	Understand the decision making regarding the status of water quality.
CO4	Understand the waste water characteristics.
CO5	Understand the type of treatment to be adopted for water and waste water based on lab results.
CO6	Understand the measurement of air pollutants and comment on the air quality status based on lab testing.

**Experiments:** Following all laboratory tests must be completed on water and waste-water samples.

1. Determination of pH, alkalinity, chlorides, EC and turbidity.
2. Determination of percentage available chlorine in bleaching powder, residual chlorine, chlorine demand and break-point chlorination.
3. Determination of optimum dose of alum, total, dissolved, suspended and volatile solids.
4. Determination of fluoride and total iron.
5. Determination of sulphates and nitrates.
6. Determination of SVI, BOD and COD.
7. Determination of DO, total hardness, temporary, permanent, calcium and magnesium hardness.
8. Assessment of SPM.

**Projects**

1. Report on visit to nearby WTP.
2. Report on visit to nearby STP.

  
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**Building Design & Drawing Laboratory**

CE506	PCC	Building Design & Drawing Laboratory	0-0-4	2 Credits
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<b>Teaching Scheme:</b>	<b>Examination Scheme:</b>
Practical: 4hr/week	Continues Assessment 1 : 15 Marks Continues Assessment 2 : 15 Marks End Semester Exam : 20 Marks

**Course outcome:** At the end of the course, students will be able to:

CO1	Measure and draw existing residential building consisting of plan, elevation & section
CO2	Develop a plan of residential G+1 building consisting of plan, elevation & section
CO3	Organise building services for residential buildings
CO4	Model a line plan for commercial or public buildings

**Experiments**

1. Drawing based on actual measurement of existing residential building consisting of plan, elevation, section passing through staircase/ WC, Site plan. Area statement & brief specifications.
2. Planning & design of a building (Minimum G+1): Full set of drawings for: Municipal Submission drawing as per local statutory body bye-laws such as Town Planning, Municipal Councilor Corporation Authorities
Foundation / Center Line Drawing
Furniture layout plan.
Electrification plan
Water supply & drainage plan.
Detailed drawing
3. Sizes of commercial and public buildings as per NBC Code.
4. Line plan of 5 commercial / Public buildings.
5. Sketch book for symbols used in civil engineering and general specifications.



**Mini Project-IV**

PRJ04	PROJ	Mini Project-IV	0-0-2	1 Credit
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<b>Teaching Scheme:</b>	<b>Examination Scheme:</b>
Practical: 2 hrs/week	Continues Assessment 1: 25 Marks Continues Assessment 2: 25 Marks

**Course Outcomes:** Upon successful completion of this course, the students will be able to:

CO 1	Select the appropriate method for solving the problem
CO 2	Make use of various engineering techniques and tools to give a solution
CO 3	Justify the method/tools used to develop the solution
CO 4	Demonstrate tangible solutions to the problem
CO 5	Describe the solution with the help of a project report and presentation

**About Mini Project - IV**

The project is a part of addressing societal and industrial needs. Mini Project-IV is one of the platforms that students will use to solve real-world challenges. This course focuses on the selection of methods/engineering tools/analytical techniques for problem-solving. Through this course, students gain a thorough understanding of engineering basics and ideas, gain practical experience, have the opportunity to display their skills and learn about teamwork, financial management, communication skills, and responsibility

**Guidelines**

1. Every student shall undertake the Mini Project - IV activity for semester V.
2. Minimum three and maximum of five students should work together in Mini Project-IV.
3. The students have to work on different approaches and finalize the best methodology to solve the problem in consultation with the project guide.
4. The students should use different tools /Techniques for the development of the solution to the problem.
5. While developing solutions, the student can take care of effective use of resources, follow ethical practices, finance management.
6. The solution should be optimal, affordable, user-friendly and environment friendly.
7. Critically analysis and testing of the solution provided.
8. By using IPR, students should reserve their rights of innovations as well as communicate new findings to society with the help of research papers.

The committee of senior faculty members and a project guide will be appointed to monitor the progress and continuous evaluation of each project. The assessment shall be done jointly by the guide and committee member.

  
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**Aptitude Skill -III**

HMS05	HSMC	Aptitude Skill -III	1-0-0	1 Credit
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<b>Teaching Scheme: CS/AIDS/ETC/EE</b>	<b>Examination Scheme:</b>
Lecture: 1hrs/week	Continues Assessment 1:25 marks Continues Assessment 2:25 marks

**Pre-Requisites:** Communication Skills, Aptitude Skills I, II

**Group A**

**Aptitude(12Hrs)(Compulsory)**

**Course Outcomes:** At the end of the course, students will able to:

CO1	Solve the problems on system of equation
CO2	Solve the problems on seating arrangement
CO3	Solve the logical reasoning problems
CO4	Solve the critical analysis problems
CO5	Solve the problems of Data interpretation
CO6	Solve the problems permutations and combinations

**Course Content**

<b>Unit 1: System of equations</b> Quadratic equations, Surds and indices, solution of equations, Ages.	[2]
<b>Unit 2: Seating Arrangements</b> Linear seating Arrangement, Circular seating arrangement, Complex seating arrangement	[2]
<b>Unit 3: Logical Reasoning</b> Numerical based on sense of direction, Blood relations, Odd man Out	[2]
<b>Unit 4: Critical analysis</b> Clock and Calendar based problems, Crypt arithmetic, heights and distances	[2]
<b>Unit 5: Data Interpretation</b> Table form, Bar form, Line for Pi chart form	[2]
<b>Unit 6: Permutation and combination</b> Permutation & Combinations	[2]

  
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**Text Books:**

1. R S Aggarwal "A Modern Approach to Verbal & Non-Verbal Reasoning", S.Chand Publisher; 2016 edition
2. R S Aggarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand Publisher; 2016 edition
3. Raymond Murphy "Essential English Grammar with Answers", Murphy

**Reference Books:**

1. Rao N,D,V,Prasada,Wren&Martin High School English Grammar and Composition Book,S Chand Publishing,2017
2. Murphy,Intermediate English Grammar with Answers,Cambridge University Press;Second edition
3. RS Aggarwal,Objective General English,S.Chand Publisher;2016 edition.

  
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**Group B**

**Verbal Ability(12Hrs)(Compulsory)**

Pre-Requisites: **Communication Skills Aptitude Skills I,II**

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Solve the questions on ordering of words & Parts of Speech
CO2	Organize contents of Business Communications such as CV, emails and letters.
CO3	Solve the questions based on jumbled paragraphs and reading comprehension.
CO4	Solve the questions on spotting error and sentence correction.
CO5	Summarize proceedings of any event or conference.
CO6	Discuss about current and critical issues during group discussion.

