

Walchand College of Engineering, Sangli
(Government Aided Autonomous Institute)

AY 2023-24

Course Information

Programme	M.Tech. (Structural Engineering)
Class, Semester	Second year M. Tech., Semester III
Course Code	6ST645
Course Name	Dissertation Phase I
Desired Requisites:	Courses of Semester I and II of F. Y. M. Tech (Civil-Structures)

Teaching Scheme		Examination Scheme (Marks)			
Practical	6 Hrs/week	LA1	LA2	ESE	Total
		100			100
Credits: 3					

Course Objectives

1	To impart knowledge for establishing objectives by carrying out extensive literature review on selected dissertation topics.
2	To develop methodology to execute the proposed research work through analytical/experimental work.
3	To analyse, interpret, debate, and classify the findings of the work.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	Execute detailed literature survey to understand research developments and set up research hypotheses.	Applying
CO2	Construct research methodology to evaluate the research hypothesis	Analysing
CO3	Assess research idea with perspective scope.	Evaluating

Contents

The dissertation work will start in semester III, and should involve scientific research, design, collection, and analysis of data, determining solutions and must bring out the individual's contribution. Dissertation Phase I will have presentation and report submission (synopsis). The presentation will include identification of the research problem based on the extensive literature review on the topic referring to latest literature available, defining objectives of the work, and the methodology to be adopted.

References

1	National and International journals, Conference Proceedings in Structural Engineering.
2	Technical Reports of Professional societies.
3	International and national codes of Practices and Handbooks.
4	Internet sources and Distance Learning.
5	Published Ph.D. and M. Tech Thesis of Reputed Institutes.

CO-PO Mapping

	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1			2	2		3
CO2			2	2		3
CO3	1		2			2

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.

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Walchand College of Engineering, Sangli
(Government Aided Autonomous Institute)

AY 2023-24

Course Information

Programme	M.Tech. (Structural Engineering)
Class, Semester	Second year M. Tech., Semester III
Course Code	6ST646
Course Name	Dissertation Phase II
Desired Requisites:	Dissertation Phase I

Teaching Scheme		Examination Scheme (Marks)			
Practical	6 Hrs/week	LA1	LA2	ESE	Total
			100		100
Credits: 3					

Course Objectives

1	To analyze/experiment selected research topic further.
2	To review, classify and consolidate observations/results based on the detailed analytical/experimental work.
3	To document the research work in the prescribed format and present it effectively.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	Execute detailed literature survey to understand research developments.	Applying
CO2	Apprise analytical/experimental work in detail for the selected research problem.	Analysing
CO3	Classify and assess research outcomes critically.	Evaluating

Contents

Dissertation Phase 2 will have mid semester evaluation based on presentation. Mid semester presentation will include the validation work and completion of one to two objectives of the study. The literature review should continue to study the latest research material available in the chosen field.

References

1	National and International journals, Conference Proceedings in Structural Engineering.
2	Technical Reports of Professional societies.
3	International and national codes of Practices and Handbooks.
4	Internet sources and Distance Learning.
5	Published Ph.D. and M. Tech Thesis of Reputed Institutes.

CO-PO Mapping

	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1			2	2		3
CO2			2	2		3
CO3	1		2			2

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

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Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2023-24

Course Information

Programme	M.Tech. (Structural Engineering)
Class, Semester	Second year M. Tech., Semester III
Course Code	6ST647
Course Name	Dissertation Phase III
Desired Requisites:	Dissertation Phase II

Teaching Scheme		Examination Scheme (Marks)			
Practical	8 Hrs/week	LA1	LA2	ESE	Total
				100	100

Credits: 4

Course Objectives

- 1 To analyze/experiment selected research topic further.
- 2 To review, classify and consolidate observations/results based on the detailed analytical/experimental work.
- 3 To document the research work in the prescribed format and present it effectively.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	Apprise analytical/experimental work in detail for the selected research problem.	Applying
CO2	Classify and assess research outcomes critically.	Analysing
CO3	Compose and conclude the results for presentation and dissertation report writing.	Evaluating

Contents

Dissertation Phase 3 will have end semester presentation. End semester presentation will include the validation work and completion of nearly half the work defined for the dissertation. The literature review should continue to study the latest research material available in the chosen field. The external examiner should assess the work done by the individual student based on the detailed report on identification of topic for the work, the methodology adopted, and presentation followed by viva-voce.

References

- 1 National and International journals, Conference Proceedings in Structural Engineering.
- 2 Technical Reports of Professional societies.
- 3 International and national codes of Practices and Handbooks.
- 4 Published Ph.D. and M. Tech Thesis of Reputed Institutes.

