E.G.S. PILLAY ENGINEERING COLLEGE (AUTONOMOUS)

Department of Civil Engineering

1701MA301		ENGINEERING MATHEMATICS III	L	T	P	C
			3	2	0	4
		(Common to B.E / B.Tech-All branches)				

Course Objectives:

1. To introduce Fourier series analysis and applications in Engineering, apart from its use in solving boundary value problems.
2. To acquaint the student with Fourier transform techniques used in wide variety of situations.
3. To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

Unit I	**PARTIAL DIFFERENTIAL EQUATIONS**	**9+3Hours**

Formation of partial differential equations – Singular integrals — Solutions of standard types of first order partial differential equations – Lagrange's linear equation — Linear partial differential equations of second order with constant coefficients of homogeneous type.

Unit II	**FOURIER SERIES**	**9+3 Hours**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic analysis.

Unit III	**APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS**	**9+3 Hours**

Classification of PDE – Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

Unit IV	**FOURIER TRANSFORMS**	**9+3 Hours**

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity

Unit V	**Z – TRANSFORMS AND DIFFERENCE EQUATIONS**	**9+3 Hours**

Z - Transforms – Elementary properties – Inverse Z – transform (using partial fraction and residues) – Convolution theorem – Formation of difference equations – Solution of difference equations using Z – transform.

	Total:	**45 + 15 Hours**

Further Reading:

1. Linear partial differential equations of higher order
2. Solution of non-homogeneous partial differential equations

Course Outcomes:

After completion of the course, Student will be able to

1. Compute the solution of partial differential equations (K2)
2. Use Fourier series analysis which is central to many applications in engineering (K2)
3. Solve boundary value problem using partial differential equation.(K3)
4. Apply Fourier transform techniques used in wide variety of situations.(K3)
5. Apply Z transform techniques for discrete time systems. (K3)

References:

1. Veerarajan. T., "Transforms and Partial Differential Equations", Second reprint, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2012.
2. Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 2012.
3. Narayanan.S.,ManicavachagomPillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998.
4. Bali.N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications PvtLtd , 2007.
5. Ramana.B.V., "Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company Limited, New Delhi, 2008.
6. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.
7. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, Wiley India, 2007.
8. Ray Wylie. C and Barrett.L.C, "Advanced Engineering Mathematics" Tata McGraw Hill Education Pvt Ltd, Sixth Edition, New Delhi, 2012.
9. nptel.ac.in/courses/111105035, www.nptelvideos.in/2012/11/Mathematics.html
10. www.learnerstv.com/Free-maths-video lectures - ltv348-page1.html

1702CE302		SOLID MECHANICS - I	L	T	P	C
			3	0	0	3

Course Objectives:

1. To impart knowledge on fundamental concepts of Stress, Strain and deformation of solids with applications to bars, beams and thin cylinders.
2. To acquire the ability to analyze the mechanism of load transfer in beams, the induced stress resultants and deformations.
3. To develop the clear understanding of the effect of torsion on shafts and springs.

Unit I **Stress and strain** **9 Hours**

Stress and strain at a point – Tension, Compression, Shear Stress – Hooke's Law – Relationship among elastic constants – Stress Strain Diagram for Mild Steel, TOR steel, Concrete – Ultimate Stress – Yield Stress – Factor of Safety – Thermal Stresses – Thin Cylinders and Shells – Strain Energy due to Axial Force – Resilience – Stresses due to impact and Suddenly Applied Load – Compound Bars.

Unit II **Shear and bending in beams** **9 Hours**

Beams and Bending- Types of loads, supports – Shear Force and Bending Moment Diagrams for statically determinate beam with concentrated load, UDL, uniformly varying load. Theory of Simple Bending – Analysis of Beams for Stresses – Stress Distribution at a cross Section due to bending moment and shear force for Cantilever, simply supported and overhanging beams with different loading conditions - Flitched Beams.

Unit III **Deflection of beams** **9 Hours**

Double Integration Method – Macaulay's Methods -Area Moment Method – Conjugate Beam Method For Computation Of Slopes And Deflection Of Determinate Beams

Unit IV **Torsion** **9 Hours**

Torsion of Circular and Hollow Shafts – Elastic Theory of Torsion – Stresses and Deflection in Circular Solid and Hollow Shafts – combined bending moment and torsion of shafts - strain energy due to torsion - Modulus of Rupture – Power transmitted to shaft – Shaft in series and parallel – Closed and Open Coiled helical springs – Leaf Springs – Springs in series and parallel – Design of buffer springs.

Unit V **Complex stresses and plane trusses** **9 Hours**

2 D State of Stress – 2 D Normal and Shear Stresses on any plane – Principal Stresses and Principal Planes – Mohr's circle - Plane trusses: Analysis of plane trusses - method of joints - method of sections

Total: 45 Hours

Further Reading

*Analysis of all types of horizontal determinate flexural members.
*Categorize various materials by virtue of its different strength properties.

Course Outcomes:

After completion of the course, Student will be able to

1. Understand the fundamental concepts of stress and strain in mechanics of solids and structures.
2. Analyze the determinate beams and trusses to determine shear forces, bending moments and axial forces
3. Compute the maximum deflection of beam.
4. Analyze laminar and turbulent flows in circular pipes and energy losses in pipes
5. Discuss about the Principal Plane and stresses.

References:

1. Rajput.R.K. "Strength of Materials", S.Chand and Co, New Delhi, 2007.
2. Bhavikatti. S., "Solid Mechanics", Vikas publishing house Pvt. Ltd, New Delhi, 2010.
3. Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., New Delhi, 2009.
4. Vazirani.V.N and Ratwani.M.M, "Analysis of Structures", Vol I Khanna Publishers, New Delhi,1995.
5. Junnarkar.S.B. and Shah.H.J, "Mechanics of Structures", Vol I, Charotar Publishing House, New Delhi 1997.
6. Bansal.R.K "Strength of materials", Laxmi Publications (P) Ltd, New Delhi 2014

1702CE303		FLUID MECHANICS	L	T	P	C
			3	0	0	3

Course Objectives:

1. To impart knowledge on the basic properties of the fluid
2. To impart knowledge in the area of fluid kinematics and fluid dynamics
3. To analyze and appreciate the complexities involved in solving the fluid flow problems

Unit I	**Fluid statics**	**9 Hours**

Definitions - Continuum concept – Units and dimensions - Fluid Properties – Classification of fluids - Fluid Pressure and its measurements (manometers) - forces on immersed plane and curved surfaces – buoyancy - Metacentric height – fluid mass under relative equilibrium – Micro fluidics.

Unit II	**Kinematics of fluids**	**9 Hours**

Lagrangian and Eulerian methods – Classification of fluids - Streamlines, path lines and streak lines - Continuity equation - Velocity potential and Stream function – Flow nets.

Unit III	**Fluid dynamics**	**9 Hours**

Euler and Bernoulli's equation – Application of Bernoulli's equation – Flow measurement – Laminar flow through parallel plates and pipes – Darcy-Weishbach friction factor – Turbulent flow.

Unit IV	**Problems in pipe flow**	**9 Hours**

Major and minor losses in pipe flows – Pipes in series and parallel – Pipe networks – Concept of Boundary Layer Theory

Unit V	**Dimensional analysis**	**9 Hours**

Rayleigh's method – Buckingham's Pi-theorem – model study and similitude – Practical applications.

Total:	**45 Hours**

Further Reading

To analyze and create a solution for Fluid flow issues.

To minimize the losses in conveyance of fluids

Course Outcomes:

After completion of the course, Student will be able to

1. Understand the basic properties of fluids, and apply Newton's Law of Viscosity in solving practical problems
2. Understand the principles of kinematics with specific emphasis on application of continuity equation, stream function etc
3. Apply the principles of Bernoulli's equation in measurement of discharge in pipes, and in other pipe flow problems.
4. Apply fundamental concepts of fluid mechanics in solving fluid flow problems in pipes, design of pipe, and analysis of pipe networks.
5. Understand the fundaments of dimensional analysis and application of Buckingam π-theorem in fluid flow problem

References:

1. Bansal, R.K., Mechanics of Fluids, Laxmi Publications, Pvt. Ltd, New Delhi, 1St Edition, 2005.
2. Rama Durgaiah,D., Fluid Mechanics and Machinery,New Age International Publishers, New Delhi, 1st Edition, Reprint, 2006.
3. Jain A.K"fluid mechanics" khanna publishers,2010
4. White f.m "fluid mechanics"tatamcgraw hill 5th edition, new 2000

1702CE304		ENGINEERING GEOLOGY	L	T	P	C
			3	0	0	3

Course Objectives:

1. To summarize the origin, development and ultimate fate of various surface features of the earth.
2. To impart the understanding of rock forming minerals, their properties and classifications of rocks.
3. To analyze the geological structures and their effects due to geological factors.

Unit I	**General geology**	**9 Hours**

Geology in civil engineering – Branches of geology – Earth structures and composition –Elementary knowledge on continental drift and plate tectonics - Earth processes –Weathering – Geological work of rivers, wind and sea - Engineering importance – Earthquake belts in India - Groundwater – Mode of occurrence – Prospecting – Importance in civil engineering..

Unit II	**Mineralogy**	**9 Hours**

Introduction – Crystallography – Elements – Symmetry – Axes – Forms – Systems –Properties - physical - optical – Study of rock forming minerals - Felspar group - Orthoclase, microcline, albite, anorthite - pyroxenegroup - Enstatite, augite - Amphibole group - Anthophyllite, hornblende - Mica group – Muscovite, biotite - Oxide minerals - Quartz, corundum - Carbonate minerals – Calcite, dolomite, magnesite - Coal and petroleum – Origin and occurrence in India.

Unit III	**Petrology**	**9 Hours**

Classification of rocks – Distinction between igneous, sedimentary and metamorphic rocks- Occurrence, engineering properties and distribution - Igneous rocks– Granite, syenite, diorite, gabbro, pegmatite, dolerite and basalt- sedimentary rocks - Sandstone, limestone, shale, conglomerate and breccia-Metamorphic rocks- quartzite, marble, slate, phyllite, gneiss and schist.

Unit IV	**Structural geology and geophysical method**	**9 Hours**

Introduction – Basic terminologies – Study of structural features – Folds, faults and joints -Engineering considerations - Geophysical investigations- Seismic and electrical.

Unit V	**Geological investigations in civil engineering**	**9 Hours**

Geological conditions necessary for construction of dams, tunnels, buildings, road cuttings- Landslides – Causes and preventions- improvement of sites.

	Total:	**45 Hours**

Further Reading

Geo Technical Engineering, Structural geology

Course Outcomes:

After completion of the course, Student will be able to

1. Understand weathering process and mass movement
2. Identify the available minerals by their properties and behavior.
3. Differentiate three important major rock types based on their origin, occurrence, engineering properties and uses.
4. Describe the geological structures fold, fault, joints etc., and identify the subsurface geological formations.
5. Describe the applications of geological concepts in civil engineering projects.

References:

1. Parbin Singh, “Engineering and General Geology”, S.K.Kataria& Sons, 2008.
2. MarlandP.Billings, “Structural Geology”, PHI Learing Pvt. Ltd. New Delhi, 2012
3. F.G.Bell, “Engineering Geology”, Butterworth –Heinemann (An Imprint of Elsevier), 2007.
4. F.G.H. Blyth and M.H.de Freitas, “A Geology for Engineers”, Butterworth –Heinemann (An Imprint of Elsevier), 2006

E.G.S. PILLAY ENGINEERING COLLEGE (AUTONOMOUS)
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1702CE305		BUILDING MATERIALS AND MANAGEMENT	L	T	P	C
			3	0	0	3

Course Objectives:

1. To give students an understanding of typical and potential application of Building materials.
2. To ensure that students know about the manufacturing process of Building materials and mix designing procedure of concrete
3. Give students an appreciation of the effective use of common and modern materials in construction

Unit I **Stones – bricks – concrete blocks** **9 Hours**

Stone as building material – Criteria for selection – Tests on stones – Deterioration and Preservation of stone work – Bricks – Classification – Manufacturing of clay bricks – Tests on bricks – Compressive Strength – Water Absorption – Efflorescence – Bricks for special use – Refractory bricks – Cement, Concrete blocks – Lightweight concrete blocks.

Unit II **Lime – cement – aggregates – mortar** **9 Hours**

Lime – Preparation of lime mortar – Cement – Ingredients – Manufacturing process – Types and Grades – Properties of cement and Cement mortar – Hydration – Compressive strength – Tensile strength – Fineness– Soundness and consistency – Setting time – Industrial byproducts – Fly ash – Aggregates – Natural stone aggregates – Crushing strength – Impact strength – Flakiness Index – Elongation Index – Abrasion Resistance – Grading – Sand Bulking.

Unit III **Concrete** **9 Hours**

Concrete – Ingredients – Manufacturing Process – Batching plants – RMC – Properties of fresh concrete – Slump – Flow and compaction Factor – Properties of hardened concrete – Compressive, Tensile and shear strength – Modulus of rupture – Tests – Mix specification – Mix proportioning – BIS method – High Strength Concrete and HPC – Self compacting Concrete – Other types of Concrete – Durability of Concrete

Unit IV **Timber and modern material** **9 Hours**

Timber – Market forms – Industrial timber– Plywood – Veneer – Thermacole – Panels of laminates – Steel Aluminium composite panel – Uses – Paints – Varnishes – Distempers – Bitumen, Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products – Refractories – Composite materials — Fibre textiles – Geo membranes and Geotextiles for earth reinforcement.

Unit V **Materials management** **9 Hours**

Materials Management - Material Procurement and Delivery - Inventory Control - Tradeoffs of Costs in Materials Management

Total: 45 Hours

Further Reading:

1. On completion of this course the students will be able to Compare the properties of most common and advanced building materials and understand the typical and potential applications of these materials

Course Outcomes:

After completion of the course, Student will be able to

1. Summarize the most common and advanced materials used for construction.
2. Explain the manufacturing process of various building materials
3. Explain the properties of fresh and hardened concrete and performance of other types of concrete.
4. Illustrate the usage of timber, plywood and aluminum, composite material, paints, distemper and modern materials.
5. summarize the procedure in material management

References:

1. Varghese.P.C, "Building Materials", PHI Learning Pvt. Ltd, New Delhi, 2012.
2. Rajput. R.K., "Engineering Materials", S. Chand and Company Ltd., 2008.

3. Shetty.M.S., "Concrete Technology (Theory and Practice)", S. Chand and Company Ltd.,2008.
4. Gambhir M.L., "Concrete Technology", 3rd Edition, Tata McGraw Hill Education, 2004
5. Duggal.S.K., "Building Materials", 4th Edition, New Age International , 2008.

1702CE351		SURVEYING LAB 1	L	T	P	C
			0	0	4	2

Course Objectives:	
	1. To introduce the principles of various surveying methods and using the survey instrument to Civil Engineering projects.

List of Experiments:		
1. Study about Chain and accessories		
2. Aligning, Ranging and chaining		
3. Compass Traversing		
4. Plane table surveying : Radiation		
5. Plane table surveying : Intersection		
6. Plane table surveying : Two point Problem		
7. Fly leveling using Dumpy level		
8. Check Leveling		
9. LS and CS		
10. Study of Theodolite		
	Total:	**45 Hours**

Additional Experiments:	
	1. Using in the field for taking leveling checking and measurements.
	2. Electronic instrument

Course Outcomes:	
	After completion of the course, Student will be able to
	1. On completion of this course student shall be able to understand the Surveying of the Lands and Pots use various method.
	2. Understanding the working principle.
	3. Understanding the methods of using the proper instrument for the method.

References:
G. Brancato, S. Macchia, M. Murgia, M. Signore, G. Simeoni - Italian National Institute of Statistics, ISTAT
K. Blanke, T. Körner, A. Nimmergut - Federal Statistical Office Germany, FSO
P. Lima, R. Paulino - National Statistical Institute of Portugal, INE
J.H.P. Hoffmeyer-Zlotnik - German Center for Survey Research and Methodology, ZUMA

1702CE352		STRENGTH OF MATERIALS LABORATORY	L	T	P	C
			0	0	4	2

Course Objectives:	
	1.To find the strength properties of different construction materials like steel, concrete, brick and timber
	2. To evaluate stiffness properties of springs and to find the hardness properties of various metals.

List of Experiments:		
1. Tension test on Mild steel rod		
2.Tension test on tor steel rod		
3.Torsion test on MS bar		
4.Tension and compression test on springs		
5.Compression test on bricks and concrete cubes		
6. Water absorption test on bricks		
7.Brinell and Rockwell Hardness test		
8.Compression and bending test on wood specimens		
9.Charpy and Izod Impact Test		
10.Double shear test		
11. Test on cement	**Total:**	**45 Hours**

Additional Experiments:	
	1. .

Course Outcomes:	
	After completion of the course, Student will be able to
	1.The experimental works involved in this laboratory make the student to determine the properties of different structural elements
	2. The student should be able to obtain the strength of the material and stiffness properties of structural elements.

References:
1. Strength of Materials Laboratory Manual, Anna University, Chennai - 600 025.
2. IS1786-2008, Specification for cold worked steel high strength deformed bars for concrete reinforcement, 2008

TECHNICAL SEMINAR I

0 0 2 1

Course Objectives

To develop self-learning skills of utilizing various technical resources to make a technical presentation.

To promote the technical presentation and communication skills.

To impart the knowledge on intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.

To promote the ability for Interacting and sharing attitude.

To encourage the commitment-attitude to complete tasks.

Course Outcomes (COs)

Identify and utilize various technical resources available from multiple field.

Improve the technical presentation and communication skills.

Improve communicative competence.

Interact and share their technical knowledge.

Understand and adhere to deadlines and commitment to complete the assignments.

1704GE 351	LIFE SKILLS – BUSINESS ENGLISH (Lab)	L	P	T	C
		0	2	0	1

OBJECTIVES

To enables learners to

- Develop Communication Competence In Prospective Engineers.
- Enable Them To Convey Thoughts And Ideas With Clarity And Focus.
- Develop Report Writing Skills.
- Equip Them To Face Interview & Group Discussion.
- Inculcate Critical Thinking Process.
- Prepare Them On Problem Solving Skills.
- Provide Symbolic, Verbal, And Graphical Interpretations Of Statements In A Problem Description.
- Understand Team Dynamics & Effectiveness.
- Create Awareness On Engineering Ethics And Human Values.
- Instil Moral And Social Values, Loyalty And Also To Learn To Appreciate The Rights Of Others.
- Learn Leadership qualities and practice them.

SYLLABUS

Communication Skill:

Introduction to Communication, The Process of Communication, Barriers to Communication, Listening Skills, Writing Skills, Technical Writing, Letter Writing, Job Application, Report Writing, Non-verbal Communication and Body Language, Interview Skills, Group Discussion, Presentation Skills, Technology-based Communication

Critical Thinking & Problem Solving:

Creativity, Lateral thinking, Critical thinking, Multiple Intelligence, Problem Solving, Six thinking hats Mind Mapping & Analytical Thinking.

Teamwork:

Groups, Teams, Group Vs Teams, Team formation process, Stages of Group, Group Dynamics, Managing Team Performance & Team Conflicts

Ethics, Moral & Professional Values:

Human Values, Civic Rights, Engineering Ethics,
Engineering as Social Experimentation, Environmental Ethics, Global Issues, Code of Ethics like ASME, ASCE, IEEE.

Leadership Skills:

Leadership, Levels of Leadership, Making of a leader, Types of leadership, Transactions Vs Transformational Leadership, VUCA Leaders, DART Leadership, Leadership Grid & leadership Formulation

Expected Outcomes:

The Learners will be able to

- Communicate and Make presentations.
- Write different types of report.
- Face Interview and group discussion.
- Think critically and solve critical issues.
- Work in Groups.
- Become an effective leader.

References:

John C. Maxwell (2014); "The 5 Levels of Leadership", Centre Street, A division of Hachette Book Group Inc

Kalyana; (2015) "*Soft Skill for Managers*"; First Edition; Wiley Publishing Ltd.

Larry James (2016); "*The First Book of Life Skills*"; First Edition; Embassy Books

ShaliniVerma (2014); *"Development of Life Skills and Professional Practice"*; First Edition; Sultan Chand (G/L) & Company

1701MA403	NUMERICAL METHODS AND STATISTICS	L	T	P	C
		3	2	0	4
	(Common to B.E EEE)				

Course Objectives:

1. To sole the engineering problem, by use of numerical tools
2. To understand the concept of interpolation.
3. To analyze the population and samples using statistics techniques

Unit I	**INTERPOLATION AND APPROXIMATION**	**9+3Hours**

Interpolation with unequal intervals - Lagrange's interpolation – Newton‟s divided difference interpolation – Interpolation with equal intervals – Newton's forward and backward difference formulae.

Unit II	**NUMERICAL DIFFERENTIATION**	**9+3 Hours**

Approximation of derivatives using interpolation polynomials-Taylor's series method – Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order equations

Unit III	**NUMERICAL INTEGRATION**	**9+3 Hours**

Numerical integration using Trapezoidal, Simpson's 1/3 rule – Romberg's method - Two point and three point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.

Unit IV	**SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS**	**9+3 Hours**

Solution of algebraic and transcendental equations -Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel

Unit V	**TESTING OF HYPOTHESIS**	**9+3 Hours**

Large sample test based on Normal distribution for single mean and difference of means - Tests based on t and F distributions for testing means and variances – Contingency table (Test for Independency) – Goodness of fit

Total:	**45 + 15 Hours**

Further Reading:

3. Finding Eigen value using power method
4. Cubic Spline

Course Outcomes:

After completion of the course, Student will be able to

6. To find the intermediate values, when huge amounts of experimental data are involved.
7. To solve first order differential equation using Numerical methods
8. To perform Integration using Numerical methods
9. To solve algebraic and transcendental Equations numerically
10. Analyze the statistical data

References:

6. Johnson R.A.Gupta C. B, Miller and Freunds Probability and statistics for Engineers, 7th edition ,Pearson Education,2007
7. Grewal B.S and Grewal J.S, Nummerical methods in Engineering and Science, 6thedition,Khanna puplishers,2004
8. Walpole R.E. Myers S.L ,Ye.K, Probability and statistics for Engg and scientists, 8th edition Pearson education,2007
9. Gerald C.F Wheatley P.O, Applied Numerical Analysis, 6th edition ,Pearson education Asia 2006
10. www.indiastudychannel.com
11. nptel.ac.in/courses/111105035, www.nptelvideos.in/2012/11/Mathematics.html
12. www.learnerstv.com/Free-maths-video lectures - ltv348-page1.html

1702CE401		ENGINEERING SURVEYING II	L	T	P	C
			3	0	0	3

Course Objectives:

Objective:
This subject deals with geodetic measurements and Control Survey method. The student is also exposed to the Modern Surveying.

