LORDS INSTITUTE OF ENGINEERING AND TECHNOLOGY
(An Autonomous Institute)
DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION & EXAMINATION [LR-23]
(W.e.f Academic Year 2025– 26)

Course Structure
B.E. V-Semester (Tentative)

S. No.	Course Code	Category	Course Title	Scheme of Instructions				Scheme of Examination			CREDITS
				L	T	P/D	Contact Hours/Week	CIE	SEE	Duration in Hours	
Theory Course											
1	U23CE501	PCC	Concrete Technology	2			2	40	60	3	2
2	U23CE502	PCC	Environmental Engineering	2			2	40	60	3	2
3	U23CE503	PCC	Structural Analysis-I	3	1		4	40	60	3	4
4	U23CE504	PCC	Hydrology and Water Management	3			3	40	60	3	3
5	--	PEC	Professional Elective-I	3			3	40	60	3	3
6	--	OEC	Open Elective-I	3			3	40	60	3	3
Practical/ Laboratory Course											
7	U23CE5L1	PCC	Survey Camp	-	-	2	2	25	25	3	1.0
8	U23CE5L2	PCC	Concrete Technology Lab			3	3	25	50	3	1.5
9	U23CE5L3	PCC	Environmental Engineering Lab			2	2	25	50	3	1.0
Internship											
10	U23CE5P1	PROJ	Internship (During vacation period after IV Sem)	-	-	2	2	50	-	-	1
Total				16	1	10	26	365	485	27	**21.5**

L: Lecture (Hrs/Wk/Sem) **T**: Tutorial (Hrs/Wk/Sem) **P**: Practical **D**: Drawing (Hrs/Wk/Sem)
CIE: Continuous Internal Evaluation **SEE**: Semester End Examination (Univ. Exam)
PEC: Professional Elective Courses **PCC**: Program Core Courses **PROJ:** Project
CE: Civil Engineering
Note:

1. Each contact hour isa Clock Hour.
2. The duration of the practical class is three hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

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Professional Elective Courses

S. No.	Course Code	Category	Course Title	Scheme of Instructions				Scheme of Examination			CREDITS
				L	T	P/ D	Contact Hours/Week	CIE	SEE	Duration in Hours	
Theory Course											
1	U23CE505	PEC 1	Solid and Hazardous Waste Management	3	-	-	3	40	60	3	3
	U23CE506		Advanced Surveying	3	-	-	3	40	60	3	3
	U23CE507		Construction Project and Planning	3	-	-	3	40	60	3	3
2	U23CE604	PEC 2	Design Of Hydraulic Structures	3	-	-	3	40	60	3	3
	U23CE605		Sustainable Construction Methods	3	-	-	3	40	60	3	3
	U23CE606		Urban Transportation Planning	3	-	-	3	40	60	3	3
3	U23CE704	PEC 3	Advanced Concrete Technology	3	-	-	3	40	60	3	3
	U23CE705		Traffic Engineering and Management	3	-	-	3	40	60	3	3
	U23CE706		Foundation Engineering	3	-	-	3	40	60	3	3
4	U23CE707	PEC 4	Groundwater Engineering	3	-	-	3	40	60	3	3
	U23CE708		Contract Management	3	-	-	3	40	60	3	3
	U23CE709		Air and Noise Pollution Control	3	-	-	3	40	60	3	3
5	U23CE801	PEC 5	GIS &Remote Sensing	3	-	-	3	40	60	3	3
	U23CE802		Advanced RCC Design	3	-	-	3	40	60	3	3
	U23CE803		Environmental Impact Assessment	3	-	-	3	40	60	3	3
6	U23CE804	PEC 6	Intelligent Transport Systems	3	-	-	3	40	60	3	3
	U23CE805		Repair and Rehabilitation of Structures	3	-	-	3	40	60	3	3
	U23CE806		Finite Elements Methods	3	-	-	3	40	60	3	3

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SCHEME OF INSTRUCTION & EXAMINATION[LR-23]
OPEN ELECTIVE COURSES

S. No.	Course Code	Category	Course Title
1	U23EE508	OEC 1	Non-Conventional Energy Systems
	U23EE509		Energy Conservation and Management
	U23CS508		Fundamentals of Data Base Management Systems
	U23IT506		Data Structures
	U23ME508		Basics of Mechanical Engineering
	U23ME509		Modern Manufacturing Processes
	U23CE508		**Disaster Preparedness and Management****
	U23CE509		**Sustainable water and Sanitation System****
	U23EC509		Principles of Electronics Communication
	U23EC510		Introduction to Internet of Things
	U23MB502		Managerial Communication
	U23MB503		Managerial Science and Theory
	U23CD508		Fundamentals of Data Science
	U23CM507		Basics of Artificial Intelligence
	U23SH501		History of Science & Technology
	U23SH502		Economic Policies in India

S. No.	Course Code	Category	Course Title
2	U23EE608	OEC 2	Fundamental of Power Electronics
	U23EE609		Electrical Installation and Safety
	U23CS607		Introduction to Programming in JAVA
	U23IT606		Operating Systems
	U23ME609		Basics Of 3-D Printing
	U23ME610		Optimization Methods for Engineers
	U23CE607		**Construction Materials ****
	U23CE608		**Road Safety Engineering ****
	U23EC609		Principles of Data Communications and Computer Networks
	U23EC610		Introduction to Microprocessors and Microcontrollers
	U23MB602		Total Quality Management
	U23MB603		Innovation Management
	U23SH601		Indian Music System
	U23SH602		Introduction to Art and Aesthetics
	U23CD607		Data Ethics
	U23CM607		Fundamentals of Machine Learning

Course Code	Course Title						Core/ Elective
U23CE501	Concrete Technology						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Building Materials	2	-	-	-	40	60	2

Course Objectives

1. To familiarize students with the constituents, types, grades, and manufacturing processes of cement.
2. To understand the hydration process, heat of hydration, and microstructure of hydrated cement.
3. To apply the knowledge of IS code specifications for conducting physical tests on cement.
4. To analyze the factors affecting workability and identify causes of segregation and bleeding in fresh concrete.
5. To evaluate the methods and effectiveness of various curing techniques and the use of self-curing agents in fresh concrete.

Course Outcomes

After Completion of this course, the student will be able to

1. List the major constituents, types, and manufacturing methods of Portland cement.
2. Explain the hydration process, chemical reactions, and the development of microstructure in cement paste.
3. Perform standard physical tests on cement and fresh concrete as per IS codes (e.g., fineness, consistency, slump test, compaction factor).
4. Analyze the effects of temperature, time, and admixtures on workability and setting time of concrete.
5. Evaluate the appropriate mixing, placing, compaction, and curing techniques to enhance concrete performance at site conditions.

UNIT-I

Cement: Portland cement – Constituents, types and grades of cement – Composition and functions of each compound – Manufacturing of Ordinary Portland Cement (dry and wet process) – Hydration of cement, chemical reactions and hydration products – Microstructure of hydrated cement – Heat of hydration and rate of hydration – Physical tests on cement as per IS codes (fineness, consistency, setting time, soundness, compressive strength, specific gravity).

Fresh Concrete: Workability – Definition and factors affecting workability – Tests for workability (slump test, compaction factor, Vee-Bee test, flow test) – Setting time of concrete – Effect of time and temperature on workability – Segregation and bleeding – Batching, mixing (manual and machine), transportation, placing and compaction of concrete – Vibration and revibration – Curing of concrete (methods and importance) – Self-curing agents and water curing.

UNIT-II

Properties of Hardened Concrete: Water–cement ratio – Abram's Law – Gel-space ratio – Effective water in mix – Microstructure and strength development – Short term and long term properties of concrete – Stress–strain behaviour of concrete.

Testing of Hardened Concrete: Destructive tests – Compression, tension (split and direct), and flexure tests – Non-destructive tests (Rebound hammer test, Ultrasonic pulse velocity test) – Significance and limitations of each method.
Elasticity, Creep and Shrinkage: Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep: nature, types, factors influencing, relationship with time, and effects – Shrinkage: types (plastic, drying, autogenous, carbonation) – Control measures.

UNIT-III

Concrete Mix Design: Basic considerations – Target mean strength – Statistical quality control – Acceptance criteria – Factors affecting mix design – Proportioning of ingredients – Trial mixes – Adjustments for field conditions – Detailed procedure for IS method (IS 10262:2019) – Overview of British and ACI methods of mix design – Quality control at batching plant and construction site.

UNIT-IV

Admixtures: Introduction – Classification – Chemical admixtures (plasticizers, super plasticizers, retarders, accelerators, air-entraining agents) – Mineral admixtures (fly ash, silica fume, GGBS, rice husk ash, metakaolin) – Influence on workability, strength, durability – Compatibility issues – Dosage and standards.

Special Applications: Self-Compacting Concrete (SCC) – Concrete for fiber reinforced applications (FRC) – Concept, characteristics, and applications – Use of admixtures in SCC and FRC – Ready Mix Concrete (RMC) – Concept, production process, benefits and site handling.

UNIT-V

Special Concretes: High Strength Concrete – High Performance Concrete – Fiber Reinforced Concrete – Ferrocement – Mass Concrete – Lightweight Concrete – High Density Concrete – Polymer Concrete – Recycled Aggregate Concrete – Geopolymer Concrete – Nano Concrete – Shotcrete – Reactive Powder Concrete – Concept, need, properties, mix composition and applications.

Text Books:

1. Concrete Technology, M.L. Gambir, Tata, Mc. Graw Hill Publishers, New Delhi, 5th Edition, 2017
2. Concrete Technology, M.S. Shetty, S.Chand & Co., Revised Edition, 2006
3. Design of Concrete Mixes – N.K. Krishna Raju, CBS Publishers and Distributors
4. Special Concrete and Concrete Construction – Dr. B.C. Punmia, Laxmi Publications

References:

1. Properties of Concrete Pearson, A.M. Naville, Education India, 5th edition, 2012
2. Concrete Technology, A.R. Santha Kumar, Oxford university Press, New Delhi
3. Concrete: Micro structure, Properties and Materials, P.K. Metha and J.M. Monteiro, Tata Mc-Graw Hill Education
4. Concrete Admixtures Hand Book Properties, V S Rama Chandran, Noyes Publications, U.S.A
5. Concrete Admixtures Handbook: Properties, Science and Technology – V.S. Ramachandran, William Andrew/Noyes Publications, 2nd Edition

Course Code	Course Title						Core/Elective
U23CE502	Environmental Engineering						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Engineering Chemistry	2	-	-	-	40	60	2

Course Objectives

The objectives of this course is to impart knowledge of and problem solving skills in

1. Introduction to the basic concepts and requirements of environmental engineering
2. Knowledge about different sequential unit operations of water and waste water treatment processes.
3. Inputs on engineering principles for analyzing various environmental issues.
4. Awareness towards the sustainability of standards for water resources.
5. Design of distribution system waste water treatment.

