



Walchand Institute of Technology, Solapur
(An Autonomous Institute)

Affiliated to
Punyashlok Ahilyadevi Holkar Solapur University,
Solapur

Choice Based Credit System (CBCS)

Structure and Syllabus
for
Final Year B.Tech. Civil Engineering

W.E.F. 2025-26

HEAD,

Department of Civil Engineering
Walchand Institute of Technology,
SOLAPUR-413006.



Dr. Mrs. M. A. Nirgude
Dean Academics

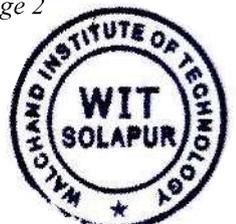
Department of Civil Engineering

Vision

- To excel and lead in education, research, and innovation, contributing to the advancement of design, construction, and maintenance of infrastructure, to enhance the quality of life for humanity in a sustainable way.

Mission

- **M1:** To provide an outstanding learning experience through a rigorous curriculum of theory and practice that develops students' technical and professional skills to succeed in a wide range of careers.
- **M2:** To continually advance research through a culture of discovery, creativity, and innovation to benefit humankind.
- **M3:** To serve as highly capable resources to society, and the profession through professional organizations, consultancy, and continuing education.



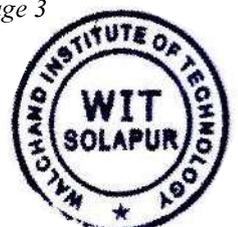
Department of Civil Engineering

Program Educational Objectives (PEOs)

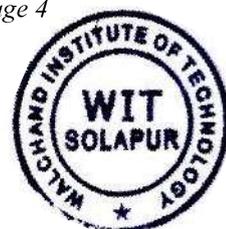
- Graduate will demonstrate peer-recognized technical competency in the analysis, design and construction of Civil Engineering Structures.
- Graduates will demonstrate leadership and initiative to advance professional and organizational goals with a commitment to ethical standards of profession, teamwork and respect for diverse cultural backgrounds.
- Graduates will be engaged in ongoing learning and professional development through pursuance of higher education and self-study.
- Graduates will be committed to create practice of engineering and other professions in a responsible manner contributing to the socio-economic development of the society.

Knowledge and Attitude Profile (WK)

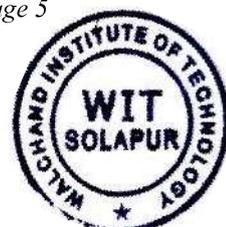
WK1	A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.
WK2	Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.
WK3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.
WK4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
WK5	Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.
WK6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
WK7	Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.
WK8	Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative



	approaches to evaluate emerging issues.
WK9	Ethics, inclusive behavior, and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability, etc., with mutual understanding and respect, and of inclusive attitudes.
Program Outcomes (POs)	
PO 1	Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO 2	Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO 3	Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO 4	Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO 5	Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO 6	The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO 7	Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO 8	Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO 9	Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make



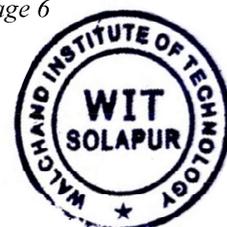
	effective presentations considering cultural, language, and learning difference
PO 10	Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO 11	Life-long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)
Program Specific Outcomes (PSOs)	
<ol style="list-style-type: none"> 1. Graduates will be able to survey, conduct geotechnical investigations, plan, analyze, design, estimate, and construct residences, public buildings, industrial buildings, townships, and infrastructural projects by adopting appropriate construction methods. 2. Graduates will be able to analyze and design the water resources systems, and municipal and industrial waste treatment plants with due consideration to a pollution-free environment. 3. Graduates will be able to use appropriate application software, develop skills necessary for professional practice as a Civil Engineer, and prepare themselves for competitive examinations for higher education & for public service commissions 	



Department of Civil Engineering

Legends Used

L	Lecture Hours / week
T	Tutorial Hours / week
P	Practical Hours / week
FA	Formative Assessment
SA	Summative Assessment
ESE	End Semester Examination
ISE	In Semester Evaluation
ICA	Internal Continuous Assessment
POE	Practical and Oral Exam
OE	Oral Exam
MOOC	Massive Open Online Course
HSS	Humanity and Social Science
NPTEL	National Programme on Technology Enhanced Learning
F.Y.	First Year
S.Y.	Second Year
T.Y.	Third Year
B. Tech.	Bachelor of Technology

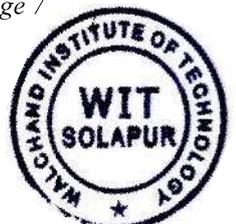


Department of Civil Engineering

Course Code Format									
2	1	C	E	U/P	2	C	C	1	T/L
Year of Syllabus revision		Program Code		U-Under Graduate P-Post Graduate	Semester No./ Year1/2/3/...8	Course Type		Course Serial No1-9	T-Theory, L-Lab session A- Tutorial P-Programming / Design

Program Code	
CE	Civil Engineering
Course Type	
BS	Basic Science
ES	Engineering Science
HU	Humanities & Social Science
MC	Mandatory Course
CC	Core Compulsory Course
SN*	Self-Learning <i>N* indicates the serial number of electives offered in the respective category</i>
EN*	Core Elective <i>N* indicates the serial number of electives offered in the respective category</i>
ON*	Open Elective <i>N* indicates the serial number of electives offered in the respective category</i>
SK	Skill Based Course
SM	Seminar
MP	Mini project
PR	Project
IN	Internship

Sample Course Code	
22CEU7CC1T	Estimating, Costing, and Valuation



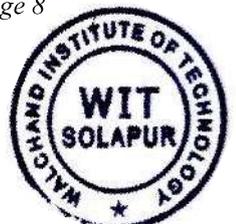
Department of Civil Engineering

B. Tech. Semester VII

Course Code	Name of Course	Engagement Hours			Credits	SA		FA		Total
		L	T	P		Theory	OE/POE	ISE	ICA	
22CEU7CC1T	Estimating, Costing, and Valuation	3	-	-	3	60		40	-	100
22CEU7CC2T	Earthquake Engineering	3	-	-	3	60		40	-	100
22CEU7CC3T	Construction Management and Practices	3	-	-	3	60		40	-	100
22CEU7EN*4T	Core Elective - II/MOOC#	3	-	-	3	60		40	-	100
Subtotal		12	-	-	12	240		160	-	400
Laboratory Courses										
22CEU7CC1L	Estimating, Costing, and Valuation Lab	-	-	4	2	-	50	-	50	100
22CEU7CC3L	Construction Management and Practices Lab	-	-	2	1	-		-	25	25
22CEU7PR5L	Project on R. C. C. Structures Lab	-	-	4	2	-	25	-	50	75
22CEU7PR6L	Project Phase I	-	-	8	4		50	-	100	150
Subtotal		-	-	18	21	-	125	-	225	350
Grand Total		12	-	18	21	240	125	160	225	750

Note:

- N*indicates the serial number of electives offered in the respective category
- #-The student may take NPTEL/Online courses/Industry MOOC of a minimum eight weeks duration. Students shall register and complete the equivalent course and submit the passing certificate to the department.



Department of Civil Engineering

B. Tech. Semester VIII

Course Code	Name of Course	Engagement Hours			Credits	SA		FA		Total
		L	T	P		Theory	OE/ POE	ISE	ICA	
22CEU8PR1L	Project Phase II	-	-	4	2	-	50	-	50	100
22CEU8IN2L	Internship	-	-	20	10	-	100	-	100	200
Grand Total		-	-	24	12	-	150	-	150	300

- N*indicates the serial number of electives offered in the respective category
- ##indicates the program code of the offering Programme

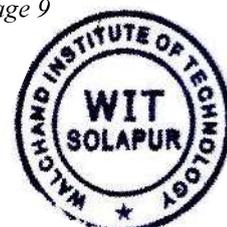
22CEU7EN*4T Core Elective II List

List of Core Electives II offered to students for Structural Engineering Domain	
Course Code	Course Title
22CEU7E14T	Advanced Structural Analysis
22CEU7E24T	Repairs & Rehabilitation of Structures
22CEU7E34T	Structural Dynamics

List of Core Electives II offered to students for Geotechnical & Transportation Engineering Domain	
Course Code	Course Title
22CEU7E44T	Traffic Engineering and Management
22CEU7E54T	Geosynthetics and Reinforced Soil Structures

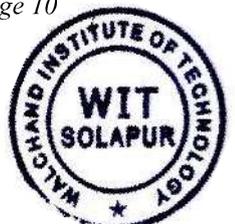
List of Core Electives II offered to students for Construction Engineering & Management Domain	
Course Code	Course Title
22CEU7E64T	Optimization Techniques-
22CEU7E74T	Entrepreneurship

List of Core Electives II offered to students for Environmental Engineering & Hydraulics, Hydrology & Water Resources Engineering Domain	
Course Code	Course Title
22CEU7E84T)	Environmental Systems-
22CEU7E94T)	Solid and Hazardous Waste Management-



- Internship / On Job Training (OJT) :
 - a. Students may complete an internship / On Job Training (OJT) of a minimum of two months duration at the industry during Final Year Sem VIII.
 - b. The Industry shall appoint a Supervisor to assess the performance of the student and share the same with the departmental supervisor for the fulfilment of ICA marks
 - c. The student shall prepare a report of the work completed at the Industry duly endorsed by the industry Supervisor and submit the same as an Internship report.
 - d. The ESE for Internship / On Job Training (OJT) shall be conducted by the departmental supervisor in the presence of an external industry or academic expert

Sr. No.	MDM Program	MDM I (Sem III)	MDM II (Sem IV)	MDM III (Sem V)	MDM IV (Sem VI)	MDM V (Sem VII)
1	Computer Science and Engineering	Operating System	UI Technologies	Software Engineering	Big Data Technologies	Software Testing and Quality Assurance
2	Information Technology	Principles Of Operating Systems	Web Technology (UI/UX)	Software Engineering Principles	DevOps	Cyber Security
3	Mechanical and Automation Engineering	Manufacturing Processes and Mechanisms	Machine Drawing and 3D Modeling	Automotive Engineering and Robotics	Additive Manufacturing	Thermal Engineering
4	Electronics and Telecommunication Engineering	Fundamentals of Electronic Circuits	Electronics Design and Prototyping	Introduction to Embedded Systems	Fundamentals of Communication Techniques	Enclosure and Communication Design for IoT
5	Electronics and Computer Engineering	Analog Electronics	Digital Electronics	Microcontrollers and Peripherals	Advanced Controllers and Interfacing	Electronic System Design





WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR

(An Autonomous Institute)

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

22CEU7CC1T: Estimating, Costing and Valuation

Teaching Scheme		Examination Scheme	
Lectures	3 Hours/week	ESE	60 Marks
Practical	4 hours per week	ISE	40 Marks
Credits	5	ICA	50 Marks
		POE	50 Marks

Introduction:

This course simplifies the basics of building cost estimation. It guides learners through quantity calculation based on architectural drawings, using standard rates. Ideal for aspiring quantity surveyors, project managers, or individuals managing personal construction projects, it covers estimation for buildings, water supply, roads, and irrigation works. Topics include rate analysis, property valuation, and report preparation. By the end, students will be able to estimate materials, prepare bills of quantities, draft specifications, and create tenders and value estimates.