**Course Contents**

<b>Unit1</b> Parts of Speech, Word Family (Using the same word as different Parts of Speech), Punctuation	[2]
<b>Unit2</b> Analogy, Letter Writing(Formal), E-Mail Writing, CV Writing	[2]
<b>Unit3</b> Reading Comprehension, Paragraph Jumbles	[2]
<b>Unit4</b> Spotting Errors(indifferent parts of sentence), Subject-Verb Agreement, Sentence Correction, Sentence Completion	[2]
<b>Unit5</b> One Word Substitution, Narrating Events/Reports, Summary/Precis Writing	[2]
<b>Unit6</b> Dialogue Writing, Group Discussion, Interview Skills(Using formal notations & gestures etc.)	[2]
<b>Text Books:</b> 1. Raymond Murphy, Essential English Grammar with Answers, Murphy 2. Objective General English by R.S. Aggarwal, S Chand Publishing; Revised edition (15 March 2017)	
<b>Reference Books:</b> 1. Rao N, D, V, Prasada, Wren & Martin High School English Grammar and Composition Book, S Chand Publishing, 2017 2. Murphy, Intermediate English Grammar with Answers, Cambridge University Press; Second edition	



**Language Skill -III**

HMS06	HSMC	Language Skill -III	0-0-2	Audit
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<b>Teaching Scheme: CS/AIDS/ETC/EE</b>	<b>Examination Scheme:</b>
Practical:2 hrs/week	Continues Assessment 1:25 marks Continues Assessment 2:25 marks

**Pre-Requisites:**Language Skills I, II

**Languages(Any One)**

**Python(Technical Language) (24Hrs)**

**Course Outcomes:**At the end of the course, students will be able to:

<b>CO1</b>	Develop a program to read input and return output.
<b>CO2</b>	Develop a program using data types, Strings and variables
<b>CO3</b>	Develop a program using Unary, Binary and Ternary operator
<b>CO4</b>	Develop a program using Conditional and Logical statements.

**Course Content**

<b>Unit1:Introduction</b> What is Python, what can python do, why python, how to use Python, Python indentation, python comments,basic syntax of program,first program of python	[6]
<b>Unit2:Variable and data types</b> Creating variable,casting, variable name,global variable,local variable, built in data types, string, constructor,function of data type,type c on version	[6]
<b>Unit3 : Operators in Python</b> Unary Operator,Binary operator-:(arithmetic operator,logical operator,assignment operator, membership operator,identity operator ,bitwise operator ),ternary operator	[6]
<b>Unit 4:Statements and loops</b> Input&Output Statements,Conditional Statements,Simple if Statement ,If-else statement ,Else-if Ladder,Nested if statement,,while loop ,for loop,break,continue,pass statements	[6]
<b>Text Books</b> 1. Python Projects (Author: Laura Cassell, Alan Gauld) Wrox publication 2. murach's Python Programming. Aut.:Michael Urban, Joel Murach, 'murach's Publication. 3. Fundamentals of Python (First Program) Cengage MINDTAP Publication 2nd Edition. Author: K.A. Kambert	

  
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**Engineering Management**

OE XXX	OEC	Engineering Management	3-0-0	3 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs./week	Continues Assessment 1 : 10 Marks Continues Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Use basic management principles to execute managerial activities
CO2	Use of various techniques to manage the projects.
CO3	Use of Project evaluation and review techniques.
CO4	Apply principals of engineering economics.
CO5	Apply resource management techniques.
CO6	Use new techniques in managements.

**Course Content**

<b>Unit 1: Management and planning</b> <b>Management-</b> Nature and function of management- Importance ,Definition, management Functions-planning, organizing, directing and controlling , Levels of management, Role of manager, Management skills, Management and administration. Decision Making and decision tree.	[06]
<b>Unit 2: Project Management</b> <b>Phases of project management:</b> Bar chart, Gantt chart. Work breakdown structure. CPM network- Time estimates, floats, critical path, Network compression and updating	[06]
<b>Unit3:PERT</b> Introduction, Time estimates, floats, project duration, precedence network.	[06]
<b>Unit 4: Engineering Economics</b> Types of interest, Time value of money, Equivalence. <b>Economic comparison method:</b> Present worth method, EUAC method, Capitalized cost method. <b>Investment criteria:</b> Net present value , rate of return, Benefit cost ratio, Payback period method, concept of break even analysis	[08]
<b>Unit 5: Resource Management:</b> Inventory control, Resource allocation, ABC analysis, EOQ techniques , HML, VED, SDE. Concepts of smoothing and leveling.	[06]
<b>Unit 6:Emerging trends in Management-</b> Study of project management software.Concept of work study and method study	[04]
<b>Text Books:</b> 1. Industrial Engineering and Management, Dr. O.P. Khanna, Dhanapatay Ray and sons, New Delhi. 2. Work study- Dr. O.P. Khanna, Dhanapatay Ray and sons, New Delhi.	



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3. Project Planning and control with PERT & CPM- B.C. Punmia, Laxmi Publication.
4. Industrial Engineering and Management, Banga And Sharma, Khanna publications, New Delhi
5. Engineering management by A. K. Gupta, S. Chand Publication.
6. Engineering management – Stoner, Pearson Publication.
7. Financial Management- Prasanna Chandra , TATA McGraw Hill.
8. Industrial Engineering and production Management- Martand Telsang, S. Chand publication.

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**Department:** Department of Civil Engineering  
**Class:** T.Y. B.Tech

**Rev:** Course Structure/00/2021-22  
**Semester:** VI

Course Code	Type of Course	Course	Teaching Scheme				Evaluation Scheme					Credits
			L	T	P	Total Hrs	CA1	CA2	MSE	ESE	Total	
CE601	PCC	Design of Concrete Structure – I	3	-	-	3	10	10	30	50	100	3
CE602	PCC	Soil Mechanics	3	-	-	3	10	10	30	50	100	3
CE603	ESC	Transportation Engineering	3	-	-	3	10	10	30	50	100	3
CE604	PCC	Water Resource Engineering	3	-	-	3	10	10	30	50	100	3
CE605	PEC	Elective-III	2	-	-	2	10	10	30	50	100	2
CE606	PCC	Soil Mechanics Laboratory	-	-	2	2	15	15	-	20	50	1
CE607	ESC	Transportation Engineering Laboratory	-	-	2	2	25	25	-	-	50	1
CE608	PCC	Structural Design and Drawing – I Laboratory	-	-	2	2	15	15	-	20	50	1
PRJ05	PROJ	Mega Project Phase –I (Seminar)	-	-	4	4	25	25	-	50	100	2
IFT02	PROJ	Industrial Training/ Field Training - II	-	-	-	-	-	-	-	50	50	Audit
HMS07	HSMC	Aptitude Skills-IV	1	-	-	1	25	25	-	-	50	Audit
HMS08	HSMC	Language Skills-IV	-	-	2	2	25	25	-	-	50	1
OE XXX	OEC	Open Elective-II	3	-	-	3	10	10	30	50	100	3
<b>TOTAL</b>			<b>18</b>	<b>-</b>	<b>12</b>	<b>30</b>	<b>215</b>	<b>215</b>	<b>180</b>	<b>390</b>	<b>1000</b>	<b>23</b>

**\* Elective-III List:**

CE 605 A	Design of Industrial Steel Structures
CE 605 B	Waste Water Treatment
CE 605 C	Disaster Management
CE 605 D	Town Planning

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**Design of Concrete Structure – I**

CE601	PCC	Design of Concrete Structure – I	3-0-0	3 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs./week	Continues Assessment 1 : 10 Marks Continues Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

**Pre-Requisites:** Strength of material, Concrete technology.

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Explaining the concept of RCC structural design.
CO2	Analyze and design of beam(Singly reinforced, Doubly reinforced and Flanged Beam)
CO3	Study the bond type, Significance of deflection and Design of shear reinforcement & torsion reinforcement for the beam.
CO4	Analyze and design of Slab(One Way, Two Way and stair case)
CO5	Analyze and design of axially and eccentrically loaded Column(Rectangular and Circular)
CO6	Design of isolated footing and combined footing.

