



An Autonomous Institute

Shree Warana Vibhag Shikshan Mandal's

**Tatyasaheb Kore Institute of
Engineering And Technology,
Warananagar**

NBA Accredited Institute



Department of Civil Engineering

**T. Y. B. Tech. Civil Engineering
2022-23**

B. Tech. In Civil Engineering

Syllabus Structure and Curriculum under Autonomy

Abbreviations

Sr. No.	Acronym	Definition
1	ISE	In-Semester Examination
2	ISE-I	In-Semester Examination-I
3	ISE-II	In-Semester Examination-II
4	ESE	End Semester Examination
5	ISA	In-Semester Assessment (Term Work)
6	L	Lecture
7	T	Tutorial
8	P	Practical
9	CH	Contact Hours
10	C	Credit

Course/ Subject Categories

Sr. No.	Acronym	Definition
1	BSC	Basic Science Course
2	HSC	Humanity Science Course
3	ESC	Engineering Science Course
4	PCC	Professional Core Course
5	OEC	Open Elective Course
6	MC	Mandatory Course
7	PEC	Professional Elective Course
8	PW	Project Work (Mini and Major Project)
9	II	Industrial Internship

CO, PO & PSO Mapping Correlation:

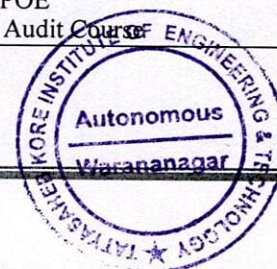
Low	Medium (Moderate)	High (Substantial)
1	2	3

Course/ Subject Code

C	E	5	0	1
Branch Code		Semester	Course Number	

Course Term work and POE Code

C	E	5	0	1	T / P / A
Branch Code		Semester	Course Number		T- Tutorial P- POE A- Audit Course





Vision

To become an academy of excellence in technical education and human resource development.

Mission

- To develop engineering graduates of high repute with professional ethics.
- To excel in academics and research through innovative techniques.
- To facilitate the employability, entrepreneurship along with social responsibility.
- To collaborate with industries and institutes of national recognition.
- To inculcate lifelong learning and respect for the environment.

Quality Policy

To promote excellence in academic and training activities by inspiring students for becoming competent professionals to cater industrial and social needs.





Department of Civil Engineering

Program Educational Objectives (PEO's)

After completion of program, Graduates will be able to

1	To Impart quality technical education and graduate the students for employment in civil engineering and related professions.
2	To provide students with solid foundation in mathematical and analytical subjects so as to solve civil engineering problems and also to pursue higher studies.
3	To develop the ability among the students to organize the data, synthesize data and technical concepts which will helps them to solve problems relevant to the general practice of various civil engineering disciplines
4	To inculcate with the student the expertise of using computer tools to solve problems, for presentations works, acquaint them with professional level software for planning, analysis and design purpose
5	To provide an experience in surveying work, site investigations, familiarity with the real issues of civil engineering including ethics, economy, management and emerging technologies
6	To provide an opportunity for the students to work in team by organizing various curricular and professional activities resulting in the improvement of technical and soft skills.



Department of Civil Engineering

Program Outcomes (PO's)

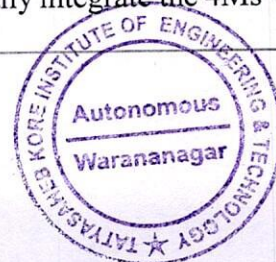
After completion of program, Graduates will be able to

PO1	Demonstrate knowledge in mathematics, basic sciences & civil engineering
PO2	Identify , formulate and solve civil engineering problems.
PO3	Prepare structural design such that fulfills design specification, durability, economy & safety.
PO4	Design and conduct experiment, analyze data & also interpret result to provide conclusion.
PO5	Use appropriate engineering techniques & software tools to analyze civil engineering problems.
PO6	Apply civil engineering knowledge for construction site in all respect like planning, execution and supervision.
PO7	Sensitive towards ethical, societal & environmental issue along with professional work.
PO8	Exhibit understanding of professional & ethical responsibility.
PO9	Ability to function as a leader of multidisciplinary team.
PO10	Communicate effectively in both verbal & written form.
PO11	Develop engineering research ability & project management skill.
PO12	Possess confidence for self education & ability for lifelong learning.

Program Specific Outcomes (PSO's)

After completion of program, Graduates will be able to

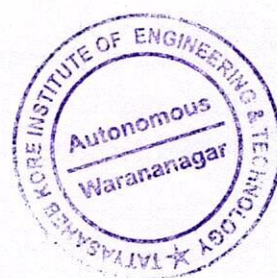
1	Plan and Design, Maintain and execute smart infrastructural projects.
2	Assess and analyze environmental impact of civil engineering projects and take corrective action for sustainable development.
3	Use leadership and communication abilities to optimally integrate the 4Ms Viz.- Men, Money, Material and Machine





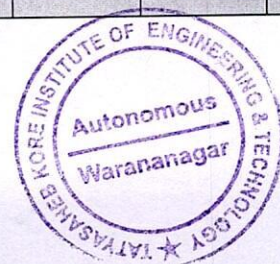
Third Year B. Tech. In CIVIL Engineering

**Syllabus Structure Under Autonomous Status of
TKIET, Warananagar
2022-23**



Semester-V (To be implemented from 2022 - 23) Credit Scheme

Course Code	Category	Course Title	Teaching Scheme					Examination & Evaluation Scheme			
			L	T	P	C	CH	Components	Marks	Min for Passing	
CE501	PCC	Soil Mechanics	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE502	PCC	Water Resource Engineering	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE503	PCC	Theory of Structures	4	-	-	4	4	ESE	60	24	40
								ISE	40	16	
CE504	PCC	Environmental Engineering	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE505	OEC	Open Elective-I	2	-	-	2	2	ESE	60	24	40
								ISE	40	16	
CE501P	PCC	Soil Mechanics	-	-	2	1	2	ISA	25	10	10
								POE	50	20	20
CE502P	PCC	Water Resource Engineering	-	-	2	1	2	ISA	25	10	10
								POE	25	10	10
CE503P	PCC	Theory of Structures	-	-	2	1	2	ISA	50	20	20
CE504P	PCC	Environmental Engineering	-	-	2	1	2	ISA	25	10	10
								POE	50	20	20
CE505P	OCC	Open Elective-I	-	-	2	1	2	ISA	50	20	20
CE 506A	MC	Audit Course – III (Seminars)	-	-	2	-	2	-	-	-	-
			15	-	12	20	27	-	800	320	-



Semester-VI

(To be implemented from 2022 - 23)

Credit Scheme

Course Code	Category	Course Title	Teaching Scheme					Examination & Evaluation Scheme			
			L	T	P	C	CH	Components	Marks	Min for Passing	
CE601	PCC	Design of Steel Structure	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE602	PCC	Reinforced Concrete Structures	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE603	PCC	Legal Aspects & Construction Practices	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE604	PEC	Professional Elective-I	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE605	OEC	Open Elective-II	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE601P	PCC	Design of Steel Structure	-	-	2	1	2	ISA	50	20	20
CE602P	PCC	Reinforced Concrete Structures	-	-	2	1	2	ISA	25	10	10
								POE	50	20	20
CE605P	OEC	Open Elective-II	-	-	2	1	2	ISA	50	20	20
CE606P	MC	Building Modelling & Design	-	-	2	1	2	ISA	50	20	20
								POE	25	10	10
CE604T	PEC	Professional Elective-I	-	1	-	1	1	ISA	50	20	20
CE 607A	MC	Audit Course – IV (Sports & Cultural)	-	-	-	-	-	-	-	-	-
			15	1	08	20	24	-	800	320	-



**Third Year B. Tech.
In CIVIL Engineering**

SYLLABUS

**SEMESTER - V
ACADEMIC YEAR 2022-23**



CE501-SOIL MECHANICS

Lectures : 3 Hrs/Week
Credit : 3
Tutorials : ---

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The objective of the course is to

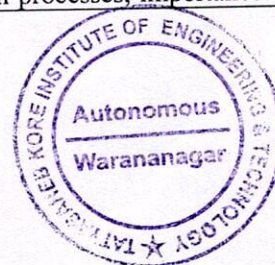
1. To provide a coherent development to the students for the course in the field of soil mechanics & soil improvement techniques
2. To present different soil conditions, their analysis and applications to design field as a foundation.
3. To give a practical experience in the implementation of soil properties and its behavior in the wide field of soil mechanics.
4. To involve the learning methods of soil properties improvisation by compaction, consolidation and ground improvement techniques.

Course Outcomes (CO):

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Understand soil origin, physical properties, phase relationships, and classification methods	Remember Understand
CO2	Analyze soil permeability, seepage behavior, and stress conditions under various soil states	Understand Analyze
CO3	Understand soil compaction principles, factors influencing compaction, field control techniques, and consolidation behavior for construction applications	Understand
CO4	Understand Bousinessq and Westergaard theories for stress distribution, load applications, and methods for calculating contact pressures in various soil conditions	Understand Apply
CO5	Analyze shear strength using Mohr-Coulomb theory and evaluate soil strength through various tests and drainage conditions	Apply Evaluate
CO6	Understand earth pressure concepts, Rankine's theory for cohesive and cohesionless soils, and their applications in practical scenarios	Understand Apply

Description

Soils mechanics refers to the art of applying the mechanics of solids to the soil to predict its deformation behavior and strength. Understanding soil mechanics enables engineers and other professionals to create structures with soil and appreciate its interaction with other structures built on it. This course teaches students basic fundamentals of soil, its properties and applications to practical field. Prime focus on permeability and its calculations, fundamentals of soil compaction, methods and consolidation processes, importance of shear

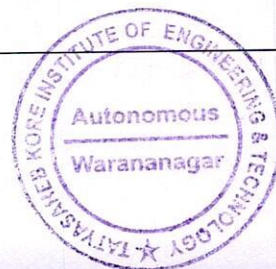


strength in design of structures over soil, stress developed in soil, importance of lateral soil pressure, analysis and of design vertical/abutment walls against soil pressure. This course also helps in applying different test on soil for its investigation, soil study in deep is essential before beginning of construction activities of any structure over it.