Course Prerequisite:

Surveying and Geomatics, building materials, construction & planning, Reinforced concrete structures design and drawing

Course Objectives:

The objective of this course is to make the student

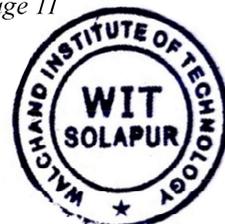
1. Understanding the Quantity Surveying Process.
2. Estimating the quantities of materials for buildings and roads.
3. Calculate the rate per unit of any item.
4. Provide knowledge of Contracts and the tendering process.
5. Assessing the value of a property

Course Outcomes:

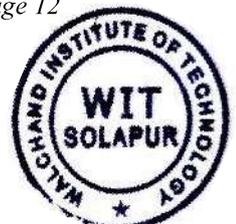
After completing the course, students will be able to

1. Formulate precise technical specifications for civil engineering works.
2. Evaluate rates using market data, standard schedules, and codes.
3. Analyze and compute quantities for various construction items.
4. Develop tender documents and assess contract procedures.
5. Prepare and justify valuation reports for land and buildings.

Unit – I	Specifications	6 Hours
Types, requirements, and importance, detailed specifications for buildings, roads, minor bridges, and industrial structures.		



Unit – II	Rate analysis	6 Hours
Purpose, importance, and necessity of the rate analysis, factors affecting, task work, and daily output from different equipment/ productivity.		
Unit – III	Estimation / Measurements for various items	6 Hours
Introduction to the process of Estimation; taking out quantities from the given requirements of the work, comparison of different alternatives, Bar bending schedules, Mass haul Diagrams, Estimating Earthwork and Foundations, Estimating Concrete and Masonry, Finishes, Interiors, MEP works; BIM and quantity take-offs.		
Unit – IV	Costing	4 Hours
Adding equipment costs; labor costs; Material Survey-Thumb rules for computation of materials requirement for different materials for buildings, percentage breakup of the cost, cost-sensitive index, a market survey of basic materials. Use of Computers in Quantity Surveying.		
Unit – V	Tendering	6 Hours
Preparation of tender documents, the importance of inviting tenders, contract types, relative merits, and prequalification. general and special conditions, termination of contracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes, R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, etc. Preparing Bids- Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads, Profits; Bid conditions.		
Unit – VI	Introduction to Acts	4 Hours
Minimum wages, Workman's compensation, Contracts, Arbitration, Easement rights		
Unit – VII	Principles of valuation	6 Hours
Definition of value, price, and cost. Attributes of value, Different types of values- Book value, salvage value, scrap value, replacement value, reproduction value, earning value, Market value, Potential value, Distress value, Speculation value, and Sentimental value. Accommodation value, Essential characteristics of market value, the Valuer and his duties, the purpose of valuation, and its function. Factors affecting the valuation of properties-tangible and intangible properties, landed properties- freehold and leasehold properties, different types of leases.		
Unit – VIII	Methods of Valuation	6 Hours
Rental method of valuation. Form of rent, different types of rent, and standard rent, Value of land, belting method of valuation, Valuation based on land and building- item wise, carpet area basis, unit basis, cubic content basis, Development method of valuation for building estate, Valuation on profit basis for lodges, cinema theatres, hotels, motels etc. valuation for compulsory acquisition of land, structure by the Government. Valuation for rating purpose, Methods for assessing ratable value of property, Rental method, Comparison method, fundamental principles of rating valuation, Valuation from yield and life, gross yield and net yield, outgoing, capitalized value, Year's Purchases-Single rate and dual rate, reversion value of land, annuity perpetual, whole life, deferred, Sinking fund.		



INTERNAL CONTINUOUS ASSESSMENT (ICA)

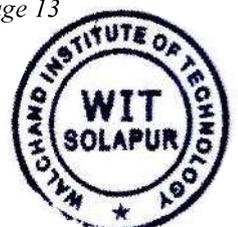
The ICA shall consist the following

1. **Reading the Drawings** (Plan and section) Minimum 3- drawings need to be given for (Reading only) such as:
 - a) Watchman's cabin
 - b) Compound wall
 - c) Septic tank/water tank.
 - d) Building drainage system
 - e) Kitchen platform
 - f) Cement godown
 - g) Staircase block
 - h) A small culvert
2. **Market survey of basic material rates and labour wages**
3. **Detailed specification for a minimum of five civil engineering items.** (One each from Roads, Irrigation works, Water Supply & Sanitation & three from buildings)
4. **Computer-aided**
 - a) Detailed estimate for a two-storied building
 - i. Selecting the items from the drawing.
 - ii. Preparing abstract as per DSR or standard building items.
 - iii. Take off quantities related to buildings (all items need to be taken)
 - iv. Preparing the bill of quantity (BOQ).

Note: Estimate shall include compound wall with gate, sanitary schedule and electrification schedule.
- b) Estimate for structural steel shed.
5. **Rate Analysis: (Civil engineering items.)**

One each from (Road, Irrigation work, Water supply, and sanitation) and five from buildings.
6. **Schedule of reinforcement: any two of the following**
 - a) Column and column footing.
 - b) Beam and Slab
 - c) Staircase.
7. **Valuation reports for any two of the following:**
 - a) A building for residential or commercial purposes.
 - b) A hotel.
 - c) A theatre
 - d) Any construction machine.

The report shall include a valuation certificate.



Text Books

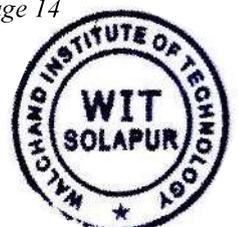
1. A Textbook of Estimating, Costing & Accounts (Civil), R.C. Kohli, S. Chand Publishing New Delhi
2. Civil Estimating and Costing, A. K. Upadhyay, S. K. Katuria and Sons
3. Elements of Estimating and Costing – S. C. Rangwala - Charotar Publication
4. Civil Engineering Contracts and Estimates – B. S. Patil- Orient Blackswan Publication
5. Professional Practice (Estimating and Valuation) – Roshan Nanavati – Lakhani Book Depot.
6. Estimating and Costing – B. N. Dutta- UBS publishers
7. Estimating, Costing, Specification and valuation in civil engineering, Chakroborty M, Khanna Publishers
8. Valuation of real Properties – S. C. Rangwala- Charotar Publishing House Ltd.

Reference Books

1. Relevant Indian Standard Specifications (IS 1200)
2. World Bank Approved Contract Documents.
3. FIDIC Contract Conditions.
4. Acts Related to Minimum Wages, Workman's Compensation, Contract, and Arbitration.
5. C.P.W.D. specifications
6. C.P.W.D. schedule of rates.
7. Standard specifications Volumes I & II (P. W. D. Maharashtra)

e-Resources

NPTEL Course: “Estimation & Valuation”





WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR

(An Autonomous Institute)

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

22CEU7CC2T: Earthquake Engineering

Teaching Scheme		Examination Scheme	
Lectures	3 Hours/week	ESE	60 Marks
Credits	3	ISE	40 Marks

Introduction:

This course is designed to reflect current developments and advances being made in the field of Earthquake Resistant Technology of Structures. The course introduces the terms of Seismology and the theory of vibration. The dynamic analysis of structures for earthquake load is a fundamental principle of this course. This course facilitates the application of earthquake-resistant principles, features, and criteria to structures through the provisions of IS 1893 & 13920: 2016 codes.

Course Prerequisite:

Basic knowledge of Structural Mechanics, and Geology

Course Objectives:

The objective of this course is to make the student

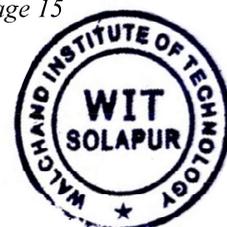
1. To make students aware of earthquake terminology
2. To make students learn the behaviour of structures under dynamic load
3. To make students apply the Earthquake standard codes at planning & design
4. To make students apply earthquake-resistant features

Course Outcomes:

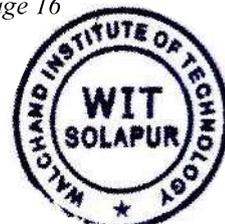
After completing the course, students will be able to

1. Describe the causes & effects of an Earthquake and various Earthquake terminology
2. Perform the dynamic analysis of structures under earthquake load.
3. Apply the principles of earthquake-resistant philosophy in planning, design, and construction of buildings.
4. Adopt the provisions of IS 1893-2016 and IS 13920- 2016 Codes.
5. Incorporate the earthquake-resistant features for various types of construction.

