

An Autonomous Institute

Shree Warana Vibhag Shikshan Mandal's

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

NBA Accredited Institute



# Department of Civil Engineering

**Final Year B. Tech. Civil Engineering**

To be implemented from 2023-24

## **B. Tech. In Civil Engineering**

Syllabus Structure and Curriculum under Autonomy



## SWVSM'S

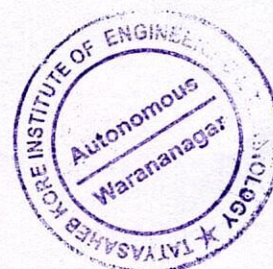
**Tatyasaheb Kore Institute of Engineering and Technology, Warananagar**  
**An Autonomous Institute**

### 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 80808





### CO ,PO & PSO Mapping Correlation:

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

### Course/ Subject Code

C	E	7	0	1
Branch Code		Semester	Course Number	

### Course Term work and POE Code

C	E	7	0	1	T / P / A
Branch Code		Semester	Course Number		T- Term work P- POE A- Audit Course





**Tatyasaheb Kore Institute of engineering and Technology, Warananagar**  
**An Autonomous Institute**  
**Department of Civil Engineering**

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**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.



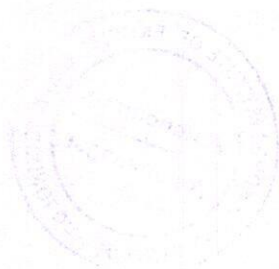


**Tatyasaheb Kore Institute of Engineering and Technology, Warananagar**  
**(An Autonomous Institute)**

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

**Syllabus under Autonomous Status of TKIET, Warananagar**

**2023-24**





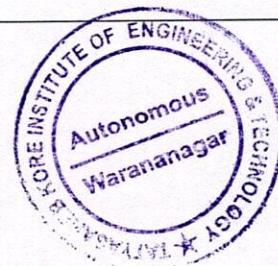
**TATYASAHEB KORE INSTITUTE OF ENGINEERING & TECHNOLOGY,  
WARANANAGAR**

**Department of Civil Engineering**

**4.1 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 help 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.





**TATYASAHEB KORE INSTITUTE OF ENGINEERING & TECHNOLOGY,  
WARANANAGAR  
Department of Civil Engineering**

**4.2 Program Outcomes (POs)**

**After completion of program, Graduates will be able to**

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

**PROGRAM SPECIFIC OUTCOMES**

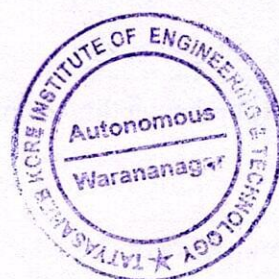
**After completion of program, Graduates will be able to**

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





**Final Year B. Tech. in CIVIL Engineering**  
**Syllabus Structure under Autonomous Status of TKIET, Warananagar**  
**SEM VII**  
**To be implemented from**  
**2023-24**





**Final Year B. Tech. (Civil Engineering)****Semester-VII**

(To be implemented from 2023 - 24)

**Credit Scheme**

Course Code	Category	Course Title	Teaching Scheme					Examination & Evaluation Scheme			
			L	T	P	C	CH	Component	Marks	Min for Passing	
CE 701	PCC	Earthquake Engineering	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE 702	PCC	Transportation Engineering	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE 703	PCC	Quantity Surveying and Valuation	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE 704	PEC	Professional Elective II	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE 705	PCC	Design of Structures and Drawing I	2	-	-	2	2	ESE	60	24	40
								ISE	40	16	
CE 704T	PCC	Professional Elective II	-	1	-	1	1	ISA	25	10	10
CE 701P	PCC	Earthquake Engineering	-	-	2	1	2	ISA	25	10	10
CE 702P	PCC	Transportation Engineering	-	-	2	1	2	ISA	25	10	10
								POE	25	10	10
CE 703P	PCC	Quantity Surveying and Valuation	-	-	4	2	4	ISA	25	10	10
								POE	25	10	10
CE 705P	PCC	Design of Structures and Drawing I	-	-	2	1	2	ISA	25	10	10
								POE	25	10	10
CE706P	PW	Project Phase I	-	-	4	2	4	ISA	100	40	40
CE 707 A	MC	Audit Course - Field Training	-	-	-	-	-	-	-	-	-
			14	1	14	22	29	--	800	320	320

**Professional Elective II – CE704-1 Irrigation Engineering, CE704-2 Solid Waste Management, CE703-3.Advanced Construction Technology, CE704-4 Open Channel Hydraulics**





**Final Year B. Tech. (Civil Engineering)**

**Semester-VIII**

(To be implemented from 2023 - 24)

**Track – 1 Capstan /Academic Pattern**

**Credit Scheme**

Course Code	Category	Course Title	Teaching Scheme					Examination & Evaluation Scheme			
			L	T	P	C	CH	Component	Marks	Min for Passing	
CE 801	PCC	Town Planning and Docks-Harbor Engineering	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE 802	PCC	Design of Bridges	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE803	PCC	Professional Elective III	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE804	PCC	Professional Elective IV	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE 801P	PCC	Town Planning and Docks and Harbor Engineering	-	-	2	1	2	ISA	25	10	10
								POE	50	20	20
CE 802P	PCC	Design of Bridges	-	-	2	1	2	ISA	25	10	10
CE805P	PCC	Design of Structures and Drawing II	-	-	2	1	2	ISA	50	20	20
								POE	50	20	20
CE806P	PW	Project Work – II	-	-	6	3	6	ISA	100	40	40
								POE	100	40	40
CE807A	MC	Audit Course – Paper presentation and Project Competition									
			12	-	12	18	24	--	800	320	--

Professional Elective III – CE803-1 Structural Design of Foundation & Retaining Structures, CE803-2 Advanced Design of Concrete Structures, CE803-3.Pre-stressed Concrete Design, Professional Elective IV - CE804-1 Remote Sensing, GIS and GPS Application in Civil Engineering, CE804-2.Construction Practices, CE804-3.Site Investigation Methods And Practices, CE804-4 Advanced Traffic Engineering





Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

**Final Year B. Tech. (Civil Engineering)**

**Semester-VIII**

(To be implemented from 2023 - 24)

**Track -2 Industrial Internship Pattern**

Course Code	Category	Course Title	Teaching Scheme					Examination & Evaluation Scheme			
			L	T	P	C	CH	Component	Marks	Min for Passing	
CE 801	PCC	Town Planning and Docks-Harbor Engineering	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE 802	PCC	Design of Bridges	3	-	-	3	3	ESE	60	24	40
								ISE	40	16	
CE 801P	PCC	Town Planning and Docks and Harbor Engineering	-	-	2	1	2	ISA	25	10	10
								POE	50	20	20
CE 802P	PCC	Design of Bridges	-	-	2	1	2	ISA	25	10	10
CE806P	PW	Project Work – II	-	-	6	3	6	ISA	100	40	40
								POE	100	40	40
CE808P	II	Industrial Internship	-	-	14	7	14	ISA	100	40	40
								POE	200	80	80
CE807A	MC	Audit Course – Paper presentation and Project Competition									
			9	2	24	18	30	--	800	320	--

**Credit Scheme**

**Professional Elective III – CE803-1** Structural Design of Foundation & Retaining Structures, **CE803-2** Advanced Design of Concrete Structures, **CE803-3**.Pre-stressed Concrete Design, **Professional Elective IV - CE804-1** Remote Sensing, GIS and GPS Application in Civil Engineering, **CE804-2**.Construction Practices, **CE804-3**.Site Investigation Methods And Practices, **CE804-4** Advanced Traffic Engineering





## **Final Year B. Tech. (Civil Engineering)**

### **List of Professional Elective Course ( PE II) Sem.VII**

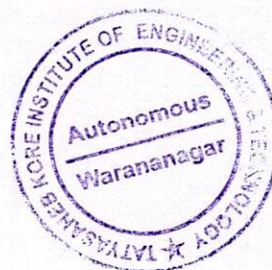
<b>Category</b>	<b>Course Code</b>	<b>Course Title</b>
PCC	CE 704 -1	Irrigation Engineering
	<b>CE 704-2</b>	Solid Waste Management
	<b>CE 704-3</b>	Advanced Construction Technology
	<b>CE 704 -4</b>	Open Channel Hydraulics

### **List of Professional Elective Course ( PE III) Sem.VIII**

<b>Category</b>	<b>Course Code</b>	<b>Course Title</b>
PCC	CE 803 -1	Structural Design of Foundation & Retaining Structures
	<b>CE 803-2</b>	Advanced Design of Concrete Structures
	<b>CE 803-3</b>	Pre-stressed Concrete Design
	<b>CE 803 -4</b>	Dynamics of Structure

### **List of Professional Elective Course ( PE IV) Sem.VIII**

<b>Category</b>	<b>Course Code</b>	<b>Course Title</b>
PCC	CE 804 -1	Remote Sensing, GIS and GPS Application in Civil Engineering
	<b>CE 804-2</b>	Construction Practices
	<b>CE 804-3</b>	Site Investigation Methods And Practices
	<b>CE 804- 4</b>	Advanced Traffic Engineering





## CE701-Earthquake Engineering

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

**Evaluation Scheme**  
**ISE** : 40 Marks  
**ESE** : 60 Marks

### Course Objectives: The objective of the course is

1. To impart the basic knowledge of interior of earth and behaviour of earth during earthquake
2. To know various concepts of mathematical modelling.
3. To understand dynamic behavior of structure.
4. To understand earthquake resistant philosophy of structure.
5. To understand modern techniques of earthquake resistant method.

### Course Outcomes (CO):

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Understand behaviour of earth during earthquake	Understand
CO2	Apply the concepts of mathematical modelling	Apply
CO3	Analyze the seismic behavior of multistory structures	Analyze
CO4	Understand & Apply earthquake resistant design philosophy of structure	Apply
CO5	Understand seismic behavior of nonstructural elements of building	Understand
CO6	Understand advanced earthquake resistance techniques.	Remember

### Description:

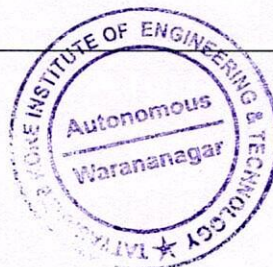
Earthquake engineering is an interdisciplinary branch of engineering that designs and analyzes structures, such as buildings and bridges, with earthquakes resistance criterias. Its overall goal is to make such structures more resistant to earthquakes. An earthquake (or seismic) engineer aims to construct structures that will not be damaged in minor shaking and will avoid serious damage or collapse in a major earthquake

<b>Prerequisites</b>	1	Basics of analysis and design of Steel structures.
	2	Basics of analysis and design of RCC structures.
	3	Knowledge of Planning Principals.
	4	Basics of Mathematical expressions.





Section – I		
	<b>Seismology</b>	
<b>Unit 1</b>	Elements of seismology – Terminology, structure of earth, causes of an earthquake, plate tectonic theory, continental drift theory, elastic rebound theory, seismic waves, magnitude and intensity, methods of measurement, energy released, seismograph, strong motion earthquakes, accelogram, prominent earthquakes of India	<b>5 Hrs.</b>
	<b>Fundamentals of theory of vibration</b>	
<b>Unit 2</b>	Fundamentals of theory of vibration, free and forced vibrations (harmonic loading) of single degree of freedom systems, Logarithmic decrement Undamped and viscously damped vibrations, equations of motion and solution.	<b>7 Hrs.</b>
	<b>Response spectrum theory</b>	
<b>Unit 3</b>	Response spectrum theory: Earthquake response spectrum, tripartite spectrum, construction of design response spectrum, effect of foundation soil and structural damping on design spectrum, evaluation of lateral loads due to earthquake on multistory buildings as per IS1893–2016 Part I	<b>6 Hrs.</b>
Section – II		
	<b>Conceptual Design</b>	
<b>Unit 4</b>	<b>PartA:</b> Conceptual Design: Planning aspects, Load path, Stiffness and strength distribution, different structural system, liquefaction and settlement. <b>PartB:</b> Earthquake Resistance Design Principles: Design philosophy, Behavior of RC building, ductility and ductile detailing of beam and columns using IS13920.	<b>9 Hrs.</b>
	<b>Masonry Structures</b>	
<b>Unit 5</b>	Masonry Structures: Behavior of unreinforced masonry and reinforced masonry, RC bands, vertical reinforcement, openings, Provisions of I.S.4326, Repairs and strengthening of masonry and RC members.	<b>4 Hrs.</b>
	<b>Earthquake resistant modern techniques</b>	
<b>Unit 6</b>	Introduction to Earthquake resistant modern techniques – Base Isolation- Elastomeric, Sliding, Combined. Seismic Dampers - Friction Dampers, TMD, Visco elastic dampers.	<b>5 Hrs.</b>





### CO - PO Mapping

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

### REFERENCES

Text Books	
1	Earthquake Resistance Design of Structure – S. K. Duggal, Oxford Uni. Press
2	Earthquake Engineering- Manish Shrikhande and Pankaj Agarwal, Prentice Hall of India Pvt Ltd, New Delhi
3	Structural Dynamics - Mario Paz, CBS Publication
4	Foundation Design Manual– N.V.Nayak, Dhanpat Rai and Sons, Delhi
5	Dynamics of Structures, A K chopra.Eearthquake Engineering Research Institute
Reference Books	
1	Earthquake Resistant Structures – D.J. Dowrick, John Wiley Publication
2	Dynamics of Structures – R. M. Clough and Ponian, McGraw Hill Co.New Delhi
3	Mechanical Vibrations–G.R.Grover Roorkee University, Roorkee.
4	Analysis and Design of Foundations for Vibrations – P.J. Moove. Oxford and I.B.H. Publication, Delhi
5	Manual of Earthquake Resistant Non Engineering Construction, University of Roorkee





**CE702- TRANSPORTATION ENGINEERING**

**Lectures** : 3  
**Credit** : 3

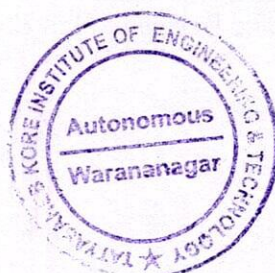
**Evaluation Scheme**  
**ESE** : 60 Marks  
**ISE** : 40 Marks

**Course Objectives:** The objective of the course is

1. To Study of the various principles of highway planning, design of flexible and rigid pavements, traffic engineering, traffic safety analysis
2. To familiarizing the students with desirable properties and testing procedures of highway Construction materials as per BIS and Indian Roads Congress (IRC) standards.
3. To know about tunneling methods in various types of soil
4. To study of various components of a railway track and geometric design of curves along railway tracks.
5. To impart knowledge of functioning of railway points, crossings and junctions.