Prerequisites:	1:	Knowledge of different types of soil available in field
	2:	Compaction process and different types of equipment used for compaction
	3:	Different types of earthen structures, stress and resultant calculations
	4:	Units and conversions

Section – I

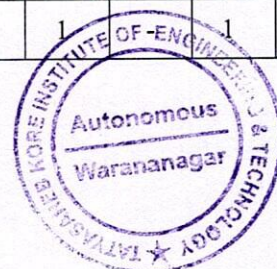
SOIL PROPERTIES		
Unit 1	Origin of soil, soil structure, soil phase systems, weight-volume relationship, Index properties of soil – unit weights, water content, specific gravity, void ratio, porosity, air content, degree of saturation, their relationships and significance, particle size distribution by sieve analysis and hydrometer analysis, Atter berg's consistency limits (Liquid limit, plastic limit, shrinkage limit), consistency indices and activity number, unified and Indian standard soil classification system, Casagrande plasticity chart	6 Hrs
PERMEABILITY AND SEEPAGE ANALYSIS		
Unit 2	Darcy's law and its validity, one dimensional permeability factors affecting permeability of soil, intrinsic permeability, determination of permeability of soil by constant head and variable head methods, permeability of stratified soils, seepage through soil, seepage pressure, flow net, flow net applications, uplift pressure, piping, quick sand condition, critical hydraulic gradient. concept of total stress, pore pressure and effective stress under different soil conditions.	6 Hrs
COMPACTION AND CONSOLIDATION		
Unit 3	Concept of compaction, factors affecting compaction, standard proctor test and modified proctor test as per IS 2720, dry density and moisture content relationship, zero air void line and placement water content. Field compaction control, field compaction equipment with their suitability in construction work, concept of consolidation, factors affecting consolidation, Terzaghi's piston and spring model, Terzaghi's theory of one-dimensional consolidation, lab consolidation tests to find coefficient of consolidation, coefficient of volume change, compression index, coefficient of compressibility, NCC, UCC and OCC	6 Hrs



Section – II		
Unit 4	STRESS DISTRIBUTION IN SOIL	
	Bousinessq theory, assumptions and application to point load, strip load, circular sections, pressure distribution diagrams on horizontal and vertical plane, Radial shear stress, Isobars and pressure bulbs, use of Newmark' s charts, Westergaard's theory assumptions and application to uniformly loaded rectangular area, contact pressure for different footings in different soils, equivalent point load method for stress calculation, approximate method OR (2V:1H) method for stress calculations.	6 Hrs.
Unit 5	SHEAR STRENGTH OF SOIL	
	Concept of shear stress and shear strength, Mohr-Coulomb's theory and failure envelopes for different types of soils such as cohesive soil, cohesionless soil, and composite soils, representation of stress on Mohr's circle, Terzaghi's total stress and effective stress approach, factors affecting shear strength of cohesive and cohesionless soils, determination of shear strength of soil by direct shear test, Triaxial compression test, under UU, CU & CD conditions, unconfined compression test and vane shear test, sensitivity, Skempton pore water pressure parameters.	6 Hrs.
Unit 6	EARTH PRESSURE THEORY	
	Concept of earth pressure, plastic equilibrium, earth pressure at rest, active and passive condition, its practical applications, Rankine's earth pressure theory for cohesionless soils under dry, partially and fully submerged condition, horizontal back fill with surcharge, total lateral force on wall, Bell-Rankine's theory for cohesive soils under dry, partially and fully submerged condition, tension cracks in soil, critical height,	6 Hrs.

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	1	2	2	3	2	1	-	1	-	-	-	-	1	-	-
CO2	2	3	1	2	2	2	-	-	-	-	1	-	2	-	1
CO3	2	2	3	2	1	3	1	1	-	-	1	-	2	1	1
CO4	1	3	1	2	1	-	-	-	-	-	2	-	1	-	1
CO5	1	2	3	2	1	-	-	1	-	-	-	-	2	-	-
CO6	1	2	3	2	1	2	-	1	-	-	1	-	1	-	1



REFERENCES

Text Books	
1	"Soil Mechanics and Foundation Engineering" - B. C. Punmia, Laxmi Publication
2	"Soil Mechanics and Foundation Engineering" - K. R. Arora, Standard Publisher
3	"Soil Mechanics and Foundation Engineering" - V. N. S. Murthy, Marcell Decker
4	"Basic and Applied soil Mechanics" - A. S. R. Rao and Gopal Ranjan, New age International Publication
5	"Geotechnical Testing and Instrumentation" - Alam Singh, CBS Publisher
6	"Geotechnical Engineering" - C. Venkatramaiah, New age International Publication
7	"Geotechnical Engineering" - Purushottam Raj New age International Publication
Reference Books	
1	"Soil Mechanics" - Terzaghi and Peak, Jony Willey and Sons, New York
2	"Soil Testing" - T. W. Lambe, Willey Eastern Ltd, New Delhi



CE-502 Water Resource Engineering

Lectures : 3 Hrs/Week
Credit : 03
Tutorials : ---

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The objective of the course is

1. To impart the basic knowledge of importance of Hydrology & irrigation in water resources development.
2. To know various hydrometeorological parameters and their estimation.
3. To create awareness about floods, their estimation using various methods.
4. To understand the importance of irrigation in Indian agricultural industry considering cropping patterns.
5. To understand the principles of watershed management and water harvesting.

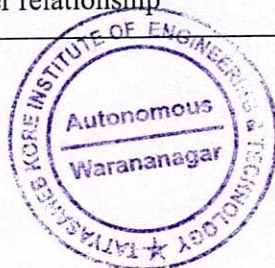
Course Outcomes:

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Analyze hydro metrological processes and utilize advanced measurement techniques of the same	Analyze
CO2	Analyze and apply principles of evaporation, transpiration, infiltration, and runoff, including their measurement and influencing factors.	Apply, Analyze
CO3	Evaluate hydrograph parameters and flood estimation techniques for peak flow and design floods.	Evaluate
CO4	Interpret and relate groundwater occurrence and distribution in aquifers.	Apply, Analyze
CO5	Organize different methods of irrigation and water conservation.	Analyze
CO6	Understand various crops and their water requirement to estimate reservoir capacity.	Understand

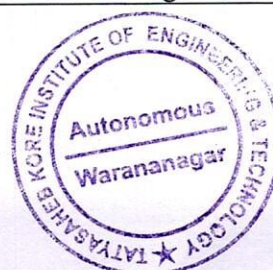
Description:

Water resources engineering has its roots in the tasks of supplying water for human use, removing water when humans are finished using it and developing methods of avoiding damage from excess water (floods). Much of the work of water resource engineers involves the planning and management of constructed facilities that address these tasks. Water resources engineering is the quantitative study of the hydrologic cycle -the distribution and circulation of water linking the earth's atmosphere land and oceans.

Prerequisites:	1:	Basics of Fluid Mechanics
	2:	Basic knowledge of soil water relationship



	3:	Knowledge of flow of Water through open channel	
Section – I			
	Hydrology and Precipitation:		
Unit 1	Introduction of Hydrology: Definition, Importance and scope of hydrology, Hydrologic Precipitation: Forms and types of precipitation, Methods of measurement, Rain-gauge Network, Determination of average precipitation over the catchment & its numerical Estimation of missing rainfall data, Graphical representation of rainfall - Mass rainfall curves, Double mass rainfall curve, Rainfall hyetograph.		6 Hrs
	Evaporation and Runoff:		
Unit 2	Evaporation: Process, Factors affecting, Measurement and control of evaporation Evaporation Transpiration: Process, factors affecting, Measurement. Infiltration: Process, Factors affecting and measurement of infiltration, Infiltration indices & its numerical. Runoff: Classification, Factors affecting runoff, Determination of runoff-empirical equations, Rainfall runoff co-relation.		6 Hrs
	Hydrograph and Floods:		
Unit 3	Hydrograph: Components of Storm hydrograph, Base flow and Separation of base flow, Direct runoff hydrograph, Unit hydrograph – theory, assumptions and limitations, Derivation and use of unit hydrograph, Conversion of UH of different durations using Principle of Superposition S-curve hydrograph. Floods: Introduction of river gauging, Estimation of peak flow - empirical equations, rational method Importance of - Design flood, Standard project flood, Maximum probable flood.		6 Hrs
Section – II			
	Ground Water Hydrology:		
Unit 4	Ground Water Hydrology: Occurrence, Distribution and classification of ground water, Darcy's law, Aquifer parameters. Hydraulics of Well: Under steady flow conditions in confined and unconfined aquifers. Introduction to Tube wells and open wells.		6 Hrs
	Irrigation and Minor Irrigation Works:		
Unit 5	Introduction to Irrigation: Definition and necessity of irrigation, ill-effects of irrigation, Systems of irrigation - Surface, Sub-surface (Drip irrigation), Sprinkler irrigation; Water logging and land drainage, . Minor Irrigation Works: General layout, main components and functioning of 1. Percolation tanks 2. K. T. Weir, 3. Bandhara irrigation 4. Lift irrigation		6 Hrs



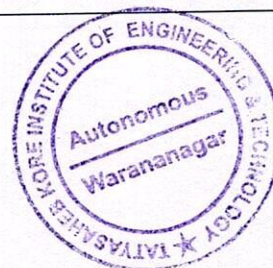
	Water Requirements of Crops:	
Unit 6	Water Requirement of Crops: Principal crops and crop seasons, cropping pattern and crop rotation, Classes and availability of soil water, depth and frequency of watering. Duty, delta, base period and their relationship, factors affecting duty, methods of improving duty. Numerical on command area calculations and reservoir capacity based on crop water requirement.	6 Hrs

Mapping of POs & COs:

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	2	-	1	1	1	-	-	-	-	1	-	1	-	-
CO2	1	2	-	2	-	-	-	-	-	-	1	-	2	-	1
CO3	2	2	-	1	1	-	-	-	-	-	1	-	2	-	-
CO4	-	1	1	1	1	-	-	-	-	-	1	-	-	-	-
CO5	-	1	-	1	1	-	-	-	-	-	-	-	-	-	1
CO6	2	2	-	-	-	-	-	-	-	-	-	-	1	-	1

References:

Text Books	
1	"Irrigation Engineering" – S. K. Garg – Khanna Publishers, Delhi.
2	"Water Resources & Irrigation Engineering" – Dr. K. R. Arora, Standard Publisher.
3	"Irrigation, Water Resources and Water Power Engineering" – Dr P.N. Modi, Standard Book House.
4	"Irrigation and Water Power Engineering" – Dr. Punmia and Dr. Pande – Laxmi Publications, Delhi
5	"Engineering Hydrology" – Dr. K. Subramanya, -Tata McGraw Hill, New Delhi.
Reference Books	
1	"Hydrology and water resources" - R. K. Sharma, Dhanpatrai and sons, New Delhi.
2	"Theory and design of irrigation structures" - Varshney, Gupta and Gupta, vol. I and II and III, New Chand and Brothers.



3	"Irrigation Theory and practice" - Michael, Vikas Publications House.
4	"Water management" - Jaspal Sing, M. S. Acharya, Arun Sharma, Himanshu Publications.
5	"Design of M.I. and Canal Structure" - Satyanarayan and R. Murthy, Wiley Eastern Ltd, New Delhi.
6	"Irrigation Engineering" - Raghunath, Wiley Eastern Ltd, New Delhi.



CE503-THEORY OF STRUCTURES

Lectures : 4 Hrs./Week
Credit : 4
Tutorials : ---

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The objective of the course is

1. To impart principles of elastic structural analysis and behavior of indeterminate structures.
2. To analyze indeterminate structures by using different methods.
3. To make aware of the limitations of the methods of solution and their outcomes.

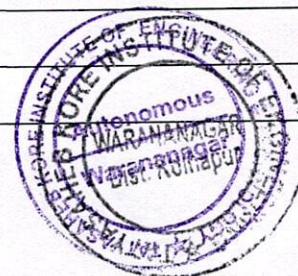
Course Outcomes (CO):

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Remember the concept of indeterminacy and various methods of analysis.	Remember
CO2	Analyze Continuous Beams with Clapeyron's 3 moment theorem	Analyze
CO3	Understand and Apply Strain Energy theorem in Indeterminate Structures	Understand Apply
CO4	Analyze Continuous Beams and Frames Using Slope-Deflection Method	Analyze
CO5	Analyze Continuous Beams and Frames Using Moment Distribution Method	Analyze
CO6	Understand and analyze matrix method for indeterminate beams.	Understand Analyze

Description:

Theory of Structures teaches the basic difference between statically determinate structures and Indeterminate structures. The creativity and imagination of an architect come to reality by adopting a suitable structural system. Architects should understand the basic principles and concepts of structure in order to apply the structural system suitably but Civil engineers are required to use structural design to ensure the safety and stability of the structure before they add in some creative designs into a structure for visual appeal. This course teaches different methods for analysis of indeterminate structures including frames. The advance software tools for analysis are based on basic fundamentals of these methods. The student is capable to do analysis and design of RCC structures by using fundamentals of theory of structures.