Unit – I	Elements of Seismology	4 Hours
General effects of an earthquake, terminology, structure of the earth, causes of an earthquake, plate tectonic theory, seismic waves, magnitude and intensity, methods of measurement, energy released, seismograph, strong motion earthquakes, accelerogram, soil liquefaction, prominent earthquakes of India		



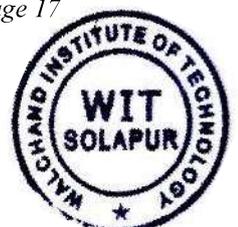
Unit – II	Free vibrations of single-degree-of-freedom systems	7 Hours
Dynamic loads and dynamic analysis, degrees of freedom, Undamped free vibrations, multiple elastic forces, viscously damped vibrations, equations of motion and solution, and logarithmic decrement		
Unit – III	Forced vibrations of single-degree-of-freedom systems	7 Hours
Forced vibrations (harmonic loading) of single-degree-of-freedom systems. Undamped and viscously damped vibrations, equations of motion and solution, Force transmitted to foundation, transmissibility.		
Unit – IV	Response Spectrum Theory	4 Hours
Response to general dynamic loading, Earthquake response spectrum, tripartite spectrum, construction of design response spectrum, effect of foundation, and structural damping on design spectrum.		
Unit – V	Principles of Earthquake-Resistant Design	6 Hours
Principles: - Planning aspects, symmetry, simplicity, and regularity. Resistance of structural elements and structures for dynamic load, design criteria, strength, and deflection.		
Unit – VI	Evaluation of Seismic Forces	7 Hours
Philosophy of earthquake resistant design, Provisions of IS 1893 (All Parts), Soft storey, Design spectrum of IS 1893-2016, evaluation of lateral loads due to earthquake on multistory buildings.		
Unit – VII	Ductile Detailing of RCC Members	5 Hours
Concept of ductility, different ways of measuring ductility, factors affecting ductility, energy absorption, provisions of IS13920-2016.		
Unit – VIII	Earthquake-Resistant Construction	5 Hours
Failure mechanism of different types of masonry construction, Construction aspects of Masonry and Timber structures, Retrofitting and strengthening techniques of low-cost and low-rise buildings, Provisions of IS 4326 and IS 13935.		
Text Books		
<ol style="list-style-type: none"> 1. Elements of Earthquake Engineering–Jai Krishna, South Asian Pub. New Delhi 2. Earthquake Resistant, Design of Masonry and Timber Structures–A.S. Arya 3. Earthquake Resistant Design of R.C.C. Structures–S.K.Ghosh 		
Reference Books		
<ol style="list-style-type: none"> 1. Dynamics of Structures–A.K. Chopra 		



2. Structural Dynamics- Mario Paz CBS Publication
3. Earthquake Resistant Structures–D.J. Dowrick John Wiely Publication
4. Dynamics of Structures–R.M. Clough and Penzian, McGraw Hill co. New Delhi
5. Mechanical Vibrations–G.R. Grover, Roorkee University, Roorkee
6. Analysis and Design of Foundations for Vibrations – P.J. Moove. Oxford and I.B. H. Publication, Delhi
7. Foundation Design Manual–N.V. Nayak, Dhanpat Rai and Sons, Delhi
8. Manual of Earthquake Resistant Non-Engineering Construction, University of Roorkee
9. Elements of Seismology– Rochter
10. IS 1893-2016 –Part I, IS 13920-2016, IS: 4326 and IS 13935.
11. Earthquake Tips published by NICEE, IIT Kanpur.

e-Resources

NPTEL course: “Introduction to Earthquake Engineering”





WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
(An Autonomous Institute)
Final Year B.Tech. (Civil Engineering), Semester-VII

22CEU7CC3T: Construction Management and Practices

Teaching Scheme		Examination Scheme	
Lectures	3 Hours/week	ESE	60 Marks
Practical:	2hours per week	ISE	40 Marks
Credits	4	ICA	25 Marks

Introduction:

This course provides an application of the Project Management Tools and techniques required for decision-making related to the project for successful completion. The course introduces Construction Safety, Construction equipment, and advanced technology required on Civil Engineering Sites. Additionally, the course covers Project Management software and its application for Civil Engineering Projects.

Course Prerequisite:

Principles of Management and Quantitative Techniques, Inventory Management and Quality Control

Course Objectives:

The objective of this course is to make the student to

1. To make students learn about Project management tools such as the Bar charts and Network diagrams required for the successful completion of projects.
2. To make students learn Network Compression and Updating to make various decisions related to the projects.
3. To instruct students about various construction safety measures and methods in the construction industry.
4. To educate students about Construction Equipment and Advanced formworks.
5. To educate students about project management software for the successful completion of Civil Engineering Projects.

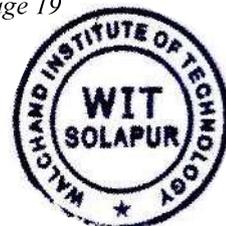
Course Outcomes:

After completing the course, students will be able to

1. Develop bar charts and network diagrams to determine project duration and critical path.
2. Optimize project cost and duration using network compression and update schedules.
3. Implement safety measures in diverse civil engineering projects.
4. Evaluate and choose suitable equipment and advanced formwork systems.
5. Apply project management software for planning, monitoring, and reporting.



Unit – I	Project Management, Network Diagram and Critical Path Method (CPM)	8 Hours
Introduction, Steps in Project Management, Work Breakdown Structure (WBS). Gantt (Bar) Chart, Milestone chart, Development of network: Representation by Activity on Arrow (AOA) and Activity on Node (AON), Fulkerson's Rule, Critical Path Method (CPM): Introduction, Time estimates, floats, critical path.		
Unit – II	Performance Evaluation and Review Techniques (PERT) and Precedence Network	8 Hours
Concept of probability, Normal and Beta Distribution, Central limit theorem. Time estimates and calculations of project duration, critical path, slack, and probability of project completion, Precedence Network and example.		
Unit – III	Network Compression and Updating	6 Hours
Cost associated with Activity in Project: Least Cost and Optimum Duration, Resource allocation: Smoothing and levelling, Updating: Need, steps, project duration, and calculation for updated network.		
Unit – IV	Construction Safety	6 Hours
Safety against accidents on various construction sites such as buildings, roads, tunnels, bridges, fabrication and erection works, etc., Safety at various stages of construction, Safety measures in construction		
Unit – V	Construction Equipment and Advanced Formworks	6 Hours
Earthmoving Equipment - Tractors, Bulldozers, Scrappers, Power shovels, Hoes, Dragline, Hauling Equipment: Tipper (Dumper Truck), Compactors- types and performance, operating efficiencies, Lifting Cranes: Mobile and Floating Cranes, Advanced formworks- Aluform and Mivan Formwork		
Unit – VI	Project Management Software (PMS) and Building Information Modelling (BIM)	8 Hours
Introduction to applications of PMS such as MS Excel, MS Project, Primavera, PRINCE, and Open-Source software, Introduction to BIM (Building Information Modeling).		
INTERNAL CONTINUOUS ASSESSMENT (ICA)		
<ol style="list-style-type: none"> 1. Internal Continuous Assessment (ICA) shall consist of a minimum of six assignments based on the entire curriculum. 2. Sample Civil Engineering project management reports generated using relevant software. 3. Site visit report covering construction safety, construction Practices, and construction equipment. 		
Text Books		



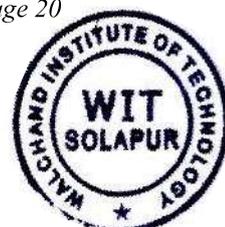
1. A Management Guide to PERT/CPM: Weist J. D. Levy, Prentice Hall of India, New Delhi, 2nd Ed. 1982
2. PERT and CPM Principles and Applications: Srinath L. S., East West Publication, New Delhi, 3rd Ed. 1995.
3. PERT and CPM- B. C. Punmia, K. K. Khandelwal, Laxmi Publications, New Delhi, 4th Ed. 2012.
4. Computerized Project Management Technique for Manufacturing and Construction: Samaras T.T., Kim Yensueng, Prentice Hall of India, New Delhi, 1979.
5. Principles of Construction Management: Roy Pilcher, Tata McGraw-Hill Publications.
6. Construction, Planning, Equipment, and Methods - R. L.. Peurifoy McGraw-Hill Book co, New Delhi
7. Construction Equipment Guide, David A. Day, Neal B. H. Benjamin, John Wiley & Sons.
8. Construction Equipment – Mahesh Varma, Metropolitan Book co, New York
9. Heavy Construction – Planning, Equipment and methods – Jagman Singh, Oxford and IBH publishers, New Delhi.
10. Construction of Diaphragm Walls, I Hajnal, I Marton, F. Regele, Wiley Interscience Publication, John Wiley & Sons.
11. Structural & cut off Diaphragm walls, R.G.H. Boyes, Applied Science Publishers Ltd., London.

Reference Books

1. CPM in Construction Practice, Antill J. M., John Wiley and Sons.
2. Construction Project Management – Planning, Scheduling and Control- Chitkara K.K., Tata McGraw Hill Publications New Delhi, 4th Ed. 2002.
3. Construction Planning and Management through System Techniques: Verma M., Metropolitan Publication, 3rd Ed. 1985.
4. Construction Project Management- Bennett J. M. Clough R. H., Butterworth’s Wiley John, New Delhi, 1972.
5. Construction Scheduling with Primavera Enterprise- Marchman D.A., Thomson/Brooks- Cole.

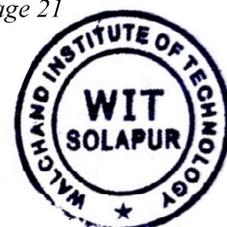
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NPTEL course: “Principles of Construction Management and Practices”

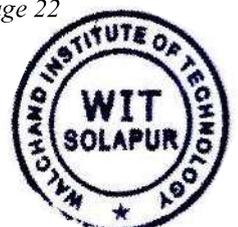


**WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR****(An Autonomous Institute)****Final Year B.Tech. (Civil Engineering), Semester-VII****22CEU7E14T: Core Elective-II-Advanced Structural Analysis**

Teaching Scheme		Examination Scheme	
Lectures	3 Hours/week	ESE	60 Marks
Credits	3	ISE	40 Marks
Introduction:			
This course provides the knowledge of analysis of complex indeterminate structure. The course covers the basics of Influence line diagram; Beam curved in plan and beams on elastic foundation. It also covers the application of matrix method of analysis.			
Course Prerequisite:			
Basics of Linear Algebra, numerical methods, structural analysis of determinate structure and basic principles of Finite Element Method.			
Course Objectives:			
The objective of this course is to make the student to			
<ol style="list-style-type: none"> 1. Draw ILD for indeterminate structures 2. Learn the basics of the beams curved in plan and beams resting on elastic foundation 3. Analyze the Beam column 4. Apply the structure-oriented stiffness method for the analysis of structure 5. Learn and apply the structure-oriented stiffness method for the analysis of structure 			
Course Outcomes:			
After completing the course, students will be able to			
<ol style="list-style-type: none"> 1. Construct influence line diagrams (ILDs) for indeterminate structures. 2. Evaluate the behavior of beams curved in plan and those on elastic foundations. 3. Analyze beam-columns under combined loading conditions. 4. Apply the structure-oriented stiffness method for structural analysis. 5. Apply the member-oriented stiffness method to analyze complex structures. 			
Unit – I	Influence Line Diagrams for Indeterminate Structures	8 Hours	
Muller- Breslau’s Principle and Moment Distribution Method. Continuous beams, portal frames and two-hinged arches.			
Unit – II	Beams curved in plane:	7 Hours	
Determinate and indeterminate beams curved in plan.			