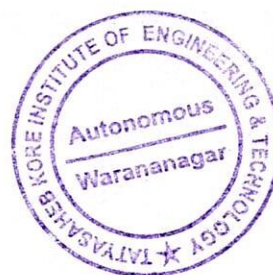
**Course Outcomes (CO):**

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Carry out surveys involved in planning and highway alignment	Apply Evaluate
CO2	Design the geometric elements of highways and expressways.	Apply Evaluate
CO3	Characterize pavement materials and design flexible and rigid pavements as per IRC	Knowledge Understand
CO4	To study terminology in tunneling and different method of tunneling in hard and soft rock.	Knowledge Understand
CO5	To study of various components of a railway track and geometric design of curves along railway tracks.	Apply
CO6	To impart knowledge of functioning of railway points, crossings and junctions.	Knowledge Understand



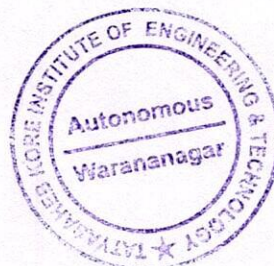


Description:		
<p>Transportation engineering or transport engineering is the application of technology and scientific principles to the planning, functional design, operation and management of facilities for any mode of transportation in order to provide for the safe, efficient, rapid, comfortable, convenient, economical, and environmentally compatible movement of people and goods transport. The planning aspects of transportation engineering relate to elements of urban planning, and involve technical forecasting decisions and political factors. Technical forecasting of passenger travel usually involves an urban transportation planning model.</p>		
Prerequisites	1	Elements of Civil Engineering & Mechanics
	2	Concrete Technology
	3	Geotechnical Engineering
Section – I		
Unit 1	<b>Introduction to Highway Engineering</b>	
	1.1 Modes of transportations, their importance and limitations, the importance of highway Transportation. Highway Development and Planning: Principles of Highway planning. 1.2 Road development in India, NHAI, NHDP, PMGSY, MSRDC. Classification of roads, road Network patterns, Planning Surveys. 1.3 Terrain classification, design speed, vehicular characteristics, highway cross-section Elements. 1.4 Sight distance: introduction to sight distance, reaction time, analysis of safe sight distance, Analysis of overtaking sight distance, intersection sight distance.	6 Hrs.
Unit 2	<b>Highway Geometric Design</b>	
	2.1 Design of horizontal alignment: horizontal curves, design of super elevation and its provision, radius at horizontal curves, widening of pavements at horizontal curves, analysis of transition curves. 2.2 Design of vertical alignment: different types of gradients, grade compensation on curves, analysis of vertical curves, summit curves, valley curves. 2.3 Intersection: at grade and grade separated intersections, speed change lanes, Canalization, Design of rotary intersection and mini roundabout.	6 Hrs.
	<b>Pavement Materials &amp; Design</b>	





<b>Unit 3</b>	<p>3.1 Pavement materials- Stone aggregates: desirable properties, tests, requirements of aggregates for different types of pavements. Bituminous materials: types, tests on bitumen, desirable properties, selection of grade of bitumen. Bituminous mix design: principle, methods, modified binders.</p> <p>3.2 Design of pavements-Types of pavements, functions of pavement components, pavement design factors, design wheel load, equivalent single wheel load, repetition of loads, equivalent wheel load factors, strength characteristics of pavement materials, climatic variation; design steps of flexible highway pavement as per IRC 37-2001 and problems based on CBR method, Design of rigid pavement as per IRC 58-2002, Stresses in rigid highway pavements,</p> <p>3.3 Joints in rigid pavements: transverse joints, longitudinal joints, fillers and sealers.</p>	<b>6 Hrs.</b>
<b>Section – II</b>		
<b>Unit 4</b>	<p align="center"><b>Highway Construction, Maintenance &amp; Rehabilitation</b></p> <p>4.1 Highway construction- construction of different Types of roads: water bound macadam, BBM, SDBC, DLC &amp;PQC, use of geo-textiles and geo-grids.</p> <p>4.2 Highway maintenance &amp; rehabilitation- Pavement failures: flexible pavement failures, rigid pavement failures, maintenance of different types of pavements: assessment and need for maintenance, pavement management system, evaluation of pavements: structural evaluation of pavements, functional evaluation of pavements, strengthening of existing pavements: object of strengthening, types of overlays, design of different types overlays.</p>	<b>6 Hrs.</b>
<b>Unit 5</b>	<p align="center"><b>Tunnel Engineering</b></p> <p>5.1 Tunnel Engineering: Introduction to tunnelling, size and shape of tunnel and suitability</p> <p>5.2 Tunnelling in hard rock, and soft material, shield method, safety measures,</p> <p>5.3 Ventilation, lighting and drainage of tunnelling.</p>	<b>6 Hrs.</b>
<b>Unit 6</b>	<p align="center"><b>Railway Engineering</b></p> <p>6.1 Introduction, Permanent Way : Components, coning of wheels</p> <p>6.2 Geometric design: Alignment, gradient, horizontal curves, super elevation, design problems on above.</p> <p>6.3 Points &amp; 4Crossing: Terms used, standard points and crossings, design of simple turnout various types of track junctions.</p> <p>6.4 Stations and yards: purpose, location, site selection, types and general layouts of terminus, Junction.</p>	<b>6 Hrs.</b>



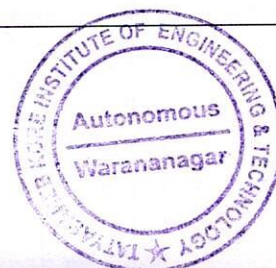


### CO - PO Mapping

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

### REFERENCES

Text Books	
1	Principles and Practice of Highway Engineering Including Expressways and Airport Engineering, Kadiyali L.R. and N.B. Lal (2004) Khanna Publishers, New Delhi
2	Traffic Engineering and Transport Planning, Kadiyali L.R. (1994) Khanna Publishers, New Delhi. 18
3	Principles of Transportation Engineering, Partha Chakroborty and Animesh Das (2003) Prentice-Hall India, New Delhi.
4	Highway Engineering, Justo and Khana
Reference Books	
1	Transportation Engineering – An Introduction, by Khistry, C.J, PHI Publication.
2	An Introduction to Transportation Engineering and Planning, by Morlok, E.R., McGraw Hill, NY, 1970
3	Introduction to transportation Engineering, by Hay W.W., John Wiley & Sons, NY, 1988.
4	Fundamentals of transportation Engineering, by Papacostas C.S., Prentice Hall of India, 1987.
5	IRC-37-2001 - Guidelines for the Design of Flexible Pavements for Highways
6	Railway Engineering- by Aggarwal M.M.
7	Railway and track Engineering- by Mundrey J.S.
8	Indian Railway permanent way manual – 1986.
9	Planning and Construction of Docks and Harbors–Quinn.





### CE 703-Quantity Surveying and Valuation

**Lectures** : 3  
**Credit** : 3  
**Tutorials** : -

**Evaluation Scheme**  
**ISE** : 40 Marks  
**ESE** : 60 Marks

#### Course Objectives: The objective of the course is

1. To understand the basic skills in estimation of Civil Works.
2. To prepare specifications & rate analysis of various items.
3. To carry out the estimation for various Civil engineering structures.
4. To understand the valuation of Civil Engineering Structures.
5. Prepare valuation report for residential building.

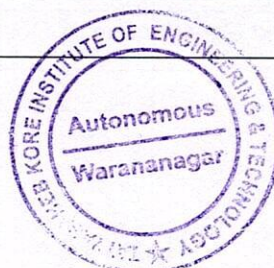
#### Course Outcomes (CO):

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Interpret the various administrative and Technical terms before starting construction.	Understand
CO2	Perform rate analysis of various items.	Apply, Analyze
CO3	Organize specifications for civil engineering items.	Analyze
CO4	Formulate estimate for various construction projects.	Evaluate
CO5	Demonstrate principles in construction economics.	Analyze
CO6	Assess valuation for construction projects.	Evaluate

#### Description:

Quantity Surveying refers to calculating quantities required to execute any work and furthermore calculating cost by multiplying rates with quantities. Also, valuation deals with to acquire knowledge of assessing value of any properties. Both the parts teach students to be fluent in art of estimation of building and other structures. Also students will know various administrative authorities and technical terms in correlation with executing work. Valuation enables students to workout value of particular structure or Land.

<b>Prerequisites</b>	1	Basics of Units of measurement.
	2	Basic knowledge of market rates of various materials.
	3	Knowledge of various shapes, areas and volumes .
	4	Terms in Economics .





Section – I		
<b>Unit 1</b>	Principles in selecting units of measurement for items, various units and modes of measurement for different items. I.S. 1200 (Part 1 to 28 ). Material Calculation for various items of work (Quantity take-off), Task Work (Out Turn Work), factors affecting the cost of materials, Rate Analysis of Various items of work, Standard schedule of rate (SSR).	<b>6 Hrs.</b>
<b>Unit 2</b>	Specifications : General and detailed Specifications. Preparation of schedule for steel as reinforcement (Bar Bending Schedule).	<b>6 Hrs.</b>
<b>Unit 3</b>	Estimates : Meaning, Importance and Purpose, Measurement and abstract sheets, Detailed estimates & Approximate estimates, Provisional sum & provisional quantities. Administrative approval and technical sanction of estimates. Long wall and Short Wall Method (In Brief).	<b>6 Hrs.</b>
Section – II		
<b>Unit 4</b>	Detailed estimate of RCC Works (Building), Roads, Culverts.	<b>6 Hrs.</b>
	Valuation : Definition, Purposes, Principles, Factors Affecting. Value, price & cost, Types of values. Types of Properties: Tangibles, Intangible, Lease and its types. Years purchase, Capitalized value, Reversion value of land. Depreciation: Straight line method, Constant percentage method, Sinking fund method, Quantity survey method.	<b>6 Hrs.</b>
<b>Unit 6</b>	Valuation Methods for Land and Buildings : Rental Method, Land and Building Method, Profit Based method, Development method, Direct Comparison.	<b>6 Hrs.</b>





### CO - PO Mapping

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

### REFERENCES

Text Books	
1	Estimating and Costing – B.N.Dutta. Dhanpat Rai & Sons. 1682, NaiSarak, Delhi-110006
2	Estimating, Costing and Specification in civil engineering – Chakroborty M. 21 b, Bhabananda Road, Kolkata-700026
3	Elements of Estimating and Costing – S. C. Rangwala. Charotar Publishing House - Opp Amul Dairy Court road Anand.388001 (west rly) India
4	Civil Engineering, Contracts and Estimates – B. S. Patil. Universities Press Private Ltd. 3-5-819 Hyderguda, Hyderabad. 500029(A.P),India.
5	Standard specifications Volumes I & II (P. W. D. Maharashtra) Govt. of Maharashtra
Reference Books	
1	Professional Practice (Estimating and Valuation) – Roshan Nanavati (1984 Edition) U.B.S. Publishers, Distributers PVT. Ltd.5 Ansari road, New Delhi.
2	Standard specifications Volumes I & II (P. W. D. Maharashtra) Govt. of Maharashtra
3	W.D. specifications& schedules of rates
4	Valuation of real Properties – S. C. RangwalaCharotar Publishing House, opposite Amul dairy, court Road Anand. 388001.India
5	IS :1200 Part 1 to 28.
6	onal Building Code 2005.





**CE 704-1 Irrigation 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. Impart the students with knowledge required for planning design, and development of different types of dams and reservoirs.
2. Equip the students with capabilities required for identifying, formulating and management of water resources related issues and problems.
3. Impart the students with knowledge required for planning design, and development of canal distribution systems for agriculture purpose
4. Make the students understand the importance of hydropower projects and their needs of development.
5. Understand the basic concepts and importance of river engineering works.

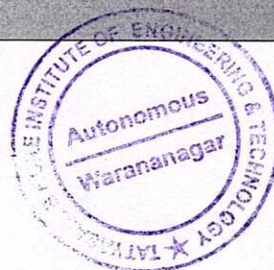
**Course Outcomes (CO):**

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Analyze and evaluate the different types of dams and reservoirs, their design principles, and their environmental and functional impacts.	Analyze, Evaluate
CO2	Analyze and evaluate different forces acting on dams .	Analyze, Evaluate,
CO3	Understand the necessity, function, and design of different types of dam outlets	Understand
CO4	Identify the components and functions of diversion head works and Analyze their effectiveness in water distribution.	Understand, Analyze
CO5	Identify the components and functions of canals and regulatory works and evaluate the efficiency of canal systems in water distribution.	Understand, Evaluate
CO 6	Describe the principles of river engineering, and execute the methods of river training works.	Understand, Apply





Description		
<p>One of the basic requirements for sustenance is food but feeding the entire humanity is challenging. The countries like India, which are heavily dependent on monsoons, are facing the brunt of global warming and climate change, the effect of which is now visible on the crop yield. Erratic monsoons, contaminated water, and expeditious use of groundwater have added to the woes. Irrigation plays a pivotal role in improving the crop quality that is being sowed. But its need varies from one season to another. To overcome the challenge, Irrigation Engineering was introduced</p>		
<b>Prerequisites:</b>	1:	Knowledge of Hydrological Cycle.
	2:	Runoff process and different types of runoff
	3:	Base, duty ,delta and their relation
	4.	Minor irrigation works
Section – I		
<b>Unit 1</b>	Introduction to Dams and Reservoirs:	
	Types of dams, selection of site for dams, selection of type of dam. Reservoirs – Types of reservoirs, site selection, control levels, Area elevation-curve & Elevation-capacity curve, Reservoir capacity determination using mass curves, Silting of reservoirs, Control of losses in reservoirs.  Earthen dam: Types of earthen dams, Components and their functions, methods of construction of earthen dam, Modes of failure, seepage control measures - Drainage & filters, stability of slopes for sudden drawdown & steady seepage case only.	<b>8 Hrs</b>
<b>Unit 2</b>	Gravity and Arch Dam:	
	Forces acting on gravity dams, Modes of failures, Stress analysis, Elementary and practical profile, stability analysis, Structural joints, keys and Water seals in Gravity Dams, Drainage galleries, Foundation treatment. Arch dams - Introduction to different Types.	<b>6 Hrs</b>
<b>Unit 3</b>	Spillway and Dam Outlets:	
	Spillway: Necessity and function, components of spillway, different types, Energy dissipation arrangements, gates for spillway, Elementary design of an ogee spillway Outlets in Dams: Outlets through concrete and earth dams, different types.	<b>6 Hrs</b>
Section – II		

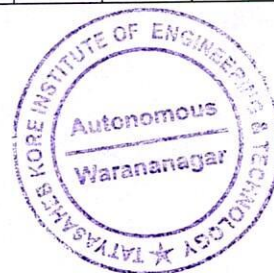




<b>Unit 4</b>	Diversion Head Works:	<b>5 Hrs.</b>
	Component parts & their functions, types of weir and barrages, Causes of failure and remedies, Introduction to Theories seepage-Bligh's creep theory, critical exit gradient, Khosla's theory.	
<b>Unit 5</b>	Canals:	<b>6 Hrs.</b>
	Types, alignment, typical sections of canals, balancing depth, Kennedy's and Lacey's silt theories, Canal lining - purpose, types, selection, and economics of lining. Types of canal outlets C.D. Works: Necessity and Types. Canal Regulatory Works: head regulator, cross regulator, canal fall, canal escape, standing wave flume.	
<b>Unit 6</b>	River Engineering:	<b>5 Hrs.</b>
	Classification and types of rivers, meandering phenomenon, River training works: Classification-Marginal bunds, Guide banks and Groynes. River navigation. Interlinking of rivers Elements of hydro-power: Hydro-power & importance, typical layout & functions of components parts	

#### 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	2	--	--	--	--	1	--	2	--	1
CO2	2	2	--	1	2	2	--	--	--	--	--	--	--	--	--
CO3	--	2	2	2	-	1	--	--	--	--	1	--	--	--	--
CO4	--	2	1	1	1	1	--	--	--	--	--	--	1	--	--
CO5	--	1	--	--	--	1	--	--	--	--	1	--	1	--	--
CO6	1	1	--	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. "Irrigation Engg.", - G. L. Asawa, Wiley Eastern
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	"Irrigation Engineering" – Dahigaonkar, Asian Book Pvt Ltd.
6	"Irrigation Engineering" – S. R. Sahastrabudhe, Katson Publishers.
7	"Irrigation Engineering" - Raghunath, Wiley Eastern Ltd, New Delhi.
8	"Irrigation Theory and practice" - Michael, Vikas Publications House
Reference Books	
1	Satyanarayan Murty, - Water resources Engg, New age international private Ltd.
2	U.S.B.R., Oxford and IBH Publication -- Design of small dams.
3	Justinn, Creager and Hinds,--Engg. For Dams.- Vol. I, II, and III
4	Satyanarayan and R. Murthy - "Design of M.I. and Canal Structure", Wiley Eastern Ltd, New Delhi.
5	Bharat Singh, 'Irrigation', New Chand and Bros., Roorkee.
6	"Water management" - Jaspal Sing, M.S.Acharya, Arun Sharma, Himanshu Publications.
7	River Behaviour and Management and Training,- CBIP publication





**CE704-2 -Solid Waste Management**

**Lectures** : 3Hrs./Week  
**Credit** : 3  
**Tutorials** :

**Evaluation Scheme**  
**ISE** : 40Marks  
**ESE** : 60Marks

**Course Objectives:** The objective of the course is,

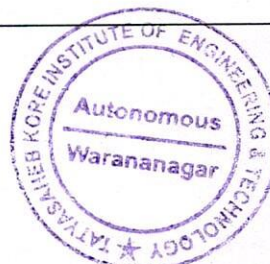
1. To impart the basic knowledge of importance of Solid waste and its sources.
2. To know various parameters and their estimation of Solid waste.
3. To create awareness about Solid waste treatment and its safe disposal.
4. To understand the importance of Solid waste hazards to human & its treatment.
5. To understand the IS provisions for Solid waste, Hazardous Waste & Medical waste

**Course Outcomes (CO):**

Cos	At the end of successful completion of the course, the student will be able to,	Blooms Taxonomy
CO1	Apply the knowledge of estimation quantification of solid waste	Apply Evaluate
CO2	To find out various ways and means of qualitative analysis of solid waste	Apply Evaluate
CO3	Understand types and treatments of solid waste	Knowledge Understand
CO4	Apply different methods of collection of solid waste.	Apply
CO5	Understand methods of safe disposal	Knowledge Understand
CO6	Wealth from waste	Knowledge

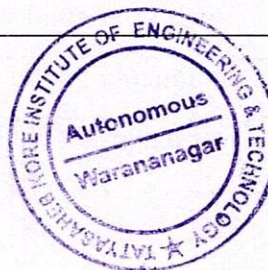
**Prerequisites:**

- 1: Solid wastes its types and quantifications
- 2: Qualities of solid waste
- 3: Treatment of solid waste
4. Safe disposal of solid waste





Section – I		
Unit 1	<b>Solid waste Management</b>	
	Solid waste management: Definition, objectives, effects, Functional outlines of solid waste, sources, types, refuse analysis, composition and quantity of refuse	6 Hrs.
Unit 2	<b>Solid waste generation collection</b>	
	Generation rate, Factors affecting generation rate, different methods of collection, collection systems, Storage, transfer and transportation of refuse, economic aspects of refuse collection& transport.	6 Hrs.
Unit 3	<b>Hydrograph and Floods</b>	
	Source Reduction, segregation and salvage, recovery of bye-products, use of solid waste as raw materials in industry, recycling of solid waste.	6 Hrs.
Section – II		
Unit 4	<b>Segregation treatment &amp; Safe Disposal</b>	
	Introduction to Biomedical waste management, Hazardous waste management and Agricultural & animal waste management. Introduction, components of land filling, types of land filling, site selection, construction techniques, maintenance and precautions, leachate and its control, control of contamination of ground water, Operation monitoring, Closure & end-use.	6 Hrs.
Unit 5	<b>Treatment of Organic solid waste</b>	
	Theory of composting, types of composting, factors governing composting, processing before composting, mechanical composting plant, recovery of Bio-gas energy from organic solid waste.	6 Hrs.
Unit 6	<b>Incineration &amp; Modern techniques – IS Provisions</b>	
	Theory and types of incinerators, location planning, aspect, Effect of feed, composition, rate, temperature and air supply, Design of incineration plant, pyrolysis and its by-products, Energy recovery, Air pollution and its control. IS Codes for Solid waste management rules, Status of solid waste management in India	6 Hrs.