Prerequisites	1	Basic knowledge of Structural mechanics
	2	Conceptual knowledge of statically determinate structures
	3	The basics of different types of beams and loadings
	4	Knowledge of matrices from Mathematics



	5	Basics of analysis and design	
	6	Different types of analysis methods	
Section – I			
Unit 1	Introduction and Consistent Deformation Method		
	Concept of determinacy and indeterminacy, Degrees of freedom and structural redundancy Methods of analysis. Consistent deformation method: propped cantilever with uniform section, fixed beams		6 Hrs.
Unit 2	Clapeyron's Theorem		
	Clapeyron's theorem of three moments, application to Continuous beams, Sinking of supports		6 Hrs.
Unit 3	Energy Theorems		
	Introduction to Castiglione's theorem and unit load method. unit load method (Degree of S.I. ≤ 2), application to statically indeterminate beam		6 Hrs.
Section – II			
Unit 4	Slope Deflection Method		
	Introduction to Slope deflection equation, Modified slope deflection equation Application to continuous Beams. Concept of sinking of supports. Portal frame without sway.		6 Hrs.
Unit 5	Moment Distribution Method		
	Moment distribution method (Degree of S.I. ≤ 2), application to Application to continuous beam. Sinking of supports. Portal frames without sway.		6 Hrs.
Unit 6	Matrix Methods		
	Introduction to Flexibility Method and Stiffness Method. Stiffness coefficients, Development of stiffness matrix, Equilibrium equations, Applications to beams.		6 Hrs.

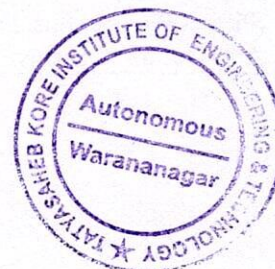


CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	1	2	2	-	1	-	-	-	-	-	-	-	2	-	-
CO2	2	2	3	-	1	-	-	-	-	-	-	-	3	-	-
CO3	2	2	3	-	1	-	-	-	-	-	-	-	3	-	-
CO4	2	2	3	-	1	-	-	-	-	-	-	-	3	-	-
CO5	2	2	3	-	1	-	-	-	-	-	-	-	3	-	-
CO6	2	2	3	-	1	-	-	-	-	-	-	-	3	-	-

REFERENCES

Text Books	
1	"Structural Analysis" - Bhavikatti, Vikas Publishing House Pvt, Ltd.
2	"Analysis of Structures" - Vazirani and Ratwani, Vol. I & II, Khanna Publishers.
3	"Mechanics of Structures" - S. B. Junnarkar, H.J. Shah, Vol-I & II, Charotar Publishers.
4	"Structural Analysis: Matrix approach - Pandit and Gupta.
5	"Structural Analysis" - L.S. Negi and R.S. Jangid, Tata Mc-Graw Hills Publishing House, New Delhi
Reference Books	
1	"Basic Structural Analysis" - C.S. Reddy, Tata McGraw Hill Publishing House, New Delhi.
2	"Structural Analysis" - Devdas Menon, Narosa Publishing House.
3	"Matrix analysis of structures" - Gere & Weave.
4	"Indeterminate structural analysis" - C.K. Wang.



CE504 - ENVIRONMENTAL ENGINEERING

Lectures : 3 Hrs/Week
Credit : 3
Tutorials : ---

Evaluation Scheme

ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The objective of the course is to

1. To understand various sources of water and waste water with respect to the quality and quantity of water and wastewater (Sewage).
2. To understand the concept and working of various water and wastewater treatment units and its design.
3. Understand the analysis of water distribution and sewage transportation system.

Course Outcomes:

COs	At the end of successful completion of the course, the student will be able to	Bloom's Taxonomy
CO1	Analyze and design a water supply scheme by estimating water demand, assessing quality standards, and selecting appropriate intake structures	Knowledge Analyze
CO2	Understand and apply the principles of water treatment processes, including aeration, coagulation, sedimentation, filtration, disinfection, and softening techniques, for safe and efficient water purification	Understand Apply
CO3	Analyze and design water transmission and distribution systems, including pipe network analysis, appurtenances, leakage control, and water auditing for efficient water supply management.	Analyze Design
CO4	Analyze wastewater characteristics, flow variations, sewerage system design, and pumping requirements for effective wastewater management	Understand Analyze
CO5	Understand and design primary, secondary, and low-cost wastewater treatment processes, including sludge management and sewage recycling, for sustainable wastewater treatment.	Understand Evaluate
CO6	Understand stream pollution, self-purification mechanisms, and wastewater disposal methods while ensuring compliance with MPCB and CPCB standards	Understand

Description:

Environmental Engineering is focused on analysing and understanding the quality of water and waste water. Knowledge of quality of water and waste water allows for the design of WTP and STP. Life of people is dependent on the quality of water supplied and waste water generated. One should know the transportation of water and waste water. This subject will provide the platform for the students to diversify their interest in environmental needs and their implementation. The quality standards of waste water and drinking water will create awareness among the society through civil engineering students. The awareness about major problem of river pollution will be handled effectively after understanding the environmental engineering.



Prerequisites	1	Knowledge about water quality parameters
	2	The sources of waste water generation and their collection
	3	Systems of water supply
	4	Knowledge of fluid mechanics including discharges
	5	River water lift and pollution of river
Section – I		
Unit 1	Introduction to water supply	
	Data collection for water supply scheme, components and layout. Design period, factors affecting design period. Quantity: Rate of water consumption for various purposes like domestic, industrial, institutional, commercial, fire demand and water system losses, factors affecting rate of demand, Population forecasting. Quality: Water quality parameters, characteristics & significance in water treatment, drinking water quality standards- BIS, WHO Standards. Water intake structures: General design considerations, types such as river intake, canal intake and reservoir intake, Concept of rising main and pumping station.	6 Hrs
Unit 2	Water treatment	
	Principles of water treatment processes. Introduction to different types of water treatment flow sheets. Aeration: Principle and Concept, Necessity, Methods, Design of cascade aerator. concept Coagulation & Flocculation- Theory, factors affecting, destabilisation of colloidal particles, types of dosing of coagulants, selection of coagulants, jar tests, rapid mixer & flocculator, Theory of Clariflocculation. Concept of Sedimentation- Theory, types of settling, types of sedimentation tanks, principles & design steps, concept of tube & plate settler. Filtration- Mechanism, head loss development, negative head loss, Types of filters- Slow sand filter, Rapid sand filter & Pressure filter, operation & design of slow sand & rapid sand filter. Disinfection- Theory, factors affecting disinfection, types of disinfectants, types and methods of chlorination breakpoint chlorination. Water softening processes - lime-soda process, ion exchange Demineralization - Reverse osmosis, electro dialysis	6 Hrs



Unit 3	Concept of Distribution reservoirs & service storages	
	<p>Necessity, location, head requirement, capacity determination by analytical & graphical method. Transmission of water, pumping & gravity mains, choice of pipe materials, forces acting on pressure pipes, leakage & pressure testing of pipes, thrust block concept, corrosion types & control measures.</p> <p>Water distribution systems, method of distributing water, layout pattern, basic system requirements for water distribution system, and methods of network analysis: equivalent pipe method, Hardy-Cross method, design problem. Water supply appurtenances- sluice valve, air relief valve, gate valve, non-return valve, scour valve, fire hydrants water metre, service connections, maintenance & leak detection of water distribution system. Necessity of water audit, water audit in domestic sector, Pre-feasibility report and feasibility report, Concept of preparation of DPR</p>	6 Hrs
Section – II		
	Components of wastewater	
Unit 4	<p>Wastewater flows, wastewater sources and flow rate, Variations in flow rates and strength, wastewater constituents, Characteristics of Municipal wastewater, Problems on B.O.D. calculations, Quantity of stormwater. Sewerage system, Types, Layout, Types of sewers, Collection system, Appurtenances, Design of sanitary and storm water sewers, Maintenance of sewerage systems Sewage and Sludge pumping, Location, Capacity, Concept of pumping station.</p>	6 Hrs
	Treatment of Wastewater	
Unit 5	<p>Primary & Secondary Treatment-Screening, comminuting, Grit removal, Oil and Grease trap Primary settling tank. Secondary Treatment-Activated sludge process, Process, design and operating parameters of ASP, modification of ASP, Operational problems, Concept of trickling filter. Sludge Treatment and disposal, Concept of anaerobic digestion, types of reactors. Low-cost wastewater treatment methods-Principles of waste stabilization pond. Design and operation of oxidation pond, Operation of aerobic & anaerobic Lagoons, Oxidation ditch, Septic tank. Selection of alternative Treatment process flow sheets, Concept of recycling of sewage</p>	6 Hrs
	Stream Pollution	
Unit 6	<p>Stream pollution, Self-Purification, DO sag curve, Streeter Philp's Equation, Stream classification, disposal of waste water methods, effluents standards for stream and land disposal as per MPCB and CPCB standards</p>	6 Hrs

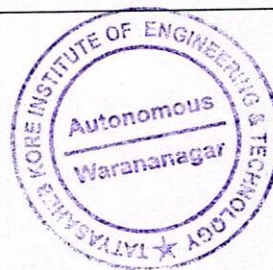


CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	3	3	2	2	3	2	2	-	1	1	1	3	2	2
CO2	1	3	3	2	2	2	2	2	-	-	2	2	2	2	2
CO3	2	3	3	2	2	3	2	2	-	1	1	1	3	2	2
CO4	3	3	3	2	2	3	1	2	-	1	1	1	3	2	2
CO5	1	3	3	2	2	2	2	2	-	-	2	2	2	2	2
CO6	-	2	2	1	-	2	1	1	-	-	1	-	1	1	1

REFERENCES

Text Books	
1	Environmental Engineering by Peavey, H. S. Rowe, D.R. and Tchobanoglous McGraw Hill Book Company.
2	Water Supply and Pollution Control by Viessman W. and Hammer M.J. HarperCollins College Publishers.
3	Water and Waste Water Technology by Hammer M.J. Prentice-Hall of India Private Ltd.
4	Water and Wastewater Technology by G.S. Birdie and J.S. Birdie
5	Water Supply by Duggal K. N, S. Chand and Company.
6	Water Supply by Garg S.K., Khanna Publishers.
7	Water Supply and Waste water Disposal by Fair and Gayes, John Wiley Publication.
Reference Books	
1	Manual on Water Supply and Treatment- Government of India Publication. -1993
2	Water and Waste Water Engineering Vol. I & II, John Wiley Publication, 1966. Fair G. M, Geyer J. C, and Okun D. A
3	Water and Wastewater Technology, Prentice Hall of India Private Limited, 1996. Hammer
4	Manual on sewerage & sewage Treatment published by Ministry of Urban Development Govt. of India Msy-2000. 35 PDOP-4-59-85-97, Ministry of Urban development
5	Water and wastewater Technology - Hammer M.J, [Prentice-Hall of India Private Ltd.]
6	Masters. G.M. Introduction to Environmental Engineering and Science




OPEN ELCTIVE-I

CE505-PROJECT MANAGEMENT

Lectures : 3Hrs/Week
Credit : 3
Tutorials : 1

Evaluation Scheme
ISE : 40Marks
ESE : 60Marks

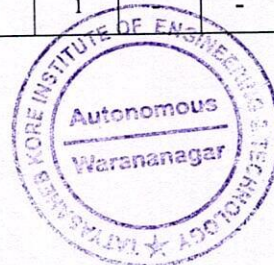
Course Objectives: The objective of the course is to		
1. To learn project management tools. 2. To understand Resource management. 3. To get acquainted with financial management.		
Course Outcomes (CO):		
COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Use the Project planning and management tools in Construction.	Knowledge Understand
CO2	Evaluate and draw project network for estimating time and Cost.	Understand Apply
CO3	Know the techniques of resource management.	Apply
CO4	Understand the economic comparison of alternatives.	Apply
CO5	Evaluate feasibility of alternatives using investment criteria.	Apply Evaluate
CO6	To get acquainted with occupational ethics.	Knowledge Understand

Description:	
<p><i>Project Management</i> is versatile subject which deals with understanding various aspects of engineering projects. It covers application of tools of handling project in scientific way. Also, this subject explores resource management techniques along with Economic and Financial analysis of projects. The valuable insights and awareness about work behavior parameters like safety, health hazards are created during project management.</p>	
Prerequisites:	1. Basic knowledge of working of Business organization.
	2. Strong ability to do mathematical calculations with logic.
	3. Financial knowledge of how and money transactions.
	4. Basic idea about planning and execution.
	