Course Outcomes

After Completion of this course, the student will be able to

1. Aptitude to plan for protected water supply system needs and requirements.
2. Ability to design sequential unit operations in water treatment plants.
3. Design for the safe disposal of waste water and its reuse.
4. Analyze sustainable development of the society.
5. Execute and maintain standards for sustainable development of the society.

UNIT-I

Water Supply: Need for planned water supply schemes, water demand for industrial and agricultural water requirements, sources of water, water quality requirements for different beneficial uses, population forecast, methods of population forecast, water treatment through aeration, coagulation flocculation, and sedimentation, types of sedimentation,

UNIT-II

Water Treatment: Filtration, Disinfection, chlorination and Softening, methods of layout of distribution pipes, design of distribution by Hardy Cross method for simple networks, various types of pipes and valves used in water supply systems.,

UNIT-III

Sewage: Domestic and storm water, Quantity of Sewage, Sullage, Sewage flow variations. Conveyance of Sewage: Sewers shapes, design of sewerage systems, operation and maintenance of sewers, sewage pumping, sewer appurtenances.

UNIT-IV

River Cleaning Plans: Self- purification of streams, BOD and COD concepts, waste water treatment, aerobic and anaerobic treatment system, suspended and attached growth systems, quality requirements of recycled water for various purposes. Principles of Septic Tank, working of septic tank.

UNIT-V

Advanced Waste Water Treatment (WWT) Concepts: Theory and design concepts of Activated Sludge process, Mechanically Aerated Lagoons, Sequencing Batch Reactor (SBR), waste stabilization ponds, basic concepts of bio-remediation.

Text Books:

1. Water Supply and Sanitary Engineering, G.S. Birdie &J.S. Birdie, Dhanpat Rai Publishing Company(P)Ltd..
2. Water Supply Engineering, Dr .B.C .Punmia &AK Jain, Laxmi Publications(P)Ltd.

Suggested Readings:

1. Water Supply and Sanitary Engineering, G.S. Birdie & J.S. Birdie, Dhanpat Rai Publishing Company(P) Ltd.
2. Water and Wastewater Technology, Hammer, M.J. and Hammer, M.J. Jr., Prentice-Hall of India Pvt. Ltd., New Delhi, 1998.
3. Water Supply Engineering, Dr .P.N.Modi, Standard Book House, Raj sons Publications Pvt. Ltd.
4. Waste Water Treatment, M N Rao, A K Datta, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi

Course Code	Course Title						Core/Elective
U23CE503	**STRUCTURAL ANALYSIS - I**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Strength of Materials	**3**	**1**	**-**	**-**	**40**	**60**	**4**

Course Objectives

1. Understand the advantage of statically indeterminate structure over the statically determinate structure
2. Understand basic methods for the analysis of statically indeterminate beams and frames and know the difference between different methods
3. Analyze the statically indeterminate members such as continuous beams for various types of loading.
4. Identify the various straining action in arches
5. Analyze arches with varying degrees of indeterminacy

Course Outcomes

After completing this course, the student will be able to:

1. Solve statically indeterminate beams and portal frames using classical methods
2. Sketch the SFD and BMD diagrams for different loading condition for in determinate structures.
3. Find the degree of static and kinematic indeterminacies of the structures.
4. Analyze the three hinged and two hinged arches.
5. To analyze multi storied frames using approximate methods

UNIT–I

Slope Deflection Method: Introduction, Static and Kinematic Indeterminacy, Analysis of continuous beams with and without sinking of supports, single bay - portal frames (Degree of freedom not exceeding three), loading on each span may be point load(s) or uniformly distributed load on whole span, shear force and bending moment diagrams.

UNIT-II

Moment Distribution Method: Analysis of continuous beams with and without sinking of supports, portal frames (static indeterminacy not exceeding three), loading on each span may be point load(s) or uniformly distributed load on whole span, shear force and bending moment diagrams.

UNIT-III

Kani's Method: Analysis of continuous beams with and without support sinking, portal frames (static indeterminacy not exceeding three), and loading on each span may be point load(s) or uniformly distributed load on whole span, shear force and bending moment diagrams.

UNIT–IV

Elastic Theory of Arches: Introduction – Types of Arches – Comparison between Three hinged and Two hinged Arches Eddy's theorem - Analysis of Three hinged parabolic arches - determination of horizontal thrust, bending moment, normal thrust and radial shear for static loading, draw BMD

Two hinged arches: Introduction –Analysis of two hinged parabolic arches, determination of horizontal thrust, bending moment, normal thrust and radial shear for static loading and Secondary stresses in two hinged arches due to temperature and elastic shortening of rib.

UNIT–V

Cables and Suspension bridges: Stresses in suspended loaded cables, length of cable, simple suspension bridge with 3-hinged stiffening girders for static load.

Text Books

1. Structural Analysis- A Unified Approach, D.S. Prakash Rao, UniversityPress, 1996
2. Theoryof structures, B.C. Punmia and A.K. Jain, Laxmi Publications, NewDelhi, 2004.

References

1. Basic Structural Analysis, C.S.Reddy,TataMcGraw-Hill Publishing Co.Ltd., 3rd Edition, NewDelhi, 2010.
2. Finite Element Analysis C.S .Krishna Moorthy,McGrawHill,1991.
3. Theory of Structures, G.S,Pandit,S.P.GuptaandR.GuptaVol.I&II,TataMcGrawHill,NewDelhi,1999.
4. Theoryof Structures, Pandit, G.S., S. P. Gupta and R. Gupta,Vol.l, Tata McGrawHill, NewDelhi, 1999
5. Mechanics of Structures (Vol. 1 &2), S.B. Junarkar, Charotar Publishing House Anand, 1992.
6. Basic Structural Analysis, C.S. Reddy, Tata McGraw-Hill Publishing Co. Ltd., NewDelhi.

Course Code	Course Title						Core / Elective
U23CE504	HYDROLOGY AND WATER MANAGMENT						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Fluid Mechanics-I	3	-	-	-	40	60	3

Course Objectives

The objectives of this course is to impart knowledge of and problem solving skills in

1. Understanding the importance of Hydrology and its applications
2. Introduction to Hydrological processes and estimation of Design flood
3. Basic concepts and assessment of groundwater flows
4. Applications of statistical models in Hydrology
5. Importance of Hydrology and its applications

Course Outcomes

After Completion of this course, the student will be able to

1. Compute mean Rainfall, Develop Intensity-Duration-Duration curves
2. Estimate Design flood for Water Resources structures
3. Compute drawdown and yield in aquifers
4. Apply Principles of probability to hydrological problems and develop Rainfall – Runoff relationship
5. Describe irrigation methods, soil-water-plant relationships, and crop water requirements.

UNIT-I

General: Definition, relation to engineering design, hydrological cycle, importance of hydrology and its application in engineering. Rainfall: Definition, types of rainfall, measurement of rain fall, types of rain gauges, network design, presentation of precipitation data, mean aerial rainfall; thiessen polygon, isohyetal methods., depth- area- duration curve, dependable rainfall. Infiltration: Evaporation, transpiration-definitions and processes.

UNIT-II

Runoff: Definition, runoff process, factors affecting runoff, determination of runoff, importance of stream gauging, runoff formulae and runoff tables, dependable yield of a basin. Floods: Definition, causes, importance of flood studies, flood peak and flood hydrograph, methods of computing flood peak, empirical methods, rational formula, unit hydrograph method, flood frequency studies, Weibul‟s and Gumble‟s extreme value methods.

UNIT-III

Groundwater: Types of aquifers, aquifer parameters, specific yield, storage coefficient, coefficients of permeability and transmissivity, Darcy‟s law, types of well, steady radial flow to wells in confined and unconfined aquifers, yield of open wells, safe yield, constant level pumping test and recuperation test

UNIT-IV

Statistics in Hydrology: Introduction, Statistical parameters; central tendency parameters, dispersion characteristics, Skewness., probability distribution; discrete and continuous distribution., frequency analysis; log Pearson type III distribution., regression and correlation; standard forms of bivariate equations., multivariate linear regression and correlation., analysis of time series., selection of a design return period, determination of permissible risk

UNIT-V

Irrigation: Definition, necessity of irrigation, types of irrigation, advantages and ill- effects of irrigation.

Soil-water-plant relationship: Vertical distribution of soil moisture, soil moisture tension, soil moisture stress, soil moisture constants, plant water relationship, moisture stress and plant response, consumptive use, crop factor, duty, factors affecting duty, types of crops and their water requirements, crop rotation.

Text Books:

1. Engineering Hydrology, K.Subramanya, Tata McGraw Hill Publishing Co.Ltd. 1996 Water Supply Engineering, Dr.B.C.Punmia & AK Jain, Laxmi Publications (P)Ltd..
2. Irrigation Engineering and Hydraulic Structures, S K Garg, Khanna Publisher
3. P. N. Modi, “Irrigation Water Resources & Water Power Engineering”, Standard Publishers, 2014
4. Ch. S. N. Murthy, “Water Resources Engineering: Principles and Practice”, New Age International Publishers, Delhi, 2002.
5. K Subramanya, “Engineering Hydrology”,4 th Edition, Mc-GrawHill, 2013

Suggested Reading:

1. G. L. Asawa, "Irrigation and water Resources engineering", New Age International Publishers, Delhi, 2005.
2. Larry W Mays, Water Resources Engineering, John Wiley & Sons, 2000.
3. Kedar Mutreja, "Applied Hydrology", Tata Mc-GrawHill, 1996
4. Hydrology for Engineers, Ray K.Linsley, Jr, Max A.Kohler, Joseph L.H.Paulhus, McGraw-Hill Book Company, 1980
5. . Hydrology for Engineers, Ray K. Linsley, Jr, Max A. Kohler, Joseph L.H .Paulhus, McGraw-Hill Book Company, 1980

Course Code	Course Title						Core/ Elective
U23CE505	Solid and Hazardous Waste Management						PEC-1
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Environmental Engineering	3	-	-	-	40	60	3

Course Objectives

1. Understanding of problems of municipal waste, biomedical waste, hazardous waste, industrial waste etc.
2. Knowledge about legal, institutional and financial aspects of management of solid wastes.
3. Become aware of Environment and health impacts solid waste mismanagement
4. Understand the engineering, financial and technical options for waste management
5. Understand the biomedical waste and Chemical wastes **Course Outcomes**

After Completion of this course, the student will be able to

1. Apply the Sampling techniques and characterization of solid waste.
2. Protect health and environmental issues related to solid waste management
3. Categorize nuclear waste, e waste, biomedical and chemical waste.
4. Apply steps in solid waste management-waste reduction at source, collection techniques, materials and resource recovery/recycling, transport, optimization of solid waste transport, treatment and disposal techniques; economics of the onsite vs. offsite waste management options
5. Reduce adverse effects of waste on human health, the environment, planetary resources and aesthetics

UNIT-I

Ecosystem–meaning- Types -Components- Structure – Functions, Levels of organization in nature- Food chain and Trophic structure, Bio geochemical Cycles, Energy flow.