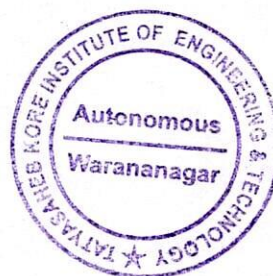


### CO - PO Mapping

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

### REFERENCES

Text Books	
1	Solid Waste Management – Dr.A.D.Bhide
2	Solid Waste Management – Gorge Tchobanoglous
3	Composting – Gottas
Reference Books	
1	Solid Waste Management Hand Book – Pavoni
2	Handbook and Solid Waste Disposal – Techabonglaus
3	Manual on Municipal Solid Waste Management by Ministry of Urban Development Of Govt. of India





**CE704-3 -Advanced Construction Techniques**

**Lectures** : 3 Hrs/Week

**Credit** : 3

**Tutorials** : ---

**Evaluation Scheme**

**ISE** : 40 Marks

**ESE** : 60 Marks

**Course Objectives:** The objective of the course is

1. To provide students the necessary knowledge and concepts of advancements/emerging techniques of Construction industry.
2. To impart students with the skill of design and operation of various special types of constructions based on latest technology.
3. To provide students prerequisite knowledge necessary for higher studies and research in the field of advanced construction techniques

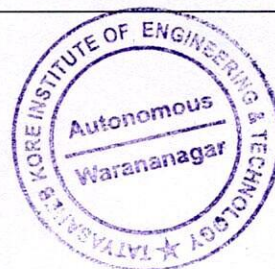
**Course Outcomes (CO):**

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Apply the knowledge of new construction materials.	Apply Evaluate
CO2	Estimate and design of formwork material.	Apply Evaluate
CO3	Understand land reclamation techniques.	Knowledge Understand
CO4	Apply different advanced methods for efficient construction.	Apply
CO5	Understand various bridge rehabilitation techniques.	Knowledge Understand
CO6	Apply various advanced techniques in concrete pavement.	Apply

**Description:**

Advanced Construction Techniques has its roots in the tasks of applying various advanced construction techniques to various aspects of construction. Much of the work of civil engineers involves the planning and management of constructed facilities that address these tasks. Advanced construction techniques is the quantitative study of the various rehabilitation and land reclamation method useful from sustainability point of view.

<b>Prerequisites</b>	1	Basics of concrete technology.
	2	Basic knowledge of various construction materials.
	3	Knowledge of pavement design and construction.
	4	Vision of advancements available in construction industry.





Section – I		
	<b>Composite construction &amp; Formwork</b>	
<b>Unit 1</b>	Composite v/s non composite action; composite steel-concrete construction. Material for formwork, special types of formwork, causes of failure of formwork ,design of formwork.	<b>6 Hrs.</b>
	<b>New material of construction</b>	
<b>Unit 2</b>	Use of new material such as geosynthetics, Epoxy resins, Adhesives, Medium density fibre board MDF, Fibre reinforced concrete FRC, Fibre reinforced plastic FRP, Polymer-based composites. Advantages, disadvantages and limitations of use.	<b>6 Hrs.</b>
	<b>Land Reclamation</b>	
<b>Unit 3</b>	Necessity, Technical progress of land reclamation, Methods used for land reclamation, structural improvement of reclaimed land, Methods of improving bearing capacity, Waterlogging- Causes and preventive measures.	<b>6 Hrs.</b>
Section – II		
	<b>Advanced Techniques</b>	
<b>Unit 4</b>	Vaccum dewatering in concrete slab construction, Reinforced earth construction, Foundation Strengthening, vaccum dewatering, Foundation dewatering.	<b>6 Hrs.</b>
	<b>Rehabilitation of bridges</b>	
<b>Unit 5</b>	Introduction, Necessity and methods of strengthening, preservation of bridges, rehabilitation of expansion joints and bearings, bridge bearings. Retaining structures like diaphragm walls, advanced methods of their construction.	<b>6 Hrs.</b>
	<b>Construction of concrete pavement</b>	
<b>Unit 6</b>	Construction of concrete pavement by techniques like vaccum processing, revibrated concrete, Roller –compacted concrete. Slipform paving technique.	<b>6 Hrs.</b>



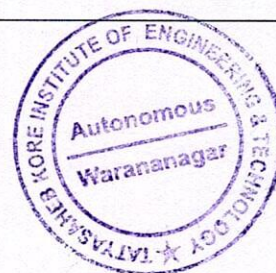


### CO - PO Mapping

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

### REFERENCES

Text Books	
1	Handbook of Composite construction Engg- G.M. Sabanis- Van Nostrand Reinhold Company, 1979.
2	Formwork design and construction-- Wynn-- Concrete Publications, 1939.
3	Concrete Technology M.S. Shetty- S.Chand publication
4	Bridge Engineering-- Raina-- Shroff Publishers and Distributors Pvt. Ltd.
Reference Books	
1	NPTL Course on Advanced Construction Technology.
2	Water power Engineering—Dandekar & Sharma-- Vikas Publishing House.
3	Bridge engineering –Punnuswamy-- McGraw Hill Education





# CE704-4 OPEN CHANNEL HYDRAULICS

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

**Evaluation Scheme**  
**ISE** : 40 Marks  
**ESE** : 60 Marks

## Course Objectives: The objective of the course is

1. To Study the fundamental principles governing open channel hydraulics required to the design of Engineering systems
2. To Study various types of open channel flow and their analysis
3. To study and understand the techniques, skills, and modern mathematical tools to applied to the river engineering problems

## Course Outcomes (CO):

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Apply knowledge of open channel flow for designing most efficient channel section and computations of flow parameters	Apply Evaluate
CO2	Analyze the Gradually varied, Rapidly varied and Spatially varied flow and apply to complex field problems.	Analyze
CO3	Design erodible channels by applying the knowledge of sediment transportation	Apply
CO4	Collect, analyze the data and apply similitude to river models.	Apply Evaluate
CO5	Apply dispersion equation on Open Channels & Bed Channels	Apply
CO6	Create Hydraulic Models of various types	Create

## Description:

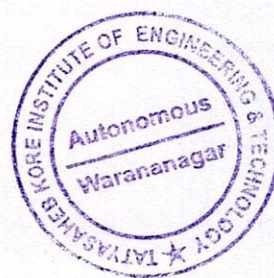
The term 'hydraulics' is related to the application of the Fluid Mechanics principles to water engineering structures, civil and environmental engineering facilities, especially hydraulic structures (e.g. canal, river, dam, reservoir and water treatment plant). We consider open channels in which liquid (i.e. water) flows with a free surface. Examples of open channels are natural streams and rivers. Man-made channels include irrigation and navigation canals, drainage ditches, sewer and culvert pipes running partially full, and spillways.

<b>Prerequisites</b>	1	Fluid mechanics
	2	Applied mechanics
	3	Engineering physics
	4	Engineering mathematics





Section – I		
Unit 1	<b>Basic Fluid Flow Concepts</b>	6 Hrs.
	Basic equations (Continuity, Energy, and Momentum) applied to OCF, Energy and Momentum correction factors, first and Second hydraulic exponent, Uniform flow computations by using section factor curve, Determination of Rigidity coefficient ‘n’, Flow in Channel transitions, Measurement of velocity of channel flow and sediment concentration in the flow By various methods. River Gauging by different methods.	
Unit 2	<b>Non-Uniform Flow in Open Channel</b>	6 Hrs.
	Computation of GVF in prismatic channels and Natural Channels by different methods, Hydraulic jump in rectangular and nonrectangular channels, Location Of Jump, Jump on sloping floor, Use of jump as Energy Dissipater (recommended by USBR and IS),Spatially-Variied Flow, Side weir, Bottom racks	
Unit 3	<b>Flow in Non-linear alignment and No prismatic Channels</b>	6 Hrs.
	Nature of Flow, Spiral Flow, Energy Loss, Super elevation, Cross Waves, Design Considerations for Subcritical and Supercritical Flow, Standing wave flume, Venturi flume, Flow between bridge piers, Flow through culvert, Flow through trash Racks.	
Section – II		
Unit 4	<b>Unsteady Flow in Open Channels</b>	6 Hrs.
	Gradually Varied Unsteady Flow, Flood routing, Rapidly Varied Flow, Waves and their classification, Celerity of a wave, Positive and negative Surges, S Dam-break problem, Introduction to HEC RAS software	
Unit 5	<b>Dispersion in Open Channels &amp; Hydraulics of Mobile Bed Channels</b>	6 Hrs.
	a)Diffusion and dispersion, Some classical solutions of the diffusion equation, Discharge measurement using tracer techniques b) Initiation of motion of sediment, Bed forms, Sediment Load, design of Erodible Channels, Regime Theory for Alluvial Channels	
Unit 6	<b>Hydraulic Models</b>	6 Hrs.
	Fixed bed river models (Distorted and Undistorted), Moveable bed Models, Model materials and construction, Physical model calibration and verification, Special-Purpose Models	





### CO - PO Mapping

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

### REFERENCES

Text Books	
1	Open Channel Hydraulics: By, Ven Te Chow, McGraw-Hill International Editions
2	Open Channel Hydraulics: By, Richard H. French, McGraw-Hill International Student Edition
Reference book	
1	Water Resources Engineering, Mays, L. W., John Wiley and Sons, New York, 2001
2	Flow Through Open Channels, Rajesh Srivastava., Oxford University Press, 2008
3	Open Channel Flow by Madan Mohan Das
4	Flow Through Open Channels: By, K. G. RangaRaju, Tata McGraw Hill Publs. Co. Ltd
5	Flow in Open Channels: By, K. Subramanyam, Tata McGraw Hill Publs. Co. Ltd.
6	Open-Channel Flow: By, M. Hanif Chaudhary, Prentice-Hall International Publications





**CE –705- Design of Structures and Drawing I**

**Lectures** : 2 Hrs/Week  
**Credit** : 2  
**Tutorials** : --

**Evaluation Scheme**  
**ISE** : 40 Marks  
**ESE** : 60 Marks

**Course Objectives:** The objective of the course is to

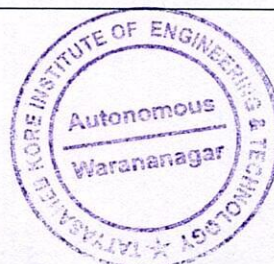
- 1) To Study the design concept of RCC structure
- 2) To understand different design concept of RCC element.
- 3) To analyze and design all components of RCC Structures.
- 4) To do the RCC detailing in the drawing..

**Course Outcomes:**

COs	At the end of successful completion of the course the student will be able to	Blooms Taxonomy
CO1	Calculate Various Design Loads coming on the structure	Understand
CO2	Analyze ,Design and understand the RCC details for Slab	Understand and Evaluate
CO3	Analyze ,Design and understand the RCC details for beam	Apply, Evaluate
CO4	Analyze ,Design and understand the RCC details for Staircase	Apply, Evaluate
CO5	Calculate the loads on the column and design the column.	Apply, Evaluate
CO6	Calculate the loads on the column and design the column Footing.	Apply, Evaluate

**Section – I**

<b>Section – I</b>		
<b>Unit 1</b>	<b>Introduction</b>	
	Types of Loads on the RCC Structures, Characteristic Load, Design Load, Factor of Safety, Load Combination for RCC structures, Analysis of structure	<b>4 Hrs.</b>
<b>Unit 2</b>	<b>Slab</b>	
	Types of slab, Load calculation for slab, Analysis of slab, Design of slab, bar bending schedule and Reinforcement detailing for slab as per IS:456	<b>4 Hrs.</b>





<b>Unit 3</b>	<b>Staircase</b>	
	Types of Staircase, Load calculation for Staircase, Analysis of Staircase, Design of Staircase, bar bending schedule and Reinforcement detailing for Staircase as per IS:456	<b>4 Hrs.</b>
<b>Section – II</b>		
<b>Unit 4</b>	<b>Beam Design</b>	
	Load calculation on beam, due to loads coming from slab, walls. Analysis of two and more Spans continuous beam and design of beam for bending moment and shear force, curtailment of reinforcement, bar bending schedule and Reinforcement detailing as per IS: 456 code.	<b>4 Hrs.</b>
<b>Unit 5</b>	<b>Column</b>	
	Calculation of load coming on column from beams. Analysis and design of rectangular and circular columns, subjected to axial load and bending Moment, bar bending schedule and Reinforcement detailing as per IS: 456 code.	<b>4 Hrs.</b>
<b>Unit 6</b>	<b>Isolated and Combined footing</b>	
	Introduction to column footing, types of footings, Design of Isolated footing, and Combined footing bar bending schedule and Reinforcement detailing as per IS: 456 code.	<b>4 Hrs.</b>

### CO - PO Mapping

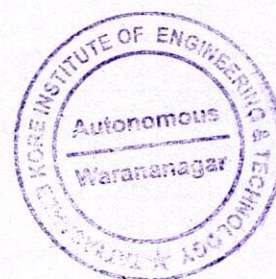
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
<b>CO1</b>	1	2	1	1	1	1	--	1	--	--	---	1	2	---	--
<b>CO2</b>	1	2	1	2	1	1	--	1	--	--	---	1	2	---	--
<b>CO3</b>	2	1	2	2	1	1	--	1	--	--	---	1	2	---	--
<b>CO4</b>	2	1	2	2	1	1	--	1	--	--	---	1	2	---	--
<b>CO5</b>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





## REFERENCES

Text Books	
1	Limit state theory and design – karve shah structures publication
2.	P. Agarwal and M. Shrikhande, Earthquake Resistant Design of Structures, Prentice-Hall of India Private Limited, 2006.
3	Reinforced concrete design – B C Punmia
4	Reinforced concrete design – A. K. jain
Reference Books	
1	IS -456 : Code of practice for RCC , IS 800 : Code of practice for Steel & Relevant Special publications of BIS
2	Handbook reinforced concrete SP34
3	Limit State Design of Reinforced Concrete P.C.Varghese, Prentice Hall, New Delhi





**CE 704-1T Irrigation Engineering (lab)**

**Practical's:** 1 hrs / week

**Credits:** 1

**Examination Scheme:**

**ISA:** 25 Marks

**POE:** --

<b>Course Objectives:</b> The objective of the course is to		
1. Familiarize the students with Dams and Reservoir. 2. Identify and control the reservoir losses. 3. Familiarize the students with Diversion head works 4. introduce the student with Canal irrigation structures.		
<b>Course Objectives:</b> The objective of the course is to		
<b>COs</b>	<b>At the end of successful completion of the course the student will be able to</b>	<b>Blooms Taxonomy</b>
CO1	Evaluate reservoir capacity using mass curve	Evaluate
CO2	Understand different forces acting on gravity dam and its modes of failure	Understand
CO3	Understand the concept of Spillway and different outlet through dams	Understand, Analyze
CO4	Apply Civil Engineering knowledge for River training works	Apply

**ASSIGNMENTS**

A) Students have to solve any **Eight** out of following

<b>Sr. No.</b>	<b>Practical/ Assignments/Tutorial Topic</b>	<b>Hrs.</b>	<b>Bloom's Taxonomy</b>
1	Reservoir Capacity determination using mass curve: Demand / supply reservoir calculation and control levels and free board	2	Apply
2	Earthen dam: components and function, Types of failure and seepage control	2	Knowledge Apply
3	Gravity dam: Forces acting, Modes of failure, Elementary and practical profile	2	Apply
4	Spillway: Geometrical sections, energy dissipation arrangement and gates, Outlet through earth dam and gravity dam.	2	Knowledge, Analyze





5	Typical section of diversion headwork, Different components, Blighs creep theory, Khosla's theory	2	Knowledge
6	Typical sections of canals, Kennedy & Lacey's theory	2	Analyze
7	Types of CD work and canal regulatory works	2	Analyze
8	Different types of river training work, Interlinking of rivers	2	Knowledge, Analyze
9	A typical layout & component parts of Hydropower plant and its functioning	2	Knowledge, Analyze
10	A Report based on field visit to a dam & CD works.	2	Knowledge

### 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	--	--	--	---	--	--	---	--	2	---	--
CO2	2	1	2	2	--	--	--	---	--	--	---	--	1	---	--
CO3	--	2	2	--	--	--	--	---	--	--	---	--	1	---	1
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. "Irrigation Engg.", - G. L. Asawa, Wiley Eastern
3	"Irrigation, Water Resources and Water Power Engineering" – Dr P.N. Modi, Standard Book House.
Reference Books	
1	Justinn, Creager and Hinds,--Engg. For Dams.- Vol. I, II, and III
2	Satyanarayan and R. Murthy - "Design of M.I. and Canal Structure", Wiley Eastern Ltd, New Delhi.
3	Bharat Singh, 'Irrigation', New Chand and Bros., Roorkee.