Unit – III	Beams on elastic foundations	7 Hours
Analysis of infinite, Semi-infinite and finite beams		
Unit – IV	Beam Columns	7 Hours
Concept of geometric and material non-linearity, governing differential equation, Analysis of beam-columns subjected to different loadings and support conditions, Stiffness and carry-over factors for beam-columns, fixed end actions due to various loads.		
Unit – V	Stiffness method of structural analysis:	8 Hours
Analysis of continuous beams, trusses, and plane frames by structure-oriented stiffness approach.		
Unit – VI	Member-oriented stiffness Method:	7 Hours
Stiffness matrices of beam, truss, plane frame, grid, pin, and rigid jointed space frame elements on member axes. Transformation of matrices on structural axes. Overall joint stiffness matrix and nodal load vector, assembly rules, Calculation of member end forces, and Bandwidth.		
Text Books		
<ol style="list-style-type: none"> 1. Structural Analysis by Negi and Jangid. 2. Analysis of structure by Vazirani and Ratwani, Vol. II 3. Advanced Theory of Structures by Vazirani and Ratwani. 4. Theory of Elastic Stability by Timoshenko and Gere. 5. Matrix Analysis of Framed Structures by Gere and Weaver. 		
Reference Books		
<ol style="list-style-type: none"> 1. Structural Analysis–A Matrix Approach by Pandit and Gupta. 2. Mechanics of Structures Vol.I, II, and III by Junnarkar and Shah. 3. Basic structural Analysis by C. S. Reddy, Construction of Diaphragm Walls, I Hajnal, I Marton, F. Regele, Wiley Interscience Publication, John Wiley & Sons. 4. Structural & cut off Diaphragm walls, R.G.H. Boyes, Applied Science Publishers Ltd., London. 		
e-Resources		
NPTEL Course: Advanced Structural Analysis		





WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR

(An Autonomous Institute)

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

22CEU7E24T: Core Elective-II-Repairs & Rehabilitation of Structures

Teaching Scheme		Examination Scheme	
Lectures	3 Hours/week	ESE	60 Marks
Credits	3	ISE	40 Marks

Introduction:

This course provides a thorough introduction to the maintenance and repair strategies with serviceability and durability aspects of concrete structures. This course also introduces the materials and retrofitting techniques used for repairs of structures. It also provides information about structural health monitoring and demolition techniques used for dilapidated structures.

Course Prerequisite:

Basics of Civil Engineering and Concrete Technology.

Course Objectives:

The objective of this course is to make the student to

1. To make students aware of maintenance and repair strategies.
2. To make students learn about serviceability and durability aspects of concrete.
3. To make students learn about materials and techniques used for repair of structures.
4. To make students learn appropriate repair and retrofitting techniques.
5. To make students learn about structural health monitoring and demolition techniques for dilapidated structures.

Course Outcomes:

After completing the course, students will be able to

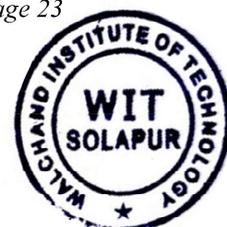
1. Evaluate maintenance and repair strategies for civil structures.
2. Assess serviceability and durability of concrete.
3. Select and justify materials and techniques for structural repair.
4. Recommend suitable repair and retrofitting methods.
5. Formulate strategies for structural health monitoring and demolition.

Unit – I

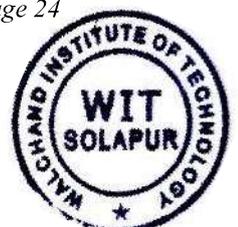
Assessment and Maintenance of Structures:

7 Hours

Repair and rehabilitation, facts of maintenance, importance of maintenance various aspects of inspection, assessment procedure for evaluating damaged structure, causes of deterioration. Repair Strategies: Causes of distress in concrete structures, construction and design failures, condition



assessment and distress-diagnostic techniques, assessment procedure for inspection and evaluating a damaged structure.		
Unit – II	Serviceability and Durability of Concrete:	8 Hours
Quality assurance for concrete construction, concrete properties – strength, permeability, thermal properties and cracking. Effects due to climate, temperature, chemicals, corrosion.		
Unit – III	Materials and Techniques for Repair:	7 Hours
Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, fibre reinforced concrete, bacterial concrete, rust eliminators and polymers coating for rebars during repair, foamed concrete, mortar and dry pack, vacuum concrete, gunite and shotcrete, epoxy injection, mortar repair for cracks, shoring and underpinning		
Unit – IV	Repair, Rehabilitation and Retrofitting Techniques:	7 Hours
Repairs to overcome low member strength, deflection, cracking, chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure.		
Unit – V	Repair of structure:	8 Hours
Common types of repairs repair in concrete structures, repairs in under water structures. Strengthening of Structures: Strengthening Methods, retrofitting, jacketing		
Unit – VI	Health Monitoring and Demolition Techniques	7 Hours
<ul style="list-style-type: none"> ▪ Long term health monitoring techniques, engineered demolition techniques for dilapidated structures, use of sensors for building instrumentation 		
Text Books		
<ol style="list-style-type: none"> 1. Concrete Technology, Theory and Practice by M.S. Shetty, S, Chand Publications, New Delhi 2. Rehabilitation of Concrete Structures by Dr. Vidivelli, Standard Publishers Distributors. 3. “Maintenance, Repair & Rehabilitation & Minor works of Buildings”, by P.C. Varghese, PHI Learning Private Limited Delhi 4. “Repair and Rehabilitation of Concrete Structures”, by Poonam Modi and Chirag Patel , PHI Learning Private Limited, Delhi. 5. “Maintenance, Repair, Rehabilitation, and Retrofitting of Structures”, by Dr. G. Nandini Devi, WILEY Publications 6. “ Repairs and Rehabilitation of Structures”, by Dr. R.N Krishna , and Prof. A.R. Santhakumar, Rajsons Publications Pvt. Ltd. 		
Reference Books		
<ol style="list-style-type: none"> 1. Concrete Technology by A.R. Santhakumar, Oxford University press 2. Defects and Deterioration in Buildings, E F & N Spon, London 3. Non-Destructive Evaluation of Concrete Structures by Bungey - Surrey University 4. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard 		

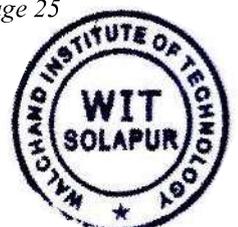


Publications.

5. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W. H. Ranso, (1981).
6. Building Failures: Diagnosis and Avoidance, EF & N Spon, London, B.

e-Resources

1. NPTEL course: Maintenance and Repair of Concrete Structures
2. NPTEL course: Retrofitting and Rehabilitation of Civil Infrastructure





WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR

(An Autonomous Institute)

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

22CEU7E34T: Core Elective-II-Structural Dynamics

Teaching Scheme

Lectures 3 Hours/week

Credits 3

Examination Scheme

ESE 60 Marks

ISE 40 Marks

Introduction:

This course is designed to reflect current developments and advances being made in the field of Vibration Analysis of Structures. The course introduces the application of Dynamic load vibration analysis of structures. The dynamic analysis of single & multistoried structures subjected to vibration is focused in the course. The methods have been introduced to solve dynamic structural problems.

Course Prerequisite:

The student shall have completed the course of Applied and Structural Mechanics.

Course Objectives:

The objective of this course is to make the student

1. To make students aware of the theory of vibration
2. To make students learn the behavior of structures under dynamic load
3. To make students apply dynamic analysis to the structures
4. To make students apply earthquake-resistant features

Course Outcomes:

After completing the course, students will be able to

1. Develop mathematical models for structures using knowledge of structural Dynamics
2. Apply different theories for the vibration study of structures.
3. Interpret dynamic analysis results for design, analysis, and research purposes
4. Apply structural dynamics theory to earthquake analysis and design of structures.

Unit – I

SDOF Systems

8 Hours

SDOF Systems Subjected to General Dynamic Loading Duhamel's integral, Application to simple loading cases, numerical evaluation of response integral, Piecewise exact method.

Unit – II

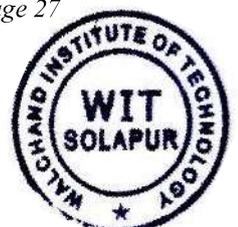
Free Vibration Analysis of MDOF Systems–I:

8 Hours

MDOF systems, selection of DOFs, formulation of equations of motion, Stiffness matrices, Static condensation, Free Vibration as Eigen Value problem, Frequency, and Mode Shapes, and Determination of natural frequencies and mode shapes. Orthogonality conditions.



Unit – III	Free Vibration Analysis of MDOF systems – II	7 Hours
Modal analysis method for free vibration analysis, modal combination rules, systems with and without damping, and proportional damping.		
Unit – IV	Forced Vibration Analysis of MDOF Systems	6 Hours
Governing equations, modal analysis, numerical evaluation of modal equations by mode combinations		
Unit – V	Distributed-Parameter Systems	10 Hours
Distributed-Parameter Systems: Partial differential equations of motion, Free and forced Vibration, Application to beams in flexure		
Unit – VI	Energy Methods	5 Hours
Rayleigh method for Discrete and continuous systems, Fundamental mode analysis		
Text Books		
<ol style="list-style-type: none"> 1. Mechanical Vibrations – G. R. Grover, Roorkee University, Roorkee. 2. Dynamics of Structures- Patrick Paultre, Wiley India Pvt. Ltd, New Delhi 		
Reference Books		
<ol style="list-style-type: none"> 1. Dynamics of Structures –A.K. Chopra, Dhanapat Rai & sons, New Delhi 2. Structural Dynamics - Mario Paz, CBS Publication 3. Dynamics of Structures – R. M. Clough and Penzian, McGraw Hill Co., New Delhi 		
e-Resources		
NPTEL course: Structural Dynamics		



**WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR****(An Autonomous Institute)****Final Year B.Tech. (Civil Engineering), Semester-VII****22CEU7E44T: Core Elective-II-Traffic Engineering & Management****Teaching Scheme****Lectures** 3 Hours/week**Credits** 3**Examination Scheme****ESE** 60 Marks**ISE** 40 Marks**Introduction:**

Traffic Congestion has become a serious 'urban illness' in the modern era of urbanization, especially in emerging countries such as India. This results in an increase in travel time, rise in traffic accidents, rise in fuel depletion, excessive exhaust emissions, etc. which can retard the growth of any city and its sustainable development. This course will help in capacity building amongst students to understand the traffic engineer's role in all relevant dimensions, and develop strategies, programs, and projects accordingly.