Unit I	**Theodolite surveying**	**9 Hours**

Horizontal and vertical Control surveying – Instrument and Accessories – Corrections – Trigonometricallevelling – single and reciprocal observation traversing.

Unit II	**Surveying Adjustment**	**9 Hours**

Introduction – Types of curves – Designation of curves – Elements of simple circular curve – simple problems – Transition curves – vertical curves.

Unit III	**Curves**	**9 Hours**

Basic Principle – Classification – Measuring principle, Working principle, Sources of errors – Infrared and Laser Total station instruments. Care and maintenances of total station instruments.

Unit IV	**GPS Surveying**	**9 Hours**

Basic concept – Different segment - -Space, Control and user segments – satellite configuration – signal structure – Hand held and geodetic receivers.

Unit V	**Total Station Surveying**	**9 Hours**

Basic Principle – Classification – Measuring principle, Working principle, Sources of errors – Infrared and Laser Total station instruments. Care and maintenances of total station instruments.

Total:	**45 Hours**

Further Reading:

1. Building Marking in the construction field using Total station
2. Leveling work in the Highways Railways and Airways using Total station

Course Outcomes:

After completion of the course, Student will be able to

1. On completion of this course students shall be able to understand the advantages of electronic surveying over conventional surveying methods
2. Understand the working principle of GPS, its components, signal structure, and error sources
3. Understand various GPS surveying methods and processing techniques used in GPS observations
4. Improve ability to function as a survey party in completing the assigned field work
5. Appreciate the need for licensed surveyors to establish positioning information for property and structures.

References:

1. Alfred Leick, "GPS satellite surveying", JohnWiley& Sons Inc., 3rd Edition, 2004.
2. GuochengXu, " GPS Theory, Algorithms and Applications", Springer - Berlin, 2003.
3. SatheeshGopi, rasathishkumar, N. madhu, “Advanced Surveying, Total Station GPS and Remote Sensing" Pearson education, 2007
4. Roy S.K., “Fundamentals of Surveying”, 2nd Edition, Prentice Ha of India, 2004
5. AroraK.R.,”SurveyingVol 1 & 2”, Standard Book House, 10th Edition 2008

1702CE402		SOLID MECHANICS - II	L	T	P	C
			3	1	0	4

Course Objectives:

1. To impart knowledge on Energy principles, stress, Strain and deformation of solids with applications to beams, cylinders and unsymmetrical sections.
2. To acquire the ability to analyze the mechanism of load transfer in columns.
3. To develop the clear understanding of the shear force and bending moment in indeterminate beams.

Unit I	Energy principles	12 Hours

Strain energy and strain energy density – strain energy due to axial load, shear, flexure and torsion – Castigliano‟s theorems – Maxwell's reciprocal theorems - Principle of virtual work – application of energy theorems for computing deflections in beams and trusses - Williot Mohr's Diagram.

Unit II	Indeterminate beams	12 Hours

Concept of Analysis - Propped cantilever and fixed beams-fixed end moments and reactions – Theorem of three moments – analysis of continuous beams – shear force and bending moment diagrams.

Unit III	Columns and cylinder	12 Hours

Euler's theory of long columns – critical loads for prismatic columns with different end conditions; Rankine-Gordon formula for eccentrically loaded columns – Eccentrically loaded short columns – middle third rule – core section – Thick cylinders – Compound cylinders.

Unit IV	State of stress in three dimensions	12 Hours

Determination of principal stresses and principal planes – Volumetric strain –Theories of failure – Principal stress - Principal strain – shear stress – Strain energy and distortion energy theories – application in analysis of stress, load carrying capacity.

Unit V	Advanced topics in bending of beams	12 Hours

Unsymmetrical bending of beams of symmetrical and unsymmetrical sections – Shear Centre - curved beams – Winkler Bach formula**.**

	Total:	45 + 15 Hours

Further Reading:

- Analysis of all types of flexural members
- Approaching the flexural members with different kinds of stress analysis

Course Outcomes:

After completion of the course, Student will be able to

1. Determine the deflection in beams and frames using Energy theorems.
2. Analyze indeterminate beams like continuous beams and fixed beams
3. Analyze the long and short columns and determine the design loads.
4. Assess the state of stress in three dimensions
5. Solve problems involving unsymmetrical bending in structural members.

References:

1. Rajput R.K. "Strength of Materials (Mechanics of Solids)", S.Chand& company Ltd., New Delhi, 2010.
2. Egor P Popov, "Engineering Mechanics of Solids", 2nd edition, PHI Learning Pvt. Ltd., New Delhi, 2012
3. Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 2003
4. William A .Nash, "Theory and Problems of Strength of Materials", Schaum‟s Outline Series, Tata McGraw Hill Publishing company, 2007.
5. PunmiaB.C."Theory of Structures" (SMTS) Vol 1&II, Laxmi Publishing Pvt Ltd, New Delhi 2004.
6. Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2011.
7. Bansal.R.K "Strength of materials", Laxmi Publications (P) Ltd, New Delhi 2014

1702CE403		APPLIED HYDRAULIC ENGINEERING	L	T	P	C
			3	0	0	3

Course Objectives:	
	1. To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines.
	2. To relate the theory and practice of problems in hydraulic engineering

Unit I	**CRITICAL FLOW**	**12 Hours**
Types and regimes of flow – velocity distribution –specific energy concept – critical flow Computations – application.		
Unit II	**UNIFORM FLOW AND GRADUALLY VARIED FLOW (GVF)**	**12 Hours**
Manning's and Chezy's equation – computation of normal depths – compound channels – most economical section – Velocity measurement. Dynamic equation for GVF – Classification of flow profiles – Computation of GVF profiles – Direct Step Method and Standard Step Method (only concept).		
Unit III	**RAPIDLY VARIED FLOW**	**12 Hours**
Hydraulic jumps – Balengar momentum equation -Classification of Jumps – Surges (only positive surges).		
Unit IV	**TURBINES**	**12 Hours**
Classifications of turbine – velocity triangle diagram for Pelton, Francis and Kaplan Turbine – Specific speed - Characteristics curves for turbines – Draft tube – Governing of turbines		
Unit V	**PUMPS**	**12 Hours**
Pumps – classification – centrifugal pump – positive displacement pumps – indicator diagrams – air vessels – characteristic curves for pumps.		
	Total:	**60 Hours**

Further Reading:	
	1.the student can be able to real time problem in efficiency of pumps & turbines

Course Outcomes:	
	After completion of the course, Student will be able to
	1. Understanding the Computation of drag and lift coefficients
	2. Analyzing channels for design
	3. Understanding flow profiles in channel transitions and analyze hydraulic transients
	4. Evaluating the working proportions of hydraulic machines
	5. Analyzing compressible flows of liquids and gases

References:

1.Modi, P.N., & Seth, S.M., Hydraulics and Fluid Mechanics including Fluid Machines Standard Book House, New Delhi, 2000

2.Rama Durgaiah,D., Fluid Mechanics and Machinery, New Age International Publishers, New Delhi, 1stEdition, Reprint, 2006.

3.Chow, V.T., Open Channel Hydraulics, Blackburn Press, 2nd Edition, Reprint, 2009

4.JAINA.K"fluidmechanics"khannapublishers,delhizolo.

5.subramanya K"flow in open channels"TATA MCGRAW HILL new delhi,2000

1702CE404		GEOTECHNICAL ENGINEERING I	L	T	P	C
			3	-	-	3

Course Objectives:	
	1. Provide the description, classification and to know about properties of soil.
	2.Familiarize the students an understanding of permeability and seepage of soils
	3. To know about the consolidation and compaction effect on soil in lab and field.

Unit I	**INTRODUCTION**	**9 Hours**
Definition of soil and soil mechanics – Formation of soil – types of soil – Three phase system of soil and their relationships – Specific gravity – Definition – Determination – Field density - sand replacement and core cutter method.		
Unit II	**INDEX PROPERTIES**	**9 Hours**
Classification of soil – Grain size analysis – Stoke's law and hydrometer analysis– Consistency of soils – Atterberg's limit - Liquid limit, Plastic limit and Shrinkage limit – Determination - plasticity index, liquidity index , consistency index ,shrinkage ratio, flow index and toughness index – Classification of coarse grained and fine grained soil as per BIS.		
Unit III	**PERMEABILITY AND SEEPAGE**	**9 Hours**
Permeability –Definition – Assumption - one dimensional flow through soil – Darcy's law – Limitations - Discharge velocity and seepage velocity – factors affecting the permeability – permeability determination - lab and field methods – permeability in stratified soil deposits – Introduction of flow net and its properties - application of flow net.		
Unit IV	**COMPACTION AND CONSOLIDATION**	**9 Hours**
Compaction – field and lab methods – Proctor's test – factors affecting the compaction – California Bearing Ratio (CBR) test – effect of compaction in soil properties – Consolidation – Terzaghi's theory of one dimensional consolidation - partial differential equation (no analytical solution) – Lab method - coefficient of consolidation – Determination - √t and log t methods.		
Unit V	**STRESS DISTRIBUTION AND SHEAR STRENGTH**	**9 Hours**
Introduction – stresses in soil – concept of effective and neutral stresses – stress distribution in soil media – Boussinesq and Westergrads analysis – Point load , Uniformly distributed load , line load – rectangular load - pressure bulb –Newmark's chart – Introduction. Shear strength – shear strength of cohesive and cohesion less soils – Mohr coulomb's theory –Direct shear, Triaxial, unconfined shear strength – Lab and field vane shear test - factors affecting the shear strength.		
	Total:	**45 + 15 Hours**

Further Reading:	
	1. To analyze and find out soil properties

Course Outcomes:	
	After completion of the course, Student will be able to
	1. Understand soil types and classification.
	2. Understand various properties of soil and their classification
	3. Understand permeability and seepage analysis.
	4.Understand soil compaction and consolidation methods
	5.Understand shear strength of soil and various techniques for improving the shear strength

References:

1. Raju .K.V.B .and Ravichandran .P.T, "Mechanics of Soils", AyyappaaPublications, 2000.
2. Punmia .B.C, "Soil Mechanics and Foundations", Laxmi Publications Pvt.Ltd., 2005.
3. GopalRanjan and Rao .A.S.R, *"Basic and Applied Soil Mechanics",* New age international(p) Ltd.,2007.
4. Terzaghi .K and Peck .R.B, "Soil Mechanics in Engineering Practice", JohnWiley Ltd., 1996.
5. Arora .K.R, "Soil Mechanics and Foundation Engineering", StandardPublication Distributors , 2011.

1702CE405		TRANSPORTATION ENGINEERING	L	T	P	C
			3	0	0	3

Course Objectives:

- To understand the importance of transportation and characteristics of road transport
- To know about the history of highway development, surveys and classification of road
- To study about the geometric design of highways
- To study about traffic characteristics and design of intersections
- To know about the pavement materials and design

Unit I	**HIGHWAY GEOMETRY**	**12 Hours**

Importance Road transportation, Highway alignment – Requirement, Engineering surveys for highway location. Maps & drawings to be prepared. Geometric design – Cross section element, width, camber, design – speed, sight distances, requirements and design of horizontal and vertical alignments.

Unit II	**HIGHWAY MATERIALS**	**12 Hours**

Highway materials – Properties of sub-grade pavement component materials – Tests on aggregates, sub- grade soil& bituminous materials. Design of Bituminous mixes as per M52

Unit III	**TRAFFIC MANAGEMENT AND CONTROL**	**12 Hours**

Traffic characteristics; Road user and vehicle characteristics, Stream flow characteristics: flow-speed-Density, measurement and analysis, concept of EPCU, capacity and level of service. Parking studies, Intersections: at grade intersections, grade separated intersections, channelized intersections and rotary, Traffic regulations: one-way streets, traffic signs, road markings, and signals. Design of isolated fixed time signal

Unit IV	**PAVEMENT DESIGN**	**12 Hours**

Pavement Design Factors in the design of flexible and rigid pavements, CBR methods. IRC recommendations on flexible pavement design (IRC37) and Rigid pavement (IRC58). Design of Surface and subsurface highway drainage.

Unit V	**CONSTRUCTION AND MAINTENANCE**	**12 Hours**

Pavement construction techniques – Types of pavements – WBM, WMM , GSB construction. Construction of bituminous pavements and rigid pavements. Pavement failures and their remedies. Pavement evaluation – structural, functional

Total:	**60 Hours**

Further Reading:

They can get the knowledge in transportation system

Course Outcomes:

After completion of the course, Student will be able to

1. carry out surveys involved in planning and highway alignment
2. design cross section elements, sight distance, horizontal and vertical alignment
3. implement traffic studies, traffic regulations and control, and intersection design
4. determine the characteristics of pavement materials
5. design flexible and rigid pavements as per IRC

References:

Veeraragavan.A, Khanna. S.K., Ceg Justo, Highway Engineering, Nem Chand & Brothers, 2014

Sharma, S.K. " Principles Practice and Design of Highway Engineering ", S. Chand & Co Ltd, 2013

Gupta B.L and Amith Gupta, Highway and Bridge Engg., Standard publishers, and Distributor, 2010

ParthaChakroborthy and Animesh Das, Principles of Transportation Engineering, Prentice Hall of India Pvt. Ltd., 2013.

LrKadiyali, LrKadyali, NbLal ," Principles and practice of highway engineering ", Khanna Publishers. 2013

Rangwala.S.C, Highway Engineering, Charotar Book Distributors, 2013

1702CE451		HYDRAULICS ENGINEERING LAB	L	T	P	C
			0	0	4	2

Course Objectives:	
	1.To acquire knowledge about properties of fluid
	2.To understand knowledge about the losses in pipes
	3.To understand knowledge about the characteristics of pumps and turbines

List of Experiments:
1. Calibration of Rotometer
2. Flow through Venturimeter Orifice meter
3. Flow through variable duct area - Bernoulli's Experiment
4. Flow through Orifice, Mouthpiece and Notches
5. Determination of friction coefficient in pipes
6. Determination of loss coefficients for pipe fittings
7. Characteristics of Centrifugal pumps
8. Characteristics of Gear pump
9. Characteristics of Submersible pump
10. Characteristics of Reciprocating pump
11. Characteristics of Pelton wheel turbine
12. Characteristics of Francis turbine
13. Characteristics of Kaplan turbine

	Total:	**45 Hours**

Additional Experiments:	
	1.Characteristics of multi stage Centrifugal pumps
	2.Characteristics of jet on vane

Course Outcomes:	
	After completion of the course, Student will be able to
	1.measure the flow properties of fluid
	2.conduct the experiment to find the losses in pipes
	3.conduct experiment to find characteristics curves of various pumps
	4.conduct experiment to find characteristics curves of various turbines

References:
1. SarbjitSingh."Experiments in Fluid Mechanics", Prentice Hall of India Pvt. Ltd, Learning Private Limited, Delhi, 2009.
2."Hydraulic Laboratory Manual", Centre for Water Resources, Anna University, 2004.
3.Modi P.N. and Seth S.M., "Hydraulics and Fluid Mechanics", Standard Book House, New Delhi, 2000.
4.Subramanya K. "Flow in open channels", Tata McGraw Hill Publishing. Company, 2001

1702CE452	GEOTECHNICAL ENGINEERING LAB	L	T	P	C
		0	0	4	2

Course Objectives:

1. To provide exposure to the students with hands on experience about classification of the soil.
2. To grant knowledge about field density of the soil.
3. To impart the knowledge about basic bearing capacity of the soil.
4. To attains adequate knowledge in assessing both Physical and Engineering behavior of soils through laboratory testing procedures.

List of Experiments:

1. Determination of water content
2. Determination of specific gravity
3. Determination of grain size distribution of Sieve Analysis
4. Determination of grain size by Hydrometer
5. Determination of Liquid limit and Plastic of the soil
6. Determination of Shrinkage limit of the soil
7. Determination of Dry density by Standard Proctor Compaction test
8. Determination of Field density by Core cutter method
9. Determination of Field density by Sand Replacement method
10. Determination of Permeability Coefficient using Constant head method
11. Determination of Permeability Coefficient using Variable head method
12. Determination of shear strength by using Direct Shear test
13. Determination of compression strength by using Unconfined compressive strength test

Total: 45 Hours

Additional Experiments:

3. CONSOLIDATION TEST
4. TRIAXIAL TEST

Course Outcomes:

After completion of the course, Student will be able to

1. Develop experience to classify the soil.
2. Identify the concept of optimum moisture content of the soil.
3. Recognize the concept of field density of the soil.
4. Practice of the concept to do performance test on Compressive and shear strength.
5. Apply the techniques to determine index properties and engineering properties by conducting appropriate tests.

References:

1. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi. 2007
2. GopalRanjan and Rao A.S.R. "Basic and Applied soil mechanics", Wiley Eastern Ltd, New Delhi (India), 2000.
3. Arora K.R. "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2002.
4. Soil Engineering Laboratory Instruction Manual" published by Engineering College Co-operative Society, Anna University, Chennai, 1996.
5. Saibaba Reddy, E. Ramasastri, K. "Measurement of Engineering Properties of Soils", New age International (P) Limited Publishers, New Delhi, 2002.
6. Lambe T.W., "Soil Testing for Engineers", John Wiley and Sons, New York, 1990.

1702CE453		SURVEYING LAB II	L	T	P	C
			0	0	4	2
Course Objectives:						
	1. This subject deals with Electronic Survey method. The student is also exposed to the Modern Surveying.					
List of Experiments:						
1. Study of theodolite						
2. Horizontal Angles by Reiteration method						
3. Horizontal Angles by Repetition method						
4. Vertical Angles						
5. Theodolite survey Traversing method						
6. Height and distance of the object						
7. Triangulation method						
8. Tachometry Tangential system						
9. Setting out work – Foundation Marking and Simple curve						
10. Field work using Total station						
			Total:			**45 Hours**
Additional Experiments:						
	1. Building Marking					
Course Outcomes:						
	After completion of the course, Student will be able to					
	1. On completion of this course student shall be able to understand the advantages of the Electronic instrument and working in the field.					
	2. Understanding the working principle.					
	3. Understanding the methods of using the proper instrument for the method.					
References:						
G. Brancato, S. Macchia, M. Murgia, M. Signore, G. Simeoni - Italian National Institute of Statistics, ISTAT						
K. Blanke, T. Körner, A. Nimmergut - Federal Statistical Office Germany, FSO						
P. Lima, R. Paulino - National Statistical Institute of Portugal, INE						
J.H.P. Hoffmeyer-Zlotnik - German Center for Survey Research and Methodology, ZUMA						

1704GE454 **TECHNICAL SEMINAR II** **0 0 2 1**

Course Objectives

To develop self-learning skills of utilizing various technical resources to make a technical presentation.

To promote the technical presentation and communication skills.

To impart the knowledge on intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.

To promote the ability for Interacting and sharing attitude.

To encourage the commitment-attitude to complete tasks.

Course Outcomes (COs)

Identify and utilize various technical resources available from multiple field.

Improve the technical presentation and communication skills.

Improve communicative competence.

Interact and share their technical knowledge.

Understand and adhere to deadlines and commitment to complete the assignments.

Evaluation Scheme:

Continuous Assessment (100)

Distribution of marks for Continuous Assessment:

Presentation I (40) Report (10)

Presentation II (40) Report (10)

Total Marks (100)

1704GE451	LIFE SKILLS: VERBAL ABILITY (LAB)-IV SEM	L	P	T	C
		0	2	0	1

OBJECTIVES

To enables learners to

- Develop their Vocabulary Skills.
- Enhance their capability on Grammar-based questions to mark and correct grammatical errors.
- Get themselves well-versed with a wide variety of words to be able to answer the synonyms and antonyms easily.
- Identify relationships or patterns within sentences or group of words.

SYLLABUS

UNIT I: Vocabulary and Paragraph Completion

Vocabulary (Synonyms & Antonyms), meanings of words, idioms, and phrases, secondary shades of meaning, usage, associated words, etc

UNIT II: Verbal Ability Tips

Meaning-Usage Match, Sentence Correction, Fill in the blanks

UNIT III: Verbal Reasoning

Facts, Inferences, Judgments, Reverse Analogies or Analogies, Error Correction articles, prepositions use of modifiers, subject-verb agreement, parallel construction, phrasal verbs, redundancy, etc.

Unit IV: Tips to Answer Vocabulary Questions

Mastering Paragraph completion (n Scope, Scale, tone, Continuity)

UNIT V: Inferential Logical Reasoning

Jumbled Paragraph, Reading Comprehension , Cloze Passage, Paragraph Completion, Focus on contemporary issues

Expected Outcomes:

The Learners will be able to

- Use the vocabulary skills in their oral and written communication.
- mark, correct and write without grammatical errors.
- Comprehend and answer technical and non technical documents and questions easily
- Identify relationships or patterns within sentences or group of words.

References:

- A Modern Approach to Verbal & Non-Verbal Reasoning (Old Edition) (S.Chand and R.S. Aggarwal) Paperback – 15 Mar 2017
- A Modern Approach to Logical Reasoning (R.S. Aggarwal) Paperback – 1 Apr 2017
- Objective General English (R.S. Aggarwal) Paperback – 15 Mar 2017
- https://www.ielts.org
- https://www.ielts.org
- https://ictcurriculum.gov.in

1702CE501		STRUCTURAL ANALYSIS I	L	T	P	C
			3	2	0	4

Course Objectives:

1. To understand the concept of analysis of indeterminate structures.
2. To Understand the methods of analysis of indeterminate trusses for external loads, lack of fit and thermal effects and also the influence line concept for indeterminate structure.
3. To study behavior of arches, Settlement and temperature effects.