Need for hazardous waste management – Sources of hazardous wastes –Effects on community – terminology and classification – Storage and collection of hazardous wastes – Problems in developing countries – Protection of public health and the environment

UNIT-II

Municipal solid waste- Definition- Sources and types of solid waste-composition and its determinants of Solid waste - factors influencing generation-quantity assessment of solid wastes- methods of sampling and characterization

UNIT-III

Nuclear wastes and e-waste-Characteristics – Types – Nuclear waste – Uranium mining and processing– Power reactors– Refinery and fuel fabrication wastes–spent fuel

Management of nuclear wastes– Decommissioning of Nuclear power reactors – Health and environmental effects.

UNIT-IV

Biomedical and chemical wastes-Biomedical wastes – Types – Management and handling – control of biomedical waste Chemical wastes – Sources – Domestic and Industrial -Inorganic pollutants– Environmental effects – Need for control – Treatment and disposal techniques – Physical, chemical and biological processes – Health and environmental effects.

UNIT-V

Management of hazardous wastes- Identifying a hazardous waste – methods – Quantities of hazardous waste generated– Components of a hazardous waste management plan–Hazardous waste minimization–Disposal practices in Indian Industries – Future challenges.

Text Books:

1. Integrated Solid Waste Management, George Techo banoglous et al , Mc Graw-Hill,1993.
2. Solid Waste Engineering Principles and Management, Techo banoglous ThiesenEllasen, McGrawHill1997

References:

1. Municipal Solid Wastes- Problems & Solutions, R.E.L and refh and P.A.Rebers, Lewis,1997.
2. Environmental Science and Engineering, J. Glynn Henry and Gary.W.Heinke, Pretice Hall of India,2004.
3. Safe Management of Wastes from Health-care Activities, Prüss A., Giroult E. and Rushbrook P. (1999) Geneva, World Health Organization.
4. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846 (1980) Washington, DC, USEPA, Available at http://www.epa.gov/epawaste/hazard/ test methods /sw846/index.htm.
5. Theisen H. and Vigil S. (1993) Integrated Solid Waste Management: Engineering Principles and Management Issues, Tcho banoglous G., New York, McGraw-Hill 6. Solid Waste Management–Collection, Processing and disposal, A.D.Bhideand, B.B.Sundaresan, Mudrashilpa Offset Printers,Nagpur,2001

Course Code	Course Title						Core/ Elective
U23CE506	Advanced Surveying						PEC-1
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Surveying & Geometrics	3	-	-	-	40	60	3

Course Objectives

The objectives of this course is to impart knowledge of and problem solving skills in

1. To introduce the purpose, principles, and instruments used in tachometric surveying.
2. To impart knowledge on geodetic surveying and triangulation methods.
3. To explain photogrammetric surveying techniques and aerial photo interpretation.
4. To provide understanding of field astronomy and celestial observations in surveying.
5. To introduce special and modern surveying instruments and their applications.

Course Outcomes

After Completion of this course, the student will be able to

1. Apply tachometric techniques to determine distances and elevations with accuracy.
2. Design and analyze geodetic triangulation networks and select survey stations
3. Perform photogrammetric computations using aerial photos and ground controls.
4. Determine geographic coordinates using astronomical observations and time conversions.
5. Operate advanced surveying instruments like Total Station and EDM effectively.

UNIT-I

Tachometric Surveying: Introduction, purpose, principle & use of tachometry, Instrument used & stadia hairs & Fixed hair methods of tachometry, Tachometry constant & Problems Anallatic lens theory, subtense bar, Field work in tachometry. Reduction of readings, errors and precisions. Difference between Theodolite & Tachometer.

UNIT-II

Geodetic Surveying: Introduction & object of Geodetic Surveying, Principal & classification of triangulation system, Selection of base line and stations, Orders of triangulation-triangulation figures, Station marks and signals-marking signals.

UNIT-III

Photogrammetric Surveying: Introduction, principle, uses Aerial camera, aerial photographs Definitions, scale of vertical and tilted photograph Ground coordinates, ground control, examples on scale, Displacements and errors, Examples on Displacement and errors, Procedure of aerial survey, Examples on flight planning, Photomaps and mosaics. Difference between Mosaic & Map, Stereoscopes, Parallax bar

UNIT-IV

Field Astronomy: Introduction & Instruments & purpose, Astronomical terms, Time & conversion of time, Abbreviations, Determination of azimuth, Latitude and longitude.

UNIT-V

Special Survey Instruments: Introduction, Electromagnetic Distance Measurement, Electronics Theodolite, Total station, Site square, Pentagraph, auto set Level, Transit level, Special Compasses, Brunton Universal Pocket Transit, Mountain Compass Transit.

Text Books:

1. Duggal, S. K., Surveying Vol. I & II, Tata Mcgraw Hill, New Delhi.
2. Subramanian, R., Surveying & Levelling, Oxford University Press, New Delhi
3. Punamia, B.C., Surveying Vol. I, II & III, Laxmi Publications
4. Kanetkar, T.P. and Kulkarni, S.V., Surveying and Levelling Vol. I & II, Pune Vidhyarthi Gruh

Suggested Readings:

1. Arora, K.R., Surveying Vol. I, II & III, Standard Book House. New Delhi
2. Basak, N.N., Surveying and Levelling, Tata Mcgraw Hill, New Delhi
3. Agor, R., Surveying and Levelling, Khanna Publishers, New Delhi
4. Remote Sensing and GIS by B Bhatia, Oxford University Press, New Delhi.
5. Anji Reddy, M., Remote Sensing and Geographical Information Systems, B.S. Publications, Hyderabad, 2001.

Course Code	Course Title						Core / Elective
U23CE507	CONSTRUCTION PROJECT AND PLANNING						PEC-1
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
---	3	-	-	-	40	60	3

Course Objectives

1. Gain an understanding of the techniques used in construction project management and practices.
2. Develop networks using the AON and AOA methods.
3. Introduce the concepts of construction planning and scheduling techniques.
4. Understand the process of contract and tender documentation.
5. Familiarize with the concepts and applications of optimization in construction monitoring and control.

Course Outcomes

After Completion of this course, the student will be able to

1. Implement construction practices and management systems in construction projects.
2. Utilize various resource management techniques in construction projects.
3. Leverage project management software for optimizing resources in construction projects.
4. Apply optimization techniques in the monitoring and control of construction projects.
5. Employ current construction practices in managing infrastructure projects.

UNIT – I

Introduction: Introduction to construction project planning - Significance, objectives and functions, organization, principles of organization and its types, Construction team and its roles and responsibility –existing construction practices and project management systems, Project scale, Economy of scale application in construction cost estimates.

UNIT – II

Construction Management through Network Theory: Definitions and different types of Event, activity, dummy, Network rules, Network event numbering (Fulkerson Rule), Hierarchies of complex network, work break down structure, Liner Scheduling methods - bar charts, milestone charts, their limitations, difference between PERT and CPM, network based scheduling techniques - PERT, CPM, AON and AOA in construction management. Numerical Problems.

UNIT – III

Cost & Resource Optimization Techniques: Cost Model - Direct and Indirect Cost component of Project, Cost Slope, Project Cost-Time analysis and optimization. Resource usage profile, Histograms, Resource allocation, smoothing & leveling techniques. Project Updating. Introduction of Project management software - Building Information Modeling (BIM) ,Ms Primavera(P6) etc

UNIT – IV

Contracts: Introduction, types of construction contracts and their advantages and disadvantages, condition of contracts, workmen compensation act, contract labor act.
Tender: Tender form, tender documents, notice inviting tenders, Work order.
Project Delivery Methods: BOT, SBOO. BOOT, Public Private Partnership (PPP), Detailed project report (DPR)

UNIT – V

Safety Management: Importance of safety in construction industry, Safety, Health and Environment on project sites, Safety management function, Safety responsibility and accountability in construction industry, Safety organizations, Safety administration. accidents their causes, effects and preventive measures, costs of accidents.

Text Books:

1. "Construction Engineering & Management of Projects" khanna publishers, S.C. Sharma, 2008
2. "PERT and CPM: Principles and Application", Srinath L.S.,East-West Press, 2001.
3. "Construction Engineering and Management", Seetharaman S., Umesh Publications, 2012.
4. "Construction Contracts", Jimmie Hinze, McGraw Hill, 2001.
5. "Safety Management in Industry" Krishnan N.V., Jaico Publishing House, Bombay, 1997

Reference Books:

1. Construction Planning and Management", Gahloj. P.S. and Dhiv. B.M., Wiley Eastern Ltd., 2018.
2. Project planning and control with PERT and CPM", Punmia, B. C., and Khandelwal, K. K., 2006.
3. Construction Project Management: Planning, Scheduling, Chitkara, K. K. Tata McGraw–Hill Education, 2004.
4. Construction Planning and Management, Gahloj. P.S. and Dhiv. B.M., Wiley Eastern Ltd., 2018.
5. Project planning and control with PERT and CPM, Punmia, B. C., and Khandelwal, K. K., 2006.

Course Code	Course Title						Core / Elective
U23CE5L1	SURVEY CAMP						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Surveying	-	-	-	2	25	25	1

Course Objectives

The objectives of this course is to impart knowledge of and problem solving skills in

1. Field exercises with modern surveying equipment's like Total station.
2. All aspects of executing of field surveys
3. All aspects of plotting the field surveys
4. Work in team and make effective presentations

Course Outcomes

After Completion of this course, the student will be able to

1. Develop knowledge of field exposure
2. Apply surveying knowledge and tools effectively for projects
3. Develop knowledge of practical application of different survey works
4. Develop knowledge of practical application of different surveying equipment's
5. Develop field constraints and also documentation of technical report.

Course Content:

Survey camp is introduced as part of the curricula to encourage students to be trained with latest equipment's and surveying. It will be conducted during the summer vacation followed after the completion IV semester course. After the completion of the Survey Camp, students need to submit a brief report to the Department.

Evaluation of students are purely based on the performance of the student at the site place and will be judged by internal guide (s) (25 Marks). A committee consisting of the Head of the department and 2-3 senior faculty members will be acting as Supervisor's and monitor the progress as per the need.