Course Prerequisite:

Basic knowledge of Transportation Engineering

Course Objectives:

The objective of this course is to make the student

1. To have an overall knowledge of the traffic components and assess the traffic characteristics and related problems.
2. To develop a strong knowledge base of traffic planning and its management in any transportation area.
3. To provide knowledge of traffic control devices and its techniques in transportation interaction

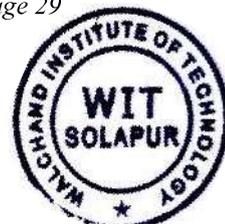
Course Outcomes:

After completing the course, students will be able to

1. Undertake various traffic studies and analysis of traffic data, including parking studies and calculation of parking demand.
2. Explain the relation between flow, density, speed, concept of level of service for urban and rural areas.
3. Evaluate the regulations on vehicle, driver speed, and Vehicle as per the Motor Vehicle Rules.
4. Design intersections and signals and propose various traffic signs, road markings, and lighting at various locations.
5. Analyse the applications and principles of various modern instruments used in traffic studies.

Unit – I**Introduction and Traffic Characteristics:****8 Hours**

Introduction: Components of road traffic, the vehicle, driver and road, Objectives-Scope of Traffic Engineering.		
Traffic characteristics: Road user characteristics, vehicular characteristics, and dynamic characteristics, power performance of vehicles, Road Characteristics, Resistance to the motion of vehicles – Reaction time of the driver.		
Unit – II	Traffic Engineering Studies and Analysis:	8 Hours
Sampling in traffic studies; adequacy of sample size; Application of sampling methods for traffic studies. Traffic parameter studies and Analysis: Objectives and Method of study – Definition of study area- Sample size – Data Collection and Analysis- Interpretation of following Traffic Studies- Volume, Spot Speed, Speed and Delay, Origin and Destination, - parking on street and off-street Parking- space consideration, parking demand, parking load and duration, space demand relation. Accidents- Causes, Analysis, Measures to Reduce Accidents. Statistical applications in traffic studies and traffic forecasting.		
Unit – III	Traffic Flow and Capacity:	7 Hours
Nature of Traffic Flow, understanding Traffic Flow, Parameters connected with Traffic Flow, Categories of traffic flow, uninterrupted traffic flow model, Analysis of speed, flow, and density relationship, Empirical studies of traffic stream Characteristics. Highway Capacity and level of service, capacity of urban and rural roads, PCU concept.		
Unit – IV	Traffic Regulations and Control:	8 Hours
Traffic Regulation: General regulations, regulations on vehicles- Vehicle registration requirements and accessories, vehicle inspection, inspection coverage, general control for motorist pedestrian, regulations on drivers- driver licensing, speed control- methods of control devices, speed zoning, one-way street – necessity, requirements, advantages, and disadvantages. Central Motor Vehicle Rules.		
Unit – V	Traffic Control Devices	8 Hours
Traffic Control Devices: Traffic signs, traffic Markings, islands, types of intersection and channelization, Rotary intersection design, and traffic signal design by IRC and Webster’s method-vehicle actuated and synchronized signals, signal coordination, and Road Lighting.		
Unit – VI	ITS	6 Hours
Introduction to Intelligent Transport System- Application of ITS to Traffic Management System- Public Transportation Management System – ITS Case studies		
Filed Studies		
<ol style="list-style-type: none"> 1. Field studies on traffic volume at midblock, intersection; O-D studies; speed studies, spot speed, speed and delay; parking demand studies, and accident studies. Preparation and submission of a report on all field surveys. 2. An assignment on each chapter and a field visit report shall be submitted by the students. 3. Brief report on applications of software used in traffic studies and analysis, such as VISSIM, SIDRA, PASSER III, TSIS, AIMSUN, Dynameq, Dynasmart, and SimTraffic and Transyt-7F 		
Text Books		



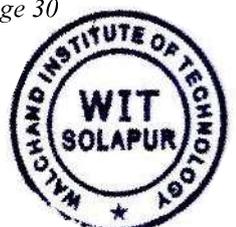
1. Traffic Engineering by Matson, Smith and Hurd McGraw Hill & Co publication.
2. Traffic Engineering and Transport Planning by Dr. L.R.Kadiyali., Khanna Publishers.
3. Highway Engineering by Khanna and Justo, Nem Chand & Bros publication.
4. Traffic Engineering – An Introduction by Wells, G.R., Griffin, London publication.

Reference Books

1. Traffic Engineering by Pignataro, Prentice Hall publications
2. Highway Traffic Analysis and Design by Salter, R.J and Hounsell, N.B., Mac Millan publishers, 1996.
3. Highway capacity Manual-2000.
4. An Introduction to Transportation Engineering by Jotin Khistey and Kent Lall, Prentice Hall publication, 2002.
5. Traffic Engineering by Roger P. Roess, Elena S. Prassas& William R. McShane, Fourth Edition, Pearson Education, South Asia

e-Resources

NPTEL course: Traffic Engineering & Management





WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR

(An Autonomous Institute)

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

22CEU7E54T: Core Elective-II-Geosynthetics and Reinforced Soil Structures

Teaching Scheme

Lectures 3 Hours/week

Credits 3

Examination Scheme

ESE 60 Marks

ISE 40 Marks

Introduction:

This course offers a thorough understanding of geotextiles and their applications in soil reinforcement and geotechnical engineering. Students will learn to select suitable geotextiles, design reinforced earth structures, and apply geosynthetics for erosion control, drainage, filtration, pavements, and landfills. The course equips students with practical skills to implement geosynthetic solutions in civil engineering projects.

Course Prerequisite:

Basics of Civil Engineering, Geotechnical Engineering, and Foundation Engineering

Course Objectives:

To make students understand the various types of geotextiles, including woven, non-woven, and knitted fabrics.

1. To make students learn about the Conduct of standard laboratory tests to determine the properties of geosynthetics.
2. To make students understand the principles of soil mechanics and geotechnical engineering in the design of RE retaining structures.
3. To make students understand the mechanisms of erosion and sediment transport.
4. To make students understand the use of geosynthetics in pavement design to enhance performance and longevity.

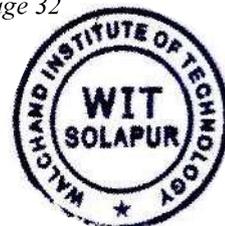
Course Outcomes:

After completing the course, students will be able to

1. Classify various types of geotextiles and evaluate their suitability for soil reinforcement structures.
2. Conduct laboratory tests to assess the properties of geosynthetics.
3. Design reinforced earth (RE) retaining structures.
4. Develop geosynthetic-based solutions for erosion control, drainage, and filtration.
5. Apply geosynthetics in the design of pavements and landfill systems for improved performance.



Unit – I	Introduction	6 Hours
Historical background of reinforced soil, Principles of reinforced soil through Mohr circle analysis. Different types of geosynthetics: Types of geosynthetics like geotextiles, geogrids, geonets, geocells, geo-composites, and their manufacturing methods.		
Unit – II	Testing methods for geosynthetics:	8 Hours
Techniques for testing different index properties, strength properties, Apparent Opening Size, In-plane, and cross-plane permeability tests, assessment of construction-induced damage, and extrapolation of long-term strength properties from short-term tests.		
Unit – III	Reinforced Soil retaining walls:	8 Hours
Different types of walls like wrap-around walls, full-height panel walls, discrete-facing panel walls, modular block walls Design methods as per BS-8006 and FHWA methods Construction methods for reinforced soil retaining walls. Reinforced soil slopes: Basal reinforcement for construction on soft clay soils, construction of steep slopes with reinforcement layers on competent soils, Different slope stability analysis methods like planar wedge method, bi-linear wedge method, and circular slip methods.		
Unit – IV	Erosion control on slopes using geosynthetics:	8 Hours
Banquet and Lee's approach for analysis of foundations with reinforcement layers. Drainage and filtration applications of geosynthetics: Different filtration requirements, filtration in different types of soils and criteria for selection of geotextiles, estimation of the flow of water in retaining walls, pavements, etc., and selection of geosynthetics.		
Unit – V	Pavement Applications	8 Hours
Geosynthetics for separation and reinforcement in flexible pavements, design by Giroud-Noiray approach, reflection cracking and control using geosynthetics. Use of geosynthetics for construction of heavy container yards and railway lines.		
Unit – VI	Construction of landfills using geosynthetics:	7 Hours
Different components of modern landfills, collection techniques for leachate, application of different geosynthetics like geonets, and geotextiles for drainage in landfills, use of geomembranes and Geosynthetic Clay Liner (GCL) as barriers.		
Text Books		
<ol style="list-style-type: none"> 1. Koerner, R.M. "Designing with Geosynthetics", Prentice Hall, New Jersey, USA, 4th edition, 1999. 2. Jewell, R.A., "Soil Reinforcement with Geotextiles", Special Publication No. 123, CIRIA, Thomas Telford. London, UK, 1996. 3. Geosynthetics - New Horizons, Eds. G.V. Rao, PK Banerjee, J.T. Shahu, G.V. Ramana, Asian Books Private Ltd., New Delhi, 2004. 		

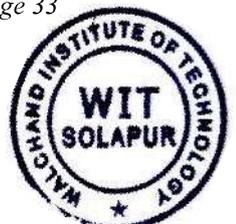


Reference Books

1. Geosynthetics Asia 1997: Select papers by C.V.J. Varma, G. Venkatappa Rao and A.R.G. Rao,1998.
2. Geosynthetics for Trails in Wet Areas: 2008, Edition by James Scott Groenier ,Bibligov Publishers,2012.
3. Fundamentals of Geosynthetic Engineering by Sanjay Kumar Shukla and Jian-HuaYin, Taylor & Francis,2008.

e-Resources

NPTEL course “Geosynthetics and Reinforced Soil Structures”





WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR

(An Autonomous Institute)

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

22CEU7E64T: Core Elective-II- Optimisation Techniques

Teaching Scheme

Lectures 3 Hours/week

Credits 3

Examination Scheme

ESE 60 Marks

ISE 40 Marks

Introduction:

This course provides an application of Operations Research required for decision-making. The course introduces Linear Programming Problems and Non-Linear Programming Problems for application in an organization.

Course Prerequisite:

Principles of Management and Quantitative Techniques

Course Objectives:

1. To make students learn about Operations Research techniques and tools for the successful completion of projects.
2. To make students learn Optimization Techniques such as Linear Programming Problems to make various decisions related to the projects.
3. To make students learn Optimization Techniques such as Non-linear programming Problems to make various decisions related to the projects.
4. To educate students about the Simulation required to resolve the problem.

Course Outcomes:

After completing the course, students will be able to

1. Formulate and solve optimization problems and use the results in the managerial decision-making process.
2. Apply optimization techniques in Civil Engineering problems such as transportation, water supply, etc.
3. Make inventory calculations for resources required in Civil Engineering Projects.
4. Explain and demonstrate the use of non-classical optimization Techniques.