**Course Content**

<b>Unit : 1</b> Introduction- Stress strain behavior of concrete and steel, Behavior of RCC, Permissible stresses in steel and concrete, Different design philosophies, various limits states, Characteristic strength and Characteristic load, Load factor, Partial safety factors. Limit state of collapse (flexure): Analysis and Design of singly reinforced rectangular sections.	[06]
<b>Unit : 2</b> Limit state of collapse (flexure): Analysis and Design of Doubly Reinforced rectangular sections, Analysis and Design of singly reinforced T and L beams.	[06]
<b>Unit : 3</b> A) Limit State of Collapse – Torsion Behavior of R.C. rectangular sections subjected to torsion, Design of sections subjected to combined bending and torsion, combined shear and torsion. B) Limit state of collapse (shear and bond): Design of Shear reinforcement, Bond-types, Factors affecting bond Resistance, Check for development length.	[07]



C) Limit state of serviceability: Cracking-classification and Types of Cracks, Causes, Mechanism, and IS recommendations.	
<b>Unit : 4</b> a) Design of slabs: Cantilever Slab, Simply supported One way slab, Two way slab with different support conditions as per IS:456-2000 b) Design of Simply Supported single flight and Dog legged staircase.	[07]
<b>Unit : 5</b> Analysis and Design of axially and eccentrically (uni-axial) loaded circular and rectangular columns, circular column with helical reinforcement.	[06]
<b>Unit : 6</b> Design of isolated rectangular column footing with constant depth subjected to axial load and moment, Concept of combined rectangular footing.	[07]

**Text Books:**

1. S. Unnikrishna Pillai, Devdas Menon (2010) "Reinforced Concrete Design," Tata McGraw-Hill Education, New Delhi
2. P.C. Varghese (2013) "Design of Reinforced Concrete Structures," Prentice-Hall of India, New Delhi
3. N. Subramanian (2014) "Design of Reinforced Concrete Structures," Oxford University Press, New Delhi
4. S. N. Sinha (2010) "Reinforced Concrete Design," Tata McGraw-Hill Education, New Delhi
5. Krishna Raju N. (2009) "Design of Reinforced Concrete Structures," CBS Publishers & Distributors New Delhi

**Reference Books:**

1. IS 456-2000, Relevant Special publications of BIS
2. Limit state theory and Design –Karve and Shah , Structures publications , Pune
3. Reinforced Concrete Design – Limit state - A.K. Jain Nem Chand brothers Roorkee
4. Fundamentals of Reinforced Concrete –Sinha and Roy, S. Chand and company Ltd. Ram Nagar, New Delhi
5. Limit State Design of reinforced concrete P.C.Varghese, Prentice Hall, New Delhi
6. Reinforced Concrete Design- B.C. Punmia Laxmi publications New Delhi
7. Reinforced Concrete Design-M. L. Gambhir-Mc millan India Ltd. New Delhi

  
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### Soil Mechanics

CE602	PCC	Soil Mechanics	3-0-0	3 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs./week	Continuous Assessment 1 : 10 Marks Continuous Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

**Pre-Requisites:** Basic Civil Engineering

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Understand the application of soil mechanics and Analyze the index properties of soil.
CO2	Illustrate and evaluate flow of water through soil.
CO3	Understand and Inspect the compaction of soil & Identify the stress analysis in soil.
CO4	Analyze shear strength of soil.
CO5	Calculate earth pressures in the soil & Identify landslide areas.
CO6	Explain fundamentals of foundation engineering

### Course Content

<b>Unit 1: Introduction</b> Introduction to Soil Mechanics and its applications to Civil Engineering, major soil deposits of India, Introduction to soil exploration-objective and purpose, Three phase soil system, Weight Volume Relationships, Index Properties of Soils, Classification of soil - UCS & IS, Numerical on above concepts.	[06]
<b>Unit 2: Permeability &amp; Seepage</b> Definition and necessity, Darcy's law, factors affecting permeability, Seepage and Seepage Pressure, quick sand phenomenon, critical hydraulic gradient, General flow equation for 2-D flow (Laplace equation), Flow Net - Properties and application, Numerical on above concepts.	[06]
<b>Unit 3: Compaction &amp; Stress Distribution</b> A) <b>Compaction</b> - Definition, factors affecting compaction, effect of compaction on soil properties, field compaction Methods & equipment. B) <b>Stress Distribution</b> - Stress Distribution in Soils: Geostatic stress, Boussinesq's theory with	[07]



assumptions for point load and circular load (with numerical), Pressure Distribution diagram on a horizontal and vertical plane, Pressure bulb and its significance, Westergaard's theory, equivalent point load method, Approximate stress distribution method.	
<b>Unit 4: Shear Strength of Soils:</b> A) <b>Introduction</b> - Shear strength an Engineering Property. Mohr's stress circle, Mohr-Coulomb failure theory. The effective stress principle- Total stress, effective stress and neutral stress / pore water pressure. Peak and Residual shear strength, factors affecting shear strength. Stress-strain behavior of sands and clays. B) Measurement of Shear Strength –Introduction, Their suitability for different types of soils, advantages and disadvantages. Different drainage conditions for shear tests. Sensitivity and thixotropy of cohesive soils.	[08]
<b>Unit 5: Earth Pressure &amp; Stability of Slopes</b> A) <b>Earth Pressure</b> - Introduction, Rankine's state of Plastic Equilibrium in soils- Active and Passive states due to wall movement, Earth Pressure at rest. B) <b>Stability of Slopes</b> - Classification of slopes and their modes of failure, Taylor's stability number, Infinite Slopes in cohesive and cohesion less soil, Landslides- Causes and remedial measures.	[06]
<b>Unit 6: Introduction to Foundation Engineering</b> Modes of failure in Soil, Bearing Capacity of soil – Concept, Methods. Shallow Foundation & Deep Foundation – Concept, Types with details.	[05]

**Text Books:**

1. "Soil Mechanics and Foundation Engineering" by Dr.B.C.Punmia (Laxmi Publications)
2. "Geotechnical Engineering" by Shashi K. Gulati & Manoj Datta, Tata (McGraw Hill)
3. "Principles of Soil Mechanics and Foundation Engineering" by V.N.S. Murthy (UBS Publishers)
4. "Soil Mechanics-Principles and Practice" by Graham Barnes (Palgrave MacMillan)

**Reference Books:**

- 1 "Geotechnical Engineering" by C.Venkatramaiah (New Age International Publishers)
2. "Principles of Geotechnical Engineering" by Braj M.Das (Cengage Learning)
3. "Geotechnical Engineering" by Dr. B. J. Kasmalkar (Pune vidyarthi griha prakashan)
4. "Soil Mechanics and Foundation Engineering" by P Purushothma Raj (Pearson)



### Transportation Engineering

CE603	ESC	Transportation Engineering	3-0-0	3 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs./week	Continuous Assessment 1 : 10 Marks Continuous Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