Section-I		
Unit 1	Project Management Concept	
	Principles of Management (H. Fayols), Functions of management, Decision tree, Work Break down structure, Phases& Agencies of Construction Project.	4Hrs
Unit 2	Network Analysis: CPM	
	Bar Chart, Gantt Chart, CPM Network: Time estimate, Floats, Critical path, Network compression, Network updating. PERT (only introduction.)	9Hrs
Unit 3	Resource Management	
	Objectives, Functions, Resource Smoothing and levelling, Inventory Control Methods: ABC, EOQ, HML, VED, SDE. (Numerical on ABC&EOQ).	5Hrs
Section-II		
Unit 4	Financial Management	
	Time value of money, Equivalence, Demand and supply theory, Types of interests, Uniform series factors. <i>Economic Comparison Methods:</i> Present worth method, EUAC method, Capitalized cost method.	8Hrs
Unit 5	Economic Analysis	
	Discounting and Non discounting investment Criteria's: - Net present value, Rate of return, Benefit cost ratio, Payback period method, Break even analysis.	6Hrs
Unit 6	Miscellaneous	
	ISO:9000, Site layout & factors affecting, Safety in construction-Injury sources and causes, occupational health hazards, Personal protective equipments.	4Hrs

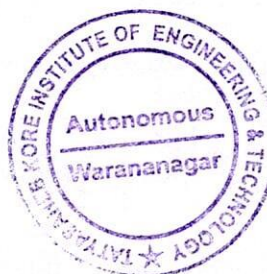
CO – PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	1	1	-	-	1	1	-	-	1	-	1	-	1	2	-
CO2	1	2	-	-	2	2	-	-	-	-	1	1	1	-	-
CO3	1	2	-	-	1	2	-	-	-	-	1	1	1	1	-
CO4	-	1	-	-	1	2	-	-	-	-	-	-	2	1	-
CO5	-	2	-	-	1	2	-	-	-	-	-	-	-	1	-
CO6	1	-	1	-	-	2	-	2	-	2	1	-	-	-	-



REFERENCES

Text Books	
1.	"Project planning and Control with PERT and CPM"- B. C. Punmia, K.K. Khandelwal, Laxmi Publication, edi.2002.
2.	"PERT& CPM: Principles and Application"-Srinath L.S, Affiliated East-West Press(Pvt.) Ltd. 1 January 2001).
3.	"Construction Engineering and Management"- Dr. S. Seetharaman, Umesh Publications,2017.
4.	Financial Management"- Prasanna Chandra, TATA McGraw Hill.2011
Reference Books	
1.	"Engineering Management"-Stoner, Pearson Publication.; Sixth edition(19January2018)
2.	"Construction Project Management"- K. K. Chitkara, TATA McGraw Hill, 1998.
3.	"Project Cost Control in Construction"-Roy Pilcher, Blackwell Scientific Publications.1994
4.	"Engineering Economics"- Layland Blanck and Tarquin, TATA McGraw Hill.1998

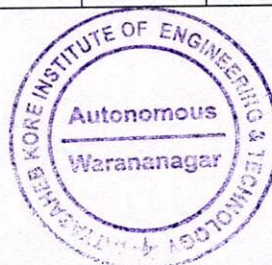


CE501P – SOIL MECHANICS (Lab)**Practical's:** 2 hrs / week**Credits:** 1**Examination Scheme:****ISA:** 25 Marks**POE:** 50 Marks

Course Objectives: The objective of the course is to		
1) To introduces different types of soils and their properties 2) To familiar different types of tests to be conducted on soil to study their behavior. 3) To understand difference between field tests and lab tests on soil. 4) To evaluate and study significance of soil testing		
Course Outcomes (CO):		
COs	At the end of successful completion of the practical's the student will be	Blooms Taxonomy
CO1	Understand various equipment's used for evaluation of soil properties	Knowledge, Apply
CO2	Apply the testing on field soil in both disturbed and undisturbed conditions	Apply
CO3	Analysis of soil properties such as Index Properties, Engineering properties, permeability, compaction, shear strength	Analyze
CO4	Understanding of result specifications for various experiments on soil.	Understand

PRACTICALS**A] Performance of at least eight experiments from the following:**

Sr. No.	Practical/ Experiment/Tutorial Topic	Hrs.	Bloom's Taxonomy
01	Determination of specific gravity by pycnometer Or density bottle method	2	Knowledge
02	Determination of water content by oven drying method & Pycnometer method	2	Knowledge
03	Particle size distribution by dry sieve analysis	2	Knowledge, Analyze
04	Particle size distribution by hydrometer analysis	2	Knowledge, Analyze
05	Determination of consistency limits (LL, PL, SL)	2	Knowledge



06	Determination of field density by core cutter method	2	Knowledge, Analyze
07	Determination of field density by sand replacement method	2	Analyze
08	Determination of MDD & OMC by standard/Modified proctor test	2	Analyze
09	Determination of coefficient of permeability by variable head method/Constant head method	2	Analyze
10	Determination of shear strength parameters of soil by using direct shear test	2	Analyze
11	Determination of shear strength of soil using Triaxial, Unconfined compression test and Vane shear test (Any one)	2	Analyze

B] One assignment on each unit with minimum five numerical in each assignment

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	3	1	1	1	1	-	-	-	-	-	-	1	-	1
CO2	1	2	2	-	-	2	-	-	-	-	-	-	-	-	-
CO3	1	2	2	3	2	1	-	-	-	-	-	-	1	-	1
CO4	1	1	2	1	2	1	-	-	-	-	-	-	-	-	1

REFERENCES

Text Books

1	"Soil Mechanics and Foundation Engineering" - B. C. Punmia, Laxmi Publication
2	"Soil Mechanics and Foundation Engineering" - K. R. Arora, Standard Publisher
3	"Soil Mechanics and Foundation Engineering" - V. N. S. Murthy, Marcell Decker

Reference Books

1	"Soil Mechanics in Engineering Practice," Karl Von Terzaghi, Wiley-Inter science; 3rd edition
2	Geotechnical engineering: principles and practices of soil mechanics and foundation engineering, V. N. S. Murthy
3	"Principles of Geotechnical Engineering", Braja M. Das, California State University, Sacramento, Cengage India Private Limited; Ninth edition

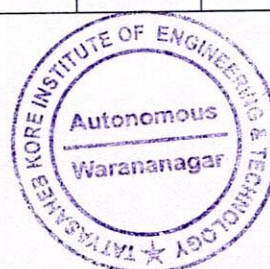


CE-502 P Water Resource Engineering**Practical's:** 2 hrs / week**Scheme:****Credits:** 1**Examination****ISA:** 25 Marks**POE:** 25 Marks

Course Objectives: The objective of the course is to		
1) To familiarize the students with determination of average annual rainfall (AAR) 2) To familiarize the students with different infiltration losses. 3) To familiarize the students with Ground water hydrology 4) To introduce the student with minor irrigation structures.		
Course Outcomes:		
COs	At the end of successful completion of the course the student will be able to	Blooms Taxonomy
CO1	Determine different infiltration losses like Phi-index, W- Index	Knowledge, Apply
CO2	Understand unit hydrograph using method of superposition and S- curve technique	Analyze
CO3	Understand concept of minor irrigation structures	Understand Analyze
CO4	Determine crop water requirement	Knowledge, Apply

Assignments on following topics (at least 6):

Sr. No.	Practical/ Assignments/Tutorial Topic	Hrs.	Bloom's Taxonomy
1	Determination of average annual rainfall using Thiessens polygon & Isohyetal map method	2	Apply
2	Consistency of rain gauge station by double mass rainfall curves.	2	Knowledge Apply
3	Determination of evaporation losses, effective rainfall hyetograph infiltration losses – Phi index calculation, Horton's infiltration curve.	2	Apply
4	To develop a unit hydrograph from a total runoff hydrograph resulting from isolated storms.	2	Knowledge, Analyze
5	Alteration of base period of given unit hydrograph using method of superposition and Scurve technique	2	Knowledge
6	Determination of well discharge in a	2	Analyze



	confined/unconfined aquifer.		
7	Layout of Percolation tank, K. T. Weir, Bandhara Irrigation, Lift Irrigation	2	Analyze
8	Estimating depth and frequency of irrigation on the basis on soil moisture regime concept.	2	Knowledge, Analyze
9	Crop water requirement and irrigation command area calculations	2	Knowledge, Analyze
10	Site visit & report on meteorological station	2	Knowledge,

Mapping of POs & COs:

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	1	1	1	--	--	--	---	--	--	---	--	--	---	--
CO2	2		2	2	--	--	--	---	--	--	---	--	--	---	--
CO3	1	2	2	--	--	--	--	---	--	--	---	--	--	---	--
CO4	--	2	--	1	--	--	--	---	--	--	---	--	--	---	--

References:

Text Books	
1	"Irrigation Engineering" – S. K. Garg – Khanna Publishers, Delhi.
2	"Water Resources & Irrigation Engineering" – Dr. K. R. Arora, Standard Publisher.
3	"Irrigation, Water Resources and Water Power Engineering" – Dr P.N. Modi, Standard BookHouse.
Reference Books	
1	"Irrigation Engineering" - Raghunath, Wiley Eastern Ltd, New Delhi.
2	"Irrigation Theory and practice" - Michael, Vikas Publications House.
3	"Water management" - Jaspal Sing, M.S.Acharya, Arun Sharma, Himanshu Publications.



CE503T-THEORY OF STRUCTURES

Lectures : ----
Credit : 1
Tutorials : 2 hrs./Week

Evaluation Scheme
ISA : 50 Marks

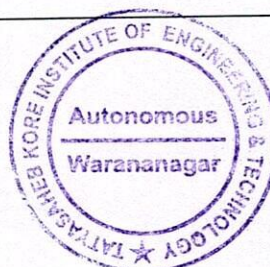
Term work shall comprise of

At least one assignment on each unit with minimum six questions

No of Assignment	CO	Description
Assignment No-01	CO-01	Consistent Deformation Method
Assignment No-02	CO-02	Clapeyron's Theorem
Assignment No-03	CO-03	Energy Theorems
Assignment No-04	CO-04	Slope Deflection Method
Assignment No-05	CO-05	Moment Distribution Method
Assignment No-06	CO-06	Matrix Methods

REFERENCES

Text Books	
1	"Structural Analysis" - Bhavikatti, Vikas Publishing House Pvt, Ltd.
2	"Analysis of Structures" - Vazirani and Ratwani, Vol. I & II, Khanna Publishers.
3	"Mechanics of Structures" - S. B. Junnarkar, H.J. Shah, Vol-I & II, Charotar Publishers.
4	"Structural Analysis: Matrix approach - Pandit and Gupta.
5	"Structural Analysis" - L.S. Negi and R.S. Jangid, Tata Mc-Graw Hills Publishing House, New Delhi
Reference Books	
1	"Basic Structural Analysis" - C.S. Reddy, Tata McGraw Hill Publishing House, New Delhi.
2	"Structural Analysis" - Devdas Menon, Narosa Publishing House.
3	"Matrix analysis of structures" - Gere & Weave.
4	"Indeterminate structural analysis" - C.K. Wang.