**CE704-2T – Solid waste Management (Lab)**

**Tutorial: 1hrs/week**

**Credits:1**

**Examination Scheme:**

**ISA:25 Marks**

**Course Objectives:** The objective of the course is to,

1. To familiarize the students with determination of qualities of solid waste
2. To familiarize the students with different IS Standards of Solid wastes
3. To familiarize the students with Treatment of solid waste
4. To introduce the student with treatment of medical waste

**Course Outcomes:**

COs	At the end of successful completion of the course the student will be able to,	Blooms Taxonomy
CO1	Determine different qualities of solid waste	Knowledge, Apply
CO2	Understand IS Standards for Solid waste	Analyze
CO3	Understand concept of Hazardous Waste	Understand Analyze
CO4	Determination of qualities and quantities of medical waste	Knowledge, Apply

**Assignments on following topics (at least 6):**

Sr. No.	Practical/Assignments/Tutorial Topic	Hrs.	Bloom's Taxonomy
1	Measurement of quantity of solid waste	2	Apply
2	Determine the quality of solid waste	2	Apply
3	Site visit – Solid waste management	2	Apply
4	IS standards application	2	Analyze
5	E waste quantities	2	Understand
6	Medical waste quantities	2	Analyze
7	Layout of solid waste treatment plant	2	Analyze
8	Hazardous waste and its treatment	2	Analyze
9	Safe disposal of solid waste	2	Analyze
10	Land fill location	2	Apply



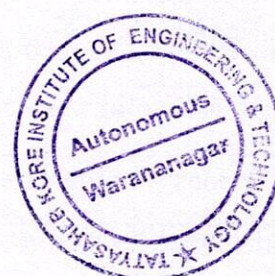


### CO - PO Mapping

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

### REFERENCES

Text Books
Solid Waste Management – Dr.A.D.Bhide
Solid Waste Management – Gorge Tchobanoglous
Composting – Gottas
Reference Books
Solid Waste Management Hand Book – Pavoni
Hand book and Solid Waste Disposal – Techabonglaus
Manual on Municipal Solid Waste Management by Ministry of Urban Development Of Govt .of India





**CE704-3T-Advanced Construction Techniques**

**Tutorial : 1 hr./week**  
**Credit : 1**

**Evaluation Scheme**  
**ISA : 25 Marks**

**Course Objectives:** The objective of the course is

1. To provide students the necessary knowledge and concepts of advancements/emerging techniques of Construction industry.
2. To impart students with the skill of design and operation of various special types of constructions based on latest technology.
3. To provide students prerequisite knowledge necessary for higher studies and research in the field of advanced construction techniques

**Course Outcomes (CO):**

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Apply the knowledge of new construction materials.	Apply Evaluate
CO2	Estimate and design of formwork material.	Apply Evaluate
CO3	Understand land reclamation techniques.	Knowledge Understand
CO4	Apply different advanced methods for efficient construction.	Apply
CO5	Understand various bridge rehabilitation techniques.	Knowledge Understand
CO6	Apply various advanced techniques in concrete pavement.	Apply

**Description:**

*Advanced Construction Techniques* has its roots in the tasks of applying various advanced construction techniques to various aspects of construction. Much of the work of civil engineers involves the planning and management of constructed facilities that address these tasks. Advanced construction techniques is the quantitative study of the various rehabilitation and land reclamation method useful from sustainability point of view.

<b>Prerequisites</b>	1	Basics of concrete technology.
	2	Basic knowledge of various construction materials.
	3	Knowledge of pavement design and construction.
	4	Vision of advancements available in construction industry.





**Term work shall comprise of**

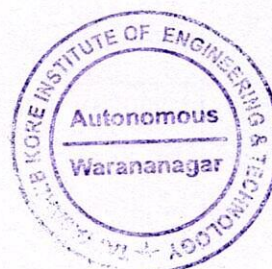
At least one assignment on each unit with minimum six questions

### CO - PO Mapping

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

### REFERENCES

Text Books	
1	Handbook of Composite construction Engg- G.M. Sabanis- Van Nostrand Reinhold Company, 1979.
2	Formwork design and construction-- Wynn-- Concrete Publications, 1939.
3	Concrete Technology M.S. Shetty- S.Chand publication
4	Bridge Engineering-- Raina-- Shroff Publishers and Distributors Pvt. Ltd.
Reference Books	
1	NPTL Course on Advanced Construction Technology.
2	Water power Engineering—Dandekar & Sharma-- Vikas Publishing House.
3	Bridge engineering –Punnuswamy-- McGraw Hill Education





# CE 704-4T – OPEN CHANNEL HYDRAULICS

**Tutorial: 1** hrs / week

**Credits: 1**

**Examination Scheme:**

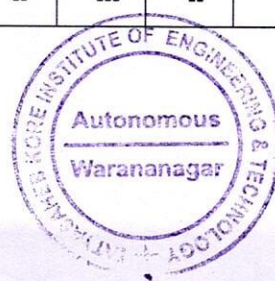
**ISA: 25 Marks**

<b>Course Objectives:</b> The objective of the course is to		
1. To Study the fundamental principles governing open channel hydraulics required to the design of Engineering systems 2. To Study various types of open channel flow and their analysis 3. To study and understand the techniques, skills, and modern mathematical tools to applied to the river engineering problems.		
<b>Course Outcomes:</b>		
<b>COs</b>	<b>At the end of successful completion of the course the student will be able to</b>	<b>Blooms Taxonomy</b>
CO1	Apply knowledge of open channel flow for designing most efficient channel section and computations of flow parameters	Understand
CO2	Analyze the Gradually varied, Rapidly varied and Spatially varied flow and apply to complex field problems.	Analyze
CO3	Design erodible channels by applying the knowledge of sediment transportation	Understand Analyze
CO4	Collect, analyze the data and apply similitude to river models.	Evaluate

<b>Sr. No.</b>	<b>Practical/ Assignments/Tutorial Topic</b>	<b>Hrs.</b>	<b>Bloom's Taxonomy</b>
1	Numerical and design problems on each unit.	2	Analyze
2	Visit to the river gauging station.	2	Understand
3	Data collection of river flow and Sedimentation	2	Create
4	Use of water resources software	2	Apply

## 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	--	--	--	---	--	--	---	--	1	---	--
CO2	2	-	2	2	--	--	--	---	--	--	---	--	--	1	--
CO3	1	2	2	--	--	--	--	---	--	--	---	--	--	1	--
CO4	--	2	--	1	--	--	--	---	--	--	---	--	1	---	--





## CE701P-Earthquake Engineering

**Practical's:** 2 hrs / week

**Credits:** 1

**Examination Scheme:**

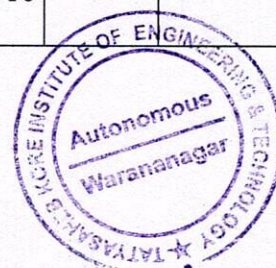
**ISA:** 25 Marks

**POE:** -

<b>Course Objectives:</b> The objective of the course is to		
1. To impart the basic knowledge of interior of earth and behaviour of earth during earthquake 2. To know various concepts of mathematical modelling. 3. To understand dynamic behavior of structure. 4. To understand earthquake resistant philosophy of structure. 5. To understand modern techniques of earthquake resistant method.		
<b>Course Outcomes:</b>		
<b>COs</b>	<b>At the end of successful completion of the course the student will be able to</b>	<b>Blooms Taxonomy</b>
CO1	Understand behaviour of earth during earthquake.	Understand
CO2	Apply the concepts of mathematical modelling.	Apply
CO3	Analyze the seismic behavior of multistory structures	Analyze
CO4	Understand earthquake resistant design philosophy of structure	Apply

**Assignments on following topics (at least 6):**

<b>Sr. No.</b>	<b>Practical/ Assignments/Tutorial Topic</b>	<b>Hrs.</b>	<b>Bloom's Taxonomy</b>
1	Earthquake Terminology, structure of earth, causes of an earthquake, plate tectonic theory, continental drift theory, elastic rebound theory, seismic waves, magnitude and intensity, methods of measurement, seismograph, strong motion earthquakes, accelogram,	2	Understand
2	free and forced vibrations (harmonic loading) of single degree of freedom systems, Numericals on Logarithmic decrement, Undamped and viscously damped vibrations, equations of motion and solution	2	Apply
3	Numericals on evaluation of lateral loads due to earthquake on multistory buildings as per IS1893-2016 Part I	2	Analyze





4	Design philosophy of earthquake, behavior of RC building, ductility and ductile detailing of beam and columns using IS13920	2	Remember
5	Behavior of unreinforced masonry and reinforced masonry, RCbands, vertical reinforcement, openings, Provisions of IS.4326, Repairs and strengthening of masonry and RC members.	2	Apply
6	Introduction to Earthquake resistant modern techniques Base Isolation- Elastomeric, Sliding, Combined. Seismic Dampers - Friction Dampers, TMD, Visco elastic dampers.	2	Apply

#### 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	--	--	--	---	--	--	---	--	1	---	--
CO2	2	-	1	2	--	1	--	---	--	--	---	--	1	---	--
CO3	1	2	--	--	1	--	--	---	--	--	---	--	1	---	--
CO4	--	1	--	1	--	1	--	---	--	--	---	--	1	---	--

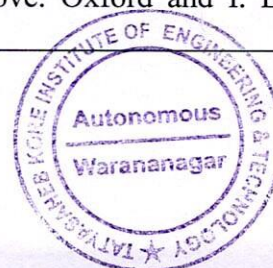
#### REFERENCES

##### Text Books

1	Earthquake Resistance Design of Structure – S. K. Duggal , Oxford Uni. Press
2	Earthquake Engineering- Manish Shrikhande and Pankaj Agarwal, Prentice Hall of India Pvt Ltd, New Delhi
3	Structural Dynamics - Mario Paz, CBS Publication
4	Foundation Design Manual–N.V. Nayak, Dhanpat Rai and Sons, Delhi
5	Earthquake Dynamics of Structures, A K chopra Earthquake Engineering Research Institute

##### Reference Books

1	Earthquake Resistant Structures–D.J.Dowrick John Wiley Publication
2	Dynamics of Structures – R. M. Clough and Ponian ,McGraw Hill co.New Delhi
3	Mechanical Vibrations–G.R.Grover Roorkee University, Roorkee.
4	Analysis and Design of Foundations for Vibrations–P.J.Moove. Oxford and I. B. H. Publication, Delhi





**CE702P -TRANSPORTATION ENGINEERING LAB**

**Practicals:** 2 hrs / week

**Scheme:**

**Credits:** 1

**Examination**

**ISA:** 25 Marks

**POE:** 25 Marks

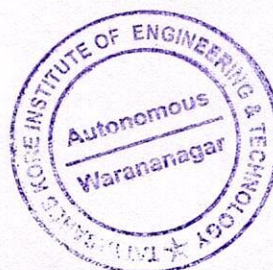
<b>Course Objectives:</b> The objective of the course is to		
5. To enable the students to conduct different tests to find various properties of aggregates, bitumen and soil sub grade and hence to assess their suitability in pavement construction.		
6. To enable students to determine different grades of bitumen binder.		
<b>Course Outcomes (CO):</b>		
<b>COs</b>	<b>At the end of successful completion of the practical's the student will be</b>	<b>Blooms Taxonomy</b>
CO1	The students will be able to assess the quality of various pavement materials and their suitability in highway construction.	Knowledge, Apply
CO2	The students will able to determine different grades of bitumen	Analyze

**PRACTICALS**

**A] Performance of at least Seven Experiments from the following:**

**B] One assignment on each unit**

<b>Sr. No.</b>	<b>Practical/ Experiment/Tutorial Topic</b>	<b>Hrs.</b>	<b>Bloom's Taxonomy</b>
01	Aggregate crushing value.	2	Understand Evaluate
02	Aggregate impact value.	2	Understand Evaluate
03	Los Angeles abrasion value.	2	Understand Evaluate
04	Stripping value of road aggregates.	2	Understand Evaluate
05	Penetration value of bitumen.	2	Understand Evaluate
06	Softening point of bitumen.	2	Understand Evaluate
07	Ductility of bitumen.	2	Understand Evaluate
08	Flash and Fire point of bitumen.	2	Understand Evaluate





### CO - PO Mapping

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

### REFERENCES

Reference Books	
1.	Principles and Practices of Highway Engineering, L .R. Kadiyali, Khanna Publishers, 2009
2.	Specification for Road and bridge works, MoRTH (2013) (5th revision)
3.	MS-2 manual (2015) Seventh edition, Asphalt Institute.
4.	Highway Engineering, S. K. Khanna, C.E.G. Justo Khanna Publishers





**Practical's: 4 hrs / week**

**Scheme:**

**Credits: 2**

**Examination**

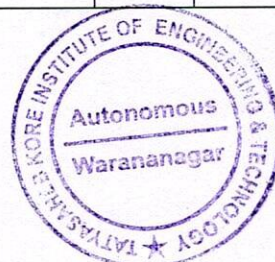
**ISA: 25 Marks**

**POE: 25 Marks**

<b>Course Objectives:</b> The objective of the course is to		
1. To know the students basic rates of building Materials. 2. To Prepare Bar Bending Schedule. 3. To Estimate G+1 RCC Framed Structure. 4. To Prepare Valuation report of Building.		
<b>Course Outcomes:</b>		
<b>COs</b>	<b>At the end of successful completion of the course the student will be able to</b>	<b>Blooms Taxonomy</b>
CO1	Perform rate analysis of various items.	Analyze
CO2	Organize specifications for civil engineering items.	Analyze
CO3	Formulate estimate for various construction projects.	Evaluate
CO4	Assess and Prepare valuation for construction projects.	Create

**Assignments on following topics :**

<b>Sr. No.</b>	<b>Practical/ Assignments/Tutorial Topic</b>	<b>Hrs</b>	<b>Bloom's Taxonomy</b>
1	Units of Measurement of construction materials.(Min 50).	2	Knowledge
2	Rate Analysis of ten civil engineering items.(Prepare excel sheet for minimum 5 items of works).	2	Analyzing
3	Detailed specification for minimum ten civil engineering items. (One each from Roads, Irrigation works, Water Supply & Sanitation & seven from buildings).	2	Analyzing
4	Schedule of reinforcement for the following a) Beams. b) Slab. c) Column & Column footing.	2	Evaluating
5	Detailed estimate of G + 1 residential Framed Structure.	2	Evaluating
6	Preparing detailed estimate for any one of the following: a) A stretch of a road about 1 Km. long including earthwork. b) RCC Small Bridge.	2	Evaluating
7	Preparing Valuation report for building of residential purpose.	2	creating
8	Use of any software for estimation.( Case study)	2	Applying





### CO - PO Mapping

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

### REFERENCES

Text Books	
1	Estimating and Costing – B.N.Dutta. Dhanpat Rai & Sons. 1682, NaiSarak, Delhi-110006
2	Estimating, Costing and Specification in civil engineering – Chakroborty M. 21 b, BhabanandaRoad, Kolkata-700026.
3	Standard specifications Volumes I & II (P. W. D. Maharashtra) Govt. of Maharashtra.
Reference Books	
1	Professional Practice (Estimating and Valuation) – Roshan Nanavati (1984 Edition) U.B.S. Publishers, Distributers PVT. Ltd.5 Ansari road, New Delhi.
2	Standard specifications Volumes I & II (P. W. D. Maharashtra) Govt. of Maharashtra.
3	C.P.W.D. specifications& schedules of rates.





**CE –705P- Design of Structures and Drawing I (Lab work)**

**Lectures:** 2 hrs / week

**Credits:** 1

**Practical's:** 2 hrs / week

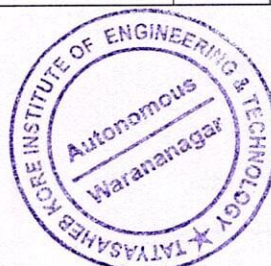
**Examination**

**ISA: 25 Marks**

**POE: 25 Marks**

<b>Course Objectives:</b> The objective of the course is to		
1) To Study the design concept of RCC Building 2) To understand different design concept of RCC Building element. 3) To analyze all components of RCC Framed Structure. 4) To do the RCC detailing in the drawing for Building.		
<b>Course Outcomes:</b>		
<b>COs</b>	<b>At the end of successful completion of the course the student will be able to</b>	<b>Blooms Taxonomy</b>
CO1	Explain the design procedure for Building structures	Understand
CO2	Calculate the load on the Building structures	Evaluate
CO3	Analyze the RCC Building Structure	Apply, Evaluate
CO4	Design the RCC Building structure	Apply, Evaluate
CO5	Explain the detailing of Reinforcement for RCC Building.	Apply, Evaluate

<b>Sr. No.</b>	<b>Practical/ Assignments/Tutorial Topic</b>	<b>Hrs</b>	<b>Bloom's Taxonomy</b>
1	Calculation of Design Loads coming on two storied RCC Residential Building	6	Understand Apply
2	Analyze and Design of all structural components of RCC Residential Building as per IS456 - 2000	6	Evaluate Apply
3	Detailing of Reinforcement for different members of RCC Residential Building as per IS456 - 2000	6	Knowledge Apply





### CO - PO Mapping

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

### REFERENCES

Text Books	
1	Limit state theory and design – karve shah structures publication
2	Reinforced concrete design – B C Punmia
3	Reinforced concrete design – A. K. jain
Reference Books	
1	IS -456 : Code of practice for RCC ,
2	Handbook reinforced concrete SP34
3	Limit State Design of Reinforced Concrete P.C.Varghese, Prentice Hall, New Delhi





**Practicals** : 4 Hrs/Week  
**Credit** : 2  
**Tutorials** : ---

**Examination Scheme:**  
**ISA: 100 Marks**

**Course Objectives:** The objective of the course is to

1. Identify problem related to civil engineering field
2. Prepare literature survey related to concerned problem
3. Finalize methodology for solving the problem.