**Pre-Requisites:** Basic Civil Engineering

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Understand the basics of Transportation Engineering and various road development programmes in India
CO2	Illustrate the principles of Highway Alignment
CO3	Understand the importance of Highway geometrics design as per IRC standards
CO4	Illustrate the various traffic characteristics while designing a traffic road
CO5	Understand the concept of railway engineering characteristics while designing a permanent way
CO6	Explain the concept of railway stations and yards in the railway

### Course Content

<b>Unit 1: Introduction</b> Transportation Engineering, Different Modes of Transportation, Road Development Programmes in India during Twentieth and Twenty First Century. Road Classification based on location and function.	[06]
<b>Unit 2: Highway Alignment</b> Highway Alignment, Factors Controlling Alignment, Engineering Survey for Highway Alignment, Pavement Surface Characteristics, Camber, Width of Carriage Way, Medians, Kerbs, Road Margins	[06]
<b>Unit 3: Geometric Design</b> Geometric Design, Importance of Geometric Design, Design controls and criteria, Sight distances, Types of Sight Distances, Stopping Sight Distance(SSD), PIEV theory, Overtaking sight distance (OSD), Criteria for Sight Distance Requirement on Highways	[06]

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<b>Unit 4: Traffic Engineering</b> Traffic Engineering, Scope of traffic engineering, Traffic Characteristics, Traffic Engineering Studies and Analysis, Traffic Volume Studies, Spot Speed Studies, Speed and Delay Studies, Origin and Destination Studies, Parking Studies, Accident Studies.	[06]
<b>Unit 5: Railway Engineering</b> Importance of Railways, Characteristics of Railways, Classification of Indian Railways, Definition of Gauge of Track, Factors affecting the choice of a Gauge, Sleepers, Function of Sleepers, Ballast, Function of Ballast	[08]
<b>Unit 6: Railway Stations and Yards</b> Rails, Functions and Types of Rails, Definition of Stations, Classification of Stations, Definition of Yards, Types of Yards, Necessity of maintenance of Track	[04]

**Text Books:**

1. Khanna and Justo, "Highway Engineering" by (Nemchand & Bros., Roorkee)
2. Arora N. L., "Transportation Engineering"
3. Bindra and Arora, "Highway Engineering" by (Standard Publishers)
4. Vazirani V.N. and Chandola S.P., "Transportation Engineering" (Khanna Publishers)
5. Shahani P.B, "Road Techniques" (Khanna Publishers)
6. Kadiyali L.R, "Traffic Engineering and Transport Planning" (Khanna Publishers)
7. Rangwala, "Railway Engineering" (Charotar Publishing House)

**Reference Books:**

1. Garber, N.J. and Hoel, L.A., "Traffic and Highway Engineering" (West Publishing)
2. Khistry, C.J. "Transportation Engineering – An Introduction" (Prentice Hall of India)
3. Agor R. Surface Transportation (Railways and Highways)" (Khanna Publishers, N. Delhi)

  
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### Water Resources Engineering

CE604	PCC	Water Resources Engineering	3-0-0	3 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs./week	Continuous Assessment 1 : 10 Marks Continuous Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks


**Pre-Requisites:** Hydraulics

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Apply the basic requirements of irrigation and various irrigation techniques, requirements of the crops
CO2	Identify various components of hydrologic cycle, calculate rainfall and losses of water
CO3	Examine the ground water hydrology
CO4	Apply different methods for forecasting models
CO5	Identify reservoir Planning, losses, sedimentation
CO6	Identify the effect, causes & prevention of water logging and water conservation technique

### Course Content

<b>Unit 1:</b> <b>Introduction to Irrigation:</b> Definition, functions, advantages and necessity, methods of irrigation, surface irrigation, subsurface irrigation, micro-irrigation <b>Water Requirements of Crops:</b> Soil moisture and crop water relationship, factors governing consumptive use of water, principal Indian crops, their season and water requirement, crop planning, agricultural practices, water requirement of crop – duty, delta, irrigation efficiency	[07]
<b>Unit 2:</b> <b>Introduction to Hydrology:</b> Hydrologic cycle, <b>Precipitation:</b> Forms, Types of precipitation, measurement, analysis of precipitation data, computation of mean rainfall (arithmetic mean method, Thiessen's polygon, isohyetal)	[07]

  
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Civil Engineering  
SHARAD INSTITUTE OF TECHNOLOGY  
COLLEGE OF ENGINEERING  
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<b>Evaporation and Infiltration:</b> Elementary concepts, factors affecting, measurement of evaporation, transpiration, evapotranspiration and infiltration (Horton's method and infiltration indices)	
<b>Unit 3:</b> <b>Ground Water Hydrology:</b> Occurrences and distribution of ground water, specific yield of aquifers, Darcy's law, permeability, safe yield of basin. Hydraulics of wells under steady flow condition in confined and unconfined aquifers, specific capacity of well, well irrigation: tube wells, open wells	[06]
<b>Unit 4:</b> <b>Runoff:</b> Factors affecting runoff, runoff hydrograph, unit hydrograph, theory, S-curve hydrograph, Method Of Super position, use of unit hydrograph. <b>Floods:</b> Factors affecting Flood, Estimation of flood- rational formula and other methods, flood frequency analysis-Gumbel's method.	[07]
<b>Unit 5:</b> <b>Reservoir planning,</b> Reservoir storage, Site selection for reservoir planning, , Fixation of reservoir capacity from annual inflow and outflow, Reservoir regulation, Reservoir losses, Reservoir sedimentation- Phenomenon , Measures to control reservoir sedimentation, Useful life of reservoir, Introduction to different types dams	[07]
<b>Unit 6:</b> <b>Water Logging and Drainage:</b> The process of water logging, Causes of water logging, Effects of water logging, preventive and curative measures, Land drainage, reclamation of water logged areas, alkaline and saline lands. <b>Water Conservation:</b> Rain water Harvesting, Ground Water Recharge, small scale techniques of surface water detention such as: Soil embankments, field ponds, concrete bandhara.	[06]

**Text Books:**

1. "Irrigation Engineering & Hydraulic Structures" by S. K. Garg (Khanna Publishers, Delhi).
2. "Water Resources & Irrigation Engineering" by Dr. K. R. Arora (Standard Publisher).
3. "Irrigation, Water Resources and Water Power Engineering" by Dr P.N. Modi (Standard Book House).
4. "Irrigation and Water Power Engineering" by Dr. Punmia and Dr. Pande (Laxmi Publications,






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Delhi).

5. "Irrigation Engineering" by Raghunath (Wiley Eastern Ltd, New Delhi).

**Reference Books:**

1. "Engineering Hydrology" by K. Subramanya (Tata McGraw Hill Publishers, New Delhi).
2. "Hydrology" by H.M. Raghunath (Wiley Eastern Publication, New Delhi).
3. "Irrigation Engineering and Hydraulics" by Sharma R.K (Oxford & IBH Publishing Co., New Delhi).
4. "Applied Hydrology" by VenTe Chow (Tata McGraw Hill Publishers, New Delhi).
5. "Irrigation Engineering" by Dahigaonkar (Asian Book Pvt Ltd).
6. "Irrigation Engineering" by S. R. Sahastrabudhe (Katson Publishers).