Unit – I

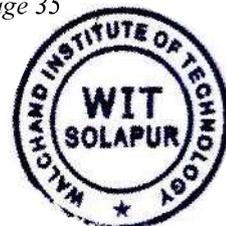
Operations Research in Civil Engineering:

6 Hours

Operations Research in Civil Engineering and Managerial Decision-making process. Introduction to Optimization Techniques and their application in Engineering Planning, Design, and Construction. Various models; Objective function and constraints, convex and concave functions, regions, and sets



Unit – II	Optimization Techniques:	8 Hours
Classical optimization techniques, Standard format of optimization problems, Types of optimization problems, formulation of optimization problems		
Unit – III	Linear programming:	9 Hours
Formulation of Linear optimization models and civil engineering applications. Simplex method, Special cases in simplex method, Method of Big M, Two-phase method, duality, sensitivity analysis, MODI method, shortest route problem, maximum flow problem, Decision theory (certainty, uncertainty, and risk), Decision tree, and Game theory		
Unit – IV	Inventory model:	8 Hours
Inventory models, deterministic models, probabilistic models, Replacement Models		
Unit – V	Introduction to non-classical Optimization Techniques:	8 Hours
Introduction to non-classical optimization Techniques viz. Artificial Neural Networks, Fuzzy Logic, Genetic Algorithms. Introduction to Non-Linear Programming, Dynamic Programming, and Integer Programming.		
Unit – VI	Simulation	5 Hours
Simulation, applications with the problem.		
Text Books		
<ol style="list-style-type: none"> 1. Optimization, S. S. Rao, Wiley Eastern Ltd. 2. Operation Research, H. A. Taha, Macmillan. 3. Operation Research, Hira and Gupta, S. Chand 		
Reference Books		
<ol style="list-style-type: none"> 1. Engineering Optimization, A. Ravindran, K. M. Ragsdell, G. V. Reklaitis, Wiley Publication. 2. Lecture Notes by Dr. Nageshkumar (nptel.iitk.ac.in/courses/Webcourse-contents/IISc/BANG/OPTIMIZATION METHODS/pdf) 3. Operations Research: Theory and Application, J.K. Sharma, Macmillan Publishers 4. Computational Intelligence for Optimization, Authors: Ansari, Nirwan, Hou, Edwin, Springer Publications. 		
e-Resources		
NPTEL course: “Optimization Methods for Civil Engineering”		





WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR

(An Autonomous Institute)

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

22CEU7E74T: Core Elective-II-Entrepreneurship

Teaching Scheme		Examination Scheme	
Lectures	3 Hours/week	ESE	60 Marks
Credits	3	ISE	40 Marks

Introduction:

This course provides a detailed overview of entrepreneurship as the foundation of business growth and value creation in the national economy. It provides multiple constructs for entrepreneurs to be successful and pathways for their companies to achieve sustainable growth. The subject aims to develop an understanding of Entrepreneurship and the conceptual framework around it.

Course Prerequisite:

The student has no specific prerequisites to learn the course on Entrepreneurship.

Course Objectives:

1. The theoretical background of the subject;
2. The skills required to become an entrepreneur.
3. The diverse nature of business models, markets, how to frame strategies, evaluate markets and customers, costing and pricing, etc.
4. The funding bodies, Legalities of establishing a business, accounting procedures, government policies, and other frameworks necessary to establish and develop an entrepreneur.
5. At the end of this course, one will be able to create a strategy for launch and give a start-up the best possible chance for success

Course Outcomes:

After completing the course, students will be able to

1. Exhibit skills necessary to craft strategies and initiatives that can enable growth and sustainability in an entrepreneurial venture.
2. Prepare preliminary and final project report
3. Exhibit higher-level critical thinking skills, evidenced by analysis, evaluation, and synthesis.
4. Demonstrate skills to establish and manage the accounting process, to employ break-even and cost-volume-profit tools.

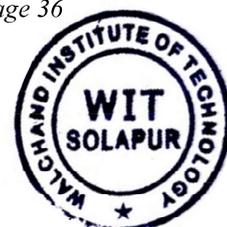
Unit – I

Meaning, Definition, and Concept of Enterprise:

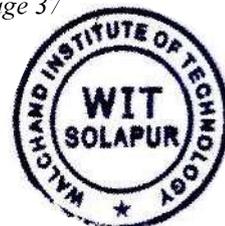
8 Hours

Entrepreneurship and Entrepreneurship Development, Evolution of Entrepreneurship, risks involved with entrepreneurship, barriers to Entrepreneurship, Factors affecting entrepreneurial growth.

Entrepreneur, qualities of a successful entrepreneur, types of entrepreneurs (on the basis of business,



motivation, stages of development, entrepreneurial activity), functions of an entrepreneur, entrepreneurial competencies, types of entrepreneurial competencies. Concepts of Intrapreneurship, Entrepreneur v/s Intrapreneur, Entrepreneur Vs. Entrepreneurship, Entrepreneur Vs. Manager, Role of Entrepreneurship in Economic Development, Factors Affecting Entrepreneurship, Problems of Entrepreneurship. Creativity and Innovation, Innovation and Entrepreneurship.		
Unit – II	Women Entrepreneurship:	8 Hours
<p>Meaning, Characteristic features, Problems of Women Entrepreneurship in India, Developing Women Entrepreneurship in India, reasons for the slow growth of women entrepreneurship, and remedies to solve the problems of women entrepreneurs. Measures taken for the development of women.</p> <p>Entrepreneurship In India: - Training of Rural Youth For Self-Employment, BANKS, NABARD, Industrial Policy, FICCI Ladies Organization (FLO), National Alliance of Young Entrepreneurs (NAYE).</p>		
Unit – III	Role of Government in Promoting Entrepreneurship:	7 Hours
<p>MSME policy in India, Agencies for Policy Formulation and Implementation: District Industries Centres (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB).</p> <p>Financial Support System: Forms of Financial support, long-term and short-term financial support, Sources of Financial support, Development Financial Institutions, and Investment Institutions. Finance, Institutional finance to Entrepreneurs, Preparation of Business Plans, Commercial Banks, Other financial institutions like IDBI, IFCI, ICICI, IRBI, LIC, UTI, SFCs, SIDCs, SIDBI, EXIM.</p> <p>Bank Institution Support to Entrepreneurs: Need for Institutional Support - Small Entrepreneurs: NSIC, SIDO, SSIB, SSICS, SISI, DICs, Industrial Estates, Specialized Institutions.</p>		
Unit – IV	Finance Analysis and Accountancy:	8 Hours
<p>Estimation of the cost of the project and means of financing, working capital requirement and its financing, estimates of working results, working capital and fixed capital assessment incentives from financial institutions and government, financial ratios, their significance, break-even analysis, cash flow charts, and financial statements.</p>		
Unit – V	Project Report:	8 Hours
<p>Preliminary and final project report preparation, financial, technical, commercial, and economic viability, project implementation process, and project profiles.</p>		
Unit – VI	Introduction to Marketing:	6 Hours
<p>Market study, Goal setting, Sales, and Sales Promotion. Industrial and commercial tax laws (major features only), Risk and Risk analysis, goal setting and decision making, Communication skills development, and barriers.</p>		
Text Books		



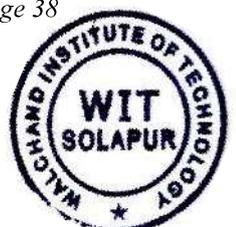
1. Patterns of Entrepreneurship, Jack M. Kaplan Wiley Publications.
2. Planning and Industrial Unit, Jay Narayan Vyas, GranthVitrان Shreyas, Opp. Jain Temple Near Navrangpura Bus Stop, Navrangpura
3. Financing an Industrial Unit, Jay Narayan Vyas and Dilip Patel, Granthvitaran Ahmadabad.
4. Entrepreneurship Development Vol. I, II & III, Vasant Desai, Himalaya Publishing house.

Reference Books

1. Entrepreneurship for the Nineties, Gordon B. Baty, Prentice Hall Inc. College Technical Reference by Granthvitaran.
2. Small Scale Industry Handbook, Jay Narayan Vyas, Granth Vitaran Ahmedabad
3. The Practice of Entrepreneurship, Geoffery G. Meredith R.E. Nelson and P. A. Neck, Published by International Labour Office, CH 1211, Geneva 22, Switzerland
4. Entrepreneurship Theory at Cross Road, Mathew J. Manimala, Biztantra publications.
5. Entrepreneurship and small business, WEBER, LEWIS, VOLERY, SCHAPER, Wiley

e-Resources

NPTEL course: Entrepreneurship Essentials





WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR

(An Autonomous Institute)

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

22CEU7E84T: Core Elective-II- Environmental Systems

Teaching Scheme

Lectures 3 Hours/week

Credits 3

Examination Scheme

ESE 60 Marks

ISE 40 Marks

Introduction:

The course examines the complex interactions between natural and human systems within the environment. The course covers a range of topics essential for understanding environmental modeling and sustainable development. Key objectives include fostering an understanding of environmental processes, exploring mitigation and adaptation strategies for environmental challenges, and promoting awareness of global environmental issues.

Course Prerequisite:

Basic knowledge of Environmental Engineering, Construction Materials: Sustainability & Usability & Sustainable Materials & Green Buildings of Civil Engineering

Course Objectives:

1. To educate students on the fundamental principles of environmental modeling, including ecosystem dynamics, biogeochemical cycles, and natural resource management.
2. To make students explore major environmental issues such as climate change, biodiversity loss, air and water pollution, and habitat destruction.
3. To make students to mitigation and adaptation strategies aimed at addressing environmental challenges.
4. To raise awareness about global environmental issues, dispersion models, and their implications for society and ecosystems.

Course Outcomes:

After completing the course, students will be able to

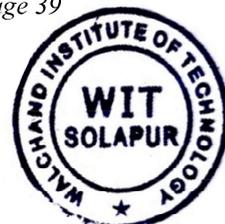
1. Explain the concept of modeling & its classification
2. Carry out ecological modeling, single and multi-species modeling in brief.
3. Model wastewater management system
4. Apply equations of continuity for various dispersion models.