EVALUATION PROCESS

1. Submit the detailed report of the Survey Camp in spiral bound in a précised format as suggested by the Department.

Guide lines for Awarding the marks		
S.No	Particulars	Maximum Marks
1.	Day wise performance	10
2.	Question and Answers	5
3.	Report in a Prescribed Format	10

2. SEE Evaluation: -

Guide lines for Awarding the marks		
S.No	Particulars	Maximum Marks
1.	Viva- voice examination and PPT presentation	25

Course Code	Course Title						Core/ Elective
U23CE5L2	CONCRETE TECHNOLOGY LABORATORY						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Material Testing	-	-	-	3	25	50	1.5

Course Objectives

The objectives of this course is to impart knowledge of and problem solving skills in

1. Determine behavior of materials through physical tests
2. Infer suitability of materials in construction
3. Able to prepare concrete as per the IS standards.

Course Outcomes

After Completion of this course, the student will be able to

1. Assess the suitability of different ingredients of concrete by conducting various test prescribed by relevant IS codes.
2. Assess the work ability of concrete and recommend its suitability for structural works
3. Determine the strengths of hardened concrete in compression, flexure and split tensile tests
4. Determine the fineness of fine aggregate
5. Assess the suitability of Bulk and compact densities of fine and coarse aggregates

I. Test on Cement

1. Fineness test
2. Specific gravity test
3. Normal Consistency test
4. Initial setting time and final setting time.
5. Soundness test.
6. Compressive strength of cement.

II. Test on Aggregate (Fine and Coarse Aggregates)

1. Specific gravity and Bulk Density
2. Surface moisture and water absorption test
3. Sieve Analysis.
4. Bulking of sand (Lab & Field method).

III. Test on Fresh & Hardened Concrete

1. Slump Cone Test
2. Compaction Factor Test
3. Compressive strength of concrete
4. Split tensile strength of concrete
5. Flexural strength of concrete

References

1. Concrete Technology, A.R.Shantha kumar, Oxford Publishers (Second edition)
2. Concrete Technology M.S.Shettyand A.K.Jain, S.Chand & Co, 2018.
3. Concrete Manual, M.L. Gambhir, Dhanpat Rai & Sons
4. IS10262:2019, Concrete Mix Proportioning Guidelines (Second Revision)
5. IS456(2000), Plain and Reinforced Concrete-Code of Practice

Course Code	Course Title						Core/Elective
U23CE5L3	ENVIRONMENTAL ENGINEERING LAB						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	2	25	50	1

Course Objectives

1. Characterization of water and waste water to ensure security and well-being of humanity.
2. Verify the efficiency of certain water treatment processes.
3. Understand the importance of coagulation.

Course Outcomes

After Completion of this course, the student will be able to

1. Understand the compile and use of experimental information.
2. Ability to perform experiments on water sample for physical and chemical tests.
3. Understand the turbidity in water sample.
4. Assess the suitability Total hardness and Alkalinity.
5. Ability to critically analyze and interpret data and present results on water samples.

LIST OF EXPERIMENTS

1. a) Determination of total dissolved solids

   b) Determination of total suspended solids

   c) Determination of fluorides
2. Determination of pH by Ph meter
3. Determination of Total Hardness
4. Determination of alkalinity
5. Determination of chlorides
6. Determination of residual chlorine
7. Determination of optimum alum dosage
8. Determination of BOD
9. Determination of COD
10. Determination of turbidity in water sample using nephelo turbidity meter

Text Books:

1. Hammer, M.J. and Hammer, M.J. Jr., Water and Wastewater Technology, Prentice-Hall of India Pvt.Ltd.,
2. G.S.Birdie & J.S.Birdie,Water Supply and Sanitary Engineering, Dhanpat Rai Publishing Company (P)Ltd.
3. Dr.P.N.Modi,"Water Supply Engineering" ,Standard Book House, Rajsons Publications Pvt.Ltd.
4. Dr. B.C. Punmia & AK Jain"Water Supply Engineering", Laxmi Publications (P)Ltd.

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Course Code	Course Title						Core/Elective
U23CE5P1	INTERNSHIP						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	2	50	-	1

Course Objectives

1. Produce an accurate record of work performed during the Internship/Co-op
2. Apply engineering knowledge to a problem in industry
3. Produce a technical report
4. Discuss work in a team environment, if relevant to the project
5. Conduct herself/himself responsibly, safely, and ethically in a professional environment

Course Outcomes

After Completion of this course the student will be able to

1. Design a small and simple production hardware.
2. Develop a small and simple product in software
3. Understand the turbidity in water sample. Complete the task or realize a pre specified target, with limited scope, rather than taking up a complex task and leave it.
4. Learn to find alternate viable solutions for a given problem and evaluate the seal ternatives with reference to pre specified criteria
5. Implement the selected solution and document the same.

Guidelines:

Internship is introduced as part of the curricula of encouraging students to work on problems of interest to industries. A batch of three students will be attached to a person from the Government or Private Organizations /Computer Industry/Software Companies/R&D Organization for a period of 4 weeks. This will be during the summer vacation following the completion of the III-year Course. One faculty coordinator will also be attached to the group of 3 students to monitor the progress and to interact with the industry co- ordinate (person from industry). The course schedule will depend on the specific internship/ training experience.

The typical time per topic will vary depending on the internship

1. Overview of company/project
2. Safety Training
3. Discussion with project teams
4. Background research, review of documents, whitepapers, and scientific papers
5. Planning, designing, and reviewing the planned work
6. Executing the plans
7. Documenting progress, experiments, and other technical documentation
8. Further team discussions to discuss results
9. Final report writing and presentation

After the completion of the project, each student will be required to:
1. Submit a brief technical report on the project executed and
2. Present the work through a seminar talk (to be organized by the Department)

Note: Students have to undergo summer internship of 4weeks at the end of semester IV and credits will be awarded after evaluation in V semester

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Course Code	Course Title						Core/ Elective
U23CE508	Disaster Preparedness and Management						OEC-1
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Environmental Engineering	3	-	-	-	40	60	3

Course Objectives

1. Learn about the basic principles of disaster management and the types of disasters
2. Understand the disaster management cycle and framework.
3. Know about the disaster management systems in India and the applications of the latest technologies in disaster management
4. Understand about the different types of disasters.
5. Know about the past disasters occurred across the globe.

Course Outcomes

After Completion of this course, the student will be able to

1. Apply the concepts of disaster management to evaluate a disaster situation.
2. Classify the various categories of disasters and their specific characteristics.
3. Select appropriate pre-disaster, during disaster and post-disaster measures and framework.
4. Apply the geo informatics technology in disaster situation.
5. Identify the disaster management acts and frameworks specific to India relevant to a situation

UNIT-I

Introduction: Understanding the Concepts and definitions of Disaster, Types of Disasters, Causes Hazard, Vulnerability, Risk and Capacity– Disaster and Development, and disaster management.

UNIT-II

Hazardous Methods: Geological Disasters (earthquakes, landslides ,tsunami, mining); Hydro- Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters –Climate Change and Urban Disasters.

UNIT-III

Disaster Management Cycle and Framework: Disaster Management Cycle – Paradigm Shift in Disaster Management Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation Micro zonation, Prevention and Mitigation of Disasters, Early Warning System;

UNIT-IV

Preparedness Capacity Development; Awareness. During Disaster–Evacuation–Disaster Communication – Search and Rescue – Emergency Operation Centre – incident Command System – Relief and Rehabilitation. Post-disaster–Damage and Needs Assessment, Restoration of Critical Infrastructure–Early Recovery–Reconstruction and Redevelopment; IDNDR.

UNIT-V

Disaster Management in India: Disaster Profile of India – Mega Disasters of India and Lessons Learnt Disaster Management Act 2005 – Institutional and Financial Mechanism National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter Governmental Agencies. Applications of Science and Technology for Disaster Management: Geo-informatics in Disaster Management (RS, GIS, GPS and RS) Disaster Communication System (Early Warning and Its Dissemination) Land Use Planning and Development Regulations Disaster Safe Designs and Constructions Structural and Non- Structural Mitigation of Disasters S&T Institutions for Disaster Management in India.

Text Books:

1. Disaster Management Global Challenges and Local Solutions" Rajib, Sand Krishna Murthy, R.R, CRC Press, 2009.
2. 2. Earth and Atmospheric Disasters Management, Natural and Manmade. Navele, P & Raja, C.K, B. S. Publications, 2009.

References:

1. Disaster Science and Management, Bhattacharya, Tata Mc GrawhillCompany,2017
2. 2. Manual on natural disaster management in India, MC Gupta, NIDM, New Delhi
3. 3. An overview on natural & man-made disasters and their reduction, RK Bhandani, CSIR, New Delhi
4. 4. Disaster Management Act 2005, Published by Govt. of India

Course Code	Course Title						Core/ Elective
U23CE509	Sustainable water and Sanitation System						OEC-1
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Environmental Engineering	3	-	-	-	40	60	3

Course Objectives

1. Outline planning and the design of water supply systems for a community/town/city.
2. Provide knowledge of water quality requirement for domestic usage
3. Impart understanding of importance of protection of water source quality and enlightens the efforts involved in converting raw water
4. Summarize the appurtenance in sewerage systems and their necessity.
5. Teach planning, and design of septic tank and Imhoff tank and the disposal of the effluent from these low cost treatment systems.

Course Outcomes

After Completion of this course, the student will be able to

1. Identify the water source and select proper intake structure.
2. Characterization of water.
3. Plan and design the sewerage systems
4. Characterization of Sewage
5. Select the appropriate appurtenances in the sewerage systems

UNIT-I

Introduction: Importance and Necessity of Protected Water Supply systems, Water borne diseases, Flow chart of public water supply system, Role of Environmental Engineer, Agency activities.

Water Demand and Quantity Estimation: Estimation of water demand for a town or city, Per capita Demand and factors influencing it - Types of water demands and its variations- factors affecting water demand, Design Period, Factors affecting the Design period, Population Forecasting.

UNIT-II

Sources of Water: Lakes, Rivers, Impounding Reservoirs, comparison of sources with reference to quality, quantity and other considerations- Capacity of storage reservoirs, Mass curve analysis. Groundwater sources of water: Types of water bearing formations, springs, Wells and Infiltration galleries, Yields from infiltration galleries.

Collection and Conveyance of Water: Factors governing the selection of the intake structure, Types of Intakes. Conveyance of Water: Gravity and Pressure conduits, Types of Pipes, Pipe Materials, Pipe joints, Design aspects of pipe lines, laying of pipe lines.

UNIT-III

Quality and Analysis of Water: Characteristics of water–Physical, Chemical and Biological- Analysis of Water – Physical, Chemical and Biological characteristics. Comparison of sources with reference to quality- I.S. Drinking water quality standards and WHO guidelines for drinking water

UNIT-IV

Introduction to sanitation – systems of sanitation – relative merits & demerits – collection and conveyance of waste water – sewerage – classification of sewerage systems- Estimation of sewage flow and storm water drainage – fluctuations – types of sewers - Hydraulics of sewers and storm drains– design of sewers – appurtenances in sewerage – cleaning and ventilation of sewers.