Unit I	**INDETERMINATE FRAMES**	**12 Hours**

Degree of static and kinematic indeterminacies for plane frames – analysis of indeterminate pin-jointed frames – rigid frames (Degree of statical indeterminacy up to two) – Energy and consistent deformation methods.

Unit II	**SLOPE DEFLECTION METHOD**	**12 Hours**

Analysis of continuous beams - sinking of supports – rigid frames (with and without sway)

Unit III	**MOMENT DISTRIBUTION METHOD**	**12 Hours**

Distribution and carryover of moments – Stiffness and carry over factors - Analysis of continuous beams - sinking of supports – Rigid frames (with and without sway).

Unit IV	**MOVING LOADS AND INFLUENCE LINES**	**12 Hours**

Influence lines for reactions in statically determinate structures – influence lines for member forces in pin-jointed frames – Influence lines for shear force and bending moment in beam sections –Calculation of critical stress resultants due to concentrated and distributed moving loads. Muller Breslau's principle – Influence lines for continuous beams and single storey rigid frames.

Unit V	**ARCHES**	**12 Hours**

Arches as structural forms – Examples of arch structures – Types of arches – Analysis of three hinged, two hinged and fixed arches, parabolic and circular arches – Settlement and temperature effects.

Total:	**45 + 15 Hours**

Further Reading:

1. To analyze and find out BMD

Course Outcomes:

After completion of the course, Student will be able to

1. Analyze The Pin Jointed Plane Frames Using Energy And Consistent Deformation Method.
2. Analyze Indeterminate Structures Using Slope Deflection Method.
3. Analyze Indeterminate Structures Using Moment Distribution Method.
4. Analyze Indeterminate Beams With Moving Loads.
5. Analyze the arches under external loads, temperature effects and support settlements.

References:

1. Vaidyanadhan, R and Perumal, P, "Comprehensive Structural Analysis – Vol. 1 & Vol. 2", Laxmi Publications Pvt. Ltd, New Delhi, 2003.
2. L.S. Negi& R.S. Jangid, "Structural Analysis", Tata McGraw Hill Publications, New Delhi, 6th Edition, 2003.
3. Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain, " Theory of structures", Laxmi Publications Pvt. Ltd., New Delhi, 2004
4. Reddy. C.S., "Basic Structural Analysis", Tata McGraw Hill Education Pvt. Ltd., New Delhi,2013.
5. BhavaiKatti, S.S, "Structural Analysis – Vol. 1 & Vol. 2", Vikas Publishing Pvt Ltd., New Delhi, 2008
6. Wang C.K. , "Indeterminate Structural Analysis", Tata McGraw Hill Education Pvt. Ltd.,New Delhi, 2010
7. DevadasMenon, "Structural Analysis", Narosa Publishing House, 2008
8. Ghali.A., Nebille and Brown. T.G., "Structural Analysis - A unified classical and matrix approach" Sixth Edition, SPON press, New York, 2013.
9. Gambhir. M.L., "Fundamentals of Structural Mechanics and Analysis"., PHI Learning Pvt.Ltd., New Delhi, 2011.

1702CE502	CONCRETE STRUCTURES I	L	T	P	C
		3	0	0	3

Course Objectives:

1. To develop an understanding on the basic concepts in the behaviour and design of reinforced concrete systems and elements using working stress method.
2. To introduce the basic concepts and steps in the design of beams and slabs mainly in accordance with Limit state method.
3. To underline the design principles of RC members for shear, bond, and torsion.
4. To introduce the concepts in the design of RC Column design.
5. To give the knowledge in the concept of RC footings.

Unit I **FUNDAMENTALS** **9 Hours**

Stages in structural design - Structural planning - Design philosophies - Working stress method - Ultimate load method - Limit state method - Characteristic strength - Characteristic load - Design values - Partial safety factors - Codal provisions - Practical aspects of design - Design of flexural members and slabs by working stress method.

Unit II **LIMIT STATE DESIGN FOR FLEXURE** **9 Hours**

Analysis and design of One way and two way slabs – Singly and doubly reinforced rectangular and flanged beams - Cantilever beams - Standard method of detailing of RC beams and slabs.

Unit III **LIMITSTATEDESIGN FOR BOND, ANCHORAGE, SHEAR AND TORSION** **9 Hours**

Behavior of RC members in bond and anchorage – Curtailment of reinforcement - Design requirements as per code provision – Behavior of RC beams in shear and torsion - Design of RC members for combined bending, shear and torsion.

Unit IV **LIMIT STATE DESIGN OF COLUMNS** **9 Hours**

Columns – Assumptions – Effective length – Classification – Design guidelines – Axially loaded short columns with lateral ties and helical reinforcement – Columns subjected to uni-axial bending and biaxial bending – Slender columns - Standard method of detailing of RC columns.

Unit V **LIMIT STATE DESIGN OF FOOTING** **9 Hours**

Introduction and selection of footing under different site conditions - Design of wall footing – Design of axially and eccentrically loaded rectangular footing – Combined footing - Standard method of detailing of RC footing.

Total: 45 Hours

Further Reading :

1. students can be able to design whole elements in a building
2. students can be able to select suitable footing type

Course Outcomes:

After completion of the course, Student will be able to

1.Know the basic principles of different design methods
2. Design flexural members using limit state method under different loading and end conditions.
3. Design flexural members of any cross sectional shape for shear, bond, and torsion.
4. Design RC columns of any cross section with different end conditions.
5.Select and design RC footing of different cross section under various site conditions

References:

1. B. C Punmia, Ashok. Kumar Jain, Arun Kumar Jain “Limit State Design of Reinforced Concrete”, Laxmi Publications (P) Ltd, NewDelhi 2007.
2. UnnikrishnaPillai, S., DevdasMenon, “Reinforced Concrete Design”,Tata McGraw-Hill Publishing Company Ltd., New Delhi 2003.
3. Sinha, S.N., “Reinforced Concrete Design”, Tata McGraw-Hill Publishing Company Ltd., New Delhi

2002.

3. Varghese, P.C., "Limit State Design of Reinforced Concrete",Prentice Hall of India, Pvt. Ltd., New Delhi 2002
4. Krishna Raju, N., "Design of Reinforced Concrete Structures", CBS Publishers & Distributors, New Delhi, 2003.

E.G.S. PILLAY ENGINEERING COLLEGE (AUTONOMOUS)
Department of Civil Engineering

1702CE503		CONCRETE TECHNOLOGY	L	T	P	C
			3	0	0	3

Course Objectives:

1. To impart knowledge of building materials used in construction.
2. To train in various test for fresh and hardened concrete
3. To impart knowledge to the students on the properties of materials for concrete by suitable tests, mix design for concrete and special concretes

Unit I	CONSTITUENT MATERIALS	**9 Hours**

Cement-Different types-Chemical composition and Properties -Tests on cement-IS Specifications- Aggregates-Classification-Mechanical properties and tests as per BIS Grading requirements- Water- Quality of water for use in concrete.

Unit II	CHEMICAL AND MINERAL ADMIXTURES	**9 Hours**

Accelerators-Retarders- Plasticisers- Super plasticizers- Water proofers - Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline -Their effects on concrete properties

Unit III	PROPORTIONING OF CONCRETE MIX	**9 Hours**

Principles of Mix Proportioning-Properties of concrete related to Mix Design-Physical properties of materials required for Mix Design - Design Mix and Nominal Mix-BIS Method of Mix Design - Mix Design Examples

Unit IV	FRESH AND HARDENED PROPERTIES OF CONCRETE	**9 Hours**

Workability-Tests for workability of concrete-Slump Test and Compacting factor Test-Segregation and Bleeding-Determination of Compressive and Flexural strength as per BIS - Properties of Hardened concrete-Determination of Compressive and Flexural strength-Stress-strain curve for concrete-Determination of Young's Modulus

Unit V	SPECIAL CONCRETES	**12 Hours**

Light weight concretes - High strength concrete - Fibre reinforced concrete – Ferro cement - Ready mix concrete - SIFCON-Shotcrete – Polymer concrete - High performance concrete- Geopolymer Concrete.

Total:	**45 + 15 Hours**

Course Outcomes:

After completion of the course, Student will be able to

1. Explain the properties of various ingredients of concrete
2. Interpret the suitable admixture for concrete with special properties
3. Apply the concrete mix using I.S code methods
4. Illustrate the properties of fresh and hardened concrete
5. Explain the special concrete and their specific applications interpret

References:

1. Santhakumar,A.R; "Concrete Technology" , Oxford University Press, New Delhi, 2007
2. Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London,1995
3. Gambir, M.L; "Concrete Technology", 3rd Edition, Tata McGraw Hill Publishing Co Ltd, New

1702CE504		GEOTECHNICAL ENGINEERING II	L	T	P	C
			3	0	0	3

Course Objectives:

1. Familiarize the students with a basic understanding of the essential steps involved in a geotechnical site investigation.
2. Introduce to the students, the principal types of foundations and the factors governing the choice of the most suitable type of foundation for a given solution.
3. Familiarize the student with the procedures used for : a) bearing capacity estimation, b) load carrying capacity of pile, c) determining earth pressure and e) concept on stability of slope.

Unit I	**SOIL EXPLORATION AND SITE INVESTIGATION**	**9 Hours**

Introduction – Planning and stages in sub-surface exploration – depth and spacing of exploration – Methods of exploration – Test pit – Trenches – Geophysical methods: Seismic refraction and Electrical resistivity method – Boring : Auger boring, Shell and Auger, Wash boring and Rotary drilling – Types of soil sample: disturbed and undisturbed soil samples – Features of sampler affecting soil disturbance – standard penetration test – static and dynamic cone penetration test – bore log report

Unit II	**SHALLOW FOUNDATION AND BEARING CAPACITY**	**9 Hours**

Introduction – Bearing capacity- definition – types of shear failure – Bearing capacity of shallow foundation on homogeneous deposits - Methods: Terzaghi's ,Skempton's and BIS methods – Effect of water table on bearing capacity – Plate load test – Bearing capacity from in-situ tests - SPT, SCPT and plate load test methods of improving bearing capacity of soil.

Unit III	**FOOTING, RAFT AND SETTLEMENT OF FOUNDATION**	**9 Hours**

Types of foundation – contact pressure distribution below isolated footing – types and proportioning of combined footing – types and application of mat foundation – floating foundation – Settlement: total and differential settlements – causes and methods of minimizing settlement

Unit IV	**DEEP FOUNDATION**	**9 Hours**

capacity of single pile in cohesion less and cohesive soil – static formula – dynamic formulae (Engineering News and Hileys) – Capacity from in-situ tests (SPT and SCPT) – Negative skin friction – Carrying capacity of Pile group – Pile load test – Under-reamed piles – Introduction to well foundation and Diaphragm wall.

Unit V	**EARTH PRESSURE AND STABILITY OF SLOPES**	**9 Hours**

Earth pressure in soils: active and passive states – Lateral earth pressure Rankine's theory – stratified soil – Cullman's Graphical method –Slopes – Infinite and finite slopes – types of failure – causes of failure – Procedure for slip circle method and method of slices.

Total: 45 Hours

Further Reading:

To select suitable foundation for various soil condition.

Course Outcomes:

After completion of the course, Student will be able to

1. Illustrate the suitable techniques used for sub soil exploration.
2. Explain the type of foundation required for the given soil condition.
3. Select the dimensions of the foundation for various types of footing.
4. Interpret the load carrying capacity of piles.
5. Explain the stability analysis of retaining walls.

References:

1. Bowles .J.E, "Foundation analysis and design", McGraw Hill, 2001.

2.Murthy .V.N.S, "Textbook of Soil Mechanics and Foundation Engineering",CBS Publishers and Distributors, New Delhi, 2009.

3. Arora .K.R, "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2011.

4.Punmia .B.C, "Soil Mechanics and Foundations Engineering", Laxmi Publications Pvt.Ltd. New Delhi, 2005.

5.Das .B.M, "Principles of Foundation Engineering" (Fifth edition), Thomson Books, 2010

1702CE551		COMPUTER AIDED BUILDING AND DRAWING LAB	L	T	P	C
			0	0	4	2

Course Objectives:	
	1. To develop skills in manual and AutoCAD drafting of building plans, elevation and sections
	2. To understand the Functional Planning and architectural design of buildings and introduction to building physics.
	3. To prepare detailed working drawing for doors, windows, etc.

List of Experiments:		
11. Functional planning – Introduction to anthropometrics and ergonomics – Occupancy classification of Buildings –Essentials of National Building Code – Essentials of Building and development rules – Introduction to green building.		
12. Building Physics : Sun's movement and building: Sun control devices –Exposed walls and Openings		
13. Lighting and acoustics		
14. Introduction to AutoCAD – Draw and modify tools- Dimensioning-Layers- Blocks-Printing- Two dimensional drawing 3D commands		
15. Door, Windows, Ventilators.		
16. Foundation, Staircase		
17. Residential buildings – Plan, Section, Elevations		
18. Public buildings like office, dispensary, post office, bank etc		
19. Industrial buildings		
	Total:	**45 Hours**

Additional Experiments:	
	2. Commercial building like sky scrapers
	3. Domed structures

Course Outcomes:	
	After completion of the course, Student will be able to
	4. Ability to develop a concept drawing based on the requirements
	5. Ability to draw Building Drawing as per planning authority requirement in AutoCAD.
	6. Understand to draw plan, elevation and section of public and industrial structures
	7. Apply the requirements to draw plan, elevation and section of load bearing and framed structures.
	8. Analysis the building code and sun movements before drawing

References:
1. Sikka V. B., A Course in Civil Engineering Drawing, 4th Edition, S.K. Kataria and Sons, 1998.
2. George Omura, "Mastering in AUTOCAD 2002", BPB Publications, 2002
3. Verma.B.P., "Civil Engineering Drawing and House Planning", Khanna Publishers, 1989.
4. A Guide to building information modeling for Owners, Managers, Designers, Engineers, and Contractors, John Wiley and Sons. Inc., 2008.
5. Marimuthu V.M., Murugesan R. and Padmini S., "Civil Engineering Drawing-I", Pratheeba Publishers, 2008.

1702CE552		SURVEYCAMP	L	T	P	C
			0	0	4	1

Course Objectives:	
	1. Two weeks Survey Camp will be conducted during summer vacation in the following activities using Theodolite, cross staff, leveling staff, tapes, plane table and total station. The camp must involve work on a large area of not less than 400 hectares. At the end of the camp, each student shall have mapped and contoured the area. The camp record shall include all original field observations, calculations and plots.

List of Experiments:
1.Triangulation
2.Trilaterationand
3.Rectangulation
4.Alignment of Road survey
5.contouring (hill survey)

EVALUATION PROCEDURE	
	Internal Marks : 20 marks (decided by the staff in-charge appointed by the Institution)
	Evaluation of Survey Camp Report : 30 marks 2.(Evaluated by the external examiner appointed the University)
	3. Viva voce examination : 50 marks (evaluated by the internal examiner appointed by the HOD with the approval of HOI and external examiner appointed by the University – with equal Weightage

Course Outcomes:	
	After completion of the course, Student will be able to
	1. The camp must involve work on a large area of not less than 400 hectares
	2. The camp record shall include all original field observations, calculations and plots.
	3. Theodolite, cross staff, levelling staff, tapes, plane table and total station
	4. Formation and extent of road
	5. can able to design drainage and pipe networks.

References:
1.Kanetkar T.P., Surveying and Levelling, Vols. I and II, United Book Corporation, Pune, 1994
2. Bannister A. and Raymond S., Surveying, ELBS, Sixth Edition, 1992.
3. Punmia B.C. Surveying, Vols. I, II and III, Laxmi Publications, 1989

1702CE553 MINI PROJECT 1 0 0 2 1

Aim: To carry out a thematic design project in one of the specializations of civilengineering

Course Objectives:
To carry out a project this will make the students aware of the different facets of civil engineering

List of areas
1. Structural Engineering
2. Geotechnical Engineering
3. Water Resources Engineering

Course outcomes:

At the end of the course, the students will be able to

Structural Engineering

1.Prepare a structural lay out from architectural drawings Calculation loads Design of representative structural elements like slab, beam, columns, foundation etc.

2.Carry out testing in Strength of materials / concrete / structural labs

3.Learn any software and solving a problem using that.

Geotechnical Engineering

1. Collect samples of soil and identification of their types Collection of literature on types of foundation Presentation of soil improvement techniques

2.Learn any software and solving a problem using that.

Water Resources And Environmental Engineering

1.Carry out population survey and working out water requirement. Preparation of a schematic diagram of water / wastewater treatment plants Assessment of quality of water / sewage by experiments Design of dock gates

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1704GE551 **LIFE SKILLS: APTITUDE – I** **L T P C**
0 0 2 1

Course Objective (s):

- To brush up problem solving skill and to improve intellectual skill of the students
- To be able to critically evaluate various real life situations by resorting to Analysis Of key issues and factors
- To be able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
- To enhance analytical ability of students
- To augment logical and critical thinking of Student

Course Outcomes:

- Learners should be able to understand number and solving problems least time using various shortcut
- Solve problems on averages; compare two quantities using ratio and proportion.
- Calculate concept of percentages, implement business transactions using profit and loss.
- Workout concepts of Coding and Decoding, ability to visualize directions and understand the logic behind a sequence.
- Learners should be able to find a series the logic behind a sequence.

Unit1	**Introduction to Number System, Basic Shortcuts of addition, Multiplication, Division**	
Classification of numbers – Types of Numbers - Divisibility rules - Finding the units digit - Finding remainders in divisions involving higher powers - LCM and HCF Models - Fractions and Digits – Square, Square roots – Cube, Cube roots – Shortcuts of addition, multiplication, Division.		
Unit 2	**Ratio and proportion, Averages**	
Definition of Ratio - Properties of Ratios - Comparison of Ratios - Problems on Ratios - Compound Ratio - Problems on Proportion, Mean proportional and Continued Proportion Definition of Average - Rules of Average - Problems on Average - Problems on Weighted Average - Finding average using assumed mean method.		
Unit 3	**Percentages, Profit And Loss**	
Introduction Percentage - Converting a percentage into decimals - Converting a Decimal into a percentage - Percentage equivalent of fractions - Problems on percentages - Problems on Profit and Loss percentage- Relation between Cost Price and Selling price - Discount and Marked Price - Two different articles sold at same Cost Price - Two different articles sold at same Selling Price - Gain% / Loss% on Selling Price.		
Unit 4	**Coding and decoding, Direction sense**	
Coding using same set of letters - Coding using different set of letters - Coding into a number - Problems on R-model - Solving problems by drawing the paths - Finding the net distance travelled - Finding the direction - Problems on clocks - Problems on shadows - Problems on direction sense using symbols and notations.		
Unit 5	**Number and letter series Number and Letter Analogies, Odd man out**	
Difference series - Product series - Squares series - Cubes series - Alternate series - Combination series - Miscellaneous series - Place values of letters - Definition of Analogy - Problems on number analogy - Problems on letter analogy - Problems on verbal analogy - Problems on number Odd man out - Problems on letter Odd man out - Problems on verbal Odd man out		

TOTAL HOURS -- 30

References:

1. Arun Sharma, 'How to Prepare for Quantitative Aptitude for the CAT', 7th edition, McGraw Hills publication, 2016.
2. Arun Sharma, 'How to Prepare for Logical Reasoning for CAT', 4th edition, McGraw Hills publication, 2017.
3. R S Agarwal, 'A modern approach to Logical reasoning', revised edition, S.Chand publication, 2017.
4. R S Agarwal, 'Quantitative Aptitude for Competitive Examinations', revised edition, S.Chand publication, 2017.
5. Rajesh Verma, "Fast Track Objective Arithmetic", 3rd edition, Arihant publication, 2018.
6. B.S. Sijwalii and InduSijwali, "A New Approach to REASONING Verbal & Non-Verbal", 2nd edition, Arihnat publication, 2014

1702CE601		STRUCTURAL ANALYSIS II	L	T	P	C
			3	2	0	4

Course Objectives:	
	1. To obtain the ability to analyze indeterminate beams and rigid frames by Flexibility and Stiffness Matrix method.
	2. To develop a clear understanding of Displacement functions in Structural element by Finite Element method.
	3. To know the concept of plastic structures and analysis of space and Cable structures.

Unit I	**MATRIX FLEXIBILITY METHOD**	**12 Hours**
Equilibrium and compatibility- Determinate Vs indeterminate structures – Indeterminacy – Primary structure – Compatibility conditions – Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames (with redundancy restricted to two).		
Unit II	**STIFFNESS MATRIX METHOD**	**12 Hours**
Element and global stiffness matrices – Analysis of continuous beams – Co-ordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacements vectors – Analysis of pin-jointed plane frames and rigid frames (with redundancy limited to two)		
Unit III	**PLASTIC ANALYSIS OF STRUCTURES**	**12 Hours**
Statically indeterminate axial problems – beams in pure bending – Plastic hinge and mechanism –Plastic analysis of indeterminate beams and frames		
Unit IV	**INTRODUCTION TO FINITE ELEMENT ANALYSIS**	**12 Hours**
Introduction- Steps involved in FEA – Displacement functions – truss element – beam element – Triangular elements.		
Unit V	**SPACE AND CABLE STRUCTURES**	**12 Hours**
Analysis of Space trusses using method of tension coefficients – Beams curved in plan Suspension cables – suspension bridges with two and three hinged stiffening girders.		
	Total:	**45 + 15 Hours**

Further Reading:	
	1. To analyze and find out the BMD.
	2. To analyze the indeterminate structures.