**Course Outcomes:**

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Undertake problem identification, formulation.	Apply
CO2	Demonstrate a sound technical knowledge of their selected project topic.	Understand
CO3	Prepare a technical report of synopsis based on the project.	Evaluate
CO4	Deliver technical seminar based on the Project work carried out.	Evaluate

**Description:**

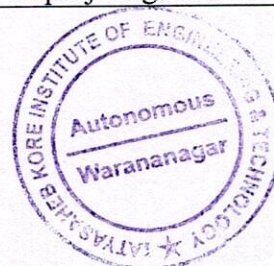
Project work will be a design project, experimental project field serving or computer oriented on any of the topics of civil engineering interest for student select the track to as per syllabus Structure.

Project work will be allotted as a group project consisting of a minimum 3 and maximum 5 numbers of students depending upon the type of the project and depth of work (for students who have opted track one as per structure)

The students are required to be literature survey, formulate the problem and form a methodology of project for arriving at the solution of the problem. Probable activities of the project phase-

- 1) submission of project topic with name of group member
- 2) finalization of topic and allotment of guide by department through department research committee (DRC)
- 3) instruction and literature review presentation.
- 4) methodology and future work presentation
- 5) submission of synopsis duly signed by students and guide
- 6) presentation of synopsis in front of DRC

The in semester assessment of the project will be done continuously throughout the semester by a DRC consisting of 3-4 faculty members from the department along with project guide.





The students will present their project work before the committee. The complete project report is not expected at the end this semester. However 10 pages typed report based on the work done will have to be submitted by the students to the DRC.

The project guides will award the ISA marks to the individual students depending on the group average award by the DRC.

3 – High, 2 – Medium, 1 – Low & - No Correction

### 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
CO2	3	2	..	--	--	--	--	---	--	--	--	--	--	1	--
CO3	2	2	--	--	1	--	--	--	--	2	---	--	--	1	--
CO4	2	2	--	--	--	--	--	---	--	2	--	--	--	---	--





Practical's: --

Examination : --

Credits: --

**Course Objectives:** The objective of the course is to

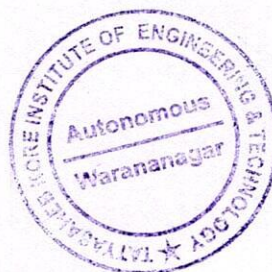
7. To familiarize the students with Field Experience.
8. To aware about organizational working.
9. To acknowledge differences in theory and practical .
10. To upgrade employability skills.

**Course Outcomes:**

COs	At the end of successful completion of the course the student will be able to	Blooms Taxonomy
CO1	Know Organizational Structure in industry.	Knowledge
CO2	Cop-up with organizational ethics.	Knowledge
CO3	Get hands on experience of Field job.	Understand
CO4	To inculcate employability skills.	Knowledge

**Guidelines about the Field Training :**

- On site training for 2 weeks after winter examination and 2 weeks after Summer Examination of TY BTech.(Combined report of the same ).
- Onsite training should be at Reputed construction Site/Architect Firm/Structural Consultant.
- Above activity should be supported with Valid certificates.
- Handwritten report of atleast 25 pages has to be submitted after completion.
- Assessment to be done along with report and Presentation slide in First semester of Final Year.





### 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	--	--	--	---	--	--	---	--	1	---	--
CO2	2	-	2	2	--	--	--	---	--	--	---	--	1	1	--
CO3	1	2	2	--	--	--	--	---	--	--	---	--	1	---	1
CO4	--	2	--	1	--	--	--	---	--	--	---	--	--	---	2



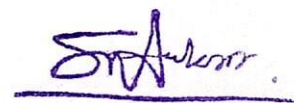
**Member Secretary**  
Board of Studies



**Chairman**  
Board of Studies



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

**PRINCIPAL**  
T.K.I.E.T.Warananagar



**Final Year B. Tech. in CIVIL Engineering**  
**Syllabus Structure under Autonomous Status of TKIET,**  
**Warananagar**  
**SEM VIII**  
**To be implemented from**  
**2023-24**





## CE801- Town planning and Docks Harbor Engineering

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

### Evaluation Scheme

**ISE** : 40 Marks  
**ESE** : 60 Marks

### Course Objectives: The objective of the course is

1. To develop an understanding of the basic knowledge of town planning and development of towns.
2. Understand the basic parts and terms used in docks and harbor.

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Understand the necessity and scope and principles of town planning.	Knowledge Understand
CO2	Understand the growth pattern of towns.	Apply Evaluate
CO3	Identify development control rules of town planning.	Knowledge Understand
CO4	Understand the village planning and multilevel planning.	Apply
CO5	Understand terms used in harbors.	Knowledge Understand
CO6	Understand necessity of docks.	Knowledge Understand

### Description:

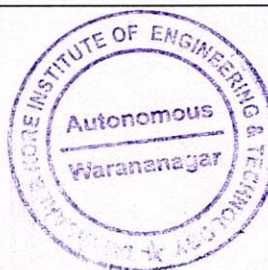
Students learn about the planning and design of all the new buildings, roads, and parks in a place in order to make them attractive and convenient for the people who live there, also to formulate Master Plans to ensure sustainable urban development in notified urban areas. Student also know the structure that's made for bringing boats or ships in to the shore and loading or unloading them of goods or passengers.

<b>Prerequisites</b>	1	Basics of town planning.
	2	Development control rules.
	3	Construction Techniques.





Section –I		
Unit 1	<b>Introduction to Town Planning</b>	
	a) Necessity and scope and principles of Town Planning, Brief history. Greek and Roman towns, planning in ancient India – Indus Valley civilization, Pre- independence, Post independence period. Present status of town planning in India. b) Contribution of town planners in modern era such as Sir Patrick Geddes. Sir Ebenezer Howard, Clarence stein, Sir Patrick Abercrombie	<b>7 Hrs.</b>
Unit 2	<b>Developments of Town Planning</b>	
	a) Growth pattern of towns- Natural and Planned, Elements of town, Types of zoning and importance, Urban roads-traffic problem in cities, various road networks (Grid iron pattern, shoe string development, etc), Surveys of data collection, physical, social, economic, civic etc. Analysis of data, Town aesthetics, landscape architecture (Suitability of trees. Treatment of traffic islands, open spaces, walks ways, public sit-outs and continuous park system. Greenways) b) Layout of residential units, neighborhood unit planning. Rehabilitation of slum and urban renewal.	<b>7 Hrs.</b>
Unit 3	<b>M RTP</b>	
	a) Development control rules with respective to town planning. b) Different town planning works with reference to M.R.T.P. Act. (Brief idea about various provisions) c) Land acquisition act– necessity and procedure of acquisition.	<b>6 Hrs.</b>
Section – II		
Unit 4	<b>Village Planning</b>	
	a) Village planning- Necessity and principles. b) Multilevel planning, Decentralization concepts, Rural developments- Growth centre approach, Area Development approach, Integrated rural development approach	<b>6 Hrs.</b>
Unit 5	<b>Inland Water Transport</b>	
	a) Introduction Inland water transport in India, tides ,waves, erosion, beach drift, littoral drift sand bars, coast protection, classification of ports and harbors, site s selection, break waters, jetties, wharves, piers, facilities required.	<b>5 Hrs.</b>
Unit 6	<b>Docks</b>	
	a) Types of dock, navigational aids, lighthouses, terminal buildings, special equipments, containerization.	<b>5 Hrs.</b>





### CO - PO Mapping

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

### REFERENCES

Text Books	
1	Town and country Planning-G.K. Hiraskar& K. G. Hiraskar, By Dhanpat Rai Publication (p) Ltd.,
2	Town Planning- S.C.Rangawala, Charotar Publications, Pune
Reference Books	
1	MRTP Act 1966
2	Rural development Planning – Design and method :Misra S.N., Satvahan Publications New Delh.
3	Urban Pattern by Gallion, Eisner





## CE802 Design of Bridges

**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 develop and understanding of the basic principles of bridge design.
- 2.Understand the analysis and design aspects of Bridge structural engineering.

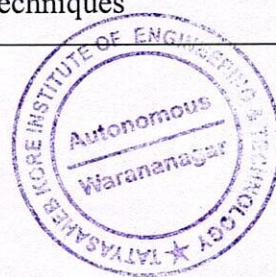
### Course Outcomes:

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Understand the components of a given type of bridge with their functions	Understand
CO2	Understand the different load on bridge	Understand
CO3	To Study the IRC standard load and design the dick slab type bridges	Apply
CO4	Understand the different construction techniques	Understand
CO5	Design and check the stability of ears and abatement	Apply
CO6	Identify bearing systems used for bridges.	Apply

### Description:

Students learn about the types of possible loads, how to calculate ultimate load combinations, and investigate the different sizes for the beams (girders) and columns(piers) of simple breach design. The learn the steps that engineers used to design bridges by conducting their own hands on associate activity to prototype their own structure. Students will begin to understand the problem and learn how to determine the bridge loads and calculate the highest possible load and calculate the amount of material needed to resist the load.

<b>Prerequisites:</b>	1:	Basic of design of bridges
	2:	Different loads calculation on bridges
	3.	construction techniques





Section – I		
Unit 1	<b>Introduction of bridges</b>	
	Introduction, and brief history of bridges, classification, importance of bridges, components of bridges, investigation for bridges	7 Hrs
Unit 2	<b>Standard specifications for Road bridges</b>	
	Standard specifications for road, bridges, IRC, bridge code, width of carriage, way, clear clearances, loads to be considered that is DL, LL, impact load, wind load of the cloud launch, eternal four centrifugal force buoyancy, earth pressure, water, current force, thermal forces.	6 Hrs
Unit 3	<b>General Design considerations</b>	
	General design considerations. For R.C.C AND P.S.C. Bridges. Traffic aspects for Highway bridges. Aesthetics of bridge design, relative costs of bridge components. Design of rain poster concrete, deck slab, pigeauds theory, Bheem and slab and T-beam, courbons theory	8 Hrs
Section – II		
Unit 4	<b>Construction techniques</b>	
	Construction of substructure footings, piles construction of rainforest Earth retaining wall and rainfall Earth abutments, superstructure erection method for bridge deck construction by cantilever method, repair, straightening and rehabilitation of existing.	5 Hrs
Unit 5	<b>Design of substructure</b>	
	Design of substructure- Abutments, piers, approach slab	8Hrs
Unit 6	<b>Bearings and expansion joints</b>	
	Different types of bridge bearing and expansion joints-forces on bearings, types of bearings, design of UN reinforcedure elastometric bearings, expansion joints	6Hrs



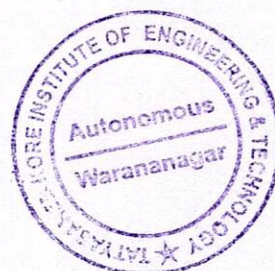


### CO - PO Mapping

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

### REFERENCES

Text Books	
1	Design Of Bridges "By N. Krishna Raju.
2	Design of Bridge Structures *by T R Jagadeesh
Reference Books	
1	Reinforced Conerete Structures -Vol. II by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications.
2	RAINA, Tata McGraw- Hills Publishing Company Limited. Concrete Bridge Practice, Analysis, Design and Economics by Dr. V. K
IS codes	
1	IRC Codes - IRC: 5, IRC: 6, IRC: 18, IRC: 27, IRC: 45, IRC: 78, IRC: 83.





## CE803-1- Structural Design of Foundation & Retaining Structures (SDFRS)

**Lectures** : 3 hrs./week  
**Credit** : 3  
**Tutorials** : --

**Evaluation Scheme**  
**ISE** : 40 Marks  
**ESE** : 60 Marks

### Course Objectives: The objective of the course is to

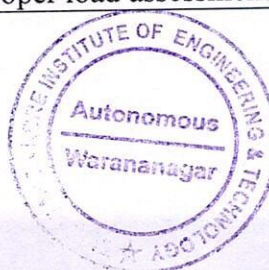
1. To learn various foundation systems and their application
2. To evaluate the load carrying capacity & stability of specify foundation system.
3. To learn analysis & design of different foundations with reinforcement details.
4. To enhance the knowledge about reinforcement curtailments with economy.
5. To study the structural construction in water bodies as retaining structures.
6. To study the various forces acting on modern foundation techniques.

### Course Outcomes (CO):

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Analyze and design rectangular and trapezoidal combined footings by applying dimension analysis and reinforcement detailing to ensure structural stability under varying load conditions	Analyze Design
CO2	Analyze and design raft foundations considering different configurations, including slabs with and without primary and secondary beams, while ensuring appropriate reinforcement detailing	Analyze Design
CO3	Analyze and design single and group pile foundations, including reinforcement detailing for individual piles and pile caps for different configurations	Analyze Design
CO4	Understanding the types, elements, installation methods, stability analysis, and issues related to well foundations, including sinking problems and worker health concerns.	Understand Knowledge
CO5	Understand and analyze the stability of cantilever retaining walls, including reinforcement curtailment, shear key usage, and design for various backfill conditions with reinforcement details	Understand Analyze
CO6	Understand the necessity, functions, types, and construction parameters of breakwaters, and analyze and design their stability	Understand

### Description

*The structural design of foundations and retaining structures* is crucial in civil engineering projects to provide stability, support, and safety. Foundations serve as the base for buildings and infrastructure, while retaining structures retain soil or other materials to create level surfaces. This description explores the key aspects and considerations involved in the design of foundations and retaining structures, highlighting their importance in maintaining structural integrity and preventing failure. The structural design of foundations and retaining structures is a fundamental aspect of civil engineering projects. Through thorough analysis of site conditions, proper load assessment, and careful selection of





foundation types and retaining structures, engineers ensure stability, support, and safety. By considering geotechnical properties, applying appropriate construction techniques, and adhering to industry standards, the design process strives to create durable, resilient structures capable of withstanding applied loads and maintaining their integrity for years to come

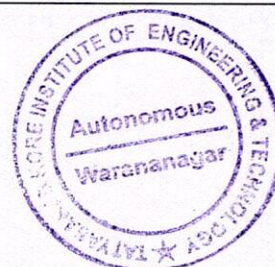
<b>Prerequisites:</b>	1:	Knowledge of different types of foundations and their functions
	2:	Hands on reinforced concrete structures (Analysis and Design)
	3:	Calculation of bending moments, shear force, torsion, SFD, BMD etc.
	4:	Knowledge and applications of IS456-2000

### Section – I

<b>Unit 1</b>	<b>Shallow Foundations – Combined footing</b>	
	Introduction to combined footings, necessity & types of combined footings for different loadings, Dimension analysis of rectangular & Trapezoidal combined footings, Design of slab type combined footing with reinforcement details, Design of slab-beam type combined footing with reinforcement details	<b>6 Hrs</b>
<b>Unit 2</b>	<b>Shallow Foundations – Raft Foundation</b>	
	Introduction to raft or mat foundation, necessity & types of rafts, Design of raft as a slab with reinforcement details (without primary & secondary beams), Design of raft as slab including primary peripheral beams with proper reinforcement details, Design of raft as a slab including both primary & secondary beam with proper reinforcement details	<b>6 Hrs</b>
<b>Unit 3</b>	<b>Deep Foundations – Pile Foundation</b>	
	Introduction to pile foundation, necessity, classifications of pile foundation, Design of single pile with reinforcement details, Introduction to group of piles, pile cap, reinforcement details etc. Design of pile cap for a group of 2, 3 and 4 piles with reinforcement details.	<b>6 Hrs</b>

### Section – II

<b>Unit 4</b>	<b>Deep Foundations – Well Foundation</b>	
	Introduction to well foundation, necessity & types of well foundations, Elements of well foundation, shapes of well foundation, installation etc., Forces acting on well foundation & lateral stability analysis, Problems associated with sinking of well & remedial measures, Tilt, shift & techniques to overcome, health problems of workers etc.	<b>6 Hrs.</b>
<b>Unit 5</b>	<b>Retaining Structures</b>	
	Introduction, functions & types of retaining wall, Stability analysis of cantilever type retaining wall, Reinforcement curtailment in cantilever type wall, use of shear key etc., Design of cantilever type retaining wall for various types of backfill conditions with reinforcement details.	<b>6 Hrs.</b>
<b>Break water Structures</b>		





**Unit 6**

Introduction, Necessity, functions and types of break water, Parameters for construction of breakwater, Methods of constructions of breakwaters, Stability analysis and design of breakwater

**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	3	1	-	2	1	2	-	-	-	1	2	-	2
CO2	2	3	3	1	-	2	-	2	-	-	-	1	2	-	2
CO3	2	3	3	1	1	3	1	2	-	-	-	1	3	-	2
CO4	-	2	3	1	2	3	1	1	-	-	-	1	1	2	1
CO5	2	3	3	2	2	2	-	1	-	-	-	-	2	-	2
CO6	1	2	3	2	2	3	1	1	-	-	-	-	1	2	2

**REFERENCES****Text Books**

- 1 "Foundation Engineering", by P. C. Varghese, Prentice Hall India Learning Private Limited
- 2 "Raft Foundation Design and Analysis with a Practical Approach", by Sharat Chandra Gupta, New age Publisher 1997
3. "Pile foundation Design & Construction", by Satyendra Mittal, CBS Publishers & Distributors Pvt. Ltd.
- 4 "Soil Mechanics and Foundations" by B. C. Punamia & Ashok Kumar Jain, Laxmi Publications
- 5 "Soil Mechanics and Foundation Engineering", by Purushotama Raj, Published by Pearson Education India, Ltd.
- 6 "Foundation Engineering", by B. J. Kasmalkar, Pune Vidyarthi Griha Prakashan
- 7 "Advance Foundation Engineering", by V.N.S. Murthy, CBS Publishers & Distributors Pvt. Ltd
- 8 "Foundation Design Manual for Practicing Engineer", by Narayan Nayak, Dhanapat Rai Publications Pvt. Ltd.