Unit – I

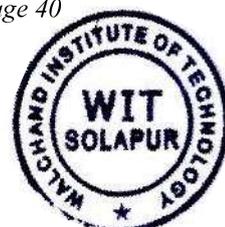
Systems Approach Concept & Analysis:

6 Hours

Model Classification, Terminology of Models, Model Building, Fundamentals of Modeling, Transport Law, Chemical Equilibrium, Phase Equilibrium, Rooth's Law, Relative Velocity, and Chemical Kinetics

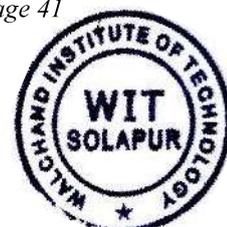


Unit – II	Ecological System:	6 Hours
Basic concepts in ecology and ecological modeling, Population Dynamics: Birth and death processes. Single-species growth, Prey-predator models: Lotka-Volterra, Rosenzweig-MacArthur, Kolmogorov models, multi-species modeling.		
Unit – III	Process Modelling:	6 Hours
Linear equilibrium system, Batch Reactor, pH system, Planning Models, Municipal solid waste management, Integrated Solid Waste Management, Reuse and Recovery in the paper, Plastic, glass, and aluminum waste		
Unit – IV	Water Modelling:	8 Hours
Modeling of wastewater management systems, Modeling of pesticide management, Modeling of municipal wastewater treatment, Model formulation, and their solution, Numerical Techniques of Linear equations, Matrix inversion method, Gasses elimination, and Gauss-Seidel method.		
Unit – V	Programming Model:	6 Hours
Resources and its utilization: Basic concepts of Conventional and non-conventional energy, General ideas about solar energy, Fuel cells, Wind energy, Small hydro plants, bio-fuels, Energy derived from oceans, and Geothermal energy.		
Unit – VI	Air Dispersion & Equations of Continuity:	8 Hours
Equations of continuity for rectangular, cylindrical, spherical, Derivation for rectangular coordinate, Numerical based on equation of continuity, Pollutant standard index criteria, toxic air pollutants, Motor vehicle emission, the point source Gaussian Plume models, Transportation Models.		
Text Books		
<ol style="list-style-type: none"> 1. Fundamentals of Atmospheric Modeling, Jacobson Mark Z., Kluwer Academic Press, 2002. 2. An Introduction to Water Quality Modeling, James A. (Ed), (2nd Ed.), 1992. 3. Techniques for Environmental System Analysis - R. H. Pantell Wiley, NY, 2001. 4. System Analysis and Design - RJ Aguilar, Prentice Hall, Englewood Cliffs, N.J., 1993. 		
Reference Books		
<ol style="list-style-type: none"> 1. Handbook of Environmental and Ecological Modeling, Halling-Sorensen B., Nielsen S.N. and Jorgensen S.E., Lewis Publishers Inc., 1995. 2. Numerical Methods and Analysis- Dr. S. K. Rathore. 3. Transport Phenomenon — Bird 4. Deaton, M.L and Winebrake, J.J., "Dynamic Modeling of Environmental Systems", Springer-Verlag, 2000. 5. Orhon, D and Artan, N., "Modeling of Activated Sludge Systems, Technomic" Publ. Co., 1994. 6. Chapra, S.C. *Surface Water-Quality Modeling", McGraw-Hill, 1997. 		



e-Resources

NPTEL (National Programme on Technology Enhanced Learning)-Website: <https://nptel.ac.in>



**WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR****(An Autonomous Institute)****Final Year B.Tech. (Civil Engineering), Semester-VII****22CEU7E94T: Core Elective-II- Solid and Hazardous Waste Management****Teaching Scheme****Lectures** 3 Hours/week**Credits** 3**Examination Scheme****ESE** 60 Marks**ISE** 40 Marks**Introduction:**

The course focuses on the effective management and disposal of solid and hazardous wastes to minimize environmental impact and ensure public safety. The course covers the principles of waste generation, characterization, treatment, and disposal methods. Key topics include regulatory frameworks, waste reduction strategies, recycling and reuse techniques, landfill design and management, incineration, and remediation of contaminated sites.

Course Prerequisite:

Environmental Engineering- I & II

Course Objectives:

1. To educate students on the sources, types, and quantities of solid and hazardous wastes generated by human activities.
2. To introduce students to various treatment technologies for solid and hazardous wastes, such as incineration, composting, and chemical treatments.
3. To provide students with an overview of local, national, and international regulations governing solid and hazardous waste management.
4. To make students promote strategies for waste reduction, recycling, and reuse to minimize the volume of waste generated and conserve natural resources.

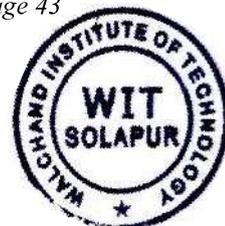
Course Outcomes:

After completing the course, students will be able to

1. Develop solid waste management systems with respect to its physical properties, and associated critical considerations in view of emerging technologies.
2. Select and adopt the appropriate methods for solid waste collection, transportation, redistribution, and disposal.
3. Identify the types of hazards and describe methods of disposal of hazardous solid waste.
4. Implement legal, political, and administrative considerations in the design and operation of solid and hazardous waste management

Unit – I**Solid Waste Management:****6 Hours**

Functional outlines of refuse, storage, transportation of refuse, analysis, composition and quantity of refuse, Economic aspects of refuse collection and transport, Solid waste in industries, common types of solid waste, classification, collection and transportation, Concept of biomedical & Hazardous waste management, Introduction to integrated solid waste management.		
Unit – II	Solid waste handling and Processing methods:	5 Hours
Solid waste handling and Processing methods, Segregation and salvage recovery of by-products, Use of solid waste as raw material in industries, Recycling of solid waste.		
Unit – III	Composting:	4 Hours
Theory of composting, types of composting, factors governing composting, processing before composting, mechanical composting plant, and recovery of biogas energy from organic solid waste.		
Unit – IV	Incineration:	6 Hours
Theory and types of incinerators, location, planning aspects, effects of feed, composition, rate, and temperature, air supply, design of incineration plant, pyrolysis and its by-products, and energy recovery. Solid waste management rules, the status of solid waste management in India		
Unit – V	Hazardous waste:	5 Hours
Definition of Hazardous waste, Characteristics and nature of hazards, natural and man-made hazards, classification of hazards.		
Unit – VI	Qualitative estimation of damages:	4 Hours
Qualitative estimation of damages, risk assessment, and management.		
Unit – VII	Types of hazardous waste:	5 Hours
Types of hazardous waste, characteristics, Site assessment waste minimization resource recovery, Strategy for minimization of damage due to natural and manmade hazards.		
Unit – VIII	Storage and handling of hazardous waste:	5 Hours
Storage and handling of hazardous waste, Site Selection, Transportation of hazardous wastes, Case Studies of hazards, episodes. Sanitary landfill site selection, types of landfilling, maintenance, and precaution, leachate and its control, control of contamination of groundwater.		
Text Books		
<ol style="list-style-type: none"> 1. Solid Waste Management – Dr. A.D. Bhide 2. Hazardous Waste Management – C. A., Wentz McGraw Hill International Edition 3. Management of Municipal Solid Waste- T. V. Ramchandra, Capital Publishing company, New Delhi 4. Solid and Hazardous Waste Management- M. N. Rao and Razia Sultana, B. S. Publication 5. Elements of Land/Soil Pollution, O.P. Gupta, Khanna Publishing House 6. Air Pollution Control Engineering, Keshav Kant, Khanna Publishing House 		

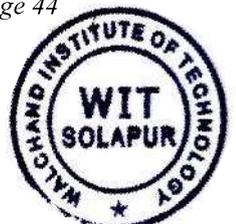


Reference Books

1. Solid Waste Management – George Tchobanoglous, McGraw Publication
2. Manual on Municipal Solid Waste management by ministry of Urban Development of Govt. of India.
3. Solid Waste Management- I. H. Khan, and Naved Ahsan, CBS Publishers and Distributors, New Delhi.

e-Resources

NPTEL course: Solid & Hazardous Waste Management





WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
(An Autonomous Institute)
Final Year B.Tech. (Civil Engineering), Semester-VII

22CEU7PR5L: Project on R. C. C. Structures

Teaching Scheme		Examination Scheme	
Drawing	4 Hours/week	OE	25 Marks
Credits	2	ICA	50 Marks

Introduction:

This course covers 3D modeling and analysis of RC framed building structures under design load combinations, using commercial software. design of structural elements. Analysis and design of foundation/water tank.

Course Prerequisite:

Basic knowledge of Structural Analysis & Design of Concrete Structures

Course Objectives:

The objective of this course is to make the student

1. Gain proficiency in using commercial structural analysis software for comprehensive building design.
2. Calculations for dead, live, and earthquake loads.
3. Apply standards and codes in the design of various structural elements, ensuring compliance and safety.
4. Acquire proficiency in drafting software for creating detailed structural drawings and layouts.

Course Outcomes:

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

1. Design and evaluate multi-storeyed RC buildings (up to G+5) using advanced 3D structural analysis software.
2. Integrate and validate dead, live, and seismic loads with appropriate load combinations to ensure structural integrity.
3. Apply and justify the use of relevant IS codes and standards to achieve code-compliant structural designs.
4. Develop and produce accurate structural drawings and layout plans using drafting software, maintaining professional quality and detail.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist of detailed design & drawing of the following R.C. structures by Limit State



method unless specified.

1) 3D Analysis and Design of RC Building up to G + 5

3D modeling and analysis of RC Framed Building Structure under design load combinations, including earthquake loads. Use of commercial software. Analysis of results for the design of structural Elements.

2) Anyone from the following.

- a) Combined trapezoidal footing/ raft foundation.
- b) Pile foundation for the structure with a pile cap.
- c) Water tank (GSR/USR/ESR) by working stress method using IS 3370.

Note:

- i. 3D Computer analysis of project No.1 shall be performed for Dead Load, live load, and earthquake load
- ii. Structural drawing showing reinforcement details shall be prepared with a provision of IS: 13920

3) Site visit: Visit to construction site to see the reinforcement details and visit Report

Text Books

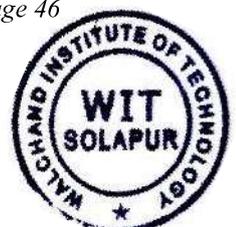
1. Reinforced Concrete Design, by S.U. Pillai and D. Menon, Tata McGraw-Hill, 3rd Edition.
2. Earthquake Resistant Design of Structures, by P. Agarwal and M. Shrikhande, Prentice-Hall of India Private Limited, 2006.