Course Outcomes:	
	After completion of the course, Student will be able to
	1. Analyze structures using matrix flexibility method.
	2. Analyze structures using stiffness method.
	3. Perform plastic analysis for indeterminate beams and frames.
	4. Implement basic concepts of finite element analysis.
	5. Analyze Space Truss using tension Coefficient method and beams curved in plan and cable suspension bridges.

References:

1. Punmia,B.C., Ashok Kumar and Arun Kumar Jain, " Theory of Structures", Laxmi Publications, 2005.
2. Vaidyanathan, R. and Perumal, P., "Comprehensive structural Analysis – Vol I & II", Laxmi Publications, New Delhi, 2003.
3. Negi L.S &Jangid R.S., "Structural Analysis", Tata McGraw Hill Publications, New Delhi, 2003.
4. Ghali.A, Nebille, A.M. and Brown, T.G, "Structural Analysis" A unified classical and Matrix approach", 6th Edition, Spon Press, London and New York, 2013.
5. Gambhir, M.L., "Fundamentals of Structural Mechanics and Analysis", PHI Learning Pvt. Ltd., New Delhi, 2011.
6.William Weaver Jr& James M. Gere, "Matrix Analysis of Framed Structures", CBS Publishers and Distributors, New Delhi, 2004

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1702CE602		CONCRETE STRUCTURES II	L	T	P	C
			3	0	0	3

Course Objectives:

1. To develop an understanding on the basic concepts in the behavior and design of reinforced concrete structures such as Retaining Wall and counterfort retaining wall.
2. To provide knowledge on design of various components in the water tank by working stress method.
3. To provide knowledge on design of various reinforced concrete structures such as staircases, flat slabs and RC walls.
4. To expose the basic concepts about the yield line theory for the analysis and design of slab of various cross sections.
5. To expose the behavior of masonry structures, and be able to design for various loading conditions.

Unit I	**RETAINING WALLS**	**9 Hours**

Retaining walls - types - earth pressure - effects of surcharge - Stability requirements - Cantilever and counterfort retaining walls - detailing of reinforcement.

Unit II	**WATER TANKS**	**9 Hours**

R.C water tanks resting on ground - general design requirements – Overhead circular and rectangular tanks - Analysis and design using working stress method - detailing of reinforcement - codal provisions.

Unit III	**STAIRS, FLAT SLABS AND WALLS**	**9 Hours**

Staircases - Ordinary and Doglegged – Flat slabs - Direct design method – Reinforced concrete walls.

Unit IV	**YIELD LINE THEORY**	**9 Hours**

Yield line – Assumptions – Characteristics – Upper bound and lower bound theories - Yield line analysis - Design of slabs.

Unit V	**BRICK MASONRY**	**9 Hours**

Introduction - classification of walls - Lateral supports and stability - effective height of wall and columns - effective length of walls - Design loads, load dispersion - Permissible stresses - design of axially and eccentrically loaded brick walls

	Total:	**45 Hours**

Further Reading :

1.Students can be able to work on retaining and storage structures

2. Students can be able to design shear walls, deck bridges.

Course Outcomes:

After completion of the course, Student will be able to

1. Design various types of retaining walls under various loading conditions
2. Design and detailing of different types of water tanks along with the staging and foundation.
3. Attain sufficient knowledge of design for staircases, flat slabs and reinforced concrete walls and gain knowledge about the principles of design of mat foundation, box culvert and road bridges
4. Apply the yield line theory for design of square, rectangular, circular and triangular slabs.
5. Design axially and eccentrically loaded brick walls based on the knowledge gained for various loading conditions

References:

1. B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain "Limit State Design of Reinforced Concrete", Laxmi Publications (P) Ltd, New Delhi 2007
2. Dayaratnam, P., "Brick and Reinforced Brick Structures", Oxford & IBH Publishing House, 1997.
3. UnnikrishnaPillai, S., DevdasMenon, "Reinforced Concrete Design".

1702CE603		DESIGN OF STEEL STRUCTURES	L	T	P	C
			3	0	0	3

Course Objectives:	
	1.To learn the properties of steel sections and design basics and codal provisions- Design of connections
	2. To design steel members subjected to tension and compression member.
	3.Design steps involved in beams, built up beams and design of plate girder

Unit I	**INTRODUCTION**	9 Hours
Structural steel sections – Limit state design concepts - Connections- bolted and welded joints - Failure of joints - Efficiency of joints - Eccentric connections		

Unit II	**TENSION MEMBERS**	9 Hours
Types of sections – Net area – net effective sections for angles and Tee in tension – Design of connections in tension members – use of lug angles – Design of tension splice – Concept of Shear lag.		

Unit III	**COMPRESSION MEMBERS**	9 Hours
Effective length about major and minor principal axis - I.S code provisions- permissible stresses - Design rules- design of one component - two components and built up compression members under axial load- Design of Lacings and Battens - Different types of column bases - Slab base and Gusseted base - connection details		

Unit IV	**BEAMS**	9 Hours
Design of laterally supported and unsupported beams – Built up beams – design of Plate Girders – Intermediate and bearing stiffeners – Web splicing.		

Unit V	**VINDUSTRIAL STRUCTURES**	9 Hours
Design of roof trusses – Elements of roof trusses – Design of purlins – Estimation of wind loads – Design of gantry girders		

	Total:	45Hours

Further Reading	
	Advanced steel structures / Composite steel structures

Course Outcomes:	After completion of this course, students can able to
	1. Explain the limit state design concept and design of bolted and welded connections.
	2. Use the IS codal provisions to the design of tension members.
	3.Use the IS codal provisions to the design of compression members
	4. Apply the design principles in beams and plate girders.
	5.Analysis various components involved in roof truss structures

References:

1. S.S. Bhavikatti ,"Design of Steel Structures", I. K. International Pvt Ltd, 2009.
2. Gaylord, E.H., Gaylord, N.C., and Stallmeyer, J.E., "Design of Steel Structures", 3rd edition, McGraw-Hill Publications, 1992
3. Negi L.S." Design of Steel Structures", Tata McGraw Hill Publishing Pvt Ltd, New Delhi, 2007.

1702CE604	WATER SUPPLY ENGINEERING	L	T	P	C
		3	0	0	3

Course Objectives:

1. To examine the water supply system and conveyance system.
2. To create an ability to evaluate the water treatment and advanced water treatment system.
3. To train the students to analyze water distribution system and supply to buildings.

Unit I	PLANNING FOR WATER SUPPLY SYSTEM	08 Hours

Public water supply system -Planning -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.

Unit II	CONVEYANCE SYSTEM	07 Hours

Water supply -intake structures -Functions and drawings -Pipes and conduits for water- Pipe materials - Hydraulics of flow in pipes -Transmission main design – Materials of pipes- Laying, jointing and testing of pipes - Drawings appurtenances - Types and capacity of pumps -Selection of pumps and pipe materials.

Unit III	WATER TREATMENT	12 Hours

Objectives - Unit operations and processes - Principles, functions design and drawing of Screens, Flash mixers, flocculators, sedimentation tanks and sand filters - Disinfection- Residue Management.

Unit IV	ADVANCED WATER TREATMENT	09 Hours

Aerator - Iron and manganese removal, Defluoridation and demineralization -Water softening - Desalination - Membrane Systems-Construction and Operation & Maintenance aspects of Water Treatment Plants- Recent advances-Membrane processes.

Unit V	WATER DISTRIBUTION AND SUPPLY TO BUILDINGS	09 Hours

Requirements of water distribution -Components -Service reservoirs -Functions and drawings -Network design - Analysis of distribution networks –Pipe Appurtenances -operation and maintenance -Leak detection, Methods. Principles of design of water supply in buildings -House service connection -Fixtures and fittings -Systems of plumbing and drawings of types of plumbing.

Total: 45 Hours

Further Reading:

1. Apply an appropriate unit system for the water treatment.
2. Estimate the quantity of wastewater and storm run-off generated from the town/ city and design a suitable collection system for the generated wastewater.

Course Outcomes:

After completion of the course, Student will be able to

1. Discuss about the principles and development of water supply system.
2. Design the pipelines for water supply system governed with head loss.
3. Design drawing of various unit operations in water supply system.
4. Identify the methods for removing contaminants in water treatment system using advanced techniques.
5. Interpret the network for water supply to buildings and House service connection.

References:

1. Garg, S.K., "Environmental Engineering", Vol.1 Khanna Publishers, New Delhi, 2005.
2. Modi, P.N. "Water Supply Engineering", Vol. I Standard Book House, New Delhi, 2005.
3. Punmia, B.C., Ashok K Jain and Arun K Jain, "Water Supply Engineering", Laxmi Publications Pvt. Ltd., New Delhi, 2005
4. Government of India, "Manual on Water Supply and Treatment", CPHEEO, Ministry of Urban Development, New Delhi, 2003
5. Syed R. Qasim and Edward M. Motley Guang Zhu, "Water Works Engineering Planning", Design and Operation, Prentice Hall of India Private Limited, New Delhi, 2006.

E.G.S. PILLAY ENGINEERING COLLEGE (AUTONOMOUS)

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1702CE651		CONCRETE AND HIGHWAY ENGINEERING LAB	L	T	P	C
			0	0	4	2

Course Objectives:

1. This course provides an understanding of the basic properties of construction materials, and presents laboratory standards and testing requirements for these materials.
2. To familiarize the students to do the experiments as per the guidelines of BIS.
3. To develop an understanding of the highway materials and to obtain knowledge on properties of these materials.

List of Experiments:

1. Tests on cement
   1. Determination of specific gravity of cement.
   2. Determination of standard consistency of cement.
   3. Determination of initial and final setting times of cement.
   4. Determination of compressive strength of cement mortar.
2. Tests on aggregates
   1. Determination of Specific gravity and water absorption of fine & coarse aggregates.
   2. Determination of Fineness modulus of fine aggregate & coarse aggregate.
3. Tests on fresh and hardened concretes
   1. Determination of degree of workability: Slump cone test, Flow table, Compaction factor and Vee bee Consistometer
   2. Determination of Compressive strength of concrete
   3. Determination of Flexural strength of concrete
   4. Determination of Splitting tensile strength of concrete
4. Tests on Highway materials- Sub-grade material and Aggregates
   1. Crushing value test, impact value test, angularity test and abrasion test on aggregates.
   2. Marshall stability for bituminous mix
   3. Bitumen extractor for bituminous mix
5. Tests on Bitumen
   1. Penetration test and Ductility test.
   2. Flash point test and viscosity test.

Total: 45 Hours

Additional Experiments:

2. CBR test on the soil/ granular material.

Course Outcomes:

After completion of the course, Student will be able to

1. Evaluate the properties of cement
2. Understand the quality of aggregates used in concrete
3. Analyze the properties of fresh and hardened concrete
4. Knowledge gain about the highway materials
5. Evaluate the properties of bitumen

References:

1. Shetty,M.S, "Concrete Technology", S.Chand and Company Ltd, New Delhi, 2003
2. Santhakumar,A.R; "Concrete Technology" , Oxford University Press, New Delhi, 2007
3. Gambir, M.L; "Concrete Technology", 3rd Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2007
4. IS10262-1982 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi, 1998
5. Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London,1995

1702CE652		ENVIRONMENTAL AND IRRIGATION DESIGN AND DRAWING	L	T	P	C
			3	0	0	3

Course Objectives:	
	1.to know about the design of environmental structures
	2.to know the pictorial representation of irrigation structures

Unit I	**WATER SUPPLY AND TREATMENT**	**08 Hours**
Design & Drawing of flash mixer, flocculator, clarifier – Slow sand filter – Rapid sand filter – Infiltration gallery – Intake towers – Service reservoirs – Pumping station – House service connection for water supply and drainage.		
Unit II	**SEWAGE TREATMENT & DISPOSAL**	**07 Hours**
Design and Drawing of screen chamber - Grit channel - Primary clarifier - Activated sludge process – Aeration tank & oxidation ditch – Trickling filters – Secondary clarifiers – Sludge digester – Sludge drying beds – Waste stabilization ponds - Septic tanks and disposal arrangements – Manholes.		
Unit III	**IMPOUNDING STRUCTURES**	**12 Hours**
Gravity dam, Tank Surplus Weir, Tank Sluice with tower road – Drawing showing plan, elevation, half section including foundation details.		
Unit IV	**CANAL TRANSMISSION STRUCTURES**	**09 Hours**
Aqueducts – Syphon Aqueducts – Super passage – Canal siphon – Canal Drops- Drawing showing plan, elevation and foundation details.		
Unit V	**CANAL REGULATION STRUCTURES**	**09 Hours**
Canal head works- Canal Regular – Canal escape- Proportional Distributors – Drawing showing detailed plan, elevation and foundation.		
	Total:	**45 Hours**

Further Reading:	
	1.to analyse and draw advanced irrigation and environmental structures

Course Outcomes:	
	After completion of the course, Student will be able to
	1.design environmental treatment system
	2. design the irrigation impounding structures
	3. design the canal transmission structures
	4. design the canal regulation structures

References:

1. Garg, S.K., "Environmental Engineering", Vol.1 Khanna Publishers, New Delhi, 2005.

2. Sathyanarayana Murthy “Irrigation Design and Drawing” Published by MrsL.Banumathi, Tuni east Godavari District. A.P. 1998

3. Sharma R.K. Irrigation Engineering and Hydraulic Structures Oxford and IBH Publishing co., New Delhi 2002.

4. Modi, P.N. "Water Supply Engineering", Vol. I Standard Book House, New Delhi, 2005.

5.Punmia, B.C., Ashok K Jain and Arun K Jain, "Water Supply Engineering", Laxmi Publications Pvt. Ltd., New Delhi, 2005

6.Government of India, "Manual on Water Supply and Treatment", CPHEEO, Ministry of Urban Development, New Delhi, 2003

7. Syed R. Qasim and Edward M. Motley Guang Zhu, "Water Works Engineering Planning", Design and Operation, Prentice Hall of India Private Limited, New Delhi, 2006.

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1704GE651 LIFE SKILLS: APTITUDE II L T P C

0 0 2 1

Course Objective (s):

- To brush up problem solving skill and to improve intellectual skill of the students
- To be able to critically evaluate various real life situations by resorting to Analysis Of key issues and factors
- To be able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
- To enhance analytical ability of students
- To augment logical and critical thinking of Studen
-

Course Outcomes:

- Solve problems on Partnership, Mixture & Allegation and ages least time using shortcuts and apply real life situations.
- Workout family relationships concepts, ability to visualize clocks & calendar and understand the logic behind a Sequence.
- Calculate concepts of speed, time and distance, understand timely completion using time and work.
- Learners should be able to understand various charts and interpreted data least time.
- Workout puzzles, ability to arrange things in an orderly fashion.
-

Unit 1	**Partnership, Mixtures and Allegations, Problem on Ages, Simple Interest, Compound Interest**	
Introduction Partnership - Relation between capitals, Period of investments and Shares- Problems on mixtures - Allegation rule - Problems on Allegation – Problems on ages - Definitions Simple Interest - Problems on interest and amount - Problems when rate of interest and time period are numerically equal - Definition and formula for amount in compound interest - Difference between simple interest and compound interest for 2 years on the same principle and time period.		
Unit 2	**Blood relations, , Clocks, Calendars**	
Defining the various relations among the members of a family - Solving Blood Relation puzzles - Solving the problems on Blood Relations using symbols and notations - Finding the angle when the time is given - Finding the time when the angle is known - Relation between Angle, Minutes and Hours - Exceptional cases in clocks - Definition of a Leap Year - Finding the number of Odd days - Framing the year code for centuries - Finding the day of any random calendar date .		
Unit 3	**Time and Distance, Time and Work**	
Relation between speed, distance and time - Converting kmph into m/s and vice versa - Problems on average speed - Problems on relative speed - Problems on trains - Problems on boats and streams - Problems on circular tracks - Problems on races - Problems on Unitary method - Relation between Men, Days, Hours and Work - Problems on Man-Day-Hours method - Problems on alternate days - Problems on Pipes and Cisterns.		
Unit 4	**Data Interpretation and Data Sufficiency**	
Problems on tabular form - Problems on Line Graphs - Problems on Bar Graphs - Problems on Pie Charts - Different models in Data Sufficiency - Problems on data redundancy		
Unit 5	**Analytical and Critical Reasoning**	
Problems on Linear arrangement - Problems on Circular arrangement - Problems on Double line-up - Problems on Selections - Problems on Comparisons - Finding the Implications for compound statements - Finding the Negations for compound statements- Problems on assumption - Problems on conclusions - Problems on inferences - Problems on strengthening and weakening of arguments .		

TOTAL HOURS – 30

References :

7. Arun Sharma, 'How to Prepare for Quantitative Aptitude for the CAT', 7th edition, McGraw Hills publication, 2016.
8. Arun Sharma, 'How to Prepare for Logical Reasoning for CAT', 4th edition, McGraw Hills publication, 2017.
9. R S Agarwal, 'A modern approach to Logical reasoning', revised edition, S.Chand publication, 2017.
10. R S Agarwal, 'Quantitative Aptitude for Competitive Examinations', revised edition, S.Chand publication, 2017.
11. Rajesh Verma, "Fast Track Objective Arithmetic", 3rd edition, Arihant publication, 2018.
12. B.S. Sijwalii and InduSijwali, "A New Approach to REASONING Verbal & Non-Verbal", 2nd edition, Arihnat publication, 2014.

1702CE653 **MINI PROJECT II** **0 0 2 1**

Aim: To carry out a thematic design project in one of the specializations of civil Engineering

Course Objectives:

The student should be made to:

To carry out a project which will make the students aware of the different facets of civil engineering

List of areas

1.Geomatics Engineering

2.Construction management

3. Transportation engineering

Course outcomes:

At the end of course, the students will be able to

Geomatics Engineering and Surveying

Prepare central line diagram of buildings and laying out at site Establishment of reduced levels of important points in an area Preparing the layout of a small area by means of compass / theodolite surveying Preparing LS / CS of an alignment..

Construction management

Prepare functional drawings for an occupancy Estimation of building components (using MS Excel) Preparation of work schedule using bar chart Preparation of paper on modern construction techniques

Transportation engineering

Carry out objective oriented traffic survey Carrying out surveys on bus routes – stopping time, ticketing time etc. Carrying out testing of highway making materials Preparation of schematic intersection layouts, grade separators etc.

1702CE654 **INDUSTRIAL VISIT PRESENTATION** **0 0 2 1**

In order to provide the experiential learning to the students, shall take efforts to arrange at least two industrial visit / field visits in a year. A presentation based on Industrial visits shall be made in this semester and suitable credit may be awarded.

Internal Assessment Only	
Test	40
Presentation / Quiz / Group Discussion	40
Report	20
Grades (Excellent / Good / Satisfactory / Not Satisfactory)	

1702CE701		QUANTITY SURVEYING & COST ESTIMATION	L	T	P	C
			3	0	0	3

Course Objectives:

1. To provide the student with the ability to estimate the quantities of item of works involved in buildings
2. To provide the student with the ability to estimate the quantities of item of works involved in buildings, waters supply and sanitary works, road works and irrigation works
3. To understand the techniques of development and management of groundwater
4. To be introduced to the different theories of traffic flow
5. To be aware of the importance of traffic safety

Unit I **Procedure of estimation quantity** **9 Hours**

Introduction– Estimate–Types of Estimates–Units of measurements–Methods of building estimate– calculation of quantities of earthwork, stone masonry, brick masonry, plastering, cement concrete, R.C.C,PCC Doors, Windows, Flooring, Whitewashing, color washing andpaintingNourishingforloadbearingstructuresandframedstructures.

Unit II **ESTIMATE OF OTHER STRUCTURES** **9Hours**

Estimating of septic tank, soakpit–sanitaryandwatersupplyinstallations–watersupplypipeline–sewerline–tubewell–openwell–estimateofbituminousandcementconcreteroads–estimateof retaining walls–culverts–estimating of irrigation works–aqueduct, syphon, fall

Unit III **SPECIFICATIONANDTENDERS** **9Hours**

Data–Schedule of rates–Analysis of rates–Specifications–sources– Preparation of detailed and general specifications – Tenders – TTT Act – e-tender– Preparation of Tender Notice and Document–Contracts–Typesofcontracts–Draftingofcontractdocuments–Arbitrationand legal requirements

Unit IV **VALUATION** **9 Hours**

Necessity–Basics of value engineering –Capitalized value –Depreciation–Escalation– Value of building–Calculation of Standard rent –Mortgage–Lease

Unit V **REPORTPREPARATION** **9 Hours**

Principlesforreportpreparation–reportonestimateofresidentialbuilding–Culvert–Roads – Water supply and sanitary installations–Tube wells– Open wells.

Total: 45 Hours

Further Reading:

1. Effective cost of good quality of building in civil engineering world.
2. Estimation of bridge ,road, culvert and other special structure using some software

Course Outcomes:

The student shall be able to estimate the material quantities, prepare a bill of quantities, make specifications and prepare tender documents. Student shall be able to prepare value estimates.

2. To know the importance of preparing the types of estimates under different conditions
3. To apply logical thoughts and prepare the rate analysis and bills
4. To analyze and synthesize cost effective approach for civil engineering projects
5. To comprehend detailed report on estimation and valuation process

References:

1. Dutta,B.N.,EstimatingAndCosting,SDutta&Co.,Lucknow2006.
2. .Rangawala,S.C.,EstimatingAndCosting,CharotarAnandPublications,1996
3..Kohli,D.D.AndKohliR.C.,ATextBookOnEstimating,CostingAndAccounts, S.Chand And Co, New Delhi,1994
4.CpwdSpecificationsAndScheduleOfRates

1702CE702		WASTE WATER ENGINEERING	L	T	P	C
			3	0	0	3

Course Objectives:

1. To understand the importance of planning and design of sewerage system.
2. To create an ability to evaluate the waste water treatment system.
3. To impart the signification of disposal of Sewage.

Unit I **PLANNING FOR SEWERAGE SYSTEMS** **09 Hours**

Sources of wastewater generation – Effects – Estimation of sanitary sewage flow – Estimation of storm runoff – Factors affecting Characteristics and composition of sewage and their significance – Effluent standards – Legislation requirements.