  
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**A) Design of Industrial Steel Structures**

CE605A	PEC	A) Design of Industrial Steel Structures	2-0-0	2 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs./week	Continuous Assessment 1 : 10 Marks Continuous Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

**Pre-Requisites:** Design of Steel Structures

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Design eccentric and moment connections by using various methods.
CO2	Design gantry Girder
CO3	Design of member under Combined Axial Load and Moment
CO4	Explain the concept of pre engineering building
CO5	Apply plastic method for design of beams and frames.
CO6	Analyze multi stored building

**Course Content**

<b>Unit 1: Eccentric and Moment Connections</b> Simple Beam-Column connections, Connections subjected to eccentric shear, Bracket connections-Bolted and Welded Connections.	[06]
<b>Unit 2: Gantry girder</b> Forces acting on a gantry girder, Commonly used sections, Introduction to design of gantry girder as laterally unsupported beam. (Problems on Max. SF And Max. BM calculations)	[06]
<b>Unit 3: Member under Combined Axial Load and Moment</b> Introduction, Column in framed structure, Crane column in industrial building.	[05]
<b>Unit 4: Pre Engineering Building</b> Introduction, Pre-Engineered Building Concept, Merits of Pre-Engineered Buildings, PEB Steel History, Design Loads, Deflection limitation, Cold steel sections for purlins.	[04]
<b>Unit 5: Plastic Behavior of Structural Steel</b> Introduction, Plastic theory, Evaluation of fully plastic moment, Evaluation of shape factor,	[05]



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Plastic hinge concept, conditions of plastic analysis, Load factor, and Theorem of Plastic analysis.

**Unit6: Multi Storied Building**

Introduction, Building frames, Bracings, Tube structure, Analysis of frame subjected to horizontal forces- Portal method and Cantilever method.


[06]

**Text Books:**

1. "Limit State Design of Steel Structures" by S. K. Duggal (McGraw Hill Education Private Ltd. New Delhi)
2. "Design of Steel Structures" by Dr. B. C. Punmia, Mr. A. K.Jain, Mr. A. K.Jain (Laxmi Publications (P) Ltd. New Delhi)
3. "Design of Steel Structures by Limit State Methods" by S. S. Bhavikatti (I & K)

**Reference Books:**

1. "Design of Steel Structures" by N. Subramanian (Oxford University Press)
2. "Design Steel Structures Volume – II" by Dr. Ramachandra & Vivendra Gehlot (Scientific Publishers Journals Department)
3. "Design of Steel Structures" by Gaylord & Gaylord (Publisher Tata McGraw Hill, Education. Edition 2012)
4. "Indian Standard Code – IS – 800 General Constructions in Steel- Code of Practice".
5. "Steel Tables".

  
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### Waste Water Treatment

CE605B	PEC	B) Waste Water Treatment	2-0-0	2 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs./week	Continuous Assessment 1 : 10 Marks Continuous Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

**Pre-Requisites:** Environmental engineering, Hydraulics

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Review the knowledge on biological wastewater treatment.
CO2	Identify the sewage characteristics and design various sewage treatment plants.
CO3	Discuss municipal water and wastewater treatment system design and operation.
CO4	Apply environmental treatment technologies and design processes for treatment of industrial wastewater
CO5	Practice different sludge handling and treatment system.
CO6	Illustrate effective wastewater land treatment process.

### Course Content

<b>Unit 1: Introduction to Wastewater Treatment</b> Introduction of wastewater, its types and various sources, Necessity of treatment of waste water Introduction to Preliminary treatment: screening and grit removal units, oil and grease removal, Primary treatment, Introduction to Secondary treatment: Activated sludge process, trickling filter, SBR, MBBR.	[04]
<b>Unit 2: Low cost wastewater treatment methods</b> Principles of waste stabilization pond, oxidation pond, aerobic & anaerobic Lagoons. Septic tank and Imhoff tank	[04]
<b>Unit 3: Industrial Waste Water Treatment</b> Sources of Pollution: Sugar industry, textile, dairy, tannery, Edible oil, electroplating industries Pre and Primary Treatment: Equalization, Proportioning, Neutralization, Oil Separation by Floatation, Treatment Methods- UASB, Chemical Precipitation, trickling filter, SBR, MBBR.	[06]

  
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<b>Unit 4: Nitrogen and Phosphorous Removal</b> Nitrification and De-nitrification, Phosphorous removal, Disposal of treated Waste	[06]
<b>Unit 5: Sludge Processing</b> Concept of Upflow Anaerobic Sludge Blanket system. Sludge processing: Sludge mass-volume relationship, Process fundamentals of Thickening, Stabilization, Conditioning, and Dewatering. Concept of gravity thickener, belt press and sludge drying bed.	[05]
<b>Unit6: Land Treatment Processes</b> Land treatment systems: Processes, Removal mechanisms of nutrients, effect on land, conditions for land treatment.	[03]

**Text Books:**

1. Manual on sewerage and sewage Treatment-Government of India Publication
2. "Waste Water Engineering Treatment & Disposal" by Metcalf & Eddy, Tata (McGraw Hill)
3. "Sewage Disposal and Air Pollution Engineering" by Garg S.K., (Khanna Publishers)
4. "Waste Water Treatment" by Rao M.N. and A. K. Datta (Oxford & IBH Publishing Co Pvt. Ltd)
5. "Municipal and Rural Sanitation" by Victor M. Ehlers and Ernest W. Steel. (New York: McGraw Hill Book Company)

**Reference Books:**

1. "Environmental Engineering" by Peavey, Rowe D. R. and Tchobanoglous, (McGraw-Hill Book Co.)
2. "Water Supply and Pollution Control" by Viessman and Hammer, (Harper Collins College Pub.)
3. "Water and Waste water Technology" by Hammer M.J., (Prentice-Hall of India Private Limited)
4. "Environmental Impact Assessment" by Larry Canter, (Tata McGraw Hill Publication)
5. "Environmental Pollution and Control" by Bhatia H. S., (Galgotia Publication Pvt. Ltd., New Delhi)





### C) Disaster Management

CE 605 C	PEC	C) Disaster Management	2-0-0	2 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs./week	Continuous Assessment 1 : 10 Marks Continuous Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

**Pre-Requisites:** Environmental Science

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Understand the concept of disaster and types of natural disasters.
CO2	Illustrate and interpret man-made disasters.
CO3	Identify disaster management systems, like prevention, mitigation and preparedness.
CO4	Analyze application of advanced systems, like remote sensing and GIS, in disaster risk management
CO5	Estimate essential services, rehabilitation and speedy reconstructions after the disaster
CO6	Evaluate the impact of major projects and developmental works on disasters.