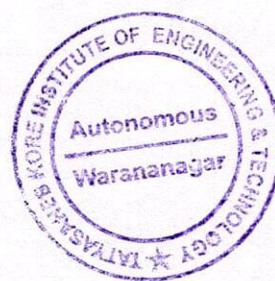
**Reference Books**

- 1 "Foundation Engineering Handbook- I", Van Nostrand Reinhold Company, 1975 by Winterkorn H.F. and Fang H. Y
- 2 "Pile Foundation Analysis and Design", Poulos, H.G. and Davis, E.H. (1980), John Wiley and Sons, New York.
- 3 "Foundation Analysis & Design", by Joseph Bowles, McGraw-Hill Education; 5th edition March 2001





4	<i>“Foundation Design”</i> by W. C. Teng, Prentice Hall of India PVT. LTD, New Delhi
5	<i>“Basics of retaining wall design”</i> , by hugh brooks, HBA Publications, Incorporated (23 May 2018)
6	<i>“Earth Pressure and Earth-Retaining Structures”</i> , by Clayton Chris R.I, Woods Rick. I, Bond Andrew J, Publisher: Taylor & Francis Inc
7	<i>“Design Applications of Raft Foundations”</i> , by J. A. Hemsley, Published on 2000 by Thomas Telford





## CE803-2-ADVANCED DESIGN OF CONCRETE STRUCTURES

**Lectures** : 3 Hrs/Week  
**Credit** : 3

**Evaluation Scheme**  
**ISE** : 40 Marks  
**ESE** : 60 Marks

**Course Objectives:** The objective of the course is to

1. Identify the provisions made in IS Codes.
2. Understand behavior of the different RCC structures and structural elements.
3. Design the reinforced concrete Flat Slab, Deep Beam, Bunkers, Silos, Continuous beam, water-tanks.
4. Analyze and Design of Slab by Using Yield Line Theory.

### Course Outcomes (CO):

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Identify the provisions made in IS-456-2000, IS-3370-1984 and IS-1346	Understand
CO2	Analysis of Deep Beams	Understand
CO3	Analysis and design of Bunkers and Silos	Evaluate
CO4	Study and design of water tanks	Apply
CO5	Analysis and design of continuous beams	Apply, Evaluate
CO6	Develop the concept of Yield Line Theory	Apply, Evaluate

### Description

Design of advanced reinforced concrete structures is an introductory advanced design course in civil engineering. In this course, extensive use of reinforced concrete for variety of structural members has necessitated the proper understanding of the design of structural elements like flat slab, deep beams, bunkers and silos, water tanks design, continuous beams, yield line theory.

**Prerequisites:** 1 Elements of Civil Engineering & Mechanics, Strength of Materials, Theory of Structures, Design of Reinforced Concrete Structures.

### Section – I

Flat Slab		
<b>Unit 1</b>	Flat Slab- Introduction, proportioning of flat slab, determination of Bending moment and shear force, direct design method, equivalent frame method, slab reinforcement.	<b>6 Hrs</b>
Deep Beams		





<b>Unit 2</b>	Deep Beams Analysis of deep beams- Design as per IS 456-2000.	<b>6 Hrs</b>
<b>Unit 3</b>	<b>Bunkers And Silos</b>	<b>6 Hrs</b>
	Bunkers and Silos- Introduction, design of rectangular bunkers, design of tension members, design of circular bunker, design of silos.	
<b>Section – II</b>		
<b>Unit 4</b>	<b>Water Tanks Design</b>	<b>6 Hrs.</b>
	Design of water tank - Introduction to working stress method for water tank design, Calculation of design constants, Design criteria, permissible stresses, design of water tank resting on ground using IS code method – circular water tanks with flexible and rigid joint between wall and floor.	
<b>Unit 5</b>	<b>Continuous Beams</b>	<b>6 Hrs.</b>
	Continuous Beams Limit state Design of two span continuous beams and three span continuous beams using IS coefficient, concept of moment redistribution.	
<b>Unit 6</b>	<b>Yield Line Theory</b>	<b>6 Hrs.</b>
	Yield Line Theory- Introduction, assumptions, characteristic features of yield lines, sign conventions for yield lines and supports, yield line patterns, moment capacity across a yield line, ultimate load on slabs, analysis by virtual work method, analysis by equilibrium method, design of slabs using Yield line theory.	

**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	--	--
CO2	2	2	--	--	2	2	--	--	--	--	--	--	1	--	--
CO3	--	2	2	1	--	1	--	--	--	--	--	--	1	--	--
CO4	--	2	--	2	1	2	--	--	--	--	--	--	1	--	--
CO5	--	1	1	1	--	1	--	--	--	--	--	--	--	--	--
CO6	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--





## REFERENCES

Text Books	
1	Advance RCC Design- S.S. Bhavikatti, Vol- II
2	Reinforced Concrete Structural Elements- Purushothaman. P, Tata Mc Graw Hill
3	Reinforced Concrete – Ashok K Jain, Nem Chand Bros. Roorkee
4	Plain and Reinforced Concrete – Jain & Jaikrishna, Vol. I & II, Nem Chand Bros. Roorkee
5	Yield Line Analysis of Slabs- Jones L L, Thomas and Hudson
6	Design of deep girders, Concrete Association of India
7	Reinforced Concrete, Mallick & Gupta- Oxford & IBH
Reference Books	
1	IS 456-2000 - Plain And Reinforced Concrete - Code Of Practice
2	IS 3370- 2009- Part 1 - 4 Code of Practice for concrete structures for the storage of liquids





**CE803-3 – Prestressed Concrete Design**

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

**Evaluation Scheme**  
**ISE** : 40 Marks  
**ESE** : 60 Marks

**Course Objectives:** The objective of the course is

1. To Study the Basic concept of prestressed concrete
2. To analyse the prestressed concrete beams.
3. To analyse the loss of prestress.
4. To design the prestressed concrete beam for flexure
5. To analyse and design of continuous prestressed beam
6. To Analyse and design of end block section

**Course Outcomes (CO):**

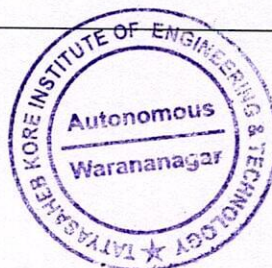
COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Apply the knowledge of prestress for structures.	Apply, Understand
CO2	Apply different methods for analysis of prestressed beam.	Apply, Evaluate
CO3	Estimate the loss of prestress	Evaluate
CO4	Design the prestressed beam for flexure	Apply, Evaluate
CO5	Analyse and design the continuous beam	Apply, Evaluate
CO6	Analyse and design the end block beam section	Apply, Evaluate

**Description:**

<b>Prerequisites</b>	1	Basics of Strength of Material
	2	Basic knowledge of analysis of structures
	3	Knowledge of behavior of reinforced concrete structures
	4	Knowledge of analyze and design of reinforced concrete structures etc

**Section – I**

	<b>Introduction</b>
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<b>Unit 1</b>	Introduction – Basic Concept of prestressing, Material of prestressing Typrs of prestressin, Systems of prestressing	<b>4 Hrs.</b>
<b>Analysis of prestress section</b>		
<b>Unit 2</b>	Methods of analysis, analysis of rectangular, I and T sections, different cable profile.	<b>6 Hrs.</b>
<b>Losses in prestress</b>		
<b>Unit 3</b>	Types of losses – Elastic deformation, creep, Shrinkage, friction, slip, relaxation of steel fro Pre & Post tensioned members	<b>6 Hrs.</b>
<b>Section – II</b>		
<b>Design of prestressed beam section</b>		
<b>Unit 4</b>	Design of rectangular and I sections for flexure by Working Stress Method and by I S codes recommendation	<b>6 Hrs.</b>
<b>Analysis and design of contionou beam</b>		
<b>Unit 5</b>	Analysis and design of Continuous and fixed beams. Elastic analysis, secondry moments, concordant cable, linear transformations.	<b>6 Hrs.</b>
<b>Analysis and design of end block</b>		
<b>Unit 6</b>	Analysis and design of End blocks in post tensioned members, primary and secondary distribution zones, brusting and spalling tensions	<b>6 Hrs.</b>

### CO - PO Mapping

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





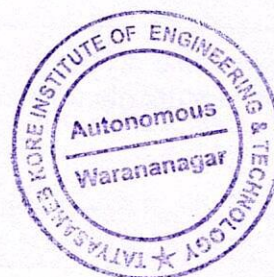
## REFERENCES

### Text Books

- 1 Fundamentals of prestressed concrete,- N C Sinha and Sujitkumar Roy.
- 2 Reinforced concrete design – B C Punmia
- 3 Prestressed concrete structures ,- Dayaratnam P ,

### Reference Books

- 1 IS -1343 : Code of practice for Prestressed concrete , BIS
- 2 Prestressed concrete,-Guyon Y, Vol. I & II, John Wiley and Sons, New Yark
- 3 Prestressed concrete, - N Krishna Raju, Tata McGraw Hill, New Delhi.
- 4 Prestressed concrete,- T Y Lin, Tata McGraw Hill, New Delhi.





## CE 803-4 -Dynamics of Structure

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

**Evaluation Scheme**  
**ISE** : 40 Marks  
**ESE** : 60 Marks

<b>Course Objectives:</b> The objective of the course is		
1. To understand the response of structures to earthquakes 2. To know various concepts of structural dynamics. 3. To understand SDOF and MDOF. 4. To understand response spectrum analysis of structure.		
<b>Course Outcomes (CO):</b>		
<b>COs</b>	<b>At the end of successful completion of the course, the student will be able to</b>	<b>Blooms Taxonomy</b>
<b>CO1</b>	Understand structural dynamics	Understand
<b>CO2</b>	Understand equation of motions	Understand
<b>CO3</b>	Analyze the seismic behavior of SDOF system	Analyze
<b>CO4</b>	Analysis of structure for higher modes	Analyze
<b>CO5</b>	Understand Response of single and multiple DOFS systems to Earthquake Loading	Understand
<b>CO6</b>	Understand concept of modal mass and mode participation factors.	Remember

<b>Description:</b>		
To understand the response of structures to earthquakes requires study of structural dynamics. Therefore, Single Dynamic Degree of Freedom Systems are first introduced, then two and three DOF system are covered. Finally the earthquake effects on structures are covered.		
<b>Prerequisites</b>	1	Basics of analysis and design of Steel structures.
	2	Basics of analysis and design of RCC structures.
	3	Knowledge of Planning Principals.
	4	Basics of Mathematical expressions.
<b>Section – I</b>		
	<b>Introduction to Structural Dynamics</b>	





<b>Unit 1</b>	Overview of Structural Dynamics, Single Degree of Freedom Systems – Analysis of Free Vibrations – undamped and damped systems, estimation of damping by logarithmic decrement method.	<b>5 Hrs.</b>
<b>Fundamentals of theory of vibration</b>		
<b>Unit 2</b>	Formulation of equation of motion for generalized SDOF dynamic problems using virtual work method	<b>7 Hrs.</b>
<b>Response spectrum theory</b>		
<b>Unit 3</b>	Response spectrum theory: Earthquake response spectrum, tripartite spectrum, construction of design response spectrum, Response of SDOFS systems to Harmonic, Periodic, Impulse Loads	<b>6 Hrs.</b>
<b>Section – II</b>		
<b>Equation of Motion</b>		
<b>Unit 4</b>	Formulation of equation of motion for two/three DOF systems. Finding mode shapes and frequencies by solving the determinantal equation, and iterative techniques. Use of sweeping matrices for obtaining higher modes. Proof of Convergence. Modal superposition and Response Spectrum Methods.	<b>6 Hrs.</b>
<b>MDOF System</b>		
<b>Unit 5</b>	Response of single and multiple DOFS systems to Earthquake Loading using TimeStepping Methods based on Forward Cauchy Euler, Backward Cauchy Euler and Trapezoidal Rule. Accuracy, stability and algorithmic damping in step-by-step methods	<b>7 Hrs.</b>
<b>Earthquake response analysis</b>		
<b>Unit 6</b>	Earthquake response analysis of Multi-DOF systems subjected to earthquake ground motion. Concept of modal mass and mode participation factors, etc.	<b>5 Hrs.</b>





### CO - PO Mapping

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

### REFERENCES

Text Books	
1	Earthquake Resistance Design of Structure – S. K. Duggal, Oxford Uni. Press
2	Earthquake Engineering- Manish Shrikhande and Pankaj Agarwal, Prentice Hall of India Pvt Ltd, New Delhi
3	Structural Dynamics - Mario Paz, CBS Publication
4	Dynamics of Structures, A K chopra. Earthquake Engineering Research Institute
Reference Books	
1	Earthquake Resistant Structures – D.J. Dowrick, John Wiley Publication
2	Dynamics of Structures – R. M. Clough and Ponian, McGraw Hill Co. New Delhi
3	Mechanical Vibrations–G.R. Grover Roorkee University, Roorkee.
4	Analysis and Design of Foundations for Vibrations – P.J. Moove. Oxford and I.B.H. Publication, Delhi
5	Manual of Earthquake Resistant Non Engineering Construction, University of Roorkee





**CE804-1 -PROFESSIONAL ELECTIVE IV**  
**REMOTE SENSING, GIS AND GPS APPLICATIONS IN CIVIL ENGINEERING**

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

**Evaluation Scheme**  
**ISE** : 40 Marks  
**ESE** : 60 Marks

**Course Objectives:** The objective of the course is

1. To study the evolution of Remote Sensing and G.I.S
2. To know various techniques of aerial photography
3. To understand geomorphologic aspects.
4. To understand Fundamentals of GIS
5. To study Application in Urban Planning and transportation engineering
6. To understand various segments of GPS

**Course Outcomes (CO):**

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Adopt the principles of physics of Electromagnetic radiation as applied to remote sensing.	Knowledge Understand
CO2	Learns the interrelationship of civil, environmental and geological studies.	Knowledge Understand
CO3	Formulate and apply remote sensing and GIS concepts to engineering problems.	Apply
CO4	Understand Fundamentals of GIS	Apply
CO5	Understand Applications in Urban Planning and transportation engineering	Knowledge Understand
CO6	Identify different segments of GPS	Knowledge Understand

**Description:**

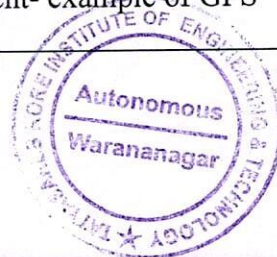
GIS and GPS provide the surveyor with accurate data in positioning and mapping. For a construction project to be successful, many factors including environmental impact, scheduling conflicts, site safety, budgeting etc; should be considered. Data from remote sensing mostly correlate spatial data to their attributes making them useful in this field. Different themes such as geology, terrain, drainage, and hydrology can be extracted by the use of remote sensing.