Unit II **DESIGN OF SEWER** **09 Hours**

Sewerage – Hydraulics of flow in sewers – Design period - Design of sanitary and storm sewers – Small bore systems – Materials of sewers– Laying, joining & testing of sewers – Forces acting on sewers– Cleaning and maintenances of sewers- Sewer appurtenances – Pumps – selection of pumps and pipe Drainage -. Plumbing System for Buildings – One pipe and two pipe system.

Unit III **PRIMARY TREATMENT OF SEWAGE** **09 Hours**

Objective – Unit Operation and Processes – Selection of treatment processes – Principles, functions design and drawing of screen, grit chambers and primary sedimentation tanks – Operation and Maintenance aspects – Onsite sanitation - Septic tank, Grey water harvesting.

Unit IV **SECONDARY TREATMENT OF SEWAGE** **09 Hours**

Objective – Selection of Treatment Methods – Principles, Functions, Design and Drawing of Units - Activated Sludge Process and Trickling filter, other treatment methods – Oxidation ditches, UASB – Waste Stabilization Ponds – Reclamation and Reuse of sewage - Recent Advances in Sewage Treatment – Construction and Operation & Maintenance of Sewage Treatment Plants.

Unit V **DISPOSAL OF SEWAGE AND SLUDGE** **09 Hours**

Standards for Disposal - Methods – dilution – Self-purification of surface water bodies – Oxygen sag curve – Land disposal – Sewage farming – Deep well injection – Soil dispersion system -Sludge characterization – Thickening – Sludge digestion – Biogas recovery – Sludge Conditioning and Dewatering – disposal – Advances in Sludge Treatment and disposal.

Total: 45 Hours

Further Reading:

1. Design the necessary treatment units for energy conservation.
2. Design the suitable disposal unit for the sludge without endangering the environment.

Course Outcomes:

After completion of the course, Student will be able to

1. Examine the waste water quality characteristics and standards.
2. Design sewerage systems and discuss about the treatment process step by step done in primary level.
3. Design the various unit operations for waste water treatment.
4. Design the sludge treatment and disposal methods.
5. Perform quality analysis of sewage the characteristics and composition of sewage, self - Purification of streams.

References:

1. Garg, S.K., Environmental Engineering Vol. II, Khanna Publishers, New Delhi, 2003.
2. Punmia, B.C., Jain, A.K., and Jain.A., Environmental Engineering, Vol.II, Lakshmi Publications, Newsletter, 2005
3. Manual on Sewerage and Sewage Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1997.
4. Wastewater Engineering – Treatment and Reuse, Tata Mc.Graw-Hill Company, New Delhi, 2003.

1702CE703		STRUCTURAL DYNAMICS AND EARTH QUAKE ENGINEERING	L	T	P	C
			3	0	0	3

Course Objectives:

To introduce dynamic loading and the dynamic performance of the structures to the students. Different types of dynamic loading also tobe discussed.

The detailed study on the performance of structures under earthquake loading is also one of the focus of the course.

Unit I	**PRINCIPLES OF VIBRATION**	**9 Hours**

Difference between static loading and dynamic loading – Degree of freedom – idealisation of structure as single degree of freedom system – Formulation of Equations of motion of SDOF system - D'Alemberts principles – effect of damping – free and forced vibration of damped and undamped structures .

Unit II	**MULTIPLE DEGREE OF FREEDOM SYSTEM**	**9 Hours**

Two degree of freedom system – modes of vibrations – formulation of equations of motion of multi degree of freedom (MDOF) system - Eigen values and Eigen vectors – Response to free and forced vibrations - damped and undamped MDOF system – Modal superposition method

Unit III	**ELEMENTS OF EARTHQUAKE ENGINEERING**	**9 Hours**

Elements of Engineering Seismology - Causes of Earthquake – Plate Tectonic theory – Elastic rebound Theory – Characteristic of earthquake – Estimation of earthquake parameters Magnitude and intensity of earthquakes – Spectral Acceleration.

Unit IV	**DESIGN SEISMIC FORCES**	**9 Hours**

Effect of earthquake on different type of structures – Behaviour of Reinforced Cement Concrete, Steel Structure under earthquake loading – Pinching effect – Bouchinger Effects – Evaluation of earthquake forces as per IS:1893 – 2002 - Response Spectra – Lessons learnt from past earthquakes.

Unit V	**DESIGN AND DETAILING**	**9 Hours**

Causes of damage – Planning considerations / Architectural concepts as per IS:4326 – 1993 – Guidelines for Earthquake resistant design – Earthquake resistant design for masonry and Reinforced Cement Concrete buildings – Later load analysis – Design and detailing as per IS:13920 – 1993

	Total:	**45 Hours**

Further Reading: At the end of the course,

1. Analyse structures subjected to dynamic loading.
2. Design the structures for seismic loading as per code provisions.

Course Outcomes:

After completion of the course, Student will be able to

1. Analyze single degree of freedom systems without damping and with damping
2. Analyse multi degree freedom system and continuous systems using iterative techniques.
3. Knowledge on earthquakes and Effects of Earthquakes
4. Knowledge on earthquakes and its resistant features for different types of buildings
5. Determine the design lateral forces by means of codal provisions.

References:

1. PankajAgarwal, "Earthquake Resistant Design of Structures" PHI Learning Private Limited, New Delhi, 2010.
2. Chopra. AK, "Dynamics of Structures – Theory and Applications to Earthquake Engineering" Second Edition, Pearson Education, 2003
3. SK.Duggal,"Earthquake Resistant Design of Structures", Oxford University Press, New Delhi, 2010
4. "Learning earthquake Design and Construction", Earthquake Tips 1 to 24, Authored by C.V.R. Murthy, IIT, Kanpur. eqtips@iitk.ac.in Web sites: www.nicee.org.
5. IS 1893: 2001, (Part I) "Criteria for Earthquake Resistant Design of Structures - Part 1: General Provisions and Buildings", BIS, 2002.

17MGX01		PROFESSIONAL ETHICS	L	T	P	C
			3	0	0	3

Course Objectives:	
	1. The primary goal is to stimulate critical and responsible reflection on moral issues surrounding engineering practice and to provide the conceptual tools necessary for pursuing those issues. 2. Also to make the students aware of the different ethical issues, codes of conduct for engineers in the society and moralities in an organization.

Unit I	**INTRODUCTION & HUMAN VALUES**	**9 Hours**
Morals, Values and Ethics- Work Ethic - Team work – Types of Ethics - Respect for Others- Living Peacefully- Honesty- Courage - Valuing Time - Co-operation - Commitment- Self-Confidence - Customs and religion-Caring and Sharing.		
Unit II	**ENGINEERING ETHICS**	**9 Hours**
Engineering ethics – Variety of moral issues – Types of Inquiry – Professional accountability – Self Interest – Moral dilemmas – Kohlberg's Theory – Gilligan's Theory – Theories about Right Action – Ethical codes of IEEE and Institution of Engineers.		
Unit III	**SAFETY & RESPONSIBILITY OF ENGINEERS**	**10 Hours**
Engineering as experimentation – Safety and Risks – Risk – benefit analysis – Computer Technology Privacy – Social Policy – Engineering standards – Communicating Risk and Public Policy – Occupational Crime – Professional Rights and Employee Rights – Whistle Blowing – Collective Bargaining – Conflicts of Interest.		
Unit IV	**ENGINEER'S ROLE**	**9 Hours**
Engineers as Managers, Advisors, Consultants, Experts and Witness – Engineers role in industry and society – Theories about right action – Moral leadership - Collegiality and loyalty – IPR – Discrimination - Bhopal gas tragedy case study.		
Unit V	**GLOBAL ISSUES**	**8 Hours**
Multinational corporations-Environmental Ethics- Weapons Development- Code of Conduct – Eco – friendly production system – Sustainable technology & development – ozone depletion – Eco system – Pollution control.		
	Total:	**45 Hours**

Further Proceeding:	
	1. Analysis about Safety and Risk Management in an Organisation
	2. Analysis about Code of Conduct for Ethical & Moral values

Course Outcomes:	
	After completion of the course, Student will be able to
	3. Obtain awareness on Human Values & Social Values of the every individual.
	4. Knowledge about ethical theories and relevant code of conduct for engineers.
	5. Enumerate the safety and responsibility of engineers in the society.
	6. Realize their responsibilities, professional rights and moralities for the enhancement of an organization.
	7. Explain about the environmental impacts at present day scenario.

References:

1. Govindarajan M, Natarajan S, Senthil Kumar V. S, " Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

2. Charles D. Fleddermann, "Engineering Ethics", Pearson Education/ Prentice Hall, New Jersey,2004 (Indian Reprint now available)

3. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Leatning, United States, 2000 (Indian Reprint now available).

4. John R Boatright, "Ethics and the conduct of business", Pearson Education, New Delhi,2003.

1702CE751		COMPUTER AIDED DESIGN AND DRAFTING LAB	L	T	P	C
			0	0	4	2

Course Objectives:	
	1.To learn the software developing skills for structural design
	2. To understand the computing skills in the field of geotechnical engineering.
	3.To study the different software packages for analysis and design

List of Experiments:	
1. Design of building elements (RC)-Standard method of detailing RC beams, slabs and columns – Special requirements of detailing with reference to erection process.	
2.Design of Industrial Buildings - Steel roof trusses	
3.Design of Overhead water tanks (RC & Steel)	
4.Design of box culvert and slab bridges	
5.Design of steel chimneys	
	Total: 45 Hours

Additional Experiments:	
	1.Transportation planning process- Trip generation and distribution- Network analysis - Shortest path algorithms
	2.Water resources - Pipe networks - Canal design - Backwater profile - Synthetic derivation of stream flows using random numbers - Dam stability

Course Outcomes:	
	After completion of the course, Student will be able to
	1. Learn software developing skills for structural design
	2. Study the different software packages for analysis and design
	3. Use computer software to model any type of structure
	4. Compute loads and use computer software to analyse a structure
	5. Use computer software to design a structure based on is codal provisions.

References:

1. Krishna Raju N, "Design of Reinforced Concrete Structures", CBS Publishers & Distributors, New Delhi, 2003.
2. Krishna Raju N, Structural Design and Drawing (Reinforced Concrete and Steel). University press, Hyderabad, 2006
3. Krishnamoorthy, C.S. and Rajeev, S., Computer Aided Design and Analytical Tools, Narosa, 1993.
4. Papacostas, C.S., Fundamentals of Transportation Engineering Prentice-Hall of India, 2001
5. Loucks, D.P., Stedinger, J.R. and Haith, D.A., Water Resource Systems Planning and Analysis, Prentice-Hall INC, 1981.

1702CE752		WATER AND WASTE WATER ENGINEERING LAB	L	T	P	C
			0	0	4	2

Course Objectives:	
	1. To know the basics, importance of water and wastewater treatment and methods measurement.
	2. To study the various effects of water and wastewater pollution.
	3.Effect of BOD and COD
	4.To find Calcium, Potassium and Sodium
	5.Heavy metal effects and finding methods

List of experiments
1. Determination of Ammonia Nitrogen in wastewater.
2.Coagulation and Precipitation process for treating waste water
3. Determination of suspended, volatile, fixed and settleable solids in wastewater.
4.B.O.D. test
5.C.O.D. test
6.Nitrateinwastewater
7.Phosphateinwastewater
8.DeterminationofCalcium, Potassium and Sodium
9. Heavy metals determination-Chromium, Lead and Zinc. (Demonstration only)

	Total:	**45 Hours**

Additional Experiments:	
	1.conductivity meter
	2.UASB Reactor

Course Outcomes:	
	After completion of the course, Student will be able to
	1.characterize given water and waste water sample
	2.perform filtration techniques and methods
	3. characterize hazardous and non-hazardous substances

References:
1.Standard methods for the examination of water and wastewater, APHA, 20th Edition, Washington, 1998
2. Garg, S.K., "Environmental Engineering Vol. I & II", Khanna Publishers, New Delhi
3. Modi, P.N., "Environmental Engineering Vol. I & II", Standard Book House, Delhi-6

1702CE753 **MINI PROJECT III** **0 0 2 1**

Aim:

To carry out a design project in one of the specializations of civil engineering withsubstantial multidisciplinary component

Course Objectives:

The student should be made to:

To guide the students in such a way so that they carry out a work on a topic as a forerunner to the full fledged project work to be taken subsequently in VIII semester. The project work shall consist of substantial multidisciplinary component

List of Experiments:

The students will carry out a project in one of the following civil engineering areasbut with substantial multidisciplinary component involving Architecture,Mechanical engg. Electrical engg., Biotechnology, Chemical engg., Computerscience.

1. Structural Engineering
2. Geotechnical Engineering
3.Water Resources engineering and environmental engg.
4.Geomatics Engineering and surveying
5. Construction management
6.Transportation engineering

Student groups will be formed (6 in a group) and a faculty member will be allocated to guide them. There will be three reviews. First review will not carry any marks but the project topic will be finalized in it. Of remaining 2 reviews one will be carried out in the mid-semester and the last one by the end of semester.

1704GE751 BE PREPARED TO ACE THE TECHNICAL SKILLS IN COMPETITIVE EXAMS 2 0 0 2

Course Objectives

The students should be made to:

1. Study the concepts of concrete structures, design and analysis.
2. Study the process and implementation of surveying,geotechnical engineering.
3. Familiar with the construction materials, management and waste water engineering

Total: 30 Periods

BUILDING MATERIALS : brick, stones, aggregates, cement,Timber

CONSTRUCTION PRACTICES: Construction of stone masonry, brick masonry and R.C.C. and block masonry– construction equipments.

ENGINEERING SURVEY: Survey - computation of areas - Chain Survey - Compass surveying - Plane table survey –levelling

STRENGTH OF MATERIALS: Stresses and strains -Thermal stresses- elastic constants - Beams and bending – Bending moment and shear force in beams

STRUCTURAL ANALYSIS: Indeterminate beams - Stiffness and flexibility methods of structural analysis – Slope deflection - Moment Distribution method – Arches and suspension cables

GEOTECHNICAL ENGINEERING: Formation of soils - types of soils - classification of soils for engineering practice – Field identification of soils - Physical properties of soils - Three phase diagram-Soil exploration - Soil sampling techniques -Borelog profile - shallow foundations

ENVIRONMENTAL ENGINEERING: Sources of water - Ground water Hydraulics - Characteristics of water - Water analysis -water treatment - water borne diseases. Sewerage system

DESIGN OF REINFORCED CONCRETE: Design of concrete members - limit state and working stress design concepts - design of slabs - one way, two way and flat slabs

HYDRAULICS: Hydrostatics-applications of Bernoulli equation – flow measurement in channels, Applications of Momentum equation, Kinematics of flow.

TRANSPORTATION ENGINEERING: Different modes of transport and their characteristics. Geometric design of highways. –Design and Construction of bituminous and concrete roads - Maintenance of roads.

1704GE754 IN-PLANT TRAINING / INTERNSHIP PRESENTATION 0 0 2 1

In order to provide the experiential learning to the students, the students undergo in-plant training or internship during summer / winter vacation between III and VII semesters. A presentation based on in-plant training / internship shall be made in this semester and suitable credit may be awarded.

Internal Assessment Only	
Test	40
Presentation / Quiz / Group Discussion	40
Report	20
Grades (Excellent / Good / Satisfactory / Not Satisfactory)	

17CE851 **PROJECT WORK** **0 0 18 9**

Course Objectives:

To guide the students such a way that the they carry out a comprehensive work on the chosen topic which will stand them in good stead as they face real life situations. The project work so chosen by the student shall culminate in gaining of major design experience in the related area of specialization.

Course Outcomes (COs)

Upon completion of the course, the student should be able to,

a) Formulate a real world problem, identify the requirement and develop the design solutions.
b) Express the technical ideas, strategies and methodologies of civil engineering.
c) Utilize the new tools,softwares and techniques that contribute to obtain the solution of the project.
d) Test and validate through conformance of the developed prototype and analysis the cost effectiveness.
e) Prepare report and present the oral demonstrations.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work

to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

Total: 180 Periods

1703CE001		REMOTE SENSING AND GIS	L	T	P	C
			3	0	0	3

Course Objectives:

1. To introduce the students to the basic concepts and principles of various components of remote sensing
2. To provide an exposure to GIS and its practical applications in civil engineering.
3. To learn the importance of monitoring and modeling using GIS

Unit I **EMR AND ITS INTERACTION WITH ATMOSPHERE & EARTH MATERIAL** **9 Hours**

Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan-Boltzman and Wein's 74 Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

Unit II **PLATFORMS AND SENSORS** **9 Hours**

Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and spaceborne TIR and microwave sensors.

Unit III **IMAGE INTERPRETATION AND ANALYSIS** **9 Hours**

Types of Data Products – types of image interpretation – basic elements of image interpretation - visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.

Unit IV **GEOGRAPHIC INFORMATION SYSTEM** **9 Hours**

Introduction – Maps – Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS softwares – Data type – Spatial and non- spatial (attribute) data – measurement scales – Data Base Management Systems (DBMS).

Unit V **DATA ENTRY, STORAGE AND ANALYSIS** **9Hours**

Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data analysis – Modeling in GIS Highway alignment studies – Land Information System. Monitoring and Modeling using GIS.

Total: 45 Hours

Further Reading:

1. How to prepare data for GIS and RS
2. Civil engineering application for various fields

Course Outcomes:

After completion of the course, Student will be able to

1. Explain the available tools using GIS
2. Explain the sensors and Platforms.
3. Understand the details of data processes.
4. Explain Spatial and Non-spatial data types using in GIS.
5. Explain the details about data entry analysis using GIS softwares.

References:

1. Lo. C.P.and A.K.W.Yeung, "Concepts and Techniques of Geographic Information Systems",Prentice Hall of India Pvt. Ltd., New Delhi, 2002

2. Peter A.Burrough, Rachael A. McDonnell, " Principles of GIS", Oxford University Press, 2000

3. Ian Heywood "An Introduction to GIS", Pearson Education Asia, 2000

1703CE002		GROUND IMPROVEMENT TECHNIQUES	L	T	P	C
			3	-	-	3

Course Objectives:	
	1.To develop an awareness of problematic soils and selection of ground improvement techniques based on soil conditions.
	2.To understand drainage, dewatering, grouting technique in ground improvement method.
	3.To aware of the ground improvement techniques
	4.To study the applications of geosynthetics.

Unit I	**PROBLEMATIC SOIL AND GROUND IMPROVEMENT TECHNIQUES**	**9 Hours**

Ground improvement - Role of ground improvement in foundation engineering –methods of ground improvement –geotechnical problems in alluvial, lateritic and black cotton soils – Selection of suitable ground improvement techniques based on soil conditions.

Unit II	**DEWATEREING**	**9 Hours**

Dewatering Techniques - Well points – Vacuum and electro-osmotic methods –Seepage analysis for two dimensional flow - fully and partially penetrated slots in homogeneous deposits (Simple cases only).

Unit III	**GROUND IMPROVEMENT FOR COHESIONLESS AND COHESIVE SOILS**	**9 Hours**

In-situ densification of cohesion-less soils and consolidation of cohesive soils: Dynamic compaction Vibroflotation, Sand compaction piles. Consolidation: Preloading with sand drains, and fabric drains, Stone columns - Lime piles installation techniques only – relative merits and limitations – deep soil mixing.

Unit IV	**GROUTING TECHNIQUE**	**9 Hours**

Grouting - Types of grouts – Suspension grouts - solutions grouts – Grouting equipment and method - Grouting with soil, Bentonite - cement mixes and asphalt - Grout monitoring schemes.

Unit V	**GEOSYNTHETICSAPPLICATIONS**	**9 Hours**

Geosynthetics - Types – functions of Geotextiles – Separation – Filtration – Drainage - reinforcement – Geomembranes - Containments and barriers - Application to Ground Anchors.

	Total:	**45 Hours**

Further Reading:	
	Apply the ground improvement techniques in problematic soils

Course Outcomes:	
	After completion of the course, Student will be able to
	1.learn the method of ground improvement
	2.Explain the methods of dewatering
	3.Explain the ground improvement for soils.
	4. Explain the grouting technique methods.
	5. Explain the geosynthetics applications

References:

1. Purushothama Raj .P, “Ground Improvement Techniques”, LaxmiPublications (P) Ltd.,New Delhi, 2000.

2. Koerner .R.M, “Construction and Geotechnical Methods in FoundationEngineering”, McGraw Hill, new York, 1984.

3. Moseley .M.P, “Ground Improvement”, Blockie Academic and Professional, Chapman and Hall, Glassgow, 1998.

4.IS: 13094:1992- “Selection of ground improvement techniques forfoundations in weak soils”.

E.G.S. PILLAY ENGINEERING COLLEGE (AUTONOMOUS)

Department of Civil Engineering

1703CE003		SOIL DYNAMICS AND MACHINE FOUNDATIONS- I	L	T	P	C
			3	0	0	0

Course Objectives:

1. To understand the soil properties and suitable remedial measures to improve their behavior and to familiarize students with the dynamic properties of soil.
2. To create an understanding about the importance of designing machine foundation for reciprocating and impact machines

Unit I	**INTRODUCTION**	**9Hours**

Vibration of elementary systems – vibratory – single degree freedom -system – free and forced vibrations with and without damping – transient response of single degree freedom systems

Unit II	**WAVES & WAVE PROPAGATION**	**9 Hours**

Wave propagation in an elastic homogeneous isotropic medium - Shear and compression waves - wave propagation in elastic, half space (no theoretical treatment or derivation) properties of compression, shear and Raleigh waves – application in soil dynamics.

Unit III	DYNAMIC PROPERTIES OF SOILS	**9 Hours**

Elastic properties of soils – soil treated as spring or elastic half space – Co – efficient – provision of dynamic properties of soil as per latest BIS 5249 -Co efficient of elastic, uniform and non-uniform compression and shear- Determination of dynamic properties of soil- Field & Laboratory methods.