### Course Content

<b>Unit 1: Natural Disasters:</b> Concepts and definitions of disaster, hazard, vulnerability, resilience risks, Natural Disasters- concept, causes and effects (Floods, Drought, Cyclone, Earthquakes, Landslides, Avalanches, Volcanic Eruptions, Heat and Cold Waves, Climatic Change: Global warming, Sea Level rise, Ozone Depletion )	[05]
<b>Unit 2: Man-made Disasters:</b> Socio-technical Disaster, Technological disaster, Transportation disaster, Structural Collapse, Wars	[04]
<b>Unit 3: Disaster Management System:</b> Concept of disaster management, Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications)	[06]
<b>Unit 4: Disaster Risk Reduction:</b>	



Disaster preparedness plan, use and application of emerging technologies (Usages of GIS and Remote sensing techniques in disaster management), Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programs in India and the activities of National Disaster Management Authority.	[06]
<b>Unit 5: Rehabilitation, Reconstruction And Recovery</b> Damage Assessment, Parameters of Vulnerability, Rehabilitation, Reconstruction and Development-Concept, Immediate shelters/camps, Development of Physical and Economic Infrastructure, Concept of recovery, Creation of Long-term Job Opportunities and Livelihood Options, Education and Awareness, Long-term Recovery	[05]
<b>Unit 6: Disasters and Environment-</b> Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land use changes, urbanization), sustainable and environmental friendly recovery methods, One case study of Natural disaster and man-made disaster	[04]

**Text books:**

1. "Disaster Management: Future Challenges and Opportunities" by Jagbir Singh (K W Publishers Pvt. . Ltd.)
2. "Disaster Management" by J. P. Singhal (Laxmi Publications.)
3. "Biodiversity, Environment and Disaster Management" by Shailesh Shukla, Shamna Hussain
4. "Earth and Atmospheric Disaster Management : Nature and Manmade" by C. K. Rajan, Navale Pandharinath (B S Publication)
5. "Disaster Management" by Dr. Mrinalini Pandey (Wiley India Pvt. Ltd.)
6. "Disaster Science and Management" by Tushar Bhattacharya (McGraw Hill Education (India) Pvt. Ltd.)

**Reference Books:**

1. "Disaster management and Risk Reduction, Role of Environmental Knowledge" by Gupta A.K., Niar S.S and Chatterjee S. (Narosa Publishing House, Delhi.)
2. "Introduction to International Disaster Management" by Damon, P. Copola (Butterworth Heineman.)
3. "Disaster Management" by Murthy D.B.N. (Deep and Deep Publication PVT. Ltd. New Delhi)
4. "Managing Natural Disasters" by Modh S. (Mac Millan publishers India Ltd.)  
Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012)







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#### D)Town Planning

CE605D	PEC	D) Town Planning	2-0-0	2 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs./week	Continuous Assessment 1 : 10 Marks Continuous Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

**Pre-Requisites:** Building Planning and Drawing

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Outline events of Indian Urbanization and its Challenges
CO2	Explain the types of town planning and importance of Special Economic Zone (SEZ)
CO3	Identify the contents of Development Plan, process, submission and its approval
CO4	Identify the Unified Development Control Regulations for building permission, Grant/ refusal and land use classification
CO5	Summarize the objectives of planning agencies in India
CO6	Summarize the development charges and implementation of Projects

#### Course Content

<b>Unit 1: Indian Urbanisation</b> Salient features of Indian Urbanisation, Challenges of Urbanisation with reference to Atal Mission for Rejuvenation and to urban transformation, Shyam Prasad Mukherjee Rurban Mission, Pradhan Mantri Awas Yojna, concept of Smart Cities	[05]
<b>Unit 2: Surveys and Planning:</b> Types of town planning survey, Introduction to urban, rural and regional planning <b>Zoning:</b> Definition – objects and principles of zoning. Advantages of zoning, Special Economic Zone (SEZ)	[05]
<b>Unit 3:Development Plan</b> Contents of Development Plan, Planning norms, Modifications to sanctioned DP, Process of DP preparation, publication, submission and approval as per provisions of MR and TP Act, 1966.	[05]

Page 17 of 33

  
Head of the Department  
Civil Engineering

SHARAD INSTITUTE OF TECHNOLOGY  
COLLEGE OF ENGINEERING  
Yadav (Ichalkaranji) Dist. Kolhapur





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<b>Unit 4 :Unified Development Control Regulations</b> Procedure for obtaining development permission/building permission, Grant/ refusal of permission, deemed permission, Commencement of works, General land development requirements, Land-Use Classification,	[05]
<b>Unit 5: Planning Authorities in Maharashtra</b> Objectives of Planning agencies for various levels of planning such as: MMRDA, PMRDA, CIDCO, MSRDC, MADC, MIDC- Functions, roles and responsibilities, projects carried out.	[05]
<b>Unit6:Development Charges and Implementation of Projects</b> Development charges for building permission, and revocation of permission, Actions against unauthorized development ; Implementation of Projects under BOT, BOO, BOOT, BOLT	[05]

**Text Books:**

1. "Fundamentals of Town Planning", by Hiraskar G.K. (Dhanpat Rai and Sons, Delhi.)
2. "Town and Country Planning and Housing", by Modak N.V. and V.N. Ambdekar (Orient Longman Ltd., New Delhi.)
3. "Town Planning", by Rangwala, (Charotar publishing house. )
4. "Textbook of Town Planning", by A.Bandopadhyay ( Books and Allied, Calcutta)

**Reference Books:**

1. Principals of Urban Transport Systems Planning by B. G. Hutchinson
2. Introduction to Transport Planning by B. J. Bruton.
3. Gallion and Eisner The Urban Pattern: City planning and design"
4. Space Standards for Roads in Urban Areas by IRC 69-1977
5. Guidelines on Regulations and Control of Mixed Traffic in Urban Areas by IRC 70-1977
6. Land Acquisition Act of 1894.
7. Maharashtra Slum Redevelopment Act
8. Urban Arts Commission Act.
9. R.T.P. Act of 1966.
10. UDPMI guidelines, ministry of urban affairs and employment, Govt. & India.
11. National Building Code of India- Part-III.

  
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**Soil Mechanics Laboratory**

CE606	PCC	Soil Mechanics Laboratory	0-0-2	1 Credit
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<b>Teaching Scheme:</b>	<b>Examination Scheme:</b>
Practical: 2 hr/week	Continuous Assessment 1 : 15 Marks Continuous Assessment 2 : 15 Marks End Semester Exam : 20 Marks

**Course outcome:** At the end of the course, students will be able to:

CO1	Analyze Index properties of soil.
CO2	Inspect Soil Strength parameters.
CO3	Explain various geotechnical software's

**Experiments**

1. Specific gravity determination by Pycnometer /density bottle.
2. Sieve analysis, particle size determination and IS classification as per I.S.Codes.
3. Determination of Consistency limits and their use in soil classification. as per I.S.Codes.
4. Field density test by a) Core cutter b) Sand Replacement
5. Determination of coefficient of permeability by a) constant head and b) Variable /Falling head method.
6. Standard Proctor test / Modified Proctor test.
7. Direct shear test.
8. Unconfined compression test.
9. Tri-axial test
- 10) Introduction to software's – 1) Adonis 2) PSlope 3) SO- Foundation 4) CRISP2D

**Projects**

In a group of five, students should collect soil sample from different territory and do any five tests on it. Prepare a report including proper evidence, result and conclusion.

  
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**Transportation Engineering Laboratory**

CEC607	ESC	Transportation Engineering Laboratory	0-0-2	1 Credit
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<b>Teaching Scheme:</b>	<b>Examination Scheme:</b>
Practical: 2 hr/week	Continues Assessment 1 : 25 Marks Continues Assessment 2 : 25 Marks


**Course outcome:** At the end of the course, students will be able to:

CO1	Design and conduct experiments, as well as to analyze and interpret data
CO2	Develop the techniques, skills necessary for engineering practice
CO3	Understand the importance of different test

- Practical Work consists of performances among the list below and detailed reporting in the form of journal.
- For end semester, Oral examination shall be based on experiment conducted
- Term work: Practical from following list of experiment.