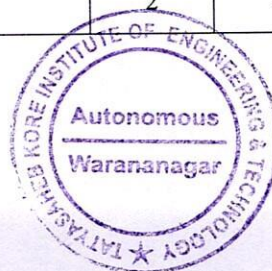


CE504 P - ENVIRONMENTAL ENGINEERING (Lab)**Practical's:** 2 hrs / week**Credits:** 1**Examination Scheme:****ISA:** 25 Marks**POE:** 25 Marks

Course Objectives: The objective of the course is to		
1. To familiarize the students with the quality of water and waste water. 2. To familiarize the students design concept of WTP & STP 3. To understand working of WTP & STP		
Course Outcomes (CO):		
COs	At the end of successful completion of the course the student will be able to	Blooms Taxonomy
CO1	Evaluate different properties like pH, Hardness, Acidity, Alkalinity, Chlorides of water and waste water.	Evaluate
CO2	Understand distribution of Water and collection of waste water	Understand
CO3	Analysis and design of water and sewerage system for a selected area.	Analyse Design
CO4	Understand the concept of drinking water treatment and waste water treatment by physical visit to treatment plant	Understand Remember

PRACTICALS

Sr. No.	Practical/ Experiment/Tutorial Topic	Hrs.	Bloom's Taxonomy
1	pH	2	Analyze
2	Alkalinity	2	Analyze
3	Solids	2	Analyze
4	Chlorides	2	Analyze
5	DO	2	Analyze
6	BOD	2	Analyze
7	COD	2	Analyze
8	Sulphates	2	Analyze
9	Oil & grease	2	Analyze



10	Volatile acids	2	Analyze
11	Design/Analysis problems on Water and sewerage system and treatment system,		Knowledge Apply
12	Visit to Water Treatment Plant and sewage treatment plant & visit report.		Knowledge Apply

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	2	2	3	1	-	-	1	-	-	1	-	2	-	1
CO2	1	2	3	3	2	1	2	1	-	-	2	1	1	-	2
CO3	2	3	3	3	2	1	1	2	-	-	1	1	2	-	2
CO4	-	2	1	1	3	3	2	-	-	-	2	2	2	-	-

REFERENCES

Text Books	
1	Water Supply by Garg S.K., Khanna Publishers.
2	Water Supply and Wastewater Disposal by Fair and Gayes, John Wiley Publication.
3	Water Supply Engineering by B.C.Punmia, Ashok Jain, Arun Jain, Laxmi Publications
4	WasteWater Engineering Treatment & Disposal - MERTCALF & EDDY, [Tata McGraw Hill]
Reference Books	
1	Manual on Water Supply and Treatment- Government of India Publication. -1993.
2	Manual on sewerage & sewage Treatment published by Ministry of Urban Development Govt. of India Msy-2000. 35 PDOP-4-59-85-97, Ministry of Urban development
3	“Water and Waste Water Engineering Vol. I & II”, John Wiley Publication, 1966. Fair G. M, Geyer J. C, and Okun D. A



OPEN ELECTIVE - I

CE505P-PROJECT MANAGEMENT (Lab)

Practical's: 2hrs./week

Credits: 1

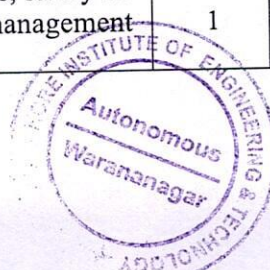
Examination Scheme:

ISA: 50 Marks

Course Objectives: The objective of the course is to		
1. To familiarize the students with Project flow and various tools of Project planning, scheduling and controlling.		
2. To inculcate in students the knowledge of Resource management, Finance and economics.		
Course Outcomes (CO):		
COs	At the end of successful completion of the course the student will be able to	Blooms Taxonomy
CO1	Learn project management, evaluate and draw the network for estimating time and cost.	Understand Apply
CO2	Know the techniques of resource management, plan, order and estimate materials for project.	Apply
CO3	Understand economic comparison methods and feasibility criteria's of investment in a project.	Apply Evaluate
CO4	Acquainted with occupational ethics and learn project management software tools.	Knowledge Understand

PRACTICALS

Sr. No.	Practical/Experiment/Tutorial Topic	Hrs.	Bloom's Taxonomy
1	Project management concept, principles, functions, Phases and agencies, decision tree.	2	Knowledge Understand
2	Bar chart, elements of network development, CPM, time estimates.	2	Understand Apply
3	Float, project cost, network compression, updating and PERT concept.	2	Analyze
4	Resource management objectives, functions, resource leveling and smoothening. Inventory control methods-EOQ, ABC, HML, VED, SDE (Numerical on ABC & EOQ)	2	Apply
5	Financial management, TVM, cash flow diagram, uniform series factors, problems on economic comparison methods (PW, EUAC, CC method)	2	Apply
6	Economic Analysis NPV, ROR, B/C ratio, Payback period, & BEA.	1	Apply Evaluate
7	Miscellaneous ISO:9000 Site layout factors, safety in construction PPEs and Microsoft project management (MSP)	1	Knowledge Understand

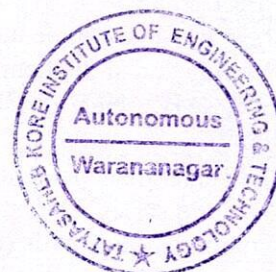


CO –PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	1	1	-	-	2	2	-	-	1	-	1	1	1	2	-
CO2	1	2	-	-	1	2	-	-	-	-	1	1	1	1	-
CO3	-	2	-	-	1	2	-	-	-	-	-	-	2	1	-
CO4	1	-	1	-	1	2	-	2	-	2	1	-	-	-	-

REFERENCES

Text Books	
1.	“Project planning and Control with PERT and CPM”-B. C. Punmia, K. K. Khandelwal, Laxmi Publication, edi.2002.
2.	“PERT & CPM: Principles and Application”- Srinath L.S, Affiliated East West Press (Pvt.) Ltd. (1January 2001).
3.	“Construction Engineering and Management”-Dr. S. Seetharaman, Umesh Publications,
4.	“Financial Management”-Prasanna Chandra, TATA McGraw Hill.2011
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1.	“Engineering Management”-Stoner, Pearson Publication. Sixth edition(19January2018)
2.	“Construction Project Management”- K. K. Chitkara, TATA McGraw Hill, 1998.
3.	“Project Cost Control in Construction”-Roy Pilcher, BlackwellScientificPublications.1994
4.	“Engineering Economics”-Layland Blanck and Torquing, TATAMcGrawHill.1998



**Third Year B. Tech.
In CIVIL Engineering**

SYLLABUS

**SEMESTER - VI
ACADEMIC YEAR 2022-23**



CE601 – DESIGN OF STEEL STRUCTURES

Lectures : 3 Hrs/Week
Credit : 3
Tutorials : ---

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The objective of the course is to

1. To understand the behavior of elements of steel structure.
2. To understand the design concept of steel structure.
3. To have sense of design of professional ethics

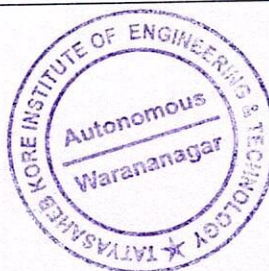
Course Outcomes:

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Understand different types of welded and bolted connections by using necessary elements for analyzing steel structures.	Remember
CO2	Evaluate axially loaded tension member along with its end connection	Evaluate
CO3	List and describe essential elements necessary to analyze and design of compression member.	Remember
CO4	Analyze and design axially and eccentrically loaded columns along with its different types of column bases.	Analyze
CO5	Analyze and design laterally supported and unsupported beams with their end connections.	Analyze
CO6	Calculate forces acting on gantry girder and its design as laterally unsupported beam.	Apply

Description:

The course deals with design of steel structures using “Limit State Design Method”. The design methodology is based on the latest Indian Standard Code of Practice for general construction (IS 800:2007). The subject covers all the necessary components such as material specifications, connections and elementary design of structural members for designing industrial steel structures. The course provides material specifications and design considerations. It provides relevant material properties of different types of steel. This course teaches the design of trusses for small and long scale for industrial structures.

Prerequisites	1	Students should locate centroid and find MI of any cross-section.
	2	Students must be able to find effective length and slenderness ratio
	3	Students must be able to draw SFD and BMD for given loading
	4	Capable to evaluate bending moments, axial forces and shear forces
	5	Knowledge of welding and bolting process



Section – I		
Unit 1	Introduction & Connections	
	Design Philosophy, comparison of LSM & WSM, advantages and disadvantages of steel structures, types of steel structures, grades of structural steel, various rolled steel sections, Types of bolts & welds, analysis and Design of axially and eccentrically loaded bolted and welded connections (subjected to bending and torsion). Loads and load combinations, partial safety factors for load and materials, load calculation for roof trusses.	6 Hrs
Unit 2	Tension Member based on IS: 800-2007	
	Common sections, Net area, modes of failure, load carrying capacity, Design of axially loaded tension members, Design of end connections (Bolted and welded).	6 Hrs
Unit 3	Design of Compression Member based on IS: 800-2007	
	Common sections, economical sections, effective length, slenderness ratio, modes of failure, Classification of cross section, behavior of compression member, Load carrying capacity & Design of compression members	6 Hrs
Section – II		
Unit 4	Column & Footing	
	Design of column subjected to Axial load Design of lacing system, battening system and column splices Design of slab bases & gusseted base subjected to axial load Design of slab bases & gusseted base subjected to eccentric load	6 Hrs
Unit 5	Design of Beam based on IS: 800-2007	
	Types of sections, behavior of beam in flexure, Design of laterally supported, unsupported beams and built-up beam using flange plates, curtailment of flange plates Check for deflection, shear, web buckling & web crippling, Secondary and main beam arrangement, beam to beam connections	6 Hrs
Unit 6	Gantry Girder	
	Forces acting on gantry girder, commonly used sections, design of gantry girder as laterally unsupported beam, connection details	6 Hrs



CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	1	2	2	-	1	-	-	-	-	-	-	-	2	-	-
CO2	2	2	3	-	1	-	-	-	-	-	-	-	3	-	-
CO3	2	2	3	-	1	-	-	-	-	-	-	-	3	-	-
CO4	2	2	3	-	1	-	-	-	-	-	-	-	3	-	-
CO5	2	2	3	-	1	-	-	-	-	-	-	-	3	-	-
CO6	2	2	3	-	1	-	-	-	-	-	-	-	3	-	-

REFERENCES

Text Books	
1	IS 800:2007-BIS
2	"Handbook on steel-SP6" BIS
3	"IS – 875, Part - III" -BIS.
4	"Design of Steel Structures (By Limit State Method As Per Is 800—2007" – S.S.Bhavikatti, I K International Publishing House, New Delhi
5	Limit State Design of Steel Structures: <i>V. L. Shah and Veena Gore</i> , Stuctures Publication, Pune
Reference Books	
1	Design of Steel Structures, by Dr. N. Subramanian, Oxford University Press, New Delhi
2	Limit State Design of Steel Structures: S.K. Duggal, Tata Mc-Graw Hill India Publishing House
3	Design of Steel Structures: K.S. Sairam, Pearson
4	Limit state design in structural steel: Dr. M. R. Shiyekar, PHI publications
5	Vajrani V. N., Ratwani M. M. and Mehra H. Design and Analysis of Steel Structures, Oscar Publications



CE602: REINFORCED CONCRETE STRUCTURES

Lectures : 3 Hrs/Week
Credit : 3
Practical's : 2 Hrs/Week

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The objective of the course is to

1. To understand the concept of RCC structural design.
2. To conceive the elementary, design of different structural elements.
3. To study the concept of torsion.
4. To impart knowledge of strength determination of different kinds of R.C. elements using I.S. Code.