Unit IV	**DESIGN OF MACHINE FOUNDATION**	**9 Hours**

General requirements of machine foundations – Design criteria – principles of & simple procedures of design of foundations for machineries of reciprocating type, Impact& Rotary type (treated as single degree freedom only) – dynamic loads, simple design procedures for foundations under Reciprocation machines. Impact type machine and Rotary type machines

Unit V	**VIBRATION ISOLATION & SCREENING**	**9 Hours**

Vibration isolation technique mechanical isolation, foundation isolation, isolation by location isolation by barriers – active and passive isolation tests – problems – types of Isolation – active, passive – principles of vibration neutralizer (no derivation)

	Total:	**45 Hours**

Further Reading:

Design of various foundations by impact loading

Advanced soil analysis for dynamic loading

Course Outcomes:

After completion of the course, Student will be able to

1. Acquire Kowledge in Single degree freedom -system – free and forced vibrations with and without damping.
2. understand the theory of wave propagation in elastic media.
2. Determine the of dynamic properties of soil- Field & Laboratory methods.
4. Design the foundations for machineries of reciprocating type, Impact& Rotary type
5. Analyse the Active and passive isolation problems

References:

1. Swamisaran, “Soil Dynamics and Machine Foundations”, Galgotia Publications Pvt. Ltd., 2010.
2. Rtehart F.E, R.D.Woods& J.R. Hall, vibrations of Soils and Foundations, Prentice Hall, 1970.
3. Prakash S. & Pun V.K, Soil Dynamics & Design foundation, McGraw Hill Co. 1998.
4. Srinivasulu P &Vaidanathan C,” Handbook on machine Foundations”, McGraw Hill Co.1976.
5. Code Practice of Design and Construction of Machine Foundations, I.S.2974, 1987 Part I to IV.
6. Prakash .S and Puri V.K, “Foundation for Machines”, McGraw Hill Publishing Company, Newyork, 1988

1703CE004		ADVANCED GEOTECHNICAL ENGINEERING	L	T	P	C
			3	-	-	3

Course Objectives:	
	1.To identify clay minerals and its interaction with water.
	2.Outline the design methods for dewatering, flow net analysis for soil
	3.Familiarize the stress distribution in soil and tunneling techniques.
	4.To Study and analyze the earth retaining structures and off shore structures.

Unit I	**CLAY MINERALOGY AND STRUCTURE**	**9 Hours**
Introduction - Gravitational and surface forces-Electrical charges on clay minerals-bonds-basic structural units of clay - isomorphic substitution – base exchange capacity common clay minerals (Kaolinite, Montmorillionite and illiteonly) - Diffuse double layer - thixotrophy - activity of soils - capillary water – soil suction -capillary potential.		
Unit II	**DEWATERING AND FLOW NET**	**9 Hours**
Permeability of soil – aquifers - field methods for permeability - quick sand condition - Two dimensional flow - Laplace's equation - flow net and it's uses - construction of flow net for sheet pile wall and earth dams - phreatic lines. Dewatering – methods - flow to a slot from a single line source and two line source – fully and partially penetrating slot.		
Unit III	**STRESS DISTRIBUTION**	**9 Hours**
Introduction - Newmarks chart – regular and irregular footing – Westergard'sstress analysis for various loading conditions - earth pressure theories - types of retaining walls – sheet pile walls – types - pressure distribution diagrams for cantilever sheet pile walls in cohesion less soil.		
Unit IV	**OFFSHORE STRUCTURES**	**9 Hours**
Origin, nature and distribution of marine soils – their engineering properties – sampling and sample disturbance – in-situ testing - Introduction of fixed and floating platforms – steel, concrete and hybrid platforms piling techniques		
Unit V	**SPECIAL STRUCTURES**	**9 Hours**
Coffer dams - Caissons and wells– Shafts – Tunnels classification – methods of tunneling - construction sequence – stress around tunnels – micro tunneling – tunnel lining - Diaphragm walls – analysis- anchors.		
	Total:	**45 + 15 Hours**

Further Reading:	
	Analyze the soil properties and structures

Course Outcomes:	
	After completion of the course, Student will be able to
	1. identify clay minerals and its interaction with water
	2.explain the design methods for dewatering, flow net analysis for soil
	3. Familiarize the stress distribution in soil and tunneling techniques.
	4. Study and analyze the earth retaining structures and off shore structures
	5.Explain the analyze the special structures.

References:

1. Shashi K. Gulhati and ManojDatta., "Geotechnical Engineering", TataMcGraw-Hill Publishing Company Limited, New Delhi, 2011.

2.Joseph .E & Bowles, "Foundation Analysis & Design", McGraw Hill, 1996

1703CE005	INDUSTRIAL POLLUTION PREVENTION AND CLEANER PRODUCTION	L	T	P	C
		3	0	0	3

Course Objectives:

1. To study about the industries in India related water usage and wastewater generation.
2. To study about the pollution prevention techniques.
3. To study about the environmental assessment

Unit I	**INTRODUCTION**	**9 Hours**

Industrial Activity and Environment – Industrialization and Sustainable Development – Indicators of Sustainability Strategies – Barriers to Sustainability – Industrial Ecology – Pollution Prevention (PP) and Cleaner Production (CP) in achieving Sustainability- Prevention versus Control of Industrial Pollution - Environmental Policies and Regulations to encourage Pollution Prevention and Cleaner Production – Regulatory versus Market-based approaches

Unit II	**POLLUTION PREVENTION TECHNIQUES**	**9 Hours**

Concept of Pollution Prevention and Cleaner Production - Definition – Importance - Historical Evolution - Benefits- Promotion - barriers – Role of Industry- Government and Institutions - Environmental Management Hierarchy – Source Reduction techniques – Process and Equipment Optimization- Reuse- Recover- Recycle- Raw material substitution -Internet information and Other PP and CP Resources

Unit III	**ANALYSIS OF POLLUTION**	**11 Hours**

Pollution Prevention and Cleaner Production Project development and implementation – Overview of CP - Assessment steps and skills-Preparing the site- Information gathering- Flow diagram-Material balance, PP and CP Option generation- Technical and Environmental Feasibility analysis- Total Cost analysis - PP and CP Financing, Establishing a Program - Organizing a Program-Preparing a program plan - Measuring progress – Pollution Prevention and Cleaner Production Awareness Plan - Waste Audit- Environmental Statement.

Unit IV	**ENVIRONMENTAL ASSESSMENT**	**10 Hours**

Life Cycle Assessment and Environmental Management Systems- Elements of LCA - Life Cycle Costing – Eco labeling – Designs for the Environment - International Environmental Standards- ISO 14001 - Environmental Audit.

Unit V	**CASE STUDIES**	**06 Hours**

Industrial Applications of PP and CP- LCA, EMS and Environmental Audits.

Total:	**45 Hours**

Further Reading:

1. Incorporate of environment concerns in the designs and delivery of services.
2. Focus the adoption of cleaner technologies and techniques.

Course Outcomes:

After completion of the course, Student will be able to

1. Examine the characterization of the pollution and legislative requirements.
2. Discuss the preventive measures and Environmental managements.
3. Evaluate consequences of industrial exposure to pollution and its impact to environmental quality
4. Assess the possible impact of industrial pollution on the environment.
5. Be able to access different case studies on pollution control and CP in practice.

References:

1. Paul L. Bishop, “Pollution Prevention: Fundamentals and Practice”, McGraw- Hill International, 2010.
2. James G. Mann and V.A. Liu, “Industrial Water Reuse and Wastewater Minimization”, McGraw Hill, 2009.
3. World Bank Group, “Pollution Prevention and Abatement Handbook-Towards Cleaner Production”, World Bank and UNE, Washington D.C., 2008.
4. Freeman .H.M, “Industrial Pollution Prevention Handbook”, McGraw Hill”, 2005.
5. Prasad Moda C. Visvanathan and MandarParasnis, “Cleaner Production Audit Environmental System Reviews”, No. 38, Asian Institute of Technology; Bangkok, 2005.

E.G.S. PILLAY ENGINEERING COLLEGE (AUTONOMOUS)

Department of Civil Engineering

1703CE006		SOLID WASTE MANAGEMENT	L	T	P	C
			3	0	0	3

Course Objectives:

- To study the Sources and types of municipal solid wastes
- To impart the knowledge of On-site Processing, collection and transfer of solid waste.
- To acquire the knowledge of Off –site Processing and waste disposal management.

Unit I	**SOURCES AND TYPES OF MUNICIPAL SOLID WASTES**	**8 Hours**

Sources and types of solid wastes - Quantity – factors affecting generation of solid wastes- characteristics – methods of sampling and characterization- Effects of improper disposal of solid wastes – public health effects- Principle of solid waste management – social & economic aspects - Public awareness- Role of NGOs- Legislation.

Unit II	**ON-SITE STORAGE & PROCESSING**	**8 Hours**

On-site storage methods – materials used for containers – on-site segregation of solid wastes – public health & economic aspects of storage – options under Indian conditions – Critical Evaluation of Options.

Unit III	**COLLECTION AND TRANSFER**	**8 Hours**

Methods of Collection – types of vehicles – Manpower requirement – collection routes; transfer stations – selection of location, operation & maintenance; options under Indian conditions.

Unit IV	**OFF-SITE PROCESSING**	**12 Hours**

Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, Pyrolysis - options under Indian conditions.

Unit V	**DISPOSAL**	**9 Hours**

Dumping of solid waste; sanitary landfills – site selection, design and operation of sanitary landfills – Leachate collection & treatment

Total:	**45 Hours**

Further Reading:

- They can categorize the types of wastes
- They can choose the disposal units

Course Outcomes:

After completion of the course, Student will be able to

- Explain the Sources and types of municipal solid wastes
- Interpret the suitable method of Segregation of solid waste under Indian condition.
- Identify the methods of collection and transfer of solid wastes
- Demonstrate the suitable Off –site Processing techniques
- Choose the various options for disposal of wastes and their selection criteria

References:

Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000

R.E.Landreth and P.A.Rebers, Municipal Solid Wastes – problems and Solutions, Lewis Publishers, 1997.

Bhide A.D. and Sundaresan, B.B., Solid Waste Management in Developing Countries, INSDOC, 1993

E.G.S. PILLAY ENGINEERING COLLEGE (AUTONOMOUS)
Department of Civil Engineering

1703CE007		ENVIRONMENTAL IMPACT ASSESSMENT	L	T	P	C
			3	0	0	3

Course Objectives:

1. To know about the basics and importance of Environmental Impact Assessment
2. To study about the Environmental Impact Statement and methods of EIA.
3. To know about the Environmental Management and Prediction Methods
4. To study about the Environmental Management Plan
5. The broad education necessary to understand the impact of engineering solutions in global, economic, environmental and social context

Unit I	**INTRODUCTION**	**09 Hours**

Impact of development projects under Civil Engineering on environment -Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS)– EIA capability and limitations –Legal provisions on EIA

Unit II	**METHODOLOGIES**	**09 Hours**

Methods of EIA –Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives

Unit III	**PREDICTION AND ASSESSMENT**	**09 Hours**

Assessment of Impact on land, water and air, noise, social, cultural flora and fauna; Mathematical models; public participation – Rapid EIA

Unit IV	**ENVIRONMENTAL MANAGEMENT PLAN**	**09 Hours**

Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected People – ISO 14000

Unit V	**CASE STUDIES**	**09 Hours**

EIA for infrastructure projects – Bridges – Stadium – Highways – Dams – Multistory Buildings – Water Supply and Drainage Projects – Waste water treatment plants.

Total:	**45 Hours**

Further Reading:

1. Introduces the methodology of EIA as a vital tool for sound environmental management and decision making.
2. Provides an overview of concepts, methods, issues and various forms and stages of EIA process.

Course Outcomes:

After completion of the course, Student will be able to

1. Explain the major principles of Environmental Impact Assessment.
2. Understand the different steps within Environmental Impact Assessment.
3. Discuss the implication of current jurisdictional and institutional arrangements in relation to Environmental Impact Assessment.
4. Understand how to liaise with and the importance of stakeholders in EIA process.
5. Be able to access different case studies or examples of EIA in practice.

References:

1. Canter .R.L, "Environmental Impact Assessment", McGraw-Hill Inc., New Delhi, 2006
2. Shukla .S.K. and Srivastava .P.R, "Concepts in Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 2002.
3. John G. Rau and David C Hooten (Ed)., "Environmental Impact Analysis Handbook" McGraw-Hill Book Company, 2000.
4. Environmental Assessment Source book", Vol. I, II & III. The World Bank,Washington, D.C., 2001.
5. Judith Petts, "Handbook of Environmental Impact Assessment Vol. I &II",Blackwell Science, 2006.

E.G.S. PILLAY ENGINEERING COLLEGE (AUTONOMOUS)

Department of Civil Engineering

1703CE008		**AIR POLLUTION CONTROL AND MANAGEMENT**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Course Objectives:

1. To impart the knowledge in sources, effect and control of air pollution.
2. To know the principles of dispersion characteristics of pollution in atmosphere
3. To impose the knowledge in the control of air pollution.
4. To know the concepts behind the air pollution management
5. To deliver the sources, effect and control of noise pollution.

Unit I	**ISOURCES AND EFFECTS OF AIR POLLUTANTS**	**9 Hours**

Classification of air pollutants – particulates and gaseous pollutants – sources of air pollution – source inventory – effects of air pollution on human beings, materials, vegetation and animals – global warming - ozone layer depletion, sampling – basic principles – source and ambient sampling – analysis of pollutants.

Unit II	**DISPERSION OF POLLUTANTS**	**9 Hours**

Elements of atmosphere–meteorological factors–wind roses–lapse rate atmospheric stability and turbulence – plume rise – dispersion of pollutants – dispersion models – applications.

Unit III	**AIR POLLUTION CONTROL**	**9 Hours**

Concepts of control – principles and design of control measures – particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – selection criteria for equipment – gaseous pollutants control by adsorption, absorption, condensation, combustion – pollution control for specific major industries

Unit IV	**AIR QUALITY MANAGEMENT**	**9 Hours**

Air quality standards – air quality monitoring – preventive measures - air pollution control efforts – zoning – town planning regulation of new industries – legislation and enforcement – environmental impact assessment on air quality.

Unit V	**NOISE POLLUTION**	**9 Hours**

Sources of noise pollution – effects – assessment - standards – control methods – prevention measure

	Total:	**45 Hours**

Further Reading:

1. Students can be able to control and measure the air pollutants from the industry.
2. Students can be able to make the structures acoustic.

Course Outcomes:

After completion of the course, Student will be able to

1. Classify the sources and effects of air pollution
2. Realize the dispersion characteristics and modeling of air pollution
3. Get an exposure to know about air pollution control methods
4. Familiarize on the air pollution management ideas
5. Aware with the sources, effects and control of noise pollution.

References:

1. Rao M.N. and Rao H.V.N., “Air Pollution” McGraw Hill Education, New Delhi, 2013.
2. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996.
3. Mahajan SP, “Air Pollution Control” TERI Press, New Delhi, 2009.
4. H.C Parkins, Air Pollution McGraw Hill Publication
5. Martin Crawford, Air Pollution Control Theory, TMH Publ.

E.G.S. PILLAY ENGINEERING COLLEGE (AUTONOMOUS)

Department of Civil Engineering

1703CE009		GROUNDWATER ENGINEERING	L	T	P	C
			3	0	0	3

Course Objectives:

1.To introduce the student to the principles of Groundwater governing Equations and Characteristics of different aquifers

2.Characteristicsofdifferentaquifers

3.To understand the techniques of development and management of groundwater

4.To be introduced to the different theories of traffic flow

5.To be aware of the importance of traffic safety

Unit I	HYDROGEOLOGICAL PARAMETERS	9 Hours

Introduction – Water bearing Properties of Rock – Type of aquifers - Aquifer properties – permeability, specific yield, transmissivity and storage coefficient – Methods of Estimation– Ground water table fluctuation and its interpretations – Groundwater development and Potential in India – GEC norms.

Unit II	WELLHYDRAULICS	9Hours

ObjectivesofGroundwaterhydraulics–Darcy'sLaw-Groundwaterequation–steadystate flow.DupuitForchheimerassumption-Unsteadystateflow-Theismethod-Jacobmethod-Slug tests - Imagewell theory –Partial penetrations of wells

Unit III	GROUNDWATER MANAGEMENT	9Hours

Need for Management Model – Database for groundwater management –groundwater balance study – Introduction to Mathematical model – Conjunctive use – Collector well and Infiltration gallery

Unit IV	GROUNDWATER QUALITY	9 Hours

Ground water chemistry - Origin, movement and quality - Water quality standards – Health and aesthetic aspects of water quality - Saline intrusion – Environmental concern and Regulatory requirements

Unit V	GROUNDWATER CONSERVATION	9 Hours

Artificial recharge techniques – Remediation of Saline intrusion– Ground water management studies – Protection zone delineation, Contamination source inventory, remediation schemes
- Ground water Pollution and legislation.

Total:	45 Hours

Further Reading:

1. Ground water to improving quality parameter
2. Water resource and hydrology for features need.

Course Outcomes:

1. Students will be able to understand aquifer properties and its dynamics after the completionofthecourse.Itgivesanexposuretowardswelldesignandpracticalproblems of ground water aquifers

2. Studentswillbeabletounderstandtheimportanceofartificialrechargeandgroundwater quality concepts

3. Model regional groundwater flow and design water wells

4.Estimatewaterqualityparameters

5.To safety ground water improvements of quality parameter

References:

1. Raghunath,H.M.,GroundWaterHydrology,WileyEasternLtd.,2000.

2. .ToddD.K.,GroundWaterHydrology,JohnWileyandSons,2000

3..VenT.Chow& David R. Maidment, Open Channel Flow, Tata McGraw-Hill Publishing Company, New Delhi, 1988

4.Walton, C, Applied Hydrology, Ground Water Resource Evaluation, McGraw-Hill Publications,1996

5.Karanth,GroundWaterAssessment,DevelopmentandManagement,TataMcGraw Hill,NewDelhi2006

1703CE010	COASTAL ZONE MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objectives:	At the end of the semester, 1.The student shall be able to understand the coastal processes
	2.The student shall be able to understand the coastal dynamics
	3.The student shall be able to understand impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone

Unit I	**COASTAL ZONE**	**9 Hours**

Coastal zone – Coastal zone regulations – Beach profile – Surf zone – Off shore – Coastal waters – Estuaries – Wet lands and Lagoons – Living resources – Nonliving resources.

Unit II	**WAVE DYNAMICS**	**9 Hours**

Wave classification – Airy‟s Linear Wave theory – Deep water waves – Shallow water waves – Wave pressure – Wave energy – Wave Decay – Reflection, Refraction and Diffraction of waves – Breaking of waves – Wave force on structures – Vertical – Sloping and stepped barriers – Force on piles.

Unit III	**WAVE FORECASTING AND TIDES**	**9 Hours**

Need for forecasting – SMB and PNJ methods of wave forecasting – Classification of tides – Darwin‟s equilibrium theory of tides – Effects on structures – seiches, Surges and Tsunamis.

Unit IV	**COASTAL PROCESSES**	**9 Hours**

Erosion and depositional shore features – Methods of protection – Littoral currents – Coastal aquifers – Sea water intrusion – Impact of sewage disposal in seas.

Unit V	**HARBOURS**	**12 Hours**

Structures near coast – Selection of site – Types and selection of break waters – Need and mode of dredging – Selection of dredgers – Effect of Mangalore forest.

	Total:	**45 + 15 Hours**

Further Reading:	
	1.Richard Sylvester, “Coastal Engineering, Volume I and II”, Elseiner Scientific Publishing Co., 1999
	2.Quinn, A.D., “Design & Construction of Ports and Marine Structures”, McGraw Hill Book Co., 1999

Course Outcomes:	
	After completion of the course, Student will be able to
	1. Describe the Coastal zone regulations,
	2. Describe the coastal processes
	3. Explain the wave dynamics and forecast waves
	4. Understand the erosion and depositional shore protection
	5. Plan the coastal structures including harbours and tides

References:

1.Ed. A.T. Ippen, “Coastline Hydrodynamics”, McGraw-Hill Inc., New York, 1993

2.Dwivedi, S.N., Natarajan, R and Ramachandran, S.,“Coastal Zone Management in Tamilnadu”, Madras, 199

3.Richard Sylvester, “Coastal Engineering, Volume I and II”, Elseiner Scientific Publishing Co., 1999

4.Quinn, A.D., “Design & Construction of Ports and Marine Structures”, McGraw Hill Book Co., 1999

E.G.S. PILLAY ENGINEERING COLLEGE (AUTONOMOUS)
Department of Civil Engineering

1703CE011	NOISEPOLLUTIONANDITS CONTROL	L	T	P	C
	(Title can be Continued)	**3**	**0**	**0**	**3**
	(Common to B.E / B.Tech – CIVIL)				

Course Objectives:	
	1. Toknowthebasics,importanceofnoisepollution measurement.
	2. Tostudythevarioueffectsofnoisepollution.
	3. Tolearntheimportanceofmethodsofcontrolofnoise.

Unit I	**NOISEPOLLUTIONANDITSMEASUREMENT**	**9 Hours**

Sourcesofnoise–UnitsandMeasurements ofNoise –Noise Powerlevel, Intensity level, Pressurelevel – Relationship, Noise level meter– Weighted networks–Decibeladdition–OctaveBand– Noisespectrum–EquivalentNoise–Dayandnighttime–Standards,EquationsandApplication

Unit II	**CHARACTERIZATIONOFNOISEPOLLUTIONANDITS**	**9 Hours**

CharacterizationofNoisefromConstruction,Mining,TransportationandIndustrial Activities,AirportNoise–GeneralControlMeasures –Effectsofnoisepollution– auditoryeffects,non-auditoryeffects.

Unit III	**CONTROLOFNOISE**	**9 Hours**

NoiseMenace–NoiseandtheFetus–Prevention andControl ofNoisePollution– Controlofnoiseatsource,controloftransmission,protection ofexposedperson- ControlofothertypesofNoiseSound Absorbent–NoisePollutionAnalyzer– AuditoriumDesigning – AntiNoiseDevice.