**Experiments any**

1. Aggregate Impact Test to Determine Resistance of an Aggregate to Sudden Shock or Impact
2. Los Angles Abrasion Test to Determine Aggregate Toughness
3. Crushing test of aggregate to Determine Resistance of Aggregate to Crushing Under a Gradually Applied Compressive Load
4. Bitumen Penetration Test to Determine Consistency of Bituminous Materials
5. Softening Point
6. Flash Point and Fire Point Test
7. Ductility Test to Determine Adhesive Property of Bitumen
8. Viscosity of Bitumen

  
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**Structural Design and Drawing – I**

CE608	PCC	Structural Design and Drawing – I	0-0-2	1 Credit
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Teaching Scheme:	Examination Scheme:
Practical: 2 hr/week	Continues Assessment 1 : 15 Marks Continues Assessment 2 : 15 Marks End Semester Exam : 20 Marks

**Pre-Requisite:** Engineering Mechanics, Design of steel structures.

**Course outcome:** At the end of the course, students will be able to:

CO1	Analysis and design of industrial building with all connection.
CO2	Analysis and design building/Bridge/Plate girder.
CO3	Draw the detailed section for steel structure.

**Projects**

The lab work shall consist of structural analysis, design and detailing of the following structures along with necessary drawings.

**1. Industrial Shed:**

- Roof truss, purlin and connections.
- Gantry girder.
- Column
- Foundation.

**2. Any one of following**

**A. Building Frames:**

- Secondary and main beams
- Column and column bases
- Beam- to- beam connection
- Column- beam connection

**B. Foot Bridge:**

- Influence lines



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- b. Cross beam
- c. Main Truss
- d. Raker
- e. Joint details
- f. Support details

**C. Welded Plate Girder :**

- a. Design of cross section
- b. Curtailment of flange plates
- c. Stiffeners and connections.

**Note:** - Analysis results of the first problem shall be compared with the results by any standard software package

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**Civil Engineering**

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**Mega Project Phase-I (Seminar)**

PRJ05	PROJ	Mega Project Phase-I (Seminar)	0-0-4	2 Credits
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Teaching Scheme:	Examination Scheme:
Practical : 4hr/week	Continuous Assessment 1 : 25 Marks Continuous Assessment 2 : 25 Marks End Semester Exam : 50 Marks

In Mega Project Phase-I, the students are expected to complete 50% of the total project by the end of semester VI. After completion of expected project work, they are expected to submit the consolidated report including the work done in phase-I.

The report shall be comprehensive and presented typed on A4 size sheets and **spiral bound**. The number of copies to be submitted is number of students plus one. The assessment would be carried out by the panel of examiners (Guide and Project Evaluation Members) for both, term work and oral examinations.

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### Internship/Field Training

IFT02	PROJ	Internship/Field Training	0-0-0	Audit
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<b>Teaching Scheme:</b>	<b>Examination Scheme:</b>
Lecture: NA	End Semester Exam : 50 Marks

**Pre-Requisite:** Basics of Civil Engineering, Good written and Oral Communication.

**Course outcome:** At the end of the course, students will be able to:

CO1	Verify the Technical knowledge in real industrial situations.
CO2	Develop interpersonal communication skills.
CO3	Discuss activities and functions of the industry in which the Internship/training has done.
CO4	Write the technical report.

### Course Description:-

Internship / Training is educational and career development opportunity, providing practical experience in a field or discipline. At the end of the **Fourth and Fifth semester**, every student should undergo practical training in an industry / professional organization / Research laboratory with the prior approval of the HoD/TPO/Principal of the college and submit the report along with the completion certification from the Industry/ Organization. The report will be evaluated during the **Sixth** semester by the department.

#### Guideline for Students:-

1. Arrive at work as per schedule, ready to work and stay for the agreed upon time.
2. Present yourself in a professional manner at all times, including being appropriately dressed at workplace.
3. Communicate any concerns with your supervisor and the internship/Training coordinator in a timely manner and respectfully.
4. Demonstrate enthusiasm and interest in what you are doing, ask questions and take the initiative as appropriate.
5. Complete and submit assigned tasks by designated timelines. Meet all deadlines.

#### Student's Diary/ Daily Log

The main purpose of writing daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students should record in the daily training diary the day to day account of the observations, impressions,

  
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COLLEGE OF ENGINEERING  
Yadrav (Ichalkaranji) Dist. Kolhapur







students should record in the daily training diary the day to day account of the observations, impressions, information gathered and suggestions given, if any. It should contain the sketches & drawings related to the observations made by the students.

The daily training diary should be signed after every day by the supervisor/ in charge of the section where the student has been working. The diary should also be shown to the Faculty Mentor. Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the SITCOE immediately after the completion of the training. It will be evaluated on the basis of the following criteria:

- Regularity in maintenance of the diary.
- Adequacy & quality of information recorded.
- Drawings, sketches and data recorded.
- Thought process and recording techniques used.
- Organization of the information.

#### **Internship Report**

After completing the internship, the student should prepare a comprehensive report to indicate what he/she has observed and learned in the training period. Daily diary will also help to a great extent in writing the industrial report since much of the information has already been incorporated by the student into the daily diary. The competent authority should sign the training report. The Internship report should be evaluated on the basis of following criteria:

- Originality.
- Adequacy and purposeful write-up.
- Organization, format, drawings, sketches, style, language etc.
- Variety and relevance of learning experience.
- Practical applications, relationships with basic theory and concepts taught in the course.

#### **Evaluation of Internship/ Training**

The student should be evaluated based on his training report and presentation, before an expert committee constituted by the concerned department as per norms. The evaluation will be based on the following criteria:

- Quality of content presented.
- Proper planning for presentation.
- Effectiveness of presentation.
- Depth of knowledge and skills.
- Attendance record, daily diary, departmental reports shall also be analyzed along with the Internship Report.

  
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**Aptitude Skills- IV**

HMS07	HSMC	Aptitude Skills- IV	1-0-0	Audit
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<b>Teaching Scheme:</b>	<b>Examination Scheme:</b>
Lecture: 1 hrs./week	Continuous Assessment 1 : 25 Marks Continuous Assessment 2 : 25 Marks

**Pre-Requisites:** Aptitude Skills-I/II

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Solve the problems on system of equation
CO2	Solve the problems on seating arrangement
CO3	Solve the logical reasoning problems
CO4	Solve the critical analysis problems
CO5	Solve the problems of Data interpretation
CO6	Solve the problems permutations and combinations

**Course Content**

<b>Unit 1: System of equations</b> Quadratic equations, Surds and indices, solution of equations, Ages.	[02]
<b>Unit 2: Seating Arrangements</b> Linear seating Arrangement, Circular seating arrangement, Complex seating arrangement,	[02]
<b>Unit 3: Logical Reasoning</b> Numerical based on sense of direction, Blood relations, Odd man Out	[02]
<b>Unit 4: Critical analysis</b> Clocks and Calendar based problems, Cryptarithmic, heights and distances	[02]
<b>Unit 5: Data Interpretation</b> Table form, Bar form, Line for Pi chart form	[02]
<b>Unit 6: Permutation and combination</b> Permutation and combinations	[02]