Reference Books

1. Seismic Design of Reinforced Concrete and Masonry Buildings, by T. Paulay and M.J.N. Priestley, John Wiley and Sons Inc., 1992.
2. Earthquake Resistant Design of Structures, by S.K. Duggal, Oxford University Press, 2007.
3. IS 456 :2000, Plain and Reinforced Concrete - Code of Practice, Bureau of Indian Standards, New Delhi.
4. IS 1893 (Part 1): 2016, Criteria for Earthquake Resistant Design of Structures, Bureau of Indian Standards, New Delhi.
5. IS 1893(Part 2): 2014 Criteria for Earthquake Resistant Design of Structures (P-II) Liquid Retaining Tanks, Bureau of Indian Standards, New Delhi.
6. IS 13920:2016, Code of Practice for Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces, Bureau of Indian Standards, New Delhi.
7. IS 3370 (Part I): 2021, Code of Practice for Concrete Structures for Retaining Aqueous

e-Resources

NPTEL course: Design of Reinforced Concrete Structures





LCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR

(An Autonomous Institute)

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

22CEU7PR6L: Project Phase-I

Teaching Scheme

Practical 8 Hours/week

Credits 4

Examination Scheme

OE 50 Marks

ICA 100 Marks

Introduction:

Project-based learning is a well-established educational paradigm gaining increasing importance today. To align with this approach, a project course is integrated into the final year curriculum, spanning both semesters. In this course, students work in teams to undertake a project, allowing them to showcase their abilities and develop expertise in their chosen areas of interest. The projects can involve both hardware and software, with a strong emphasis on design and research aspects. Additionally, effective verbal and written communication is a crucial skill for engineering graduates in various contexts. This course aims to cultivate these essential communication skills as well.

Course Prerequisite:

A student must possess both technical competency and effective teamwork skills to successfully contribute to a project. This includes adept knowledge of hardware and software architecture, as well as associated programming skills. Additionally, the student should have strong technical report writing and presentation abilities.

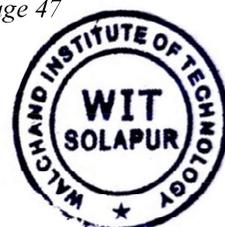
Course Objectives:

1. To expose students to the electronics and software engineering industries, enabling them to identify problem areas and formulate problem statements.
2. To equip students with the ability to design electronic and software systems that address the identified problems
3. To develop students' skills in designing the hardware and software architecture for their projects.
 1. To train students in writing technical specifications and project documentation for their chosen problems

Course Outcomes:

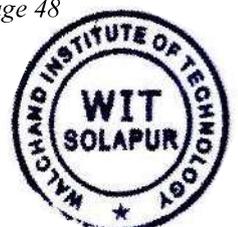
After completing the course, students will be able to

1. Conduct a comprehensive literature review to identify a project that addresses societal and environmental needs for sustainable development.
2. Develop a detailed project plan, including a timeline and an estimated budget.
3. Utilize engineering expertise to design the implementation architecture required for the project.
4. Exhibit teamwork and presentation skills by preparing thorough reports and delivering presentations, while adhering to professional ethical standards.



INTERNAL CONTINUES ASSESSMENT

1. The student will finalize the project after obtaining approval from their guide and submit a synopsis along with a presentation.
2. The student should prepare the project design.
3. The project synopsis should ideally include an abstract, literature survey, problem definition, and proposed system and design.
4. The student will need to present his/her work on the project design implemented and submit project phase -I report with details of implementation methodology, results and discussion.





WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR

(An Autonomous Institute)

Final Year B.Tech. (Civil Engineering), Semester-VIII

22CEU8PR1L: Project Phase-II

Teaching Scheme

Practical 4 Hours/week

Credits 2

Examination Scheme

OE 50 Marks

ICA 50 Marks

Introduction:

Project-based learning is a paradigm that is becoming time-honored nowadays. To keep abreast with this, the Project course is included in the curriculum, which is spread over both semesters of the final year. For this course, students carry out a project as a team that allows them to demonstrate their abilities and develop skills within their chosen area of interest. Any subdomain of Civil Engineering and Multidisciplinary with Civil Engineering relevance projects with a focus on design and research aspects are accepted. Also, communicating effectively, both in oral and written form, is an important skill for engineering graduates in many different contexts.

Course Prerequisite:

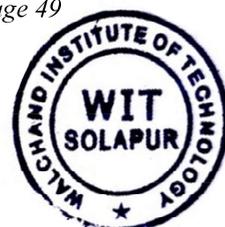
Students shall have technical competency as well as behavioral facets to carry out projects as a part of a team. He shall have an adept knowledge of core Civil Engineering subjects with software competence. Students shall also possess the necessary technical report writing and presentation skills and shall have proficiency in office software for word processing and presentation.

Course Objectives:

The objective of this course is to make the student to

1. To make students apply design concepts, prepare a detailed plan to solve the problem undertaken
2. To make students evaluate and analyze the performance of the proposed solution to the problem undertaken
3. To make the student aware of his responsibilities working in a team to provide time-bound solutions to the problem
4. To make students write technical specifications and project documents on problems undertaken.
5. To make student demonstrate a sound technical presentation of their selected project topic.
6. To make students aware of different software tools and soft skills required to practice at various stages of project execution.

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



1. Apply different design concepts to plan solution to the problem undertaken
2. Evaluate performance and detailed analysis of outcome of the proposed solution for problem undertaken
3. Work in project group following work ethics
4. Communicate with engineers and the community at large in written and oral forms
5. Demonstrate the knowledge, skills, and attitudes of a professional engineer.
6. Select and use the proper programming solution, simulator, and necessary soft skills to provide a solution to the problem undertaken.

INTERNAL CONTINUES ASSESSMENT

The objective of Project Phase - II is to enable the student to extend further the investigative study taken up under Project I, either fully practical or involving both theoretical and practical work, under the guidance of a supervisor from the department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide good training for the student(s) in R&D work and technical leadership.

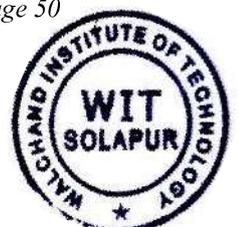
The assignment normally includes:

1. In-depth study of the topic assigned in the light of the report prepared under Project – I
2. Review and finalization of the approach to the problem relating to the assigned topic
3. Preparing an action plan for conducting the investigation, including team work;
4. Detailed analysis/modeling/simulation/design/problemsolving/experiment as needed
5. Final development of product/process, testing, results, conclusions, and future directions
6. Preparing a paper for conference presentation/publication in journals, if possible
7. Preparing a project document in the standard format for being evaluated by the department.
8. Final seminar presentation in front of a departmental committee

Project Report:

The project reports the following format should be strictly followed.

1. Page size: Trimmed A4
2. Top Margin: 1.00 Inches
3. Bottom Margin: 1.32 Inches
4. Left Margin: 1.5 Inches
5. Right Margin: 1.0 Inches
6. Para Text: Times New Roman 12point font
7. Line Spacing: 1.5 Lines
8. Page Numbers: Right aligned at footer, font 12point Times New Roman
9. Headings: New Times Roman, 14point, Boldface
10. Index of Report:
 - i) Title Sheet
 - ii) Certificate from Guide/ College
 - iii) Acknowledgement
 - iv) Abstract (Brief content of the work)



v) List of Figures

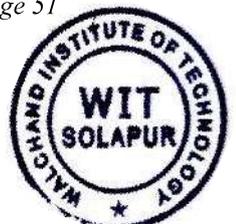
vi) List of Table

Report Content:

1. Introduction (History, Importance of Project Area, Problem identification, Objective of the Project)
2. Literature Review
3. Design/ Experimentation / Actual work carried out for the same.
4. Observation/ Analysis/ Findings/Results
5. Discussion on Results and Conclusion

References or Bibliography: References should have the following format

For Books: “Title of Book”; Authors; Publisher; Edition;





LCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR

(An Autonomous Institute)

Final Year B.Tech. (Civil Engineering), Semester-VIII

22CEU8IN2L: Internship / On Job Training (OJT)

Teaching Scheme		Examination Scheme	
Practical	20 Hours/week	OE	100 Marks
Credits	10	ICA	100 Marks

Introduction:

The purpose of the Internship Program is to provide each student with practical experience in a standard work environment. Success in this job will help ensure the development of skills necessary for a lasting and rewarding career in the future. The internship provides the student with an opportunity to gain knowledge and skills from a planned work experience in the student's chosen career field. In addition to meeting Core Learning Outcomes, jointly developed Specific Learning Outcomes. Internship placements are directly related to the student's program of study and provide learning experiences not available in the classroom setting. Internships provide entry-level, career-related experience and workplace competencies that employers value when hiring new employees. Internships may also be used as an opportunity to explore career fields. Students must meet with the Internship Coordinator before registering.

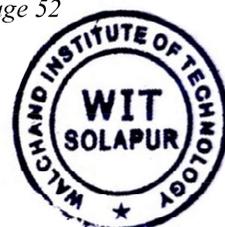
Course Prerequisite:

Students must be registered before they begin working for an internship. The internship should be in a creative industry that relates to your program of study and professional goals. Students must remain at the internship work site placement for the agreed upon period for which they are registered.

Course Objectives:

1. To provide students with hands-on experience in industrial environments, essential for developing industry-ready professionals.
2. To equip students with real-time technical and managerial skills necessary for their future careers.
3. To familiarize students with various materials, processes, products, and software applications, emphasizing quality control principles.
4. To introduce students to engineering ethics and responsibilities in professional practice.
5. To explore the social, economic, and administrative factors that impact industrial organizations' working environment.

Course Outcomes:



After completion of the internship, students will be able to:

1. Solve real-world engineering problems by synthesizing academic knowledge with practical scenarios.
2. Demonstrate leadership and collaborative skills through active engagement in team-based projects.
3. Evaluate ethical dilemmas and interact professionally with industry stakeholders in a real work environment.
4. Distinguish and critique professional conduct by analyzing workplace behavior and norms.
5. Interpret and contextualize industry-specific terminology, emerging trends, and site-specific practices.

ASSESSMENT METHOD

Engineering internships are intended to provide students with an opportunity to apply theoretical knowledge from academics to the realities of the field work/training. The following guidelines are proposed to give academic credit for the internship undertaken as a part of the Final Year Engineering curriculum.

1. Students may undergo an internship related to engineering with Small/ Medium / Large-scale industries to make themselves ready for the industry
2. Students may complete an Internship / On-the-Job Training (OJT) of a minimum of two months duration in the industry during Final Year Sem VIII.
3. The industry shall appoint a Supervisor to assess the performance of the student and share the same with the departmental supervisor for the fulfillment of ICA marks
4. Interns are required to have bi-weekly communication with their internal guide.
5. During the internship, the student will present a seminar in online /offline mode based on training in the presence of an expert committee from the department.
6. The student shall prepare a report of the work completed at the industry, duly endorsed by the industry supervisor, and submit the same as an internship report.
7. The Oral Examination for Internship / On-Job Training (OJT) shall be conducted by the departmental supervisor in the presence of an external industry or academic expert.