Unit IV	**PHYSICALCONTROLOFNOISE**	**9 Hours**

DesigningoutNoise –IndustrialNoise Control–effectsofnoiseonworkers efficiency -Acoustic quieting - mechanical isolation technique,acoustical absorption, constrainedlayer damping – OSHA Noise standards – public education–othernon-legislativemeasures.

Unit V	**NOISEPOLLUTIONREGULATIONS**	**9Hours**

LegislationNoise andtheAdministrativeFunction –Planning againstNoise – NoiseandtheLaw– TheRajasthannoisecontrol Act1963,RailwayAct1890 (Relatedtonoise only),TheAircraftAct1934(Relatedtonoise only),Factories Act1948(Relatedtonoiseonly),TheEnvironmentalProtectionAct1986–Noise pollutionremedies.

	Total:	**45 + 15 Hours**

Further Reading:	
	3. Source of noise pollution
	4. Control methods and current acts .

Course Outcomes:	
	After completion of the course, Student will be able to
	6. Source of noise pollution and its levels
	7. Noise pollution characterization and its effects
	8. Types of noise pollution and control device
	9. Control methods of noise pollution
	10. Noise pollution regulation and its acts

References:

1. Singal.S.P,"*Noise Pollution&Control"*,NarosaPublishingHouse,NewDelhi2010.

2.Agarwal.S.K,"*NoisePollution"*.APHPublications,NewDelhi,2009.

3. DeviPrasadTripathi,"*NoisePollution"*,TataMcGrawHill,NewDelhi2006.

E.G.S. PILLAY ENGINEERING COLLEGE (AUTONOMOUS)
Department of Civil Engineering

1703CE012		**ADVANCEDWASTEWATER TREATMENT DESIGN**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**
		(Common to B.E / B.Tech – CIVIL)				
Course Objectives:						
	1. Toknowtheneedforadvancedwastewatertreatment.					

	2. Tostudythedesignapproachesforphysiochemical,biologicalprocessesfor theremovalofnitrogenandphosphorus.	
	3. Tostudythebasic conceptsanddesign ofadsorption units.	
Unit I	Introduction	9 Hours
Need for advancedwaste watertreatment-technologies used for advanced treatment-goalsof advanced treatment-combination of unitoperations and processeswithtreatmentflowsheets-Effluentpolishing.		
Unit II	NUTRIENTS REMOVAL	9 Hours
Nitrogen–sources,forms,nitrificationanddenitrificationprocesses-phosphorous – sources,forms,chemicalandbiologicalmethodsoftreatment-airstripping.		
Unit III	ADSORPTION	9 Hours
Adsorptionprocesses–Adsorptionequilibria– Adsorptionisotherm–Adsorption kinetics–Influencingfactors–Design ofadsorption units.		
Unit IV	FILTRATIONANDMEMBRANEPROCESS	9 Hours
Filtration processes–membranefiltration processes–reverseosmosis – membrane properties–ultra filtration–Electrodialysis–processdesignand applications.		
Unit V	IONEXCHANGEANDCHEMICALOXIDATION	12 Hours
Exchangeprocesses– exchangematerials– exchangereactions– columndesign procedure –Applicationofion–exchangein waterandwastewater treatments. Chemicaloxidation–principlesandtheoriesofchemicaloxidation– properties, generation and applications of oxygen,permanganate,chlorine dioxide,etc.		
	Total:	**45 + 15 Hours**
Further Reading:		
	5. How to collect and handling of wastewater	
	6. How to treat that wastewater to WHO standards.	
Course Outcomes:		
	After completion of the course, Student will be able to	
	11. How to collect wastewater and wastewater treatment methods	
	12. Identification of sources and forms.	
	13. Adsorption methods and its various design	
	14. Available of filtration techniques and methods	
	15. Best selection of suitable methods for wastewater parameters	
References:		
13. Rich.L.G,"Unitoperationsofsanitaryengineers",WileyTopan, 2001		
14. Fair.G.M.,"Water andWastewaterengineeringVol.I&II.JohnWileyand Sons",Newyork,2005.		
15. Metcalf &Eddy., "WastewaterengineeringTreatmentandReuse",Tata McGrawHillpublications,2003.		

1703CE013		BRIDGE ENGINEERING	L	T	P	C
			3	0	0	3

Course Objectives:

To select the type of bridge,

To know its design and construction

Unit I	INTRODUCTION	9 Hours

Components of a bridge structure – Inspection and site investigation for a bridge – Determination of linear waterway, design discharge and scour depth – Economical span – Types and choice of bridges, IRC loading classification – Simple problems

Unit II	SLAB BRIDGE	9 Hours

Slab bridge – Distribution of concentrated loads by IRC and Pigeaud's Method – Design of tee beam bridge – Design of main girder – Design of cross girder – Load distribution by Courbon's Method – Skew slab Bridge

Unit III	BRIDGE AND CULVERT	9 Hours

Single span rigid frame bridge (barrel or slab type only) – Box culvert (single vent only). Balanced cantilever RC bridges – Design of articulations.

Unit IV	MODERN BRIDGES	9 Hours

Temporary and movable bridges, RC Arch bridges (open spandrel and sting girder type only) – Cable stayed bridges – Suspension brides (Design principles only)

Unit V	BEARING AND SUBSTRUCTURES	9 Hours

Bearing – types, functions – simple problem – substructures – abutment, pier – materials – stability requirements

Total:	45 Hours

Further Reading:

They can get the knowledge about bridge units

Course Outcomes:

After completion of the course, Student will be able to

Understand the design theories for super structure and substructure of bridges

Design Culvert, R.C.C T beam bridge

Understand the behaviour of continuous bridges, box girder bridges

Possess the knowledge to design prestressed concrete bridges

Design Railway bridges, Plate girder bridges, different types of bearings , abutments, piers and various types of foundations for Bridges

References:

Vazirani.VN, Ratwami.MM &Vaswani, "Bridge Engineeirng", Khanna publishers, 2000

Bindra. SP. "Principles and practices of Bridge Engineering", DhanapatRai& son, New Delhi, 1995

Krishnaraju, "Design of Bridges" New age international publishing Ltd. New Delhi, 2005

1703CE014		FINITE ELEMENT METHOD	L	T	P	C
			3	0	0	3

Course Objectives:

1. To understand the basic concept of Finite element Analysis and its applications.
2. To understand the numerical techniques applied in FEM Establishment of element stiffness and load vector.
3. To study about the 2-D isoparametric concepts.

Unit I	**INTRODUCTION**	**9 Hours**

Introduction - Basic Concepts of Finite Element Analysis - Introduction to Elasticity - Steps in Finite Element Analysis - Virtual Work and Variational Principle - Galerkin Method- Finite Element Method: Displacement Approach - Stiffness Matrix and Boundary Conditions.

Unit II	**ONE DIMENSIONAL PROBLEMS**	**9 Hours**

Finite element modeling – Coordinates and shape functions – Linear and quadratic elements Applications to axial loadings of rods – Extension to plane trusses – Bending of beams Element
Analysis of continuous beams - sinking of supports – rigid frames (with and without sway)

Unit III	**TWO DIMENSIONAL PROBLEMS**	**9 Hours**

Convergence requirements - Constant Strain Triangular (CST) Element – Rectangular Element -Finite element modeling - Element equations, Load vectors and boundary conditions – Assembly - shape functions from Lagrange and serendipity family— Application to heat transfer.

Unit IV	**ISOPARAMETRIC FORMULATION**	**9 Hours**

Introduction – Coordinate Transformation –Basic theorem of Isoparametric concept – Uniqueness of mapping – Isoparametric, Subparametric and Superparametric elements – Assembling Stiffness matrix – Numerical Examples.

Unit V	**APPLICATIONS OF FEM**	**9 Hours**

Application of displacement finite elements to the analysis of simple problems (one and two dimensional cases) in the area of structural mechanics. Computer Programs: Development of computer programs for an axial and beam bending elements – Use of computer packages – programming techniques.

	Total:	**45 Hours**

Further Reading:

1.To analyze one and two dimensional problems.

Course Outcomes:

After completion of the course, Student will be able to

1. Use displacement models and load vectors to find the member forces.
2. Analyze one and two dimensional problems using finite element approach.
3. Analyze one and two dimensional problems using finite element approach.
4. Apply iso-parametric concept in finite element analysis.
5. Develop computer programs for an axial and beam bending elements.

References:

1. Krishnamoorthy, C.S, Finite Element Analysis Theory & Programming, McGraw-Hill, 1995.
2. Desai C.S and Abel,, J.F., Introduction to Finite Element Method, affiliated East West Press Pvt Ltd, New Delhi, 2000
3. Chandrupatla T.R., and Belegundu A.D., “Introduction to Finite Elements in Engineering”, Pearson Education 2011, 4th Edition.
4. SS. Bhavikkatti, Introduction to Finite Element Analysis –Newage International (P) Limited Publishers, New Delhi, 2011.
5.Seshu, P., Textbook of finite element analysis. New Delhi: Prentice-Hall of India, 2006.
6. Bathe. K.J., "Finite Element Procedure", Prentice Hall of India, New Delhi, 2006.

1703CE015		PRE-STRESSED CONCRETE	L	T	P	C
			3	0	0	3
		B.E CIVIL ENGINEERING				

Course Objectives:

1. To learn the principles, materials, methods and systems of prestressing
2. To learn the design of prestressed concrete beams for flexural, shear and tension and to calculate ultimate flexural strength of beam
3. Useful course for structural engineers in designing economical structures.

Unit I	**INTRODUCTION – THEORY AND BEHAVIOUR**	**9 Hours**

Basic Concepts - Historical development - classification and types - advantages over ordinary reinforced concrete – Prestressing Materials – Loads – Design Concepts –Prestressing Techniques – Systems of Prestressing – Loss of Prestress.

Unit II	**DESIGN FOR FLEXURE AND CABLE LAYOUT**	**9 Hours**

Basic assumptions - permissible stresses in steel and concrete as per IS 1343-1980 code - Design of sections of post-tensioned and pre-tensioned beams (Type I and II) - check for strength limit state based on IS 1343 – 1980 code - Layout of cables in post-tensioned beams - location of wires in pre-tensioned beams.

Unit III	**SHEAR AND DEFLECTION**	**9 Hours**

Design for shear based on IS 1343 - 1980 code - Factors influencing deflections - short term deflections of uncracked members - prediction of long term deflections - check for serviceability limit state of deflection- Anchorage Zone

Unit IV	**COMPOSITE CONSTRUCTION**	**9 Hours**

Composite Sections – Types – Advantages – Analysis and Design – Shear Keys.

Unit V	**CIRCULAR PRESTRESSING**	**12 Hours**

Prestressed Concrete Tanks - Columns – Poles – Tension Members – Masts – Pylons –Sleepers.

Total:	**45 + 15 Hours**

Further Reading:

1.will studyvarious methods of prestressing and the concepts of partial pre-stressing.

2.will design beams, pipes, water tanks, posts and similar structures

Course Outcomes:

After completion of the course, Student will be able to

1. Understand the concepts of pre-stressing in concrete structures and identify the materials for pre-stressing
2. Analyse a Pre-stressed Concrete section
3. Design pre-tensioned and post tensioned girders for flexure and shear
4. Design continuous pre-tensioned and post tensioned beams
5. design pre-stressed concrete tanks, poles and sleepers

References:

1. Krishna Raju N, " Prestressed Concrete", Tata McGraw Hill Publishing Company, Delhi, 2007. .
2. Edward G Nawy, “Prestressed Concrete”, A Fundamental Approach, 3rd Edition, Prentice Hall, Upper Saddle river, NewJersy, 2000
3. Rajagopalan N, “ Prestressed Concrete”, Narosa Publishing House, NewDelhi, 2002.
4. Sinha N C and Roy S K, “ Fundamentals of Prestressed Concrete”, S Chand & Co, 1985.
5. Lin T Y and Ned H Burns, “ Design of Prestressed Concrete Structures”, John Wiley Sons, NewYork, 1982
6. Mallik S K and Gupta A P, “Prestressed Concrete”, Oxford & IBH Publishing Co., Pvt. Ltd., India, 2nd Edition, 1986.

1703CE016		ADVANCED STRUCTURAL ANALYSIS	L	T	P	C
			3	0	0	3

Course Objectives:	
	1. To understand the concept of static and kinematic indeterminacies
	2. To obtain the ability to analyze indeterminate beams and rigid frames by Flexibility and Stiffness Matrix method.
	3.To understand the clear concept of transformation coordinates.

Unit I	**INDETERMINACY**	**9 Hours**
Determination of static and kinematic indeterminacies of two dimensional and three-dimensional portal frames, pin jointed trusses and hybrid frames coordinate systems –structural idealization.		
Unit II	**INTRODUCTION TO MATRIX METHODS OF ANALYSIS**	**9 Hours**
Flexibility and stiffness matrices-Force displacement relationships for axial force, couple, torsional moments – stiffness method of analysis and flexibility method of analysis.		
Unit III	**ANALYSIS OF CONTINUOUS BEAMS**	**9 Hours**
Stiffness method and flexibility method of analysis –continuous beams of two and three spans with different end conditions-internal hinges		
Unit IV	**ANALYSIS OF TWO DIMENSIONAL PORTAL FRAMES AND PINJOINTED TRUSSES**	**9 Hours**
Stiffness and flexibility method of analysis of 2D portal frames and pin jointed trusses with different end conditions-plotting of bending moment diagrams		
Unit V	**TRANSFORMATION OF CO-ORDINATES**	**9 Hours**
Local and Global co-ordinate systems-transformation of matrices from local to global coordinates of element stiffness matrix-direct stiffness method of analysis-assembly of global stiffness matrix from element stiffness matrices –static condensation-sub-structuring		
	Total:	**45 Hours**

Further Reading:	
	1. To analyze and find out the indeterminate frames and trusses.

Course Outcomes:	
	After completion of the course, Student will be able to
	1.Analyze the indeterminate structures of two and three dimensional portal frames and trusses.
	2.Implement the basic concept of flexibility and stiffness method of analysis.
	3.Analyze the continuous beams using flexibility and stiffness method of analysis.
	4. Analyze two dimensional portal frames and pin jointed trusses the using flexibility and stiffness method of analysis.
	5.Use the transformation of matrices from local to global coordinates of element stiffness matrix

References:

1.Punmia,B.C., Ashok Kumar and Arun Kumar Jain, " Theory of Structures", Laxmi Publications, 2005.

2. Vaidyanathan, R. and Perumal, P., "Comprehensive structural Analysis – Vol I & II", Laxmi Publications, New Delhi, 2003.

3. Negi L.S &Jangid R.S., "Structural Analysis", Tata McGraw Hill Publications, New Delhi, 2003.

4.Ghali.A, Nebille, A.M. and Brown, T.G, "Structural Analysis" A unified classical and Matrix approach", 6th Edition, Spon Press, London and New York, 2013.

5.Gambhir, M.L., "Fundamentals of Structural Mechanics and Analysis", PHI Learning Pvt. Ltd., New Delhi, 2011.

6.William Weaver Jr& James M. Gere, "Matrix Analysis of Framed Structures", CBS Publishers and Distributors, New Delhi, 2004

1703CE017		DESIGN OF ADVANCED CONCRETE STRUCTURES	L	T	P	C
			3	0	0	3

Course Objectives:

1. To make the students be familiar with the limit state design of RCC beams and columns
2. To design special structures such as Deep beams, Corbels, Deep beams, and Grid floors
3. To make the students confident to design the flat slab as per Indian standard, yield line theory and strip method.
4. To design the beams based on limit analysis and detail the beams, columns and joints for ductility

Unit I	**INTRODUCTION**	**9 Hours**

Review of Basic Concepts - Behaviour and Design of Reinforced Concrete members considering flexure, Torsion, combined with flexure and flexural shear, axial compression deflection and crack width as per IS-456-2000 - Comparative study with BS 8110 and ACI - 318.

Unit II	**DESIGN OF SPECIAL R.C. ELEMENTS**	**9 Hours**

Behaviour and Design of Slender Columns - Design of R.C.Walls - Ordinary and Shear walls - Design of Corbels - Deep beams and grid floors.

Unit III	**FLAT SLABS AND FLAT PLATES**	**9 Hours**

Design of flat slabs and flat plate - According to ACI method - Design of shear - Reinforcement and Edge (Spandrel) beams - yield line theory & Hiller borg method of design of slabs.

Unit IV	**INELASTIC BEHAVIOUR OF CONCRETE BEAMS AND COLUMNS**	**9 Hours**

Inelastic behaviour of concrete beams and Baker's method, moment -rotation curves, ductility definitions, evaluation

Unit V	**DUCTILE DETAILING**	**9 Hours**

Concept of Ductility–Detailing for ductility–Design of beams, columns for ductility-Design of cast-in-situ joints in frames.

	Total:	**45 Hours**

Further Reading:

1.Students can be able to design lateral force resistant walls
2.Students can be able to design deck bridges and use ductile detailing.

Course Outcomes:

After completion of the course, Student will be able to

1. Design the column and beam for deflection and crack
2. Design the special structures such as Deep beams, Corbels, Deep beams, and Grid floors
3. Design the flat slab as per Indian standard, yield line theory and strip method.
4. Design the beams and columns for their inelastic behaviours
5. design the beams based on limit analysis and detail the beams, columns and joints for ductility

References:

1. Gambhir.M. L., "Design of Reinforced Concrete Structures", Prentice Hall of India, 2012.
2. Purushothaman, P, "Reinforced Concrete Structural Elements: Behaviour Analysis and Design", Tata McGraw Hill, 1986
3. UnnikrishnaPillai and DevdasMenon "Reinforced Concrete Design', Third Edition, Tata McGraw Hill Publishers Company Ltd., New Delhi, 2007.
4. Varghese, P.C, "Advanced Reinforced Concrete Design", Prentice Hall of India, 2005.

1703CE018		COMPUTER ANALYSIS OF STRUCTURES	L	T	P	C
			3	0	0	3

Course Objectives:

1. Formulate algorithm for solving equations by matrix method andconstruct algorithm for computer aided design of truss problems.
2. Construct algorithm for computer aided design of reinforcedconcrete members.
3. Construct algorithm for computer aided design of steel members.
4. Construct algorithm for analysis of pre-stressed concretemembers.
5. Outline a computer aided analysis and design software.

Unit I	**Structural Analysis**	**9 Hours**

Banded and semi-banded matrices - element stiffness matrix – structurestiffness matrix –algorithm for solving trusses by matrix stiffness method.

Unit II	**Reinforced Concrete Structures**	**9 Hours**

Stress-strain relationship in concrete and steel – algorithm for bendingmoment coefficients in slab – algorithm for developing design tables forbeams – rectangular and flanged sections.

Unit III	**Steel Structures**	**9 Hours**

Algorithm for finding load carrying capacity of steel columns – algorithmfor moment carrying capacity of steel beams.

Unit IV	**Prestressed Concrete Structures**	**9 Hours**

Algorithm for analysis of pre-stressed rectangular and I sections in flexure– algorithm for finding losses in pre-stress.

Unit V	**Software Applications**	**9 Hours**

Introduction to Analyzing software – Software working - Optimization –Application software.

	Total:	**45 Hours**

Further Reading

Advanced structural analysis,

Course Outcomes:

After completion of the course, Student will be able to

1.Formulate algorithm for solving equations by matrix method and construct algorithm for computer aided design of truss problems.
2.Construct algorithm for computer aided design of reinforced concrete members.
3.Construct algorithm for computer aided design of steel members.
4.Construct algorithm for analysis of pre-stressed concrete members.
5.Outline a computer aided analysis and design software.

References:

1. Groover M.P. and Zimmers E.W. Jr., “CAD/CAM, Computer AidedDesign and Manufacturing”, Prentice Hall of India Limited, NewDelhi, 2014.
2. KrishnamoorthyC.S.Rajeev S., “Computer Aided Design”, NarosaPublishing House, New Delhi, 2003
3. Harrison H.B., “Structural Analysis and Design, Part I and II”Pergamon Press, Oxford, 1990.
4. Rao S.S., “Optimisation Theory and Applications”, Wiley EasternLimited, New Delhi, 1977.

1703CE019		STORAGE AND INDUSTRIAL STRUCTURES	L	T	P	C
			3	0	0	3
		B.E CIVIL ENGINEERING				

Course Objectives:

1. To study the design of material storage structures
2. To study the design procedures and practices of complex steel structures like industrial structures and Gantry girders.
3. To develop an in-depth knowledge in the area of design of industrial structure with the latest code of practice as per the Indian Standard

Unit I	**PLANNING AND LAYOUT**	**9 Hours**

Planning and layout of low-rise buildings for different functions such as residences, office buildings, shopping centers, hospitals, auditoria, etc. STEEL MILL BUILDINGS: Planning the general framing scheme - Planning the Trusses - Bracing of roofs - Vertical bracing of buildings - Design of roof Trusses and lattice girders

Unit II	**DESIGN OF FRAMES**	**9 Hours**

Design of simple and rigid frames – Gable frames – Knee bents

Unit III	**DESIGN OF CHIMNEYS**	**9 Hours**

Self-supporting - Guyed Chimneys - Design of towers

Unit IV	**INDUSTRIAL ROOFING STRUCTURES**	**9 Hours**

Trusses – Design of lattice girders – design of arches – Plate girders - Design of industrial sheds - Design of over head and under slung girders - Gantry girder - Design of gantry columns – Heavy duty plate girders.

Unit V	**BUNKERS AND SILOS:**	**12 Hours**

Pressure on side walls of bunkers and silos - Janssen's and Airy's theories - Complete design of single cell circular silos including their supporting structures and foundation - Design of rectangular and square bunkers - sloping bottom - design of staging.

	Total:	**45 + 15 Hours**

Further Reading:

design concrete and steel material storage structures.