**Text Books:**

1. RS Aggarwal, " Quantitative Aptitude for Competitive Examinations ",S. Chand Publisher,

  
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2016 edition

2. Quantitative Aptitude for CAT TMH Publications

3. Vedic Maths Made Easy By Dhaval Bhatiya Jaico Publication House.

Page 27 of 33

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HMS07	HSMC	Aptitude Skills- IV	1-0-0	Audit
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<b>Teaching Scheme:</b>	<b>Examination Scheme:</b>
Lecture: 1 hrs./week	Continuous Assessment 1 : 25 Marks Continuous Assessment 2 : 25 Marks


**Pre-Requisites:** Aptitude Skills-I/II

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Solve the questions on ordering of words & Parts of Speech
CO2	Organize contents of Business Communications such as CV, emails and letters.
CO3	Solve the questions based on jumbled paragraphs and reading comprehension.
CO4	Solve the questions on spotting error and sentence correction.
CO5	Summarize proceedings of any event or conference.
CO6	Discuss about current and critical issues during group discussion.

#### Course Content

<b>Unit 1:</b> Parts of Speech, Punctuation Word Family (Using the same word as different Parts of Speech)	[02]
<b>Unit 2:</b> Analogy, Letter Writing (Formal), E-Mail Writing, CV Writing	[02]
<b>Unit 3:</b> Reading Comprehension, Paragraph Jumbles	[02]
<b>Unit 4:</b> Spotting Errors (in different parts of sentence), Subject-Verb Agreement Sentence Correction, Sentence Completion	[02]
<b>Unit 5:</b> One Word Substitution, Narrating Events/Reports, Summary/Precis Writing	[02]

  
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**Unit 6:**

Dialogue writing Group Discussion, Interview Skills  
(Using formal notations & gestures etc.)

[02]

**Text Books:**

1. Raymond Murphy, Essential English Grammar with Answers, Murphy
2. Objective General English by R.S. Aggarwal, S Chand Publishing; Revised edition.

**Reference Books:**

1. Rao and ,D,V,Prasada, Wren & Martin High School English Grammar and Composition Book, S Chand Publishing, 2017 Murphy, Intermediate English Grammar with Answers, Cambridge University Press; Second edition.

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**Language Skill- IV**

<b>HMS08</b>	<b>HSMC</b>	<b>Language Skill- IV</b>	<b>0-0-2</b>	<b>1 Credit</b>
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<b>Teaching Scheme:</b>	<b>Examination Scheme:</b>
Practical: 2 hrs./week	Continuous Assessment 1 : 25 Marks Continuous Assessment 2 : 25 Marks

**Pre-Requisites:** Language Skill III

**Course Outcomes:** At the end of the course, students will be able to:

<b>CO1</b>	Make use of Function in Python Programming.
<b>CO2</b>	Make use of Python collections.
<b>CO3</b>	Make use of classes and its objects in python.
<b>CO4</b>	Make use of file and it's handling functions.

**Course Content**

<b>Unit 1: Function</b> Why we Need Function ,Categories of Functions-Predefined ,User-define ,Parts of Functions Arguments, Return Value ,Definition of Function ,Function Calling ,Lambda(Introduction)	<b>[06]</b>
<b>Unit 2 : Python Collections</b> List, tuple, set, dictionary—> constructor ,check, change ,remove item ,list comprehension , Sort ,loop through ,joining	<b>[06]</b>
<b>Unit 3: Class and Object</b> LOOP Characteristics ,creating class ,_init_() method, creating Object ,accessing methods and variables of class ,constructor and destructor ,inheritance ,super(),function overloading	<b>[06]</b>
<b>Unit 4: File handling</b> Path & Directory Settings-Absolute,Relative,File Modes(r,w,a,etc),Open & Close file Reading File using Python--Read Line By Line readline() function,Read Word,Read character (offset),Writing Text File using Python--Write Mode,Append Mode, Exception handling	<b>[06]</b>

**Text Books:**

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1. Python Projects (Author: Laura Cassell, Alan Gault) Wrox publication
2. Murach's Python Programming. Author.:Michael Urban, Joel Murach, murach's Publication.
3. Fundamentals of Python (First Program) Cengage MINDTAP Publication 2nd Edition,  
Author: K.A. Kambert

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**Air and Noise pollution control**

OEXXX	OEC	Air and Noise pollution control	3-0-0	3 Credits
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Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs./week	Continuous Assessment 1 : 10 Marks Continuous Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

**Pre-Requisites:** Environmental studies, Environmental Engineering

**Course Outcomes:** At the end of the course, students will be able to:

CO1	Understand the atmosphere & meteorology and its importance in Air Pollution.
CO2	Estimate air pollutant concentration and understand different norms of air quality.
CO3	Understand effect of air pollutants on environment.
CO4	Understand different air pollution control measures.
CO5	Know effects of noise on human, animals and plants.
CO6	Learn the various techniques of noise measurement and control for community and industries sources.

**Course Content**

<b>Unit 1: Air Pollution- introduction</b> Atmosphere- Structure and Composition, Definition of air pollution, Stationary and mobile Sources of air pollutant and types of air pollutants.	[05]
<b>Unit 2: Effect of air pollutant</b> Effects of Air Pollution on human, vegetation, Animals; Acid rain, Global Warming, Climate Change and Greenhouse Effect, Ozone Layer Depletion, air pollution episodes. Air pollution Case study- London smog, Bhopal gas tragedy.	[07]
<b>Unit 3: Air quality monitoring</b> Units of measurement of air pollution, Study of Settling chamber, high volume air sampler, Air quality index.	[06]
<b>Unit 4: Air pollution control measures</b> Air pollution control strategy in India, stack height, Scrubbers, Electrostatic precipitators (ESPs),	[06]

  
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air filters and cyclones.	
<b>Unit 5: Noise pollution- introduction</b> Engineering definition noise and sound, sources and types of noise, effects of noise on human health and wild life.	[06]
<b>Unit 6: Industrial noise– sources and health monitoring</b> Noise monitoring in industries, Industrial materials and techniques to control noise pollution, control of noise- at source, along path and at receiving end, Noise Pollution (Regulation and Control) rules 2020.	[06]
<b>Text Books:</b> 1. "Air Pollution" by Wark K. and Warner C. F. (H. R. Publication) 2. "Air Pollution Vol. I and II" by Stern A. C. (Allied Publishers Limited) 3. "Air Pollution" Rao H.V.N. and Rao M. N., Tata (McGraw Hill) 4. IS code for practice for noise reduction in industrial buildings IS: 3483, 1965.	
<b>Reference Books:</b> 1. Air Pollution Control Engineering" by Noel de Nevers (Waveland Press, Inc.) 2. "An Introduction to Air pollution" by R.K. Trivedi and P. K. Goel (B. S. Publications) 3. "Noise Pollution" by S.K. Agarwal, (APH Publishing Corporation, New Delhi. New Delhi) 4. IS code for practice for noise reduction in industrial buildings IS:3483,1965	

F. Y. Patil