UNIT-V

Pumping of wastewater: Pumping stations – location – components– types of pumps and their suitability with regard to wastewaters. House Plumbing: systems of plumbing-sanitary fittings and other accessories–one pipe and two pipe systems – Design of building drainage.

Text Books:

1. Environmental Engineering by Howard S. Peavy, Donald R. Rowe, Teorge George Tcho banoglus – Mc-Graw-Hill Book Company,
New Delhi, 1985.
2. Elements of Environmental Engineering by K.N. Duggal, S. Chand & Company Ltd. New Delhi, 2012.
3. Wastewater Engineering Treatment and Reuse by Metcalf & Eddy, Tata McGraw-Hill edition.
4. Wastewater Treatment for Pollution Control and Reuse, by Soli. J Arceivala, Sham R Asolekar, Mc-Graw Hill, New Delhi; 3rd Edition.

References:

1. Environmental Engineering –II: Sewage disposal and Air Pollution Engineering, by Garg, S.K.; Khanna Publishers.
2. Sewage treatment and disposal by Dr. P.N. Modi& Sethi.
3. Environmental Engineering, by Ruth F. Weiner and Robin Matthews – 4th Edition Elsevier, 2003.
4. Environmental Engineering by D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.

LORDS INSTITUTE OF ENGINEERING AND TECHNOLOGY
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DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION & EXAMINATION [LR-23]
(W.e.f Academic Year 2025 – 26)

Course Structure
B.E. VI-Semester (Tentative)

S. No.	Course Code	Category	Course Title	Scheme of Instructions				Scheme of Examination			CREDITS
				L	T	P/D	Contact Hours/Wee	CIE	SEE	Duration in Hours	
Theory Course											
1	U23CE601	PCC	Geotechnical Engineering	3			3	40	60	3	3
2	U23CE602	PCC	Design of Reinforced Concrete Structures	3	1		4	40	60	3	4
3	U23CE603	PCC	Structural Analysis-II	3			3	40	60	3	3
4	------	PEC	Professional Elective-II	3			3	40	60	3	3
5	-------	OEC	Open Elective – II	3			3	40	60	3	3
Practical/ Laboratory Course											
6	U23CE6L1	PCC	Computer Aided Civil Engg Drafting Lab			2	2	25	50	3	1.0
7	U23CE6L2	PCC	Geotechnical Engg Lab			2	2	25	50	3	1.0
8	U23EN6L1	HSMC	Research Paper Writing Lab	-	-	2	2	50	-	3	1
9	U23CE6P2	PROJ	Seminar	-	-	2	2	50	-	3	1
Skill Development Course											
10	U23MA6L4	BSC	Aptitude and Reasoning Skills Lab	-	-	2	2	25	50	3	1
Total				15	1	10	26	400	400	30	**21.0**

L: Lecture (Hrs/Wk/Sem) **T**: Tutorial (Hrs/Wk/Sem) **P**: Practical **D**: Drawing (Hrs/Wk/S em)
CIE: Continuous Internal Evaluation **SEE**: Semester End Examination (Univ. Exam)
PEC: Professional Elective Courses **PCC**: Program Core Courses **HSMC:** Humanities and Social Sciences Courses
OEC: Open Elective Courses **BSC:** Basic Science Courses **EN:** English
CE: Civil Engineering **MB:** Management **MA:** Mathematics

Note:
1. Each contact hour isa Clock Hour.
2. The duration of the practical classis three hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

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Professional Elective Courses

S. No.	Course Code	Category	Course Title	Scheme of Instructions				Scheme of Examination			CREDITS
				L	T	P/ D	Contact Hours/Week	CIE	SEE	Duration in Hours	
Theory Course											
1	U23CE505	PEC 1	Solid and Hazardous Waste Management	3	-	-	3	40	60	3	3
	U23CE506		Advanced Surveying	3	-	-	3	40	60	3	3
	U23CE507		Construction Project and Planning	3	-	-	3	40	60	3	3
2	U23CE604	PEC 2	Design Of Hydraulic Structures	3	-	-	3	40	60	3	3
	U23CE605		Sustainable Construction Methods	3	-	-	3	40	60	3	3
	U23CE606		Urban Transportation Planning	3	-	-	3	40	60	3	3
3	U23CE704	PEC 3	Advanced Concrete Technology	3	-	-	3	40	60	3	3
	U23CE705		Traffic Engineering and Management	3	-	-	3	40	60	3	3
	U23CE706		Foundation Engineering	3	-	-	3	40	60	3	3
4	U23CE707	PEC 4	Groundwater Engineering	3	-	-	3	40	60	3	3
	U23CE708		Contract Management	3	-	-	3	40	60	3	3
	U23CE709		Air and Noise Pollution Control	3	-	-	3	40	60	3	3
5	U23CE801	PEC 5	GIS &Remote Sensing	3	-	-	3	40	60	3	3
	U23CE802		Advanced RCC Design	3	-	-	3	40	60	3	3
	U23CE803		Environmental Impact Assessment	3	-	-	3	40	60	3	3
6	U23CE804	PEC 6	Intelligent Transport Systems	3	-	-	3	40	60	3	3
	U23CE805		Repair and Rehabilitation of Structures	3	-	-	3	40	60	3	3
	U23CE806		Finite Elements Methods	3	-	-	3	40	60	3	3

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OPEN ELECTIVE COURSES

S. No.	Course Code	Category	Course Title
1	U23EE508	OEC 1	Non-Conventional Energy Systems
	U23EE509		Energy Conservation and Management
	U23CS508		Fundamentals of Data Base Management Systems
	U23IT506		Data Structures
	U23ME508		Basics of Mechanical Engineering
	U23ME509		Modern Manufacturing Processes
	U23CE508		**Disaster Preparedness and Management****
	U23CE509		**Sustainable water and Sanitation System****
	U23EC509		Principles of Electronics Communication
	U23EC510		Introduction to Internet of Things
	U23MB502		Managerial Communication
	U23MB503		Managerial Science and Theory
	U23CD508		Fundamentals of Data Science
	U23CM507		Basics of Artificial Intelligence
	U23SH501		History of Science & Technology
	U23SH502		Economic Policies in India

S. No.	Course Code	Category	Course Title
2	U23EE608	OEC 2	Fundamental of Power Electronics
	U23EE609		Electrical Installation and Safety
	U23CS607		Introduction to Programming in JAVA
	U23IT606		Operating Systems
	U23ME609		Basics Of 3-D Printing
	U23ME610		Optimization Methods for Engineers
	U23CE607		**Construction Materials ****
	U23CE608		**Road Safety Engineering ****
	U23EC609		Principles of Data Communications and Computer Networks
	U23EC610		Introduction to Microprocessors and Microcontrollers
	U23MB602		Total Quality Management
	U23MB603		Innovation Management
	U23SH601		Indian Music System
	U23SH602		Introduction to Art and Aesthetics
	U23CD607		Data Ethics
	U23CM607		Fundamentals of Machine Learning

`Course Code	Course Title						Core/Elective
U23CE601	Geotechnical Engineering						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	-	-	-	40	60	3

Course Objectives

1. Introduction of Particulate Mechanics further to the solid and fluid mechanics
2. Characterization of soils based on laboratory and field experiments
3. Classification of soils based on laboratory and field experiments
4. Understand the concept of compaction and consolidation in soils
5. Understand Seepage, Strength and Compressibility characteristics of soils

Course Outcomes

After Completion of this course, the student will be able to

1. Identify and classify the soil and their index properties.
2. Calculate the capillarity and permeability parameters of soils.
3. Describe the mechanisms of the process of compaction and consolidation of soils.
4. Evaluate the characteristics of compaction and consolidation of soils.
5. Analyze the soils for their shear strength and predict the stability of slopes.

UNIT-I

Origin & Classification of Soils: Soil as a pseudo-elastic three phase particulate medium Physical Properties of soil: Weight ratios (Water content, Density, Unit weights, Specific Gravity); Volume ratios (void ratio, porosity, degree of saturation, relative density); Interrelationships, Laboratory tests for determination of Index properties. Classification and Identification of soils for general and engineering purposes as per IS: 1498-1970.

UNIT-II

Capillarity in Soils: Surface tension and capillary rise in soil, Capillary tension, Capillary pressure.

Permeability of Soils: Darcy's law for flow through soils - validity of Darcy's Law - Factors affecting permeability - Laboratory tests for determination of co-efficient of permeability (constant head, variable head permeability tests) - Field tests (Pumping in and pumping out tests) - Equivalent permeability of stratified soils.

UNIT-III

Stress in Soils: Total, effective and neutral stress distribution in different ground conditions

Seepage in Soils: Seepage flow, seepage pressure - Flow nets - Locating phreatic line in a homogeneous earthen dam using Kozeny's parabola - Computation of seepage quantity.

Quick Sand phenomena: Critical Hydraulic gradient, Remedial measures.

UNIT-IV

Compaction: Compaction Mechanism; factors affecting compaction. Laboratory determination of compaction characteristics - standard and modified Proctor tests - IS Light and Heavy compaction tests; Field surface, compaction equipment, procedure, quality control.

Consolidation: Spring analogy - Void ratio and effective stress (e Vs log p) relationship - Terazaghi's theory of one dimensional consolidation - Assumptions and derivation of GDE- Computation of magnitude of settlement (using Cc, mv) and rate of settlement (cv , Tv, d) classification based on OCR.

UNIT-V

Shear Strength: Significance of Shear strength in soils - Mohr - Coulomb equation – shear parameters - Laboratory tests for determination of shear strength - Direct shear test, Tri-axial compression test, Un- confined compression test, Vane shear test, Factors affecting shear strength of cohesion-less and cohesive soils.

Text Books:

1. Soil Mechanics and Foundations, Punmia , B.C., Ashok Kumar Jain and Arun Kumar Jain, Lakshmi Publication, 17th Edition, 2005.
2. Geotechnical Engineering, Venkataramaiah, C., New Age Publishers,2006

Suggested Readings:

1. Soil Mechanics and Foundation Engineering, Arora, K.R., Standard Publishers Distributors, revised and enlarged sixth edition,2007.
2. Soil Mechanics and Foundation Engineering, Murthy, V.N.S., Dhanpat Rai & Sons,2006
3. Geotechnical Engineering, Venkataramaiah, C., New Age Publishers, 2006.
4. IS 2720 (Relevant Parts), “Laboratory Tests on Soils”, Bureau of Indian Standards.
5. IS 1498-1970 “Classification and Identification of Soils for General and Engineering purposes”, Bureau of Indian Standards.