Course Outcomes:

After completion of the course, Student will be able to

1. Discuss the planning and functional requirements of Industrial structures.
2. Discover the need to learn about the design concepts, and constructional aspects of Industrial structures
3. Design of Simple Industrial shed-gantry girder
4. Design steel gantry girders and portal frames
5. Design storage structures, bunkers and silos

References:

1. Dunham C W, "Planning Industrial Structures", McGraw Hill Book Company, Inc., 1980.
2. Subramanian N," Design of Steel Structures", Oxford University Press, NewDelhi 2008
3. Jayagopal L S, 'Structural Steel Design", Vikas Publications, 2012
4. Gaylord and Gaylord," Structural Engineering Hand Book", McGraw Hill book Co., 1990
5. Charles G Salmon & John E Johnson, "Steel Structures – Design & Behaviour", Harper Collins Publishers, 3rd edition, 1990.
6. Robert Englekirk, "Steel Structures, Controlling Behaviour through Design", John Wiley & Sons, Inc., 2003.
7. Ram Chandra, "Design of Steel Structures", Vol.2, Scientific Publication (India), Jodhpur, 2007

1703CE 020		ADVANCED DESIGN AND CONSTRUCTION OF PAVEMENTS	L	T	P	C
			3	0	0	3

Course Objectives:	
	1.To understand the analysis of stress distribution on layered system.
	2.To design flexible and rigid pavements.
	3.To evaluation and stabilization of flexible and rigid pavements.

Unit I	**TYPES OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM**	**9 Hours**
Introduction – Pavement as layered structure – Pavement types rigid and flexible. Resilient modulus- Stress and deflections in pavements under repeated loading.		
Unit II	**DESIGN OF FLEXIBLE PAVEMENTS**	**9 Hours**
Flexible pavement design factors influencing design of flexible pavement, Empirical – Semi empirical and theoretical methods – Design procedure as per IRC guidelines – design and Specification of rural roads.		
Unit III	**DESIGN OF RIGID PAVEMENTS**	**9 Hours**
Cement concrete pavements factors influencing CC pavements- Modified Westergaard approach – design procedure as per IRC guidelines – Concrete roads and their scope in India.		
Unit IV	**PERFORMANCE EVALUATION AND MAINTENANCE**	**9 Hours**
Pavement Evaluation – causes of distress in rigid and flexible pavements – Evaluation based on Surface Appearance, Cracks, patches and Pot holes, Undulations, Raveling, Roughness, Skid Resistance- Structural evaluation by Deflection Measurements- Pavement Serviceability indexpavement maintenance (IRC recommendations only).		
Unit V	**STABILIZATION OF PAVEMENTS**	**9 Hours**
Stabilization with special reference to highway pavements – Choice of stabilizers – Testing and field control stabilization for rural roads in India – use of Geosynthetics in roads.		
	Total:	**45 Hours**

Further Reading:	
	1.Knowledge on the Material properties, Pavement Design.
	2.Knowledge on the Evaluation andstabilization of pavement Systems.

Course Outcomes:	
	After completion of the course, Student will be able to
	1.Design flexible pavement based on IRC guidelines.
	2.Design rigid pavement based on IRC guidelines.
	3.Implement various techniques to evaluate performance of pavements.
	4.Utilize geosynthetics for pavements
	5.Adopt suitable soil stabilization techniques for pavements

References:

1.Wright P.H. " Highway Engineers", John Wiley and Sons, Inc., New York, 1996.

2.Khanna , S.K., Justo C.E.G and veeraragavan . A., " Highway Engineering", Nem Chand and Brothers, 10th edition, Roorkee, 2014.

3.Kadiyali, L.R. " Principles and Practice of Highway Engineering", Khanna tech. Publications, New Delhi, 1989.

4.Yoder R.J. and Witchak M.W. " Principles of Pavement Design", John Wiley 2000.

5.Rajib B. Mallick, Tahar El-Korchi, " Pavement Engineering" Principles and Practice 2nd edition, CRC Press, 2013.

1703CE021		REPAIR AND REHABILITATION OF STRUCTURES	L	T	P	C
			3	0	0	3

Course Objectives:

1.To make the students to gain knowledge on quality of concrete ,durability aspects, causes of deterioration, assessment of distressed structures ,repairing of structures and demolition procedures.

2. To make the students to assess the durability of concrete due to various climate conditions

3.To prepare the students to select the appropriate rehabilitation, retrofitting and demolition for structures

Unit I	**MAINTENANCE AND REPAIR STRATEGIES**	**9 Hours**

Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration

Unit II	**STRENGTH AND DURABILITY OF CONCRETE**	**9 Hours**

Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete - Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion - Effects of cover thickness

Unit III	**SPECIAL CONCRETES**	**9 Hours**

Polymer concrete, Sulphur infiltrated concrete, Fibre reinforced concrete, High strength concrete, High performance concrete, Vacuum concrete, Self compacting concrete, Geopolymer concrete, Reactive powder concrete, Concrete made with industrial wastes.

Unit IV	**TECHNIQUES FOR REPAIR AND PROTECTION METHODS**	**9 Hours**

Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection

Unit V	**REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES**	**12 Hours**

Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, Leakage, earthquake – Demolition Techniques - Engineered demolition methods - Case studies.

	Total:	**45 + 15 Hours**

Course Outcomes:

After completion of the course, Student will be able to

1. Suggest maintenance and repair strategies
2. Examine the durability due to various climate conditions
3. Suggest the suitable materials and techniques for repair
4. Choose various rehabilitation and retrofitting techniques.
5. Select suitable demolition techniques for structures.

References:

2. 1.Shetty M.S., "Concrete Technology - Theory and Practice", S.Chand and Company, 2008

2. DovKominetzky.M.S., " Design and Construction Failures", Galgotia Publications Pvt.Ltd., 2001

3. Ravishankar.K., Krishnamoorthy.T.S, " Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures", Allied Publishers, 2004.

4. CPWD and Indian Buildings Congress, Hand book on Seismic Retrofit of Buildings, Narosa Publishers, 2008.

5. Gambhir.M.L., "Concrete Technology", McGraw Hill, 2013

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1703CE022		TALL STRUCTURES	L	T	P	C
			3	0	0	3

Course Objectives:

1. The design aspects and analysis methodologies of tall buildings will be introduced.
2. The stability analysis of tall buildings is another important objective of this course.

Unit I	**DESIGN CRITERIA AND MATERIALS**	**9 Hours**

Development of High Rise Structures - General Planning Considerations - Design philosophies - Materials used for Construction - High Strength Concrete - High Performance Concrete - Self Compacting Concrete - Glass - High Strength Steel

Unit II	**LOADING**	**9 Hours**

Gravity Loading –Dead load, Live load, Impact load, Construction load, Sequential loading.
Wind Loading –Static and Dynamic Approach, Analytical method, Wind Tunnel Experimental methods.
Earthquake Loading –Equivalent lateral load analysis, Response Spectrum Method,
Combination of loads.

Unit III	**BEHAVIOUR OF STRUCTURAL SYSTEMS**	**9 Hours**

Factors affecting the growth, height and structural form, Behaviour of braced frames, Rigid frames, Infilled frames, Shear walls, Coupled shear walls, Wall -Frames, Tubular, Outrigger braced, Hybrid systems.

Unit IV	**ANALYSIS AND DESIGN**	**9 Hours**

Modelling for approximate analysis, Accurate analysis and reduction techniques, Analysis of Structures as an integral unit, Analysis for member forces, drift and twist. Computerized 3D analysis. Design for differential movement, Creep and Shrinkage effects, Temperature Effects and Fire Resistance.

Unit V	**STABILITY ANALYSIS**	**12 Hours**

Overall buckling analysis of frames, wall – frames, Approximate methods, Second order effect of gravity loading, P – Delta Effects, Simultaneous first order and P - Delta analysis, Translational instability, Torsional Instability, Out of plumb effects, Effect of stiffness of members and foundation rotation in stability of structures.

Total:	**45 Hours**

Further Reading: At the end of this course the student

1. Understanding on the behaviour of tallbuildings subjected to lateral building.
2. knowledge about therudimentary principles of designing tall buildings as per the existing codes.

Course Outcomes:

After completion of the course, Student will be able to

1. Demonstrate behaviour of various structural systems.
2. Calculate various types of loads for a tall building.
3. Knowledge on behaviour of structural systems.
4. Analysis and design of tall buildings.
5. Perform stability analysis of tall structures.

References:

1.Taranath B.S, “Structural Analysis and Design of Tall Buildings”: McGraw Hill

2.Wilf gang Schuller, “High rise building structures”: John Wiley

3.Bryan Stafford Smith &Alexcoull, “Tall building structures Analysis and Design”: John Wiley

4.T.Y Lin &D.Stotes Burry, “Structural concepts and system for Architects and Engineers”: John Wiley

5.LynnS.Beedle, “Advances in Tall Buildings”: CBS Publishers and Distributors.

6.Dr. Y.P. Gupta – Editor, “Proceedings National Seminar on High Rise Structures: Design and Construction practices for middle level cities”: New Age International Limited.

1703CE023		CONTRACT LAW AND REGULATIONS	L	T	P	C
			3	0	0	3

Course Objectives:

- To study the various types of construction contracts and their legal aspects and provisions
- To study the types of tenders, arbitration, legal requirement, and labour regulations

Unit I	**CONSTRUCTION CONTRACTS**	**9 Hours**

Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability – Design of Contract Documents – International Contract Document – Standard Contract Document – Law of Torts

Unit II	**TENDERS**	**10 Hours**

Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines – Transparency in Tenders Act

Unit III	**ARBITRATION**	**8 Hours**

Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs

Unit IV	**LEGAL REQUIREMENTS**	**9 Hours**

Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties and their Influence on Construction Costs – Legal Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations

Unit V	**LABOUR REGULATIONS**	**9 Hours**

Social Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes, Labour Administration– Insurance and Safety Regulations – Workmen's Compensation Act – Indian Factory Act – Tamil Nadu Factory Act – Child Labour Act - Other Labour Laws

Total:	**45 Hours**

Further Reading:

- They can get the knowledge about Contract Law And Regulations

Course Outcomes:

After completion of the course, Student will be able to

- Explain different types of contracts in construction
- Understand the tender procedures
- Know about the arbitration process
- Understand the legal requirements in contracts
- Choose the various regulations

References:

Gajaria G.T., Laws Relating to Building and Engineering Contracts in India, M.M.Tripathi Private Ltd., Bombay, 1982

Tamilnadu PWD Code, 1986

Jimmie Hinze, Construction Contracts, Second Edition, McGraw Hill, 2001

Joseph T. Bockrath, Contracts and the Legal Environment for Engineers and Architects, Sixth Edition, McGraw Hill, 2000.

Kwaku, A., Tenah,P.E. Jose M.Guevara, P.E.,"Fundamentals of Construction Management and Organisation", Printice Hall, 1985.M.M.Tripathi Private Ltd., Bombay, 1982.

Patil. B.S, "Civil Engineering Contracts and Estimates", Universities Press (India) Private Limited, 2006.

1703CE024		PRE-FABRICATED STRUCTURES	L	T	P	C
			3	0	0	3
		B.E CIVIL ENGINEERING				

Course Objectives:

1. To impart the knowledge in the area of prefabricated structures
2. To introduces the concept of prefabrication of multi – storeyed structures with components
3. Use of Construction equipments and the implementation of project management system

Unit I	**Introduction**	**9 Hours**

Need for prefabrication – Principles – Types of prefabrication - Disuniting of structures - Materials – Modular coordination – Standardization – Systems – Production – Transportation – Erection – Elimination of erection stresses

Unit II	**PREFABRICATED COMPONENTS**	**9 Hours**

Behaviour of structural components – Large panel constructions –roof and floor slabs – Wall panels – Columns – Shear walls.

Unit III	**DESIGN PRINCIPLES**	**9 Hours**

Form factor - Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation – Precision and dimensional Tolerance.

Unit IV	**JOINTS IN STRUCTURAL MEMBERS**	**9 Hours**

Types of joints - Joints for different structural connections – Dimensions and detailing – Design of expansion joints

Unit V	**PROGRESSIVE COLLAPSE & CODE PROVISIONS**	**12 Hours**

Progressive Collapse – Fire Resistance – Renovation, Demounting and Demolition -Code provisions – IS 15916:2010 – ASCE 7-02, ACI 318-02, GSA PBS Facilities Standards 2000, GSA PBS Facilities Standards 2003, GSA PBS Progressive collapse Guidelines 2003 - Importance of avoidance of progressive collapse.

Total:	**45 + 15 Hours**

Further Reading: None

design some of the prefabricated elements and also have the knowledge of the construction methods .

Course Outcomes:

After completion of the course, Student will be able to

1. Illustrate the design principles for prefabricated structures
2. Explain the various connections in prefabricated structures
3. Apply the principles and systems of prefabrication in the field
4. Identify suitable prefabricated components for specific use
5. Utilize the various code provisions regarding progressive collapse

References:

1. L. Mokk, Prefabricated Concrete for Industrial and Public Structures, Publishing House of the Hungarian, Academy of Sciences, Budapest, 2007
2. CBRI, Building materials and components, India, 1996
3. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994
4. Koncz T., Manual of precast concrete construction, Vols.I,II and III,Bauverlag, GMBH, 1971.
5. B.Lewicki, Building wih large prefabricates, Elsevier Publishing Company Amserdam / London /Newyork.1966
6. Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland BetorVerlag, 1978
7. IS 15916:2010 – Building design and erection using prefabricated concrete – Code of practice

1703CE025		TRAFFIC ENGINEERING AND MANAGEMENT	L	T	P	C
			3	0	0	3

Course Objectives:

- To learn the fundamentals of traffic engineering
- To learn the methods of intersection design
- To learn the skills of traffic control
- To be introduced to the different theories of traffic flow
- To be aware of the importance of traffic safety

Unit I **TRAFFIC PLANNINGAND CHARACTERISTICS** **9 Hours**

RoadCharacteristics– Roadusercharacteristics–PIEVtheory–Vehicle–Performance characteristics– Fundamentalsof TrafficFlow–UrbanTrafficproblemsinIndia–Integrated planningoftown,country,regionalandallurbaninfrastructure–TowardsSustainableapproach.

Unit II **TRAFFIC SURVEYS AND TRAFFIC DESIGN** **10 Hours**

Traffic Surveys–Speed, journeytimeanddelaysurveys–VehiclesVolumeSurveyincludingnon-motorizedtransports–Methodsandinterpretation–OriginDestinationSurvey IntersectionDesign-channelization,Rotaryintersectiondesign–Signaldesign–Coordination of signals—Gradeseparation

Unit III **TRAFFIC SAFETYANDENVIRONMENT** **8 Hours**

Roadaccidents–Causes,effect,prevention,andcost–Streetlighting– Trafficandenvironment hazards– AirandNoisePollution,causes, abatementmeasures–Promotionandintegrationof public transportation– Promotionofnon-motorizedtransport.

Unit IV **ROADSAFETY AND RULES** **9 Hours**

Road Safety Audit - Global & Local perspective – Road safety issues – Road safety programmes – Types of RSA, planning, design, construction & operation stage audits – Methodology – Road safety audit measures

Unit V **Traffic System Management** **9 Hours**

Traffic System Management- Management techniques, one-way, tidal flow, turning restrictions etc. – Transportation System Management Process – TSM Planning & Strategies

Total: 45 Hours

Course Outcomes:

After completion of the course, Student will be able to

1.Carry out traffic studies
2.Design intersections
3.Implement traffic system management
4.Be aware of traffic flow theory
5.Enhance safety in all design aspects

References:

16. *Kadiyali, L.R., Traffic Engineering and Transport Planning, Khanna Publishers, New Delhi, 2012*
17. *Khisty C J,LallB.Kent; Transportation Engineering-An Introduction, Prentice-Hall,NJ, 2005*
18. *May, A.D., Traffic Flow Fundamentals, Prentice – Hall, Inc., New Jersey,1990*

1703CE026	CONSTRUCTION PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objectives:	1. Understand the Perspective of owner's and Project management of Organizing.
	2. Become familiar with the Design and Construction Process.
	3. Understand the Labour, Material, equipment utilization and get Awarness about the Cost Estimation in the Construction Project.

Unit I	**Construction Planning**	**9 Hours**

Basic concepts in the development of construction planschoice of Technology and Construction method-Defining Work Tasks- DefinitionPrecedence relationships among activities-Estimating Activity Durations-Estimating Resource Requirements for work activities-coding systems.

Unit II	**Scheduling Procedures And Techniques**	**9 Hours**

Relevance of construction schedules-Bar charts - The critical path method-Calculations for critical path scheduling-Activity float and schedules-Presenting project schedules-Critical path scheduling for Activity-on-node and with leads, Lags and Windows-Calculations for scheduling with leads, lags and windowsResource oriented scheduling-Scheduling with resource constraints and precedence -Use of Advanced Scheduling Techniques-Scheduling with uncertain durations-Crashing and time/cost trade offs -Improving the Scheduling process – Introduction to application software.

Unit III	**Cost Control Monitoring and Accounting**	**9 Hours**

The cost control problem-The project Budget-Forecasting for Activity cost control - financial accounting systems and cost accounts-Control of project cash flows-Schedule control-Schedule and Budget updatesRelating cost and schedule information

Unit IV	**Quality Control and Safety**	**9 Hours**

During Construction Quality and safety Concerns in Construction-Organizing for Quality and Safety-Work and Material Specifications-Total Quality control-Quality control by statistical methods -Statistical Quality control with Sampling by Attributes-Statistical Quality control by Sampling and Variables-Safety.

Unit V	**Organization and Use of Project**	**12 Hours**

Information Types of project information-Accuracy and Use of Information-Computerized organization and use of Information – Organizing

	Total:	**45 + 15 Hours**

Further Reading:

1.Chitkara, K.K. "Construction Project Management Planning", Scheduling and Control, Tata McGraw-Hill Publishing Co., New Delhi, 1998.

2.Construction Planning & management By P S Gahlot& B M Dhir , New Age International Limited Publishers

Course Outcomes:

After completion of the course, Student will be able to

Apply knowledge on Construction Planning, Value Engineering and Feasibility Studies.

Gain knowledge on scheduling procedures

application of cost indices to estimating and allocation of construction cost overtime

Analysis the construction quality and safety

Develop knowledge of computerized organization

References:

1. Srinath,L.S.,"Pert and CPM Priniples and Applications ", Affiliated East WestPress, 2001

2. Chris Hendrickson and Tung Au, "Project Management for Construction –Fundamentals Concepts for Owners", Engineers, Architects and Builders, PrenticeHall, Pitsburgh, 2000

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1703CE027		ARCHITECTURE AND TOWN PLANNING	L	T	P	C
			3	0	0	3

Course Objectives:

1. To introduced the basics of Town Planning
2. To introduced the basics of Architecture.

Unit I	BASIC ELEMENTS OF ARCHITECTURE	9 Hours

Introduction of Architecture – Definition – Mass and space visual emotional effects of geometric forms and their derivatives– The sphere, the cube, the pyramid, the cylinder and cone – The aesthetic qualities of Architecture – Proportion, scale, balance, symmetry, rhythm and axis – contrast in form – Harmony.

Unit II	PRINCIPLES OF OREINTATION AND PLANNING OF BUILDINGS	9 Hours

General – factors affecting orientation – sun – Wind – Rain – Orientation criteria for Indian conditions – Principles governing the theory of Planning – Planning of Residential buildings.

Unit III	ELEMENTS OF INTERIOR DESIGN	9 Hours

General – Decorative Materials – Cement Bonded Board (BISON PANEL), Water proof cement paint, Industrial glazing and Roofing, unit masonry, plaster and dry wall, Wall surface materials, Effect of colour on architecture – Home furnishing– plans in rooms.

Unit IV	TOWN PLANNING	9 Hours

History of evolution of towns - Town and environment - Climate, humidity, wind and radiation - Surveys and Data collection - Residential neighborhoods - Industrial areas - Public Buildings - Housing and Slum clearance.

Unit V	BUILDING RULES AND GUIDELINES	9Hours

General – Zoning regulations – Regulations regarding layouts or subdivisions – Building regulations – Rules for special types of buildings – Floor space index – minimum plot size and building front age – Open spaces – Minimum standard dimensions of building elements – Provision for lighting and ventilation – Provision for means of access.

Total:	45 Hours

Further Reading:

1.The ability to plan any civil engineering project by incorporating variousaspect of environment and climate of the project area.

2.TheKnowledge various rules andregulation of town planning and development authorities.

Course Outcomes:

After completion of the course, Student will be able to

1.The basics of town planning and building rules.

2.Knowledge various rules and regulation of town planning and development authorities.

3.To do planning of building.

4. To do town planning of building.

5.Knowledge of variousRules and regulations

References:

1. S.C.Rangwala, “Elements of Town Planning”, McGraw Hill, London, 2006.

2.V.S.Pramar, „Design fundamentals and architecture“ Lakshmi Publishers, 2003.

3.Hiraskar, “fundamentals in town planning” Khanna Publishers, 2005.

1703CE028		NATURAL DISASTER MITIGATION AND MANAGEMENT	L	T	P	C
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Course Objectives:

1.To provide students an exposure to disasters, their significance and types.

2.To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction.

3.To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)

Unit I	**INTRODUCTION TO DISASTERS**	**9 Hours**

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc – Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability – Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

Unit II	**APPROACHES TO DISASTER RISK REDUCTION (DRR)**	**9 Hours**

Disaster cycle – Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders- Institutional Processess and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

Unit III	**INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT**	**9 Hours**

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India – Relevance of indigenous knowledge, appropriate technology and local resources.

Unit IV	**DISASTER RISK MANAGEMENT IN INDIA**	**9 Hours**

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy – Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

Unit V	**DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS**	**12 Hours**

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

Total:	**45 + 15 Hours**

Course Outcomes:

After completion of the course, Student will be able to

1.Differentiate the types of disasters, causes and their impact on environment and society

2.Assess vulnerability and various methods of risk reduction measures as well as mitigation.

3.Draw the hazard and vulnerability profile of India, Scenarious in the Indian context,

4.Disaster damage assessment and management

References:

1.Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423

2.Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]

3.Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011

4.KapurAnu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

5.Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005

6.Government of India, National Disaster Management Policy,2009.