<b>Prerequisites</b>	1	Technique of aerial photography
	2	Remote Sensing Technique of satellite imaging
	3	Fundamentals of GIS
	4	GPS Segments





Section – I		
Unit 1	<b>Introduction</b>	
	Definition, History, Types of satellites based upon uses, Programs of different countries, India's position, etc. Scope - Various fields of applications, Users in India, Data requirements of users. Topo sheets, Evolution of G.I.S. Technology.	6 Hrs.
Unit 2	<b>Space System</b>	
	Technique of aerial photography, Photographic flight mission, Factors influencing flight mission, Numbering, scale and measurement of aerial photographs, mosaic of aerial photographs, introduction of mirror stereoscope Remote Sensing Technique of satellite imaging - Important units of satellite and functioning of satellite, height, and coverage. Stages in remote sensing, Electromagnetic radiation, and electromagnetic spectrum, Interaction of electromagnetic radiation with atmosphere and earth surface. Sensors, Types of Resolutions used in remote sensing. Introduction to the application of computer in analysis of satellite images, Digital Image processing.	6 Hrs.
Unit 3	<b>Geomorphology</b>	
	Geomorphology and its scope in photo interpretation as well as in engineering, Drainage analysis, Drainage patterns, Drainage density and Drainage frequency. Geomorphologic aspects for water resources studies.	6 Hrs.
Section – II		
Unit 4	<b>G.I.S.</b>	
	Fundamentals of GIS, Definition, Components, Types of data inputs in GIS, spatial data, thematic characteristics, rasters and vectors, Databases and database management.	6 Hrs.
Unit 5	<b>Application of RS and G.I.S in Civil Engineering</b>	
	Study and selection of site or hydraulic structures, Application in urban planning. Use in Landslide, Application in Urban Planning and transportation engineering. Surface water delineation, study of floods, surface keys for subsurface water, steps in water investigations of the area. Land use/Land cover study, Terrain analysis and soil mapping with the help of remote sensing techniques, delineating forest areas.	6 Hrs.
Unit 6	<b>GPS</b>	
	GPS, different segments, space, control and user segment, satellite configuration, GPS signal structure, orbit determination and orbit representation, Anti spoofing and selective availability, task of control segment, GPS receiver- main receiver component- example of GPS receiver, DGPS.	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	--	1	--	--	--	--	--	--	--	1	--	--
CO2	2	1	2	--	1	--	--	--	--	--	--	--	2	--	--
CO3	--	2	2	--	1	--	--	--	--	--	--	--	2	--	--
CO4	--	2	2	--	2	--	--	--	--	--	--	--	1	--	--
CO5	1	2	2	--	--	--	--	--	--	--	--	--	1	--	--
CO6	1	2	--	2	1	--	--	--	--	--	--	--	--	--	--

### REFERENCES

Text Books	
1	Remote Sensing –C.S.Agrawal and P.K.Garg, Wheeler Publishing, New-Delhi
2	Principles of Remote Sensing- P.N.Patel and Surendra Singh, Scientific Publishers, Jodhapur
3	Introduction to geomatics –QGIS user guide – Mr.C.V. Nishinkanth, Mrs.AnnuNishinkanth, Dr S S Vasudevan, Dr P Ramkumar, Publishers-
4	GPS Theory, Algorithms and Applications- GuochengXu, Springer
Reference Books	
1	Remote Sensing, Principles and Interpretation –F. F. Sabins, W. H. Freeman &co.
2	Principles of Geomorphology – W. D. Thornbury – John Wiley and Sons, INC.
3	Remote sensing in Civil Engineering – T. J. M. Kennie and M. C. Mathews, Surry University press, London.
4	Introduction to GPS, the global positioning system- Ahmed ei-rabbany, Artech House
5	. Geographical Information Systems, Vo. I and II -Paul Longely, M.F. Goodchild, et.al, Wiley..





## CE 804-2 - Construction Practices

**Lectures** : 3 Lecture / Week  
**Credit** : 3  
**Tutorials** :

### Evaluation Scheme

**ISE** : 40 Marks

**ESE** : 60 Marks

### Course Objectives: The objective of the course is to

1. To study various earth moving equipment's.
2. To understand RMC and Hot Mix process.
3. To study pre fabrication technique.
4. To study various construction techniques like Slip form, Grouting, Blasting.

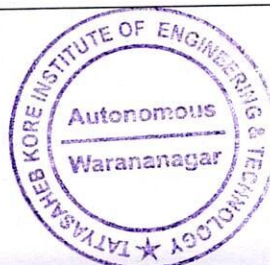
### Course Outcomes (CO):

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Know the earth moving equipments & excavation in hard rock.	Understand
CO2	Understand new construction methods & techniques.	Understand
CO3	Know the concreting equipments, plants & concreting methods.	Understand
CO4	Understand plants & equipments used for steel construction & road construction.	Remember
CO5	Understand construction of heavy structure & construction management.	Apply Evaluate
CO6	Apply conceptual planning, trenchless technology and Safety measures in construction	Apply

### Description

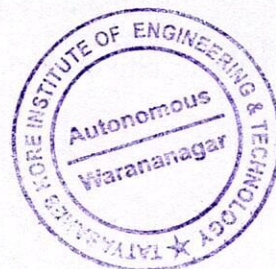
Technologies used across all phases of the constructed project life cycle continue to evolve at an ever increasing rate. Existing and emerging technologies can assist with overall project planning, design, construction, and maintenance activities by providing efficient data retrieval and information in visual formats. Construction equipment telematics now provide operators and managers with real-time equipment positioning, pressure sensing, fuel rate consumption, automated path guidance, alerts, and other specific measures to optimize machine performance.

<b>Prerequisites:</b>	1:	Knowledge of different types of equipments available in field
	2:	Excavation, Blasting, RMC, Grouting, Formwork. etc study process and different Methods to be used in field
	3:	Different types of prefabricated construction , steel Construction study process
	4:	Study about Safety measures in construction





Section – I		
Unit 1		
	a) Earth moving equipments- Tractors, bulldozers, scrapers, power shovel, hoes, drag line, clamshell, trenchers, compactors b) Cycle time and production rates (simple numerical problems ), types and performance, operating efficiencies, lifting capacities.	6 Hrs
Unit 2		
	a) Excavation in hard rock- Rippers, jack hammers, drills, compressors and pneumatic equipments. b) Blasting explosives, detonators, fuses, c) Drainage in excavation- necessity and methods of dewatering	6 Hrs
Unit 3		
	a) RMC plant, layout and production capacity b) Grouting, shotcreting, under water concreting c) Slip formwork	6 Hrs
Section – II		
Unit 4		
	a) Prefabricated construction, comparison with monolithic construction b) Steel construction- planning and field operation, erection equipments c) Floating and dredging equipments	6 Hrs
Unit 5		
	a) Asphalt mixing and batching plant hot mix plant, sensor pavers for rigid roads, crushing plants. b) Belt conveyors, cable ways – need and construction methods. c) Diaphragm walls- purpose and construction methods.	6 Hrs.
Unit 6		
	a) New projects- conceptual planning, site access and services, advantages of mechanization in construction b) Introduction to trenchless technology and need c) Safety measures in construction, prevention of accidents, introduction to disaster management.	6 Hrs





### 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	--	--
CO2	2	2	--	--	2	2	--	--	--	--	--	--	1	--	--
CO3	--	2	2	1	-	1	--	--	--	--	--	--	1	--	--
CO4	--	2	--	2	1	2	--	--	--	--	--	--	--	--	--
CO5	--	1	--	2	2	2	--	--	--	--	--	--	1	--	--
CO6	--	1	--	2	1	1	--	--	--	--	--	--	1	--	--

### REFERENCES

Text Books	
1	Construction Planning equipment & methods – R. L. Puerifoy, Mc Graw Hill Book
2	Construction equipment – Mahesh Verma.
3	Handbook of Heavy Construction – Stubb.
4	Heavy Construction – Planning, Equipment, Methods- Jagman Singh
5	Erection of steel structures – Thomas Baron
6	Reinforced concrete bridges – Taylor





**CE804-3 SITE INVESTIGATION METHODS AND PRACTICES**

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

**Evaluation Scheme**  
**ISE** : 40 Marks  
**ESE** : 60 Marks

**Course Objectives:** The objective of the course is

1. To access the general suitability of the site.
2. To know the nature of each stratum and engineering properties of the soil and rock.
3. To foresee and provide against difficulties that may arise during construction due to ground and other local conditions.
4. To investigate the occurrence or causes of all natural and manmade changes in conditions and the results arising from such changes.
5. To achieve safe and economical design of foundations and temporary works.

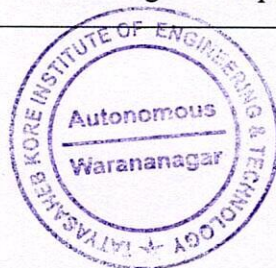
**Course Outcomes (CO):**

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	State the importance of site investigation in Civil Engineering process	Understand Apply
CO2	Describe different site investigation methods.	Knowledge Evaluate
CO3	Illustrate different subsurface exploration by nondestructive test	Knowledge Apply
CO4	Identify the various soil exploration methods for soil sampling	Evaluate Apply
CO5	Examine the various field and lab test on soil	Knowledge Understand
CO6	Interpret how to write the technical report for site investigation	Knowledge Apply

**Description:**

*Site Investigation Methods And Practices* is one vast area in the field of soil mechanics. In this soil investigations is carried out in phases with advance surveying, using nondestructive tests, In Situ testing, sampling and laboratory.

<b>Prerequisites</b>	1	Basics of soil investigations and its phases
	2	Basic knowledge of soil mechanics and soil testing's
	3	Knowledge of advance surveying and nondestructive tests
	4	Applying knowledge of soil testing in soil investigation report etc.





Section – I		
Unit 1	<b>Introduction to Site investigation</b>	
	Introduction, the Importance of Site Investigation, Purposes of a Site Investigation, Objectives, Need for Site investigation, Advantages of Site Investigation, Phases in site investigation process, Approach to site investigation.	6 Hrs.
Unit 2	<b>Methodology of site investigation</b>	
	Preliminary site investigations: Preliminary desk study, Topographical maps, Geological records, mining records, Air-photography and remote sensing, Photogrammetry, Air-photo interpretation, Site walk-over survey, Reconnaissance of site works	6 Hrs.
Unit 3	<b>Site Investigation using Non-Destructive Tests</b>	
	Introduction to Non-Destructive Tests, Electrical Methods, Magnetic Methods, Gravity Methods, Acoustic Emission Methods, Seismic Method	6 Hrs.
Section – II		
Unit 4	<b>Site Investigation Using InSitu Testing</b>	
	Introduction, Penetration testing - Standard penetration test & Cone penetration test, Strength and compressibility testing - Field vane shear test, Pressure meter test, Plate loading test	6 Hrs.
Unit 5	<b>Sampling</b>	
	Introduction, Sample sizes, Soil Disturbance, Soil disturbance during drilling, Soil disturbance during sampling, Disturbance after sampling, Undisturbed sampling techniques, Sand Sampling, Preparation of disturbed samples for testing, Preparation of undisturbed samples for testing	6 Hrs.
Unit 6	<b>Laboratory testing for site investigation</b>	
	Introduction, Purpose of soil testing, Purpose & Significance of following test – Soil classification tests, Particle size distribution tests (Sieve analysis, Hydrometer analysis), tests (Liquid limit, Cone penetrometer test, Plastic limit), Compaction tests (Proctor compaction test), Particle density (Specific gravity) determination. Tests for Geotechnical parameters - Strength tests (CBR test, Lab vane test, Direct shear test, Triaxial test), Seepage and permeability tests Technical Report writing-Standard format for a site investigation report	6 Hrs.



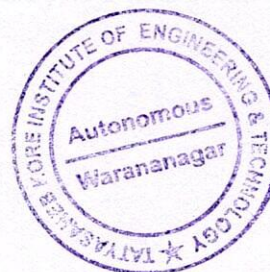


### CO - PO Mapping

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

### REFERENCES

Text Books	
1	Site Investigation Practice by Joyce, M.D.; ESN. SPON Publishers, 1982.
2	Instrumentation in geotechnical engineering by K.R. Saxena and V.M. Sharma
3	Geotechnical Engineering Investigation Manual by R.E. Hunt, Mc Graw Hill Co. New York
4	Geotechnical and Geophysical Site Characterization, An-Bin Huang, Paul W Mayne, CRC Press, 2008, ISBN 0415469368, 9780415469364
5	Advances in Site Investigation Practice by Craig C., ICE Publishing
Reference Books	
1	Subsurface exploration and sampling of soils for Civil Engg. Purposes by Hvorslev M.J.
2	Site Investigation, by C. R. I. Clayton, M. C. Matthews and N. E. Simons, Second Edition.
3	Compendium of Indian Standards on Soil Engineering Parts 1 and II 1987 - 1988.
4	Measurement of Engineering Properties of Soils by E. Saibaba Reddy , K. Rama Sastri , New Age International (P) Ltd., Publishers
5	In Situ Tests in Geotechnical Engineering by Monnet Jacques ; John Wiley & Sons Inc. Publisher
6	Soil Testing for Engineers by S. Mittal&J. P. Shukla;Khanna Publishers





**CE804-4- Advanced Traffic Engineering****Lectures : 3****Credit : 3****Evaluation Scheme****ESE : 60 Marks****ISE : 40 Marks****Course Objectives:** The objective of the course is

1. Provide an insight on traffic and its components, factors affecting road traffic.
2. Provide an insight on traffic movements and speed studies.
3. Provides clear understanding on conducting various types of traffic surveys, data collection, analysis, inference and presentation.
4. To identify the role of various modes of Mass Transportation like Bus and Rail and its Planning and Management.
5. Learn the objectives, benefits in ITS and functional areas in ITS.

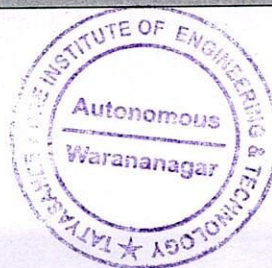
**Course Outcomes (CO):**

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Acquire and apply knowledge of traffic, its components, and factors affecting road traffic.	Apply Evaluate
CO2	Analyze traffic speed study data and its presentation.	Apply Evaluate
CO3	Apply the knowledge of sampling data in conducting various surveys and analysis.	Knowledge Understand
CO4	Understand various modes of mass transit system.	Apply
CO5	Use the advantages of ITS and suggest the appropriate technologies for field conditions	Knowledge Understand
CO6	Estimate reservoir capacity based on crop water requirement	Knowledge Understand

**Description:**

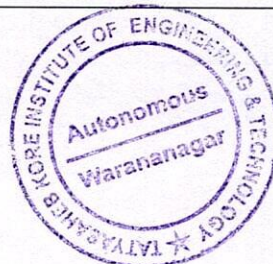
Traffic engineering is the branch of civil engineering that deals with the safe and efficient movement of people and goods on roadways. Traffic engineers work to ensure that roads are designed and operated in a way that minimizes congestion and accidents, while also providing adequate capacity for the level of traffic.

<b>Prerequisites</b>	1	Basics Knowledge of traffic studies
	2	Basic Knowledge of traffic surveys and various traffic data.
	3	Knowledge different types of road crossings

**Section – I**



<b>Unit 1</b>	<b>Introduction</b>	
	Introduction: Infrastructure & its role in developing society; Transport sector in India – policy framework; Development plans – Airports, Highways – National highway development program (NHDP); JNNURM, Asian highways network.	<b>6 Hrs.</b>
<b>Unit 2</b>	<b>Traffic characteristics</b>	
	Traffic characteristics – Road user characteristics, General human characteristics, Physical characteristics. Vision eye – movement peripheral vision, Visual attention, Visual sensitivity to light and colour, glare vision and recovery perception of space. Hearing, Stability sensation, Time factor in response, Theory of PIEV modifying factors, conditional responses; Vehicular Characteristics – types, dimensions, resistance, power requirement for different resistance, change in direction – minimum turning radius, off tracking, slip angle	<b>6 Hrs.</b>
<b>Unit 3</b>	<b>Traffic Engineering &amp; Speed Analysis</b>	
	Speed studies, journey time and delay studies, Sampling in traffic studies & application, Traffic surveys-types of volume count Planning, Problems on PCU, moving observer method and spot speed. b) Traffic operation and management. Traffic systems management and Travel demand management - Congestion management-Cost effective management measures, Traffic control aids, Street furniture, Road Arboriculture– Traffic Regulation, Traffic Sign and Road Markings.	<b>6 Hrs.</b>
<b>Section – II</b>		
<b>Unit 4</b>	<b>Trip generation</b>	
	Factors governing trip generation and attraction –Application of Regression Analysis- Methods of trip distribution; Growth and Synthetic Models Calibration and Application of gravity model. - Category analysis.	<b>6 Hrs.</b>
<b>Unit 5</b>	<b>Intelligent transportation systems (ITS)</b>	
	Objectives, Historical Background, Benefits of ITS -ITS Data collection techniques –Detectors, Automatic vehicle location (AVL), Automatic Vehicle Identification (AVI), Geographic Information Systems (GIS), Video data collection. b) ITS functional areas – Advanced traffic management systems (ATMS), Advanced traveller information Systems (ATIS), Commercial vehicle operations (CVO), Advanced vehicle control systems (AVCS), Advanced Public transportation systems (APTS), Advanced rural transportation systems (ARTS).	<b>6 Hrs.</b>
<b>Unit 6</b>	<b>Specialized traffic studies</b>	
	Parking Studies: Parking inventory, statistics, parking surveys; in out, license plate, on-street and off-street parking. Accident Studies: Accident data collection, statistics, safety audit, safety measures. Fuel consumption and emission studies: Consumption models, pollutants, air quality models, mitigation measures. Toll operation: Design and configuration, queuing theory, operation and maintenance issues	<b>6 Hrs.</b>