Course Outcomes (CO):

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Understand the basic data (Basic Mechanics, Mathematics, and structural analysis) required for design of flexural concrete members	Understand
CO2	Understand the design process for shear and bond	Understand
CO3	Understand the design of RCC members subjects to torsion	Analyze
CO4	To evaluate loads on slab and design of slabs	Evaluate
CO5	Understand analysis and design of compression members	Apply
CO6	Understand the design process for isolated rectangular footing	Evaluate

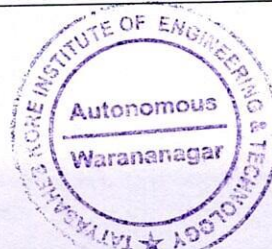
Description

Design of reinforced concrete structures is an introductory design course in civil engineering. In this course, basic elements governed by bending, shear, axial forces or combination of them are identified and are considered as building blocks of the whole structure. Different methods of design will be briefly described before introducing the limit states of collapse and serviceability. The design will be done as per IS 456:2000.

Prerequisites:	<ol style="list-style-type: none"> 1: Knowledge of concrete technology and its engineering properties. 2: Fundamental concept of stresses, strains, deflections etc. 3: Different types geometrical shapes, centroid, center of gravity, moment of inertia calculations. 4: Units and conversions
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Section – I

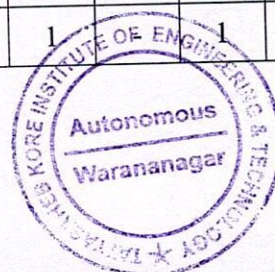
FUNDAMENTALS OF RCC STRUCTURES



Unit 1	Introduction to R.C.C., Stress-Strain behavior of concrete, Different design philosophies of RCC structures Various Limits States, Characteristic Strength and Characteristic Load, Load, Factor, Partial Safety Factors, Limit State of Collapse (Flexure) -Analysis and design of singly reinforced beam and design of doubly reinforced beam, Analysis and design of symmetrical T and L beams.	6 Hrs
Unit 2	LIMIT STATE OF COLLAPSE (SHEAR AND BOND) Shear failure, Types of Shear reinforcement, Design of Shear reinforcement, Bond-types, Factors affecting bond Resistance, Check for development length. (No Numerical on bond).	6 Hrs
Unit 3	LIMIT STATE OF COLLAPSE IN TORSION Behavior of R.C. rectangular sections subjected to torsion, Design of sections subjected to combined bending and torsion, combined shear and torsion.	6 Hrs
Section – II		
Unit 4	DESIGN OF SLABS Cantilever Slab, Simply Supported One way slab Simply Supported Two-way slab with different support conditions as per IS: 456-2000, Design of Simply Supported single flight Dog-legged staircase.	6 Hrs.
Unit 5	DESIGN OF COLUMNS General aspects, Effective length of column, loads on column, Slenderness ratio for column, Maximum and Minimum eccentricity, Codal provisions, Design of short axially loaded columns, Design of columns subjected combined axial load and uni-axial bending using SP-16.	6 Hrs.
Unit 6	DESIGN OF FOOTING Design of isolated rectangular column footing with constant depth subjected to axial load and moment.	6 Hrs.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	2	1	-	1	-	-	-	-	-	1	-	1	-	-
CO2	2	2	1	-	1	-	-	-	-	-	1	-	1	-	-
CO3	2	3	1	-	1	-	-	-	-	-	1	-	1	-	-
CO4	2	3	2	-	1	-	-	-	-	-	1	-	1	-	-
CO5	1	2	2	-	1	-	-	-	-	-	1	-	1	-	-
CO6	1	1	2	-	1	-	-	-	-	-	1	-	1	-	-



Text Books	
1	IS 456-2000, SP-16 & Relevant Special publications of BIS
2	Limit state theory and Design of Reinforced Concrete 8 th Edition – Karve and Shah, Structures publications, Pune
3	Reinforced Concrete Limit state Design, 7 th Edition — A.K.Jain Nem Chand brothers, Roorkee
4	Fundamentals of Reinforced Concrete –N C Sinha and S K Roy, S. Chand and company Ltd. Ram Nagar, New Delhi
5	Reinforced Concrete Design - B. C. Punmia Laxmi publications New Delhi
6	Reinforced Concrete Design-M. L. Gambhir Mc millan India Ltd. New Delhi
Reference Books	
1	Limit State Design of Reinforced Concrete P.C.Varghese, Prentice Hall, New Delhi



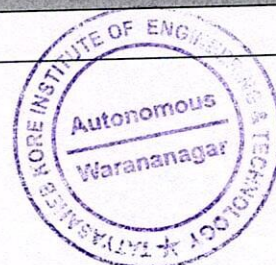
CE603-LEGAL ASPECTS AND CONSTRUCTION PRACTICES

Lectures : 3Hrs/Week
Credit : 3
Tutorials : —

Evaluation Scheme
ISE : 40Marks
ESE : 60Marks

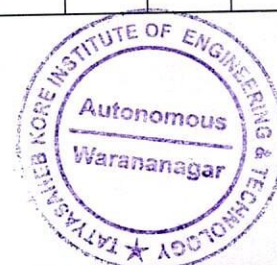
Course Objectives: The objective of the course is to		
1. To aware the students about Indian Contract and Arbitration act. 2. To provide knowledge about contract administration. 3. To understand working of various excavating, hauling, conveying, and hoisting equipment. 4. To compute cycle time of operations, rating and output of equipment.		
Course Outcomes (CO):		
COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Understand basics of contracts, tenders and e-tendering.	Knowledge Understand
CO2	Understand the concepts of contract administration and RERA.	Understand Apply
CO3	Study the Indian Arbitration Act.	Knowledge Understand
CO4	Understand the different types of excavating equipment used for construction work.	Understand Apply
CO5	Study of different types of Conveying and Hoisting Equipment and their Operations.	Understand
CO6	Compute cycle time of operations, rating and output of equipment.	Apply Analyze

Description	
<p><i>Legal Aspects & Construction Practices</i> deals with important laws in relation with Indian construction industry which helps students to run construction projects efficiently without any litigations. Also it enables students better understanding of various machineries useful for mechanization of construction industry in order to control time and cost of projects.</p>	
Prerequisites:	1. Professional etiquettes.
	2. Ethical behavioral knowledge.
	3. Basic enforcements and legal things in general activities.
	4. Basics about use of machineries in construction.
Section-I	



	Contract and Tenders	
Unit 1	Contracts, Types of Contracts, Tender document- invitation of tenders, Tender notice, tender documents, Submission. Scrutiny and acceptance two envelop method. Award of jobs. Various conditions to contracts, Rights and responsibilities of parties of contracts E-Tendering, Introduction to Non-Conventional Contracts.	6 Hrs
	Contract Administration	
Unit 2	Essentials of legally void and avoidable contracts, contract for engineer and architecture services, contract between owner and contractor BOT system, Introduction to RERA.	6 Hrs
	Arbitration	
Unit 3	Introduction to Indian Arbitration Act, Arbitration Agreement, Power and Duties of Arbitration, Different types of arbitration, Qualification of arbitrator.	6 Hrs
Section-II		
	Excavating Equipment	
Unit 4	Excavator, Shovels, different types – back hoe, draglines, clamshell, Cycles of operations, Their use in different soil conditions. Output criteria, Rippers, Trenchers, Hauling Equipment: Tractor Dumpers, Bulldozer, Scrapers, Operation cycles times.	6 Hrs.
	Conveying and Hoisting Equipment	
Unit 5	Different types of conveyors, Power requirement, Damages during operations, Economy of transportations, Cableways and Ropeways, Different types of hosting equipment-derricks and cranes.	6 Hrs.
	Equipment Management	
Unit 6	Selection of equipment, Advantages and limitations of using machines, planning of equipment – buying Vs hiring, Cost analysis, Economic life and Replacement, Problems of Equipment Management.	6 Hrs.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	1	-	-	-	-	2	2	1	-	-	-	-	1	1	-
CO2	1	-	-	-	-	1	2	2	-	-	-	-	1	2	-
CO3	1	-	-	-	-	1	2	1	-	-	-	-	-	-	-
CO4	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-



Text Books	
1.	B.S. Patil, S P Wool house, B S Patils Building and Engineering Contracts, 7 th edition, Taylor and Francis Group, Pune (India) May 2019.
2.	Dr. R.K. Bangia, Contract I, Eighth Edition
3.	Chakraborti M, Estimating, Costing, Specification and Valuation in Civil Engineering, 24 th edition, M.K. Publishers and Distributors, 2010
4.	B.N. Dutta, Estimation & Costing in Civil Engineering by, 28 th Edition, UBS Publishers & Distributor Pvt. Ltd, 2016
5.	Avatar Singh, Rajesh Kapoor, Law of Contract & Specific Relief, 13 th edition, Eastern Book Company, 27 th February 2021.
6.	Robert Purifoy, Construction Planning, Equipment and methods, Tata McGraw Hill Publication, 2010.
7.	Dr. Mahesh Varma, Construction Equipment Planning and Applications, 2 nd Edition, Metropolitan Book Company, 1975
8.	Roy Chudley and Roger Greene, Construction Technology, 4 th Edition, Pearson Prentice Hall, 2005.
Reference Books	
1.	Indian Contract Act, https://www.indiacode.nic.in/
2.	Dr. Roshan Namavati, Professional Practice: With Elements of Estimating, Valuation, Contract and Arbitration, Lakhani Book Depot, 1 January 2016.
3.	F. H. Kellogg, Construction Methods & Machinery, Prentice-Hall Inc. New York, January 1, 1955
4.	Philippe Pire and Benoît Legrand, Building Construction Manual, Nov 2013.