Course Code	Course Title						Core / Elective
U23CE602	Design of Reinforced Concrete Structures						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Concrete Technology	3	1	-	-	40	60	4

Course Objectives

1. Structural design criteria, materials, and loads, including working stress and limit state methods.
2. Limit state of collapse in flexure, including analysis and design of singly and doubly reinforced sections, T - beams, and L-beams.
3. Limit state of collapse in shear, torsion, and bond, including design and detailing of RCC beams for shear, torsion, and bond.
4. Design of slabs and staircases, including one-way and two-way slabs, continuous slabs, and detailing of reinforcement.
5. Design of columns and footings, including axially loaded columns, columns with uni-axial and bi-axial bending, and design of isolated and combined footings.

Course Outcomes

After Completion of this course, the student will be able to

1. Apply structural design criteria and loads to design RCC structures using working stress and limit state methods.
2. Analyze and design RCC sections for flexure, including singly and doubly reinforced sections, T-beams, and L-beams.
3. Design and detail RCC beams for shear, torsion, and bond, ensuring structural integrity and safety.
4. Design and detail RCC slabs and staircases, including one-way and two-way slabs, and ensure serviceability and safety.
5. Design RCC columns and footings, including axially loaded columns, columns with uni -axial and bi-axial bending, and isolated and combined footings.

UNIT-I

Material and Structural Design Criteria:

Materials used in reinforced concrete, Introduction to Relevant IS codes (IS 456-2000, IS 875 part I to IV). Dead load, imposed load, wind load and earthquake load.

Working stress method: Design of RCC beams: Balanced, under-reinforced and over reinforced sections

Limit State Method of Design: Introduction to the design of Concrete Structures using Limit state method of design. Design philosophies. Partial safety factors for material strength and loads. Limit State of Collapse and Limit State of Serviceability.

UNIT-II

Limit state of Collapse – Flexure: Assumption made in Limit state of collapse- flexure. Stress blocks Parameters, Moment of Resistance of a singly reinforced section. Analysis and design of a singly reinforced section, Doubly Reinforced sections, T-Beams, L-Beam

Limit states of serviceability: Check for deflection and cracking.

UNIT-III

Limit State of Collapse in Shear & Torsion:

Design of beam for Shear: Types of Shear failure of an R.C.C beam Shear carrying capacity of a reinforced concrete Beam. Analysis and Design of are in forced section for Shear.

Design of Beam for Torsion: Analysis of R.C.C beams for Torsion. Equivalent Shear and Equivalent Bending Moment. Design and detailing of R.C.C beam subjected to Torsion

Design of Beam for Bond: Flexural Bond, Anchorage (Development) Bond, Check for Bond Failure.

UNIT-IV

Design of Slabs: Types of Slabs: Design of one way and two-way slabs - Simply supported and continuous slabs subjected to uniformly distributed loads, detailing of reinforcement, Check for Serviceability of slabs

Design of stair cases: Types of stairs: Design and detailing of dog-legged stair cases.

UNIT-V

Design of columns: Assumptions, Design of axially loaded circular, square and rectangular columns, Design of columns with uni-axial and bi-axial bending, interaction diagrams.

Design of footings: Design of isolated square, rectangular and circular footings and Design & Detailing of combined Rectangular RCC footings

Text Books:

1. Reinforced Concrete Design, Krishna RajuN. And Pranesh R.N., New Age International Pvt.2003 Ltd.2003.
2. Design of Concrete Structures, David Darwin, Charles W.Dolan, Arthur H.Nilson 15th Edition, McGrawHill,2016
3. Reinforced Concrete Structures, B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain, Laxmi Publications, 2007.
4. Limit State Design of Reinforced Concrete, P. C. Varghese, Prentice Hall of India, 2010.

Suggested Readings:

1. Reinforced Concrete Design, Krishna Raju N. and Pranesh R.N., New Age International Pvt. Ltd., 2003.
2. Design of Reinforced Concrete Structures, N. Krishna Raju, CBS Publishers & Distributors, 2013.
3. Reinforced Concrete Design, S. N. Sinha, Tata McGraw-Hill Education, 1999.
4. Design of Concrete Structures, Ashok K. Jain, Nem Chand & Bros, 2012.
5. Reinforced Concrete Structures, S. Ramamrutham, Dhanpat Rai Publishing Company, 2011.
6. .Concrete Technology and Design of Reinforced Concrete Structures, M. L. Gambhir, Tata McGraw-Hill Education, 2008.

Course Code	Course Title						Core / Elective
U23CE603	STRUCTURAL ANALYSIS - II						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Structural Analysis-I	3	-	-	-	40	60	3

Course Objectives

1. The concept of influence lines, moving loads, and moving lines is explained to assess the maximal S.F. and B.M. for the same section
2. Analysis of indeterminate structures by stiffness matrix method.
3. Analysis of indeterminate structures by flexibility matrix method.
4. Analysis of indeterminate structures by direct element method.
5. Analysis of Building frames subjected to Lateral loads,

Course Outcomes

1. After completing this course, the student will be able to:
2. Use various classical methods for analysis of indeterminate structures
3. Analyse the structure using flexibility matrix method to calculate the Redundant forces and sketch the BMD and SFD
4. Analyse the structure using Stiffness matrix method to calculate the Redundant forces and sketch the BMD and SFD
5. Develop Stiffness matrix using Direct Element method for indeterminate structures
6. Analysis of Building frames subjected to Lateral loads

UNIT– I

Moving loads and Influence Line diagrams: Influence lines for reaction, bending moment and shear force. Determination of maximum bending moment and shear force for moving load systems on simply supported girders by ((i) single point load, (ii) uniformly distributed load longer than the span, (iii) uniformly distributed load shorter than the span and (iv) series of point loads.

UNIT-II

Matrix methods of structural analysis - Introduction, Static and Kinematic Indeterminacy, Compatibility and Equilibrium equations.

Stiffness Matrix Method: Introduction, Analysis of continuous beams including settlement of supports, pin jointed plane trusses, single bay single storey Frames including Side Sway with static indeterminacy not exceeding three

UNIT-III

Flexibility Matrix Method- Introduction, Analysis of continuous beams including settlement of supports, pin jointed plane trusses, single bay single storey Frames including Side Sway with static indeterminacy not exceeding three

UNIT-IV

Direct Element Method: Introduction, Analysis of continuous beams including settlement of supports, pin jointed plane trusses, single bay single storey Frames including Side Sway with static indeterminacy not exceeding three

UNIT– V

Approximate Methods of Analysis: Introduction – Analysis of multi-storey frames for lateral loads: Portal Method, Cantilever method and Factor method - Analysis of multi-storey frames for gravity loads - Substitute Frame method

Text Books

1. Analysis of structures, D.S.Prakasha Roa, univ.Press, Delhi,
2. Theory of Structures, G .S,Pandit, S.P.Gupta and R.Gupta Vol.I&II, Tata McGrawHill, NewDelhi, 1999.

References

1. Structural Analysis-A Unified Approach, D.S.Prakash Rao, ,UniversityPress,1996
2. Basic Structural Analysis, C.S.Reddy, Tata McGraw-Hill Publishing Co. Ltd., 3rd Edition, NewDelhi,2010.
3. Finite Element Analysis C.S. Krishna Moorthy, McGrawHill,1991.
4. The Structural Analyse by R.C. Hibbeler, Pearson, NewDelhi.
5. Fundamental Structural Analysis, K U Muthu, International Publishing house Pvt. Ltd.

Course Code	Course Title						Core / Elective
U23CE604	DESIGN OF HYDRAULIC STRUCTURES						PEC-2
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Hydrology & water Resources Management	3	-	-	-	40	60	3

Course Objectives

The objectives of this course is to impart knowledge of and problem solving skills in

1. Understand the types, alignment, and design principles of canal distribution systems.
2. Explain the theories related to canal flow and regulation works such as Kennedy's and Lacey's theories.
3. Analyze the design considerations and structural stability of gravity and earth dams.
4. Evaluate various reservoir storage methods, sedimentation issues, and site selection parameters.
5. Describe different types of spillways and energy dissipation techniques in hydraulic structures

Course Outcomes

After Completion of this course, the student will be able to

1. Apply Kennedy's and Lacey's theories to design irrigation canals.
2. Explain reservoir and dam types, site selection, storage, yield, and sedimentation.
3. Assess the forces acting on gravity dams and perform basic stability analysis.
4. Design earth dams with proper seepage control and drainage systems.
5. Comprehend various components of Hydro power stations.

Unit-I

Distribution systems –Types of canals, alignment, balancing depth, design of canals, Kennedy's and Lacey's theory, canal losses, lining of canals. Introduction to canal regulation works, cross drainage works. Canal outlets: non-modular, semi-modular and modular outlets. Introduction to diversion head works and its components.

Unit-II

Storage Works-Reservoirs - Types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, estimation of capacity of reservoir using mass curve- Reservoir Sedimentation – Life of Reservoir. Types of dams, factors affecting selection of type of dam, factors governing selection of site for a dam.

Unit-III

Gravity dam -advantages & disadvantages, selection criteria, economical height of the dam, forces acting on dam, stability analysis, elementary profile and practical profile, low and high gravity dams.

Spillways: Different types of spillways, energy dissipation below spillways, different types of spillway crest gates, stilling basin appurtenances (descriptive details only)

UNIT- IV

Earth dams: Types, Methods of construction, Seepage analysis for homogenous and zoned embankment dams, Drainage in embankment dams, various types of filters, Failure of Earth dams & Design criteria. Design to suit available materials and foundation conditions, seepage control measures.

Unit-V

Hydro-power: Comparison of hydro power with thermal power, classification of hydro power plants, definition of various terms, principal components of hydro-electric power plants (Forebay, intake structure, penstock & surge tank), economical diameter of penstock.

Power house: Substructure and super structure of a power house, merits and demerits of an underground power house, fixation of dimensions of a power house

Text Books

1. Modi, Irrigation & Water Resources and Water Power, Standard Publishers, New Delhi.
2. S.K.Garg, Irrigation Engineering & Hydraulic Structures, Khanna Publishers
3. B.C.Punmiya&B.B.Lal,Irrigation&WaterPowerEngineering,LaxmiPublishers.
4. Ralph W.Warbs and W.P.James, Water Resources Engineering, Prentice Hall, New Delhi.
5. K.R. Arora, "Irrigation, Water Power and Water Resources Engineering", 3rd Edition, Standard Publishers distributors, 2010

References:

1. Ch. S. N. Murthy, "Water Resources Engineering: Principles and Practice", New Age International Publishers, Delhi, 2002.
2. G. L. Asawa, "Irrigation and water Resources engineering", New Age International Publishers, Delhi, 2005. 3. VenTe Chow, "Hand book of Applied Hydrology", McGraw-Hill Book Company, New York, 1964

Course Code	Course Title						Core / Elective
U23CE605	SUSTAINABLE CONSTRUCTION METHODS						PEC-2
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
---	3	-	-	-	40	60	3

Course Objectives

The objectives of this course is to impart knowledge of and problem solving skills in

1. Understand the importance of modular construction methods.
2. Gain knowledge of the practical applications and fundamental concepts of basic construction methods.
3. Learn about the characteristics of sustainable, energy-efficient building materials.
4. Study the core concepts of innovative construction methods.
5. Understand rating systems in detail, including their evolution, objectives, criteria, certification levels, benefits, and limitations.