### CO - PO Mapping

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

### REFERENCES

Text Books	
1	Kadiyali L.R. and N.B. Lal (2004): Principles and Practice of Highway Engineering Including Expressways and Airport Engineering), Khanna Publishers, New Delhi
2	Kadiyali L.R. (1994): Traffic Engineering and Transport Planning, Khanna Publishers, New Delhi. 18
3	ParthaChakroborty and Animesh Das (2003): Principles of Transportation Engineering, Prentice-Hall India, New Delhi.
4	Justo and Khana Highway Engineering.
Reference Books	
1	Black John (1981): Urban Transportation Planning. Croom Helm Ltd. London. 8. 9. 10. Wells G.R. (1970) Traffic Engineering – An Introduction, Griffins, London. 11. Wohl M. and Martin B.V. (974): Traffic System Analysis of Engineers and Planners, McGraw-Hill Book Co., New York. 12. Papacostas, C.A., Fundamentals of Transportation Engineering', Prentice-Hall of India Private Limited, New Delhi.2000. 13. Road Development Plan, Indian Road Congress, November 2000. 14.Roess, RP.,McShane,WR.andPrassas,ES.(1998), Traffic Engineering,Prentice Hall 15. www.nhai.org
2	BPR (1970): Urban Transportation Planning: General Information and Introduction to System 360. Bureau of Public Roads, Washington D.C.
3	Bruton M.J. (1975): Introduction to Transportation Planning. II Edn. Hutchinson, London
4	Drew D.R. (1968): Traffic Flow Theory and Control, McGraw-Hill, New York.
5	Hutchinson B.G. (1974): Principles of Urban Transport Systems Planning. McGraw-Hill Book Co., New York.
6	McShane W.R. and Roess R.P. (1990): Traffic Engineering, Prentice-Hall Inc., New Jersey
7.	Pignataro L.J. (1973): Traffic Engineering: Theory and Practice, PrenticeHall Inc., New Jersey.
8.	Putman S.H. (1983): Integrated Urban Models. Pion Ltd., London.
9.	Wilson A.G. (1970): Entropy in Urban and Regional Modelling. Pion Ltd., London





## CE801P- Town planning and Docks Harbor Engineering

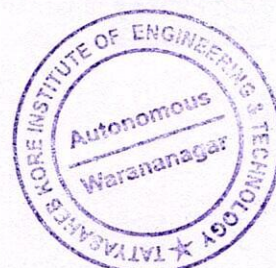
**Practical's:** 2 hrs / week  
**Scheme:**  
**Credits:** 1

**Examination**  
**ISA: 25 Marks**  
**POA: 50 Marks**

Course Objectives: The objective of the course is to		
1) To understand the different site investigation before construction of bridges. 2) To analysis and calculation different forces acting on bridge structure. 3) To understand design concept of bridge deck slab, piers, abutments.		
Course Outcomes:		
COs	At the end of successful completion of the course the student will be able to	Blooms Taxonomy
CO1	Understand the necessity and scope and principles of town planning.	Knowledge, Apply
CO2	Understand the growth pattern of towns.	Analyze
CO3	Identify development control rules of town planning.	Understand Analyze
CO4	Understand the village planning and multilevel planning.	Understand Analyze

### Assignments on following topics:

Sr. No.	Practical/ Assignments/Tutorial Topic	H rs	Bloom's Taxonomy
1	Necessity and scope and principles of Town Planning, Brief history. planning in ancient India, Present status of town planning in India. Contribution of town planners in modern era	2	Apply
2	Growth pattern of towns and Layout of residential units,	2	Knowledge Apply
3	Development control rules with respective to town planning. Different town planning works, Land acquisition act	2	Apply
4	Village planning, Rural developments	2	Knowledge, Analyze
5	Inland water transport in India	2	Knowledge
6	Types of dock, special equipments, containerization.	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	--	--	--	---	--	--	---	--	1	---	--
CO2	2	-	2	2	--	--	--	---	--	--	---	--	--	1	--
CO3	1	2	2	--	--	--	--	---	--	--	---	--	1	1	--
CO4	1	2	--	--	--	--	--	---	--	--	---	--	1	---	--

### REFERENCES

Text Books	
1	Town and country Planning-G.K. Hiraskar& K. G. Hiraskar, By Dhanpat Rai Publication (p) Ltd.,
2	Town Planning- S.C.Rangawala, Charotar Publications, Pune
Reference Books	
1	MRTTP Act 1966
2	Rural development Planning – Design and method :Misra S.N., Satvahan Publications New Delh.
3	Urban Pattern by Gallion, Eisner



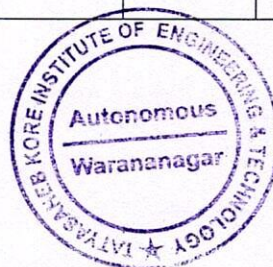


**CE802P Design of Bridges****Practicals:** 2 hrs / week**Scheme:****Credits:** 1**Examination****ISA: 25 Marks**

<b>Course Objectives:</b> The objective of the course is to		
1) To understand the different site investigation before construction of bridges. 2) To analysis and calculation different forces acting on bridge structure, 3) To understand design concept of bridge deck slab, piers, abutments		
<b>Course Outcomes:</b>		
<b>COs</b>	<b>At the end of successful completion of the course the student will be able to</b>	<b>Blooms Taxonomy</b>
CO1	Understand classification of bridges.	Apply
CO2	Determine different forces acting on bridges.	Evaluate
CO3	Understand concept of design of deck slab, piers,	Understand
CO4	Understand concept of construction techniques	Analyze
CO5	Understand Design of sub structure.	Understand
CO6	Understand Bearing and expansion joints	Understand

**Practicals:**

<b>Sr. No.</b>	<b>Practical/ Experiment/Tutorial Topic</b>	<b>Hrs.</b>	<b>Bloom's Taxonomy</b>
1	Introduction of bridges	2	Apply
2	Standard specification for Road Bridges	2	Knowledge Apply
3	General design considerations	2	Apply
4	Construction Techniques	2	Knowledge
5	Design of sub structure	2	Knowledge
6	Bearing and expansion joints	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	--	--	--	--	--	--	--	--	1	--	--
CO2	2	-	2	2	--	--	--	--	--	--	--	--	1	--	--
CO3	1	2	2	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	2	-	--	--	--	--	--	--	--	--	--	1	--	--
CO5	--	--	1	--	--	--	--	--	--	--	--	--	1	--	--
CO6	1	1	--	--	--	--	--	--	--	--	--	--	1	--	--

Text Books	
1	Design Of Bridges "By N. Krishna Raju.
2	Design of Bridge Structures *by T R Jagadeesh
Reference Books	
1	Reinforced Conerete Structures -Vol. II by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications.
2	RAINA, Tata McGraw- Hills Publishing Company Limited. Concrete Bridge Practice, Analysis, Design and Economics by Dr. V. K
IS codes	REFERENCES
1	IRC Codes - IRC: 5, IRC: 6, IRC: 18, IRC: 27, IRC: 45, IRC: 78, IRC: 83.





**CE –805P- Design of Structures and Drawing II (Lab work)**

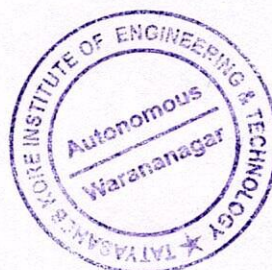
**Practical's:** 2 hrs / week  
**Credits:** 1

**Examination Scheme:**  
**ISA : 50Marks**  
**POE: 50 Marks**

<b>Course Objectives:</b> The objective of the course is to		
1) To Study the Basic design concept of Steel structure 2) To understand different design concept of structural steel element. 3) To know concept of RCC structural design. 4) To learn the software applications in structural engineering 5) To study design requirements for RCC Structures.		
<b>Course Outcomes:</b>		
<b>COs</b>	<b>At the end of successful completion of the course the student will be able to</b>	<b>Blooms Taxonomy</b>
<b>CO1</b>	To understand different design concept of structural steel element.	Knowledge, Understand
<b>CO2</b>	Analyze and design of steel column, flexural members and its elements	Analyze
<b>CO3</b>	To draw the detailing of Steel members and to learn the design.	Understand Analyze
<b>CO4</b>	To learn the software applications in structural engineering.	Knowledge, Apply
<b>CO5</b>	Prepare the working drawing as per requirement of project execution	Knowledge, Apply

**Assignments on following topics**

<b>Sr. No.</b>	<b>Practical/ Assignments/Tutorial Topic</b>	<b>Hrs</b>	<b>Bloom's Taxonomy</b>
1	Analysis and Design of Industrial Shed Roof Truss using IS 800 with detailed drawing.	20	Apply, Evaluate
2	Analysis and Design of Industrial Shed Roof Truss using ETABS/Staad pro	12	Apply, Evaluate
3	Analysis and design of Two storyed RCC Building using ETABS/stadd pro	12	Apply, Evaluate





### CO - PO Mapping

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

### REFERENCES

Text Books	
1	Limit state theory and design – karve shah structures publication
2	Reinforced concrete design – B C Punmia
3	Reinforced concrete design – A. K. jain
4	Design of Steel Structures, by Dr. N. Subramanian, Oxford University Press
Reference Books	
1	IS -456 : Code of practice for RCC , IS 800 : Code of practice for Steel & Relevant Special publications of BIS
2	Handbook reinforced concrete SP34
3	Limit State Design of Steel Structures: S.K. Duggal, Tata Mc-Graw Hill India .
4	Limit State Design of Reinforced Concrete P.C.Varghese, Prentice Hall, New Delhi





Practicals: 6 hrs / week

Credits: 3

Examination Scheme:

ISA: 100 Marks

POE: 100 Marks

Course Objectives: The objective of the course is to		
1. To carry out project work as per defined methodology. 2. To Interpretation of result, conclusion and future scope. 3. To develop student's abilities to transmit technical information clearly and test the same by delivery of technical presentation based on the Project.		
Course Outcomes:		
COs	At the end of successful completion of the course the student will be able to	Blooms Taxonomy
CO1	Analyze and Design engineering solutions to complex problems utilizing a systems approach.	Analyze
CO2	Prepare a technical report based on the project.	Evaluate
CO3	Deliver technical presentation based on the Project work carried out.	Evaluate

The project work started by the group of students (For students who have opted track 1 as per syllabus structure) in the seventh semester will be continued in this semester.

The students will complete the project work in this semester and present it before the DRC.

Probable Activities of Project Phase – II

1. Progress presentation I
2. Progress presentation II
3. Final presentations in front of DRC along with submission of spiral bound copy.
4. Checking of project format on spiral bound by DRC.
5. Submission of completed project report.

The Departmental Research Committee (DRC) constituted in the seventh semester will assess the various projects for the relative grading and group average.

The project guides will award the ISA marks to the individual students depending on the group average awarded by the DRC.

The students will present same project work before the external examiner along with project guide for POE assessment.

The POE marks to the individual students will be awarded jointly by external examiner and project guide,

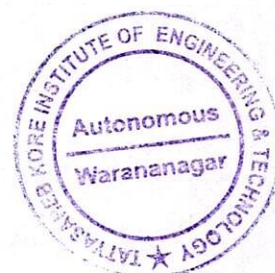
Each group will submit the copies of the completed project report signed by the guide and external examiner to the department. The head of the department will certify the copies and return them to the students. One copy will be kept in the departmental library.





# CO - PO Mapping

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO 1	PSO 2	PSO3
CO1	3	2	2	3	2	2	1	1	2	2	1	1	2	2	1
CO2	2	2	--	--	1	--	--	--	--	2	---	--	--	1	--
CO3	2	2	--	--	--	--	--	---	--	2	--	--	--	---	--





**CE807A- (MC) AUDIT COURSE- PAPER PRESENTATION AND PROJECT COMPETITION****Lectures** : --**Credit** : --**Tutorials** : --**Remark:** Satisfactory/Unsatisfactory**Evaluation Scheme:****ISE** : --**ESE** : --**Course Objectives:** The objective of the course is--

1. To understand the importance of paper presentation & project competition.
2. To learn the skills of a technical paper writing and its presentation.
3. To create ability to describe, interpret and analyze technical contents of the project.
4. To develop competence in a paper presentation and participate in project competition with confidence.

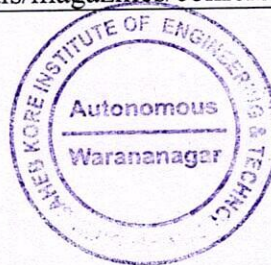
**Course Outcomes (CO):**

COs	At the end of successful completion of the course, the student will be able to	Blooms Taxonomy
CO1	Review and Organize literature survey utilizing technical resources and journals.	Knowledge Understand
CO2	Analyze data from literature survey and develop technical paper writing & its presentation.	Understand Apply
CO3	Appraise civil engineering research /Techniques/developments/ in interdisciplinary areas.	Knowledge Understand
CO4	Demonstrate the ability to perform a technical project report writing and participation in project competitions.	Analyze

**Description**

This course is designed to improve the technical paper presentation and project competition participation skills of the undergraduates. An undergraduate is expected to learn technical paper writing and appraise civil engineering research/techniques/developments in interdisciplinary areas. This will help to enhance an ability to perform technical paper writing, project report writing and its presentations and participation with confidence.

<b>Prerequisites:</b>	1:	Knowledge of technical resources, journals, magazines, advanced construction technologies and its development in civil engineering field.
	2:	Decide topic in the field of civil engineering.
	3:	Technical paper writing and project report writing skills in required format for its presentation and publication in journals/magazines/conferences/various events.





### Course Contents

	<p>An undergraduate is required to present/publish at least one paper in National/State/Institute level journals.</p> <p style="text-align: center;"><b>OR</b></p> <p>An undergraduate is required to participate in project competition at National/State/Institute level events.</p> <p><b>Note:</b> It is mandatory to submit certificate of Paper published <b>OR</b> Project competition participation certificate individually to the respective guide for the evaluation.</p>	--
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### 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	--
CO2	--	1	--	--	1	1	--	--	--	--	--	--	--	1	--
CO3	1	--	--	--	1	2	--	--	--	--	--	--	--	--	--
CO4	1	--	--	--	--	--	--	2	--	1	--	--	--	--	--

### REFERENCES

1	Relevant reference journal publications, books, magazines, open website sources, ASCE, science direct, NPTEL, YouTube for above mentioned course.





**CE808P – Industrial Internship****TEACHING SCHEME**

Theory : NA

Tutorial :NA

Practical: 8 to12 Weeks duration

**EXAMINATION SCHEME**

Practical: 7 Credit

Term work: 100 Marks

POE: 200 Marks.

**Course Objectives:** The objective of the course is to

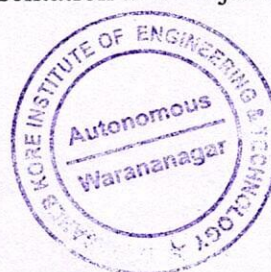
1. The course is designed to expose the students to industry environment and to take up on-site assignment as trainees or interns.
2. To get knowledge about skill requirements on site.
3. To develop student's abilities to learn advance technology.

**Course Outcomes:**

COs	At the end of successful completion of the course the student will be able to	Blooms Taxonomy
CO1	Have an exposure to industrial practices and to work in teams	Identify Knowledge
CO2	Communicate effectively	Knowledge
CO3	Understand the impact of engineering solutions in a global, economic, environmental, and societal context.	Understand
CO4	Develop the ability to engage in research and to involve in life-long learning	Evaluate
CO5	Analyze the current industrial problems and issues	Analyze
CO6	Engage in establishing his/her digital footprint	Apply

**Term Work**

- Students on joining Training at the concerned Industry / Organization, submit the Joining Report/Letters / Email.
- Before starting the internship, students are often required to submit a proposal outlining the objectives, scope, and expected outcomes of their internship to the mentor.
- Students undergo industrial training at the concerned Industry / Organization of required time period.
- Students will submit training report after completion of internship along with Training Certificate to be obtained from industry.
- Collect the Internship Completion Letter given by authorized industry and Mentor.
- Assess the work based on progress report (signed by industry expert).
- Mode of Evaluation: Internship Report, Presentation and Project Review.






# CO - PO Mapping

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO 1	PSO 2	PSO3
C01	2	2	2	2	2	3	2	2	3	2	1	3	2	-	-
C02	-	-	-	-	-	-	-	-	-	3	-	1	-	2	-
C03	-	-	-	-	-	2	3	-	-	-	1	1	-	-	3
C04	-	-	1	1	-	2	-	2	-	1	-	3	1	2	-
C05	-	2	1	2	2	1	-	-	-	-	-	2	-	-	1
C06	-	-	-	-	3	1	-	-	-	-	-	2	-	-	-


Rating 1: Lower Level

Rating 2: Medium Level

Rating Level 3: Higher Level

  
Member Secretary  
Board of Studies

  
Chairman  
Board of Studies

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

  
PRINCIPAL  
T.K.I.E.T.Warananagar