PROFESSIONAL ELECTIVE - I

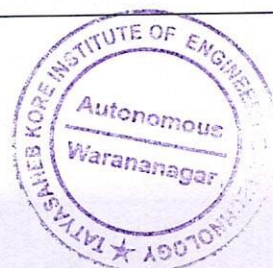
CE604-ADVANCE FOUNDATION ENGINEERING

Lectures	:	3 Hrs/Week
Credit	:	3
Tutorials	:	1

Evaluation Scheme	
ISE	: 40 Marks
ESE	: 60 Marks

Course Objectives: The objective of the course is to		
1.	Understand the importance and basics of foundations in the civil engineering projects	
2.	Evaluate the load bearing capacity and settlement of foundations by classical theories.	
3.	Analyze the geotechnical aspects of deep foundations	
4.	To learn dynamic analysis of foundations for industrial machines	
5.	Understand the concepts of the stability of slopes and study various methods of evaluating the of slopes stability	
6.	To study the types & analysis process for earth & water retaining structures	
Course Outcomes (CO):		
COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Understand and analyze shallow and raft foundations with emphasis on settlement, bending moments, and IS Code methods.	Understand Analyze
CO2	Understand the principles of bearing capacity evaluation, foundation design in weak soils, and various soil stabilization techniques and their applications.	Remember Evaluate
CO3	Analyze and design pile foundations, focusing on capacity, group behavior, and installation techniques.	Analyze
CO4	Understand and design machine foundations, focusing on dynamic loadings, vibration analysis, and IS code design criteria for various machine types.	Analyze Design
CO5	Analyze slope stability, failure modes, and design sheet pile foundations using various methods to evaluate safety factors and prevent landslides	Understand Analyze
CO6	Understand and apply design methods for well foundations, caissons, cofferdams, stone columns, and geosynthetics.	Remember Understand

Description
<p><i>Advanced Foundation Engineering focuses on the design and analysis of various foundation systems, including shallow foundations, piles, machine foundations, and specialized structures like rafts and cofferdams. The subject covers key topics such as bearing capacity, soil stabilization, slope stability, and dynamic load considerations. It also delves into advanced techniques for evaluating soil behavior, foundation performance, and the application of relevant IS Code standards. Practical aspects like construction methods, installation techniques, and safety measures for foundations in challenging soils are also discussed.</i></p>



Prerequisites:	1:	Knowledge of soil properties and their analysis
	2:	Concept of foundations and its constructions
	3:	Different types of earthen structures, stress and resultant calculations
Section – I		
Unit 1	SHALLOW AND RAFT FOUNDATIONS	
	Types & shapes of shallow foundation, minimum depth of foundation, Concept of proportioning of footings (Isolated), calculation of immediate and consolidation settlement, foundation on slopping ground etc. Different shapes, bending moment diagrams & Dimensional analysis of rectangular & Trapezoidal combined footings, Introduction to raft or mat foundation, necessity & types of rafts, floating foundation & problems associated with floating foundation, Analysis of raft or mat foundation by Rigid method (Conventional method) & Elastic plate method (IS Code method)	6 Hrs
Unit 2	BEARING CAPACITY AND SOIL STABILIZATION	
	Definitions, Modes of failure, Terzaghi's bearing capacity theory, I.S. Code method of bearing capacity evaluation & computation (IS 6403), effect of various factors on bearing capacity (Size & Shape, Depth, WT), Bearing capacity evaluation from plate load test, S.P.T. (By I.S. Code method) and Menards pressure meter tests. Introduction to difficult or weak soils, foundations in expansive soils, foundations in soft & compressible soils, Introduction to soil stabilization, methods of stabilization & their applications - mechanical stabilization, cement stabilization, lime stabilization, bituminous stabilization, chemical stabilization & stabilization by grouting	6 Hrs
Unit 3	PILE FOUNDATIONS	
	Introduction, necessity, advantages and classification of piles, Single pile capacity evaluation by static and dynamic methods for cohesive and cohesion less soil, pile load test. negative skin friction, Group action of files, efficiency of group of piles, Feld's rule, Seiler-Keeney formula, Converse-Labarre formula etc. Calculation of group capacity of pile in cohesive soil, under reamed pile – its application and installation techniques, Concept of negative skin friction and its estimation, settlement in pile foundation, estimation of load on single pile in a group of pile etc. Under reamed piles – equipment, construction, installation techniques and precautions.	6 Hrs
Section – II		
Unit 4	MACHINE FOUNDATIONS	
	Introduction to machine foundation, types of machine foundations, terms related to dynamic loadings, static and dynamic design criteria etc., Permissible amplitude of vibrations for different types of machines, calculation of probable amplitude, amplitude ratio & maximum amplitude,	6 Hrs.



	criteria for design of machine foundations, Design criteria for foundations of reciprocating machines (IS2974-Part-I), design criteria for foundations of impact type machines (IS2974-Part-II), Vibration Isolation & Its methods, vibration effects on soil etc.	
Unit 5	SLOPES AND STABILITY ANALYSIS Slope classification, slope failure, modes of failure. infinite slope in cohesive and cohesion less soil, Taylor's stability number, Swedish slip method, method of slices and concept of friction circle method to evaluate factor of safety for slope, Concept of land slide, Introduction to sheet piles, types and uses of sheet piles,	6 Hrs.
Unit 6	WELL FOUNDATIONS AND COFFER DAMS Element of wells, Types of well foundations, methods of construction, Tilt and shift, Remedial measures, Pneumatic Caissons: Sinking method - Sand Island method, Caisson disease, Common types of cofferdams, Braced cofferdam, Stone columns, Vibroflotation, Preloading technique, Civil engineering application of geo synthetics, Geo textile & geomembrane	6 Hrs.

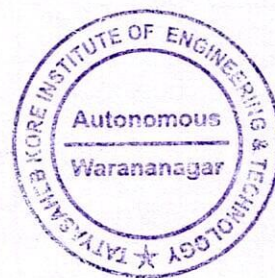
CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	1	3	2	2	-	3	-	1	-	-	1	-	3	-	-
CO2	2	3	3	3	1	1	-	1	-	-	-	-	2	-	-
CO3	1	3	3	2	-	3	-	-	-	-	-	-	3	-	-
CO4	2	3	2	1	2	1	2	-	-	-	1	-	2	-	-
CO5	1	3	2	2	2	2	-	-	-	-	2	-	2	-	2
CO6	1	3	1	1	2	1	1	-	-	-	1	-	1	1	2



REFERENCES

Text Books	
1	"Soil Mechanics and Foundation Engineering" - B. C. Punmia, Laxmi Publication
2	"Soil Mechanics and Foundation Engineering" - K. R. Arora, Standard Publisher
3	"Soil Mechanics and Foundation Engineering" - V. N. S. Murthy, Marcell Decker
4	"Basic and Applied soil Mechanics" - A. S. R. Rao and Gopal Ranjan, New age International Publication
5	"Foundation Engineering Handbook- I", Van Nostrand Reinhold Company, 1975 by Winterkorn H.F. and Fang H. Y
6	"Foundation Analysis & Design", by Joseph Bowles, McGraw-Hill Education; 5th edition
7	"Advance Foundation Engineering", by T. G. Sitharam, CRC Press, 1 st Edition 2019
8	"Soil Mechanics & Foundation Engineering", by V. N. S. Murthy, CBS Publishers & Distributors.
Reference Books	
1	"Soil Mechanics" - Terzaghi and Peak, Jony Willey and Sons, New York
2	"Soil Testing" - T. W. Lambe, Willey Eastern Ltd, New Delhi
3	Dynamics and Vibrations, A. K. Chopra,



CE605 – ENERGY AND ENVIRONMENT

Lectures : 3 Hrs/Week
Credit : 3
Practical : 2 Hrs/Week

Evaluation Scheme

ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The objective of the course is to

1. To understand various sources of energy with respect to quantity and use
2. To describe and design the various Building and industrial energy efficient units.
3. To learn the special energy requirements and its methods of applications
4. To learn various sources of Air pollution, Noise Pollution and Solid waste its treatment and safe disposal.
5. Measurement of pollution of Air, Noise and solid waste.

Course Outcomes (CO):

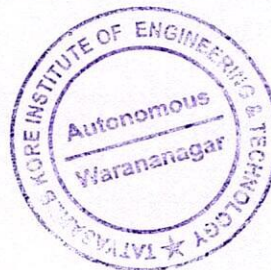
COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Understand air pollutants, their sources, and effects, and apply suitable control methods to achieve compliance with air quality standards	Knowledge Understand
CO2	Understand noise characteristics, measure noise levels, and apply control methods to meet noise standards.	Understand
CO3	Understand the types, sources, and characteristics of solid waste, and design effective treatment and processing methods like composting, incineration, and landfilling	Understand
CO4	Understand the principles of green buildings and analyse sustainable energy solutions, including biofuels, energy storage, and catalytic processes for development	Knowledge Understand
CO5	Analyze energy efficiency, conduct audits, and design sustainable green building solutions.	Understand Analyse
CO6	Understand various types of energy, their environmental impacts, and the challenges related to energy production and consumption.	Understand

Description:

Energy and Environment is focused on analysing and understanding the quality and quantity of Energy required for various types of buildings and its audits. Moreover, the awareness of Air pollution, Noise Pollution and Solid waste generates its pollution intensity, limits laws, and various methods of testing and reduction of pollution. This course will enhance the knowledge about green energy and its applications. The future of globe to reduce use of non-renewable energy and application of green energy is achieved through this course. The environmental pollution impact can be controlled through various techniques and their implementation.



Prerequisites	1	Energy requirements for human activities	
	2	Effects of Air pollution and noise pollution on Human and his environment	
	3	Solid wastes and its nuisance	
	4	MPCB, CPCB and its standards	
Section – I			
Unit 1	Air Pollution		7 Hrs
	Definition, Sources and classification of pollutants, Effects. Measurement of Air Pollutants, Control of industrial air pollution- Settling Chamber, Bag filter, Cyclone separator, Scrubbers, Electrostatic precipitators. Air quality standards		
Unit 2	Noise Pollution		4 Hrs
	Noise characteristics and measurements, Levels of noise and standards, control.		
Unit 3	Solid Waste Management		7 Hrs
	Solid wastes Definition, Types, Sources, Characteristics, Functional outlines-storage, Collection, Processing techniques, Methods of treatment of solid waste-Composting, Incineration, Pyrolysis and Sanitary land filling.		
Section – II			
Unit 4	Green Energy and Environment:		6 Hrs
	Introduction to Green Buildings, Aspects of green energy and the environment, such as bio-fuel and bio-energy, energy storage and networks, Catalysis of sustainable development		
Unit 5	Clean Energy and its uses		5 Hrs
	Reduced air pollution and greenhouse gas emissions, Lower consumer energy bills, Enhanced state and local economic development and job creation, Improved energy system reliability and security. Energy audits and green building rating		
Unit 6	Environmental Problems and Energy:		7 Hrs
	Different types of Energy – Conventional and non-conventional, The environmental problems directly related to energy production and consumption include air pollution, climate change, water pollution, thermal pollution, and solid waste disposal. The emission of air pollutants from fossil fuel combustion is the major cause of urban air pollution.		



CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	1	2	-	2	1	1	3	1	-	-	2	-	1	-	2
CO2	1	2	-	2	1	1	3	1	-	-	2	-	1	-	2
CO3	2	2	-	2	3	1	3	1	-	-	2	-	1	-	3
CO4	2	1	3	2	3	2	1	-	-	-	2	1	-	-	1
CO5	2	1	3	2	3	2	1	-	-	-	2	1	1	-	2
CO6	1	1	2	2	2	1	2	1	-	-	2	-	-	-	1

REFERENCES

Text Books	
1	Sewage Disposal and Air Pollution Engineering - Garg S.K., [Khanna Publishers]
2	Solid Waste Management in Developing countries - Bhide A.D. and Sundersen B. B. [Indian National Scientific Documentation Centre, New Delhi]
3	Air Pollution- Rao M.N. and Rao H.V.N. [Tata McGraw Hill]
4	Environmental Noise Pollution: Noise Mapping, Public Health, and Policy Paperback – Import by Enda Murphy (Author), Eoin A King (Author)
Reference Books	
1	Manual on sewerage & sewage Treatment published by Ministry of Urban Development Govt. of India Msy-2000. 35 PDOP-4-59-85-97, Ministry of Urban development
2	Manual on Municipal Solid Waste Management- Ministry of Urban Development Govt. of India



CE601P – DESIGN OF STEEL STRUCTURES (Lab)**Practical's:** 2 hrs / week**Credits:** 1**Examination Scheme:****ISA:** 50 Marks

Course Objectives: The objective of the course is to		
1. To understand the behavior of elements of steel structure. 2. To understand the design concept of steel structure. 3. To have sense of design of professional ethics		
Course Outcomes:		
COs	At the end of successful completion of the course the student will be able to	Blooms Taxonomy
CO1	Understand different types of welded and bolted connections by using necessary elements for analyzing steel structures.	Remember
CO2	Evaluate axially loaded tension member along with its end connection	Evaluate
CO3	List and describe essential elements necessary to analyze and design of compression member.	Remember
CO4	Analyze and design axially and eccentrically loaded columns along with its different types of column bases.	Analyze
CO5	Analyze and design laterally supported and unsupported beams with their end connections.	Analyze
CO6	Calculate forces acting on gantry girder and its design as laterally unsupported beam.	Apply