Course Outcomes

After Completion of this course, the student will be able to

1. Apply the modular construction techniques in practice.
2. Understand the fundamental construction methods used in construction projects.
3. Appropriately apply innovative and advanced construction methods.
4. Comprehend and utilize cutting-edge sustainable, energy-efficient building materials and methods.
5. Demonstrate the ability to evaluate and design sustainable building rating systems.

UNIT – I

Modular Construction Practices - Introduction to formwork - requirements of formwork, loads carried by formwork, types of formwork-timber, steel, slip forms, scaffolding. Modular construction - modular coordination, modular standardization, modular system building, modular shuttering, limitation and advantages of modular construction

UNIT – II

Basic Construction Methods – Construction of foundation and super structure - buildings - precast concrete structures, bridges - steel bridges, arch bridges, cantilever bridges segmental construction, box girders. Construction of special type of bridges such as cable stayed bridge, suspension and pre-stressed bridge.

UNIT – III

Sustainable Construction Materials – Overview of cutting-edge sustainable energy - efficient building materials, alternative cements and cementitious materials, sustainable issues for concrete, minimization of natural resource utilization, reduction in water consumption in concrete, recycled aggregate, evaluation of their potential to reduce the negative environmental impacts of construction activity.

UNIT – IV

Innovative Methods of Construction – Slip form technology, jump from technology, aluminum form technology, tunnel form technology, dry wall technology, plastering machines.

UNIT – V

Sustainable Building Rating Systems - Rating systems for the design, construction, operation, and maintenance of green buildings through Leadership in Energy and Environmental Design (LEED), Case Study of recent green construction projects in India – Certification of LEED Green Associate professional licensing. , Sustainable construction methods as per Indian Green Building Council (IGBC)

, TERIs – Green rating for integrated habitat assessment (GRIHA), ECBC 2017 (Energy Conservation Building Code).

Text Books:

1. Construction Technology, Roy Chudley and Roger Greeno, Prentice Hall, New Delhi, 2005.
2. Construction Planning, Equipment and Methods, Peurifoy, Tata McGraw Hill Publication, NewDelhi, 2001.
3. "Sustainable Building Design Manual- Volume II", Published by TERI, New Delhi, 2009.
4. "The Engineering Guide to LEED-New Directions (Green Source): Sustainable construction", Liv Haselbach, McGraw-Hill Professional, 2008.
5. Indian Green Building Council, Green building rating system: New construction and major renovations (LEED-India NC) reference guide version 1.0, Confederation of Indian Industry, CII- Sohrabaji Godrej Green Business Centre, Hyderabad, 2007.

Reference Books:

1. Principles and Practices of Commercial Construction, Cameron K. Andres, Ronald C. Smith,Prentice Hall, New Delhi, 2009
2. Formwork for Concrete Structures, Kumar Niraj Jha, McGraw Hill Publication, New Delhi, 2004.
3. Fundamentals of Building Construction Material and Method, Allen E, Iano, J, John Wiley andSons, 2011
4. Rebecca L. Henn; Andrew J. Hoffman (2013), Constructing Green the Social Structures of Sustainability (Urban and Industrial Environments), MIT Press.
5. Steve Goodhew Sustainable Construction Processes: A Resource Text ISBN: 978-1-40518759-6 May 2016 Wiley- Blackwell.

Course Code	Course Title						Core/Elective
U23CE606	URBAN TRANSPORTATION PLANNING						PEC-2
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Transportation Engineering	3	-	-	-	40	60	3

Course Objectives:

1. To discuss various urban transportation systems planning process and its components
2. To understand a variety of travel survey and data collection procedures
3. To review different travel demand forecasting models
4. To examine urban land use models and urban goods transportation models
5. Understand the challenging need for efficient planning of urban transport

Course Outcomes

At the end of the course the student will be able to

1. Describe and evaluate various urban transportation issues and planning methodologies
2. Demonstrate effective way of understanding trip distribution and mode split models
3. Explain various issues related to trip assignment and land use transportation models
4. Transportation impacts various aspects such as mobility, health of residents, economic and energy aspects in an urban area.
5. Understand the challenging need for effective and efficient planning of urban transport addressing the growing travel demand in a sustainable and affordable way.

UNIT-I

Components of Urban Transportation System and Challenges- Transportation system definition, urban issues, evolution of planning process, demand and supply, challenges, limitation, measure of effectiveness, measure of collectiveness, traffic problem elements, planning and management, models, planning methodologies. Emerging future trends in Transportation Systems.

UNIT-II

Data Collection and Travel Surveys: Collection of data, design of survey format, organization of surveys and analysis, study area definition, zoning system, types and sources of data, road side interview method, home interview survey, in-vehicle surveys, sampling, types, various techniques, expansion factors, logical checks, use of secondary sources of data, planning variables, vehicles ownership, projection of data and statistical techniques.

UNIT-III

Travel Demand Forecasting: Various trends, overall planning process, short-and long-term planning, travel attributes, traffic analysis zones, trip generation, category analysis, concept of gravity model, trip distribution, model split and trip assignment and land use transportation interaction.

UNIT-IV

Trip Distribution and Model Split Analysis: Growth factor models, synthetic pattern models, gravity model, competing opportunity model, intervening opportunity model, linear programming model and abstract mode model, time series models, aggregate and disaggregate models, mode choice, competing modes, mode split models, trip interchange, Toronto transit model, service ratio model, probabilistic models, discriminate analysis, probit analysis and logit analysis, and probabilistic approaches.

UNIT-V

Traffic Assignment and Plan Preparation; Nodes, links, transport. Network, coding, rout characteristics, network skims, various methods, judgment tow path method, diversion curves, network, assignment, all or nothing assignment, capacity restraint techniques, multi-path assignment technique, graph theory, probabilistic assignment model, allocation of traffic, equilibrium assignment, dynamic assignment, land use transport. models, Lowry models, Garin Lowry models, ISGLUTI models, mobility and accessibility, five stage models, choice models, urban goods transport, strategies for the evaluation of alternate transportation plans and plan implementation, framework and case studies, preparation of master plans.

Text Book:

1. Principles of Urban Transport Systems Planning, Hutchinson, E.G.,Mc Graw Hill, NewYork, 1974.
2. Modelling Transport, Ortuzar, J.and Williamson, E.G.,Wiley, Chinchestor, 1994.

References

1. Urban Travel Demand Modeling, Oppenheim,N., Wiley, NewYork, 1995.
2. Traffic Assignment Techniques, Thomas,R., AveburyTechnical, Aldershot,1991.
3. Network Modelling and Intelligent Transport Systems, Taniguchi, E.,Thompson, R.G,Yamada, T. and Van Duin, R., City Logistics, Elsevier, Pergamon, Oxford, 2001.
4. Introduction to Transportation Planning, Bruton, M.I, Hutchinson, London, 1985.
5. IRC: 37 (2018), „Guidelines for the design of flexible pavements", Indian Roads Congress, New Delhi
6. IRC: 58 (2015), „Guidelines for the design of plain jointed rigid pavements", Indian Roads Congress, New Delhi

Course Code	Course Title						Core/Elective
U23CE6L1	COMPUTER AIDED CIVIL ENGG DRAFTING LAB						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	2	25	50	1

Course Objectives:

1. Achieve skill sets to prepare computer aided engineering drawings
2. Understand the details of construction of different building elements
3. Visualize the completed form of the building and the intricacies of construction based on the engineering drawings.
4. Apply the building bye laws of planning for residential and public buildings
5. Apply the principles of planning for residential and public buildings

Course Outcomes

At the end of the course, the student will be able to:

1. Illustrate the basic principles of building planning and drawings as per codal provisions.
2. Apply the tools of AUTOCAD software to prepare structural drawings of various building components
3. Draw plan, elevation and sectional drawings of residential buildings in AutoCAD software.
4. Develop isometric views of Single Double story
5. Develop any type of building drawing using CADD software

S.no	Description of the Topic
1	Introduction to 2D, co-ordinate systems, reference planes, Commands-Initial settings, Line commands, Edit Commands, Copy commands, Move Commands, Modify commands, Layers, Text and Dimensioning, Blocks.
2	**Brick Masonry Bonds** Detailed drawing (section and elevation) of English Bond and Flemish Bond in odd and even courses - One brick wall and one and half brick wall,
3	**Doors & Windows** Detailed drawing (plan, section and elevation) of doors and windows – framed paneled and glazed
4	**Staircase** Detailed drawing (plan, section and elevation) of different forms of staircases – open well and dog legged.
5	**Footings** Detailed drawing (Plan and section) of different types of footings
6	**Trusses:** Detailed drawing (sectional elevation) of different types of roof trusses – king post, queen post.
7	**Developing** plan, section and elevation of a single room.
8	**Developing** plan, section and elevation of a single bedroom house.
9	**Developing** plan, section and elevation of a Multi-story Building.
10	**Isometric** view of building Single store residential building
11	**Isometric** view of building Double store residential building
12	Detailing of RCC beam and footing.

Note:

1. At least 10 sheets must be covered.
2. All drawings must be through commercially available software like AutoCAD, etc.

Text books:

1. Gurucharan Singh and Jagdish Singh, building planning, designing and scheduling, Standard Publishers-Delhi, 2005
2. S.N Lal, "Engineering Drawing with Introduction to Auto CAD", Cengage Learning India Pvt Ltd, New Delhi, 2018.

References

1. Malik R.S., Meo, G.S. (2009) "*Civil Engineering Drawing",* Computech Publication Ltd New Asian
2. Sikka, V.B. (2013), "*A Course in Civil Engineering Drawing*", S.K.Kataria &Sons.
3. M.G. Shah, C.M. Kale and S.Y. Patki, *Building Drawing*, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2009
4. National Building Code, Bureau of Indian Standards, New Delhi, 2005.
5. IS:962 – 1967 Code of Practice for Architectural and Building Drawing.
6. IS:4021 – 1983 Specification for Timber Door, Window and Ventilator Frames

Course Code	Course Title						Core/ Elective
U23CE6L2	GEO TECHNICAL ENGINEERING LAB						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Soil Mechanics	-	-	-	2	25	50	1

Course Objectives

The objectives of this course is to impart knowledge of and problem solving skills in

1. Introduce the concepts of Soil mechanics useful in Civil Engineering applications in Laboratory
2. Understand the formation of soil and classification of the soils in Laboratory
3. Determine the Index & Engineering Properties of Soils in Laboratory
4. Determine the flow characteristics & stresses due to externally applied loads in Laboratory.
5. To obtain estimate the consolidation properties of soils in Laboratory.