TUTORIALS

Term work shall comprise of at least one assignment on each unit with minimum 5 numerical

Sr. No.	Practical/ Experiment/Tutorial Topic	Hrs.	Bloom's Taxonomy
1	Design of bolted Connections	2	Remember
2	Design of Welded Connections	2	Apply, Evaluate
3	Design of Tension Member	2	Apply, Evaluate
4	Design of Compression Member	2	Apply, Evaluate
5	Design of Column & Footing	2	Apply



6	Design of Footing	2	Remember, Apply
7	Design of Beam	2	Apply, Evaluate
8	Design of Gantry Girder	2	Apply, Evaluate

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	1	2	2	-	1	-	-	-	-	-	-	-	2	-	-
CO2	2	2	3	-	1	-	-	-	-	-	-	-	3	-	-
CO3	2	2	3	-	1	-	-	-	-	-	-	-	3	-	-
CO4	2	2	3	-	1	-	-	-	-	-	-	-	3	-	-
CO5	2	2	3	-	1	-	-	-	-	-	-	-	3	-	-
CO6	2	2	3	-	1	-	-	-	-	-	-	-	3	-	-

REFERENCES

Text Books	
1	IS 800:2007-BIS
2	"Handbook on steel-SP6" BIS
3	"IS – 875, Part - III" -BIS.
4	"Design of Steel Structures (By Limit State Method As Per Is 800—2007" – S.S.Bhavikatti, I K International Publishing House, New Delhi
5	Limit State Design of Steel Structures: <i>V. L. Shah and Veena Gore</i> , Stuctures Publication, Pune
Reference Books	
1	Design of Steel Structures, by Dr. N. Subramanian, Oxford University Press, New Delhi
2	Limit State Design of Steel Structures: S.K. Duggal, Tata Mc-Graw Hill India Publishing House
3	Design of Steel Structures: K.S. Sairam, Pearson
4	Vajrani V. N., Ratwani M. M. and Mehra H. Design and Analysis of Steel Structures, Oscar Publications



CE602P - REINFORCED CONCRETE STRUCTURES

Practical's: 2 hrs / week
Credits: 1

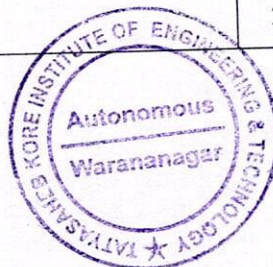
Examination Scheme:
ISA: 25 Marks
POE: 50 Marks

Course Objectives: The objective of the course is to		
1. To introduces different types of stresses, strains, analysis and design of singly reinforced beams, L and T beams. 2. To calculate the shear reinforcement in beams. 3. To understand the concept of combined bending and torsion. 4. To analysis and design of different types of slabs. 5. To understand the design of column. 6. To calculate the design of footings.		
Course Outcomes (CO):		
COs	At the end of successful completion of the practical's the student will be	Blooms Taxonomy
CO1	Able to understand basic properties of RCC structures and solve singly, L and T beams design problems.	Analyze
CO2	Analyze and design shear reinforcement in beams.	Analyze
CO3	Understand and able to evaluate combined bending and torsion.	Understand Analyze
CO4	Understand the design of different types of slabs.	Understand Analyze
CO5	Analyze and design of column.	Analyze
CO6	Calculate the design of footings.	Analyze

PRACTICALS

A] At least one assignment on each unit

Sr. No.	Assignment	Hr s.	Bloom's Taxonomy
01	Assignment No. 1: FUNDAMENTALS OF RCC STRUCTURES	2	Knowledge Analyze
02	Assignment No. 2: LIMIT STATE OF COLLAPSE (SHEAR AND BOND)	2	Knowledge Analyze
03	Assignment No. 3: LIMIT STATE OF COLLAPSE IN TORSION	2	Knowledge, Analyze
04	Assignment No. 4: DESIGN OF SLABS	2	Knowledge, Analyze
05	Assignment No. 5: DESIGN OF COLUMNS	2	Knowledge
06	Assignment No. 6: DESIGN OF FOOTING	2	Knowledge, Analyze



B] One assignment on each unit with minimum five numerical in each assignment

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	2	1	-	1	-	-	-	-	-	1	-	1	-	-
CO2	2	2	1	-	1	-	-	-	-	-	1	-	1	-	-
CO3	2	3	1	-	1	-	-	-	-	-	1	-	1	-	-
CO4	2	3	2	-	1	-	-	-	-	-	1	-	1	-	-
CO5	1	2	2	-	1	-	-	-	-	-	1	-	1	-	-
CO6	1	1	2	-	1	-	-	-	-	-	1	-	1	-	-



CE604T – ADVANCE FOUNDATION ENGINEERING (T)

Lectures : 0
Credit : 1
Tutorials : 2 Hrs./Week

Evaluation Scheme
ISA : 50 Marks

A] Minimum one Assignment on each CO by considering understanding of concepts and skills to solve engineering problems wherever applicable.

No of Assignment	CO	Description
Assignment No-01	CO-01	Concepts and Problems on shallow foundations
Assignment No-02	CO-02	Concepts and Problems on Bearing capacity
Assignment No-03	CO-03	Concepts and Problems on Pile foundations
Assignment No-04	CO-04	Concepts and Problems on Machine foundations
Assignment No-05	CO-05	Concepts and Problems on Slope Stability
Assignment No-06	CO-06	Concepts on Well Foundations

B] Seminar on any topic with advances in foundation Engineering OR Site visit to foundation site

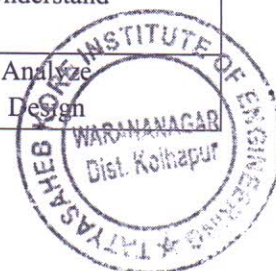


CE605P – ENERGY AND ENVIRONMENT (Lab)**Practical's:** 2 hrs / week**Credits:** 1**Examination Scheme:****ISA:** 50 Marks

Course Objectives: The objective of the course is to		
1)	To familiarize the students with the quality and quantity of Air, sound and solid waste	
2)	To familiarize the students Concept and Design of green Building	
3)	To understand Location and development of sound and its measurement	
Course Outcomes (CO):		
COs	At the end of successful completion of the course the student will be able to	Blooms Taxonomy
CO1	Analyze and optimize water, wastewater, and energy usage in various buildings through field studies	Understand Analyze
CO2	Analyze noise levels at various locations and evaluate their impact using standard measurement techniques	Analyze
CO3	Analyze and optimize energy, water, and resource budgeting for residential, commercial, and industrial building	Analyze
CO4	Design and optimize the utilization of natural energy for sustainable applications.	Design

PRACTICALS

Sr. No.	Practical/ Experiment/Tutorial Topic	Hrs.	Bloom's Taxonomy
1	Visit to Residential, Commercial and industrial Buildings for its Water, wastewater, Electricity requirements-use optimization and its study	2	Understand Analyze
2	Measurement of Noise levels at various location at and around – Traffic Signals, Hospitals, Schools, Industries etc	2	Understand Analyze
3	Problems on Residential, Commercial and industrial Buildings for its energy uses Water, Electricity and resources budgeting.	2	Knowledge Understand
4	Planning for optimal use of natural energy and its application.	2	Analyze Design

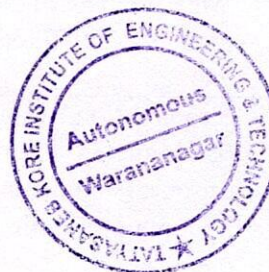


CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	1	3	2	3	1	-	-	-	-	-	2	2	2	-	3
CO2	1	2	2	3	2	-	2	-	-	-	1	1	2	-	2
CO3	1	3	3	3	2	2	1	-	-	-	2	2	2	-	3
CO4	1	1	2	2	2	2	-	-	-	-	1	1	1	-	1

REFERENCES

Text Books	
1	Sewage Disposal and Air Pollution Engineering - Garg S.K., [Khanna Publishers]
2	Solid Waste Management in Developing countries - Bhide A.D. and Sundersen B.B. [Indian National Scientific Documentation Centre, New Delhi]
3	Air Pollution- Rao M.N. and Rao H.V.N. [Tata Mcgraw Hill]
4	Environmental Noise Pollution: Noise Mapping, Public Health, and Policy Paperback – Import by Enda Murphy (Author), Eoin A King (Author)
Reference Books	
1	Manual on sewerage & sewage Treatment published by Ministry of Urban Development Govt. of India Msy-2000. 35 PDOP-4-59-85-97, Ministry of Urban development
2	Manual on Municipal Solid Waste Management- Ministry of Urban Development Govt. of India



CE606P – BUILDING MODELLING & DESIGN (Lab)

Practical's: 2 hrs / week

Credits: 1

Examination Scheme:

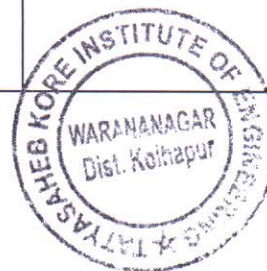
ISA: 50 Marks

POE: 25 Marks

Course Objectives: The objective of the course is to		
1)	To familiarize the students with the quality and quantity of Air, sound and solid waste	
2)	To familiarize the students Concept and Design of green Building	
3)	To understand Location and development of sound and its measurement	
Course Outcomes (CO):		
COs	At the end of successful completion of the course the student will be able to	Blooms Taxonomy
CO1	Student should have a good working knowledge of SketchUp's 2D & 3D drawing tools as well as editing tools	Understand Analyze
CO2	Students to know how to create a group or component, and how to paint a face with colours or materials,	Understand Analyze
CO3	Students to know how to use texture positioning, Photo Match, scenes, layers, or styles	Understand Analyze
CO4	Using this software study student will present building in all ways.	Analyze

PRACTICALS

Sr. No.	Practical/ Experiment/Tutorial Topic	Hrs.	Bloom's Taxonomy
1	Introduction Google SketchUp , Establishing the Modelling Mind-Set, Getting Off to a Running Start	2	Analyze
2	Modelling in SketchUp, Develop Buildings, Falling in Love with Components Going Beyond Buildings, Keeping Your Model Organized	2	Analyze
3	Modelling with Photographs, Viewing Your Model in Different Ways, Working with Styles and Shadows	2	Analyze
4	Working with Google Earth and the 3D Warehouse, Printing Your Work, Exporting Images and Animations, Creating Presentation Documents with Lay out application.	2	Analyze



CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	1	1	1	--	--	--	---	--	--	---	--	--	---	--
CO2	2	1	2	2	--	--	--	---	--	--	---	--	--	---	--
CO3	--	2	2	1	--	--	--	---	--	--	---	--	--	---	--
CO4	1	2	--	1	--	--	--	---	--	--	---	--	--	---	--

REFERENCES

Text Books	
1	Aidan Chopra - Google SketchUp 7 For Dummies-For Dummies (2009) [Wiley Publishing]
2	SketchUp website - online videos and tutorials (go to http://sketchup.google.com/training).
Reference Books	
1	O'Reilly's Google SketchUp: The Missing Manual by Chris Grover.
2	SketchUp website - online videos and tutorials





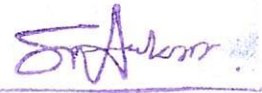
Member Secretary
Board of Studies



Chairman
Board of Studies



Academic Dean
T.K.I.E.T. Warananagar



PRINCIPAL
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