Course Outcomes

After Completion of this course, the student will be able to

1. Understand the broad principles of Soil Mechanics in Laboratory.
2. Characterize and classify the soils in Laboratory
3. Able to estimate seepage, stresses under various loading conditions and compaction characteristics In Laboratory.
4. Analyze the compressibility of the soils in Laboratory.
5. Understand the strength of soils under various drainage conditions in Laboratory.

LIST OF EXPERIMENTS

1. Determination of Moisture Content
2. Determination of Specific Gravity
3. Atterberg Limits (Liquid Limit, Plastic Limit, and shrinkage limit)
4. Field Density
   a) Field density by core cutter method and
   b) Field density by sand replacement method
5. Determination of Specific gravity of soil Grain size distribution by sieve analysis
6. Permeability of soil by constant and variable head test methods
7. Standard Proctor's Compaction Test
8. Determination of Coefficient of consolidation (square root time fitting method)
9. Unconfined compression test
10. Direct shear test
11. Vane shear test
12. Differential free swell index (DFSI)test
13. Triaxial Test (Demonstration only)

Text Books:

1. Soil Mechanics and Foundation Engg., K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Principals of Geotechnical Engineering, Braja M. Das, Cengage Learning Publishers.

Suggested Readings:

1. Geotechnical Engineering by C. Venkataramiah, New age International Pvt. Ltd, (2002).
2. Geotechnical Engineering Principles and Practices Cuduto, PHI International.
3. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata McGraw-Hill Publishers New Delhi.
4. Soil Mechanics and Foundation, B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
5. Measurement of Engineering Properties of Soils, E. Saibaba Reddy & K. Rama Sastri, New Age International

Course Code	Course Title						Core / Elective
U23CE6P2	SEMINAR						PROJ
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	2	50	-	1

Course Objectives

The objectives of this course is to impart knowledge of and problem solving skills in

1. Analyze a current topic of professional interest by conducting literature survey.
2. Summarize and present the topic before an audience.
3. Acquire skills in technical report writing
4. Improving the problem-solving skills
5. Acquire knowledge of communication and soft skills.

Course Outcomes

After Completion of this course, the student will be able to:

1. Understand the current needs of the industry.
2. Understand techniques, processes and tools used in the industry.
3. Prepare technical report on an industrial project
4. Present the technical experience at an industry or through the mini-project
5. Present the importance of delivering the content.

Course Plan

Seminar

Each student shall identify a topic of current relevance in his/her branch of engineering, get approval of faculty concerned, collect sufficient literature on the topic, study it thoroughly, prepare own report and presenting the class.

1. Deliver the seminar for a maximum duration of 30 minutes, where the presentation should be for 20 minutes in power point, followed by question and answers session for 10 minutes.

2. Submit the detailed report of the seminar in spiral bound in a précised format as suggested by the department

	Guide lines for awarding marks	
S. No	Description	Max. Marks
1	Contents and relevance	10
2	Presentation Skills	10
3	Preparation of PPT Slides	05
4	Questions and Answers	05
5	Report in a prescribed format	20

Course Code	Course Title						Core/ Elective
U23CE607	Construction Materials						OEC-2
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Engineering Geology	3	-	-	-	40	60	3

Course Objectives

The objectives of this course is to impart knowledge of and problem solving skills in

1. List the construction material
2. Explain different construction techniques.
3. Understand the building bye-laws.
4. Highlight the smart building materials.
5. To understand the different types of arches, roofs and floors.

Course Outcomes

After Completion of this course, the student will be able to

1. Understand the different construction material.
2. Understand the types of cement, its manufacturing, tests and uses
3. Understand the different component parts of building and their construction practices
4. Understand about mortar, fishes and formwork
5. Identify the factors to be consider planning and construction of buildings

UNIT-I

Stones and Bricks, Tiles: Building stones – classifications and quarrying –properties structural requirements – dressing. Bricks – Composition of Brick earth – manufacture and structural requirements, Fly ash, Ceramics. Timber, Aluminum, Glass, Paints and Plastics: Wood structure– types and properties – seasoning– defects; alternate materials for Timber – GI / fiber–reinforced glass bricks, steel & aluminum, Plastics.

UNIT-II

Cement & Admixtures: Ingredients of cement – manufacture – Chemical composition–Hydration field & lab tests. Admixtures – mineral & chemical admixtures – uses.

UNIT-III

Building Components: Lintels, Arches, walls, vaults – stair cases – types of floors, types of roofs– flat, curved, trussed; foundations – types; Damp Proof Course; Joinery – doors – windows–materials – types. Building Services: Plumbing Services: Water Distribution, Sanitary –Lines& Fittings; Ventilations: Functional requirements systems of ventilations. Air conditioning – Essentials and Types; Acoustics – characteristic – absorption – Acoustic design; Fire protection – Fire Hazards– Classification of fire- resistant materials and constructions.

UNIT-IV

Mortars, Masonry and Finishing's Mortars: Cement Mortar, Brick masonry – types –bonds; Stone masonry – types; Composite masonry – Brick stone composite; Concrete, Reinforced brick. Finishers: Plastering, Pointing, Painting, Claddings – Types – Tiles – ACP. Formwork: Types: Requirements – Standards – Scaffolding – Design; Shoring, Underpinning.

UNIT-V

Building Planning: Classification of buildings, functional Planning of buildings: Sustainability and concept of Green building, General aspects to consider for planning, byelaws and regulations, Selection of site for building construction, Principles of planning, Orientation of building and its relation to outside environment.

Text Books:

1. Building Materials and Construction – Arora & Bindra, Dhanpat Roy Publications.
2. Building Materials and Construction by G C Sahu, Joygopal Jena McGrawhill Pvt Ltd2015.
3. Building Construction by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain –Laxmi Publications (P) ltd., New Delhi.
4. Building Materials by Duggal, New Age International.

Suggested Readings:

1. Construction Technology – Vol – I & II by R. Chubby, Longman UK.
2. Alternate Building Materials and Technology, Jagadish, Venkatarama Reddy
3. Concrete: Microstructure, properties and materials, P.K. Mehta and P.J.M. Monteiro, McGraw Hill, 2014.
4. Engineering Materials 1: An introduction to their properties & applications, M.F. Ashby and D.R.H. Jones, Butterworth Heinemann, 2003.
5. Construction materials: Their nature and behaviour, Eds. J.M. Illston and P.L.J. Domone, 3rd ed., Spon Press, 2001.
6. The Science and Technology of Civil Engineering Materials, J.F. Young, S. Mindess, R.J. Gray and A. Bentur, Prentice Hall, 1998.

Course Code	Course Title						Core/Elective
U23CE608	ROAD SAFETY ENGINEERING						OEC-2
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	-	-	-	40	60	3

Course Objectives

1. Introduction to various factors considered for road safety and management
2. Explain the road safety appurtenances and design elements
3. Know the Cause of accidents and accident data
4. Learn crash reduction techniques
5. Discuss the various traffic management techniques

Course Outcomes

After completing this course, the student will be able to:

1. Recall the road safety scenario in India and the world, understand the basic characteristics of motor-vehicle traffic, and explain the fundamentals of traffic engineering. & Statistical methods in traffic safety analysis.
2. Comprehend the concepts of accident analysis, including accident investigations, risk management, collection, and analysis of accident data, and determine possible causes of crashes and crash reduction capabilities.
3. Apply road safety principles in planning and geometric design, including considerations for vehicle and human characteristics, road design, road equipment, junction redesigning, and cross-section improvements.
4. Comprehend the traffic signals and road signs, including factors affecting signal design, provisions for non-motorized vehicles, safety provisions for pedestrians and cyclists, and road signs and pavement markings.
5. Apply traffic management safety audit techniques, tools for safety management systems, and road safety audit processes, and develop road safety improvement strategies.

UNIT I

Introduction: Road Safety scenario in India and World, Road Accident Characteristics. Traffic Safety Analysis: Fundamentals of Traffic Engineering - Basic Characteristics of Motor-Vehicle Traffic, Highway Capacity, Applications of Traffic Control Devices, Design of Parking Facilities, Traffic Engineering Studies; Statistical Methods in Traffic Safety Analysis Regression Methods, Poisson Distribution, Chi- Squared Distribution, Statistical Comparisons.

UNIT II

Accident Analysis: Accident Investigations and Risk Management, Collection and Analysis of Accident Data, Condition and Collision Diagram, Causes and Remedies, Traffic Management Measures and Their Influence on Accident Prevention, Assessment of Road Safety, Methods to Identify and Prioritize Hazardous Locations and Elements, Determine Possible Causes of Crashes, Crash Reduction Capabilities and Countermeasures, Effectiveness of Safety Design Features, Accident Reconstruction. Application of computer analysis of accident data.

UNIT III

Road Safety in planning and Geometric Design: Vehicle And Human Characteristics, Road Design and Road Equipment's, Redesigning Junctions, Cross Section Improvements, Reconstruction and Rehabilitation of Roads, Road Maintenance, Traffic Control, Vehicle Design and Protective Devices, Post Accident Care.

UNIT IV

Traffic Signals & Road signs: Traffic Signals, Factors affecting signal design, street lighting, Provisions for NMT Vehicles in India, Safety Provisions for Pedestrians & Cyclists, Road Signs and Pavement Markings. Safety at Construction Site: Safety provisions for workers at construction site, Construction Zone markings, signs.

UNIT V

Traffic Management safety audit: Traffic Management Systems for Safety, Road Safety Audits and Tools for Safety Management Systems, Road Safety Audit Process, Approach to Safety, Road Safety Improvement Strategies, ITS and Safety.

Text Book

1. Kadiyali L.R,. Traffic Engineering and Transport planning, 9th Edition, Khanna Tech Publishers, 2013.
2. C.E.G. Justo, A. Veeraragavan and S. K. Khanna, Highway Engineering, 10th Edition, Nem Chand Publishers, 2017.

Suggested Readings:

1. Donald Drew, Traffic Flow Theory Chapter 14 in Differential Equation Models, Springer, 1983
2. C. Jotin khisty and B. Kent Lall, Transportation Engineering An Introduction, 3rd Edition, Pearson publications, 2017
3. Elvik, Alena Hoye, Truls Vaa, Michael Sorenson, Handbook of Road Safety measures, second Edition, Emerald Publishing, 2009.
4. Highway Research Programme (NCHRP) Synthesis 336.A synthesis of Highway Research Board, Washington D.C, 2016.