CO-PO Mapping

	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1			2	2		3
CO2			2	2		3
CO3	1		2			2

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

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Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2023-24

Course Information

Programme	M. Tech. Civil (Structural Engineering)
Class, Semester	Second Year M. Tech., Semester III
Course Code	6ST611
Course Name	Elective 4 - Computer Aided Analysis and Design
Desired Requisites:	Dynamics of Concrete Structures, Design of Steel Structures

Teaching Scheme		Examination Scheme (Marks)			
Lecture	3 Hrs/week	MSE	ISE	ESE	Total
Tutorial	-	30	20	50	100

Credits: 3

Course Objectives

1	To provide knowledge of numerical approach and significance of analysis by computers.
2	To impart necessary knowledge of numerical tools required for analyzing and solving problems in the field of engineering.
3	To provide pre-requisite knowledge to the students for analyzing and designing structures by professional software.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	Execute various programs using software for modeling of structures.	Applying
CO2	Analyze various reinforced concrete and steel structures.	Analyzing
CO3	Create various programs for design of structures.	Creating

Module	Module Contents	Hours
I	Algorithm Development and Programming Languages Basics of computer hardware and os, WWW and Apps, Algorithm essentials: problem analysis and flowcharting, fundamentals of sequential programming: Variables, data types & functions + input-output + data handling + various development units, Introduction to programming in MS EXCEL®, MATLAB®, PYTHON.	5
II	Matrix Methods and Programming Matrix operations: product-inverse etc., Simultaneous linear equations, Eigen analysis method, Algorithm /Programming techniques of above methods.	5
III	Numerical Methods and Programming Numerical Integration methods, Numerical differentiation methods, Regression Analysis tools and curve fitting, Numerical Methods in structural dynamics. Algorithm/Programming techniques of above methods.	5
IV	Computer Aided Structural Analysis Analysis of Trusses by Stiffness method. Analysis of CB by Stiffness method, Analysis of PF by Stiffness method. 3D Analysis issues. Algorithm development for each structural analysis type.	5
V	Computer Aided Structural Design Design of Steel Truss members by IS-800, Design of Beam sections in RCC, Design of One way and Two-way slabs by IS-456. Algorithm development for each structural design type.	4
VI	Commercial Software Applications Application in commercial software SAP®/ABACUS®/ANSYS®: Analysis of TRUSS, Analysis of 2D frame, Analysis of 3D structure for various LOAD COMBINATIONS. Design of building members- Beam, Slab, Column, Footing by STAAD®. Introduction to other commercial soft-wares.	4

Textbooks

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1	PratapRudra, "Getting started with MATLABM", Oxford University press, 2010.
2	Jain M. K., Iyengar S. R. K. & Jain R. K. " Numerical Methods for Scientific and Engineering Computation ", 4th ed. 2004.
3	Pundit & Gupta "Structural Analysis", Tata MC Graw Hill Book company.

References

1	Steve Otto and James P. Denier "An Introduction to Programming and Numerical Methods" in, Springer International books, 1st Edition, 2007
2	Cotes, R.C., Couties, M.G., and Kong, F.K., Structural Analysis, ELBS.
3	Chopra A. K., "Structural Dynamics for Earthquake Engineering", Pearson Publications.

Useful Links

1	https://nptel.ac.in/courses/105/105/105105180/
2	http://www.nptelvideos.in/2012/11/numerical-methods-in-civil-engineering.html
3	https://in.mathworks.com/matlab/trial
4	http://www.gnumeric.org/freewarespreadsheetshttps://d.wps.com/?from=premiumpage#/

CO-PO Mapping

Programme Outcomes (PO)

	1	2	3	4	5	6
CO1	2					
CO2		3			2	
CO3			3		1	

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Pratap Rudra

11/9/23

Walchand College of Engineering, Sangli
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AY 2023-24

Course Information

Programme	M. Tech. Civil (Structural Engineering)
Class, Semester	Second Year M. Tech., Semester III
Course Code	6ST612
Course Name	Elective 4: Advances in Concrete Composites
Desired Requisites:	Concrete technology

Teaching Scheme		Examination Scheme (Marks)			
Lecture	3 Hrs/week	MSE	ISE	ESE	Total
Tutorial	-	30	20	50	100
Credits: 3					

Course Objectives

1	To impart knowledge of various concrete composites used in practice
2	To demonstrate variations in strength of concrete composites
3	To provide knowledge of various advanced types of concrete in modern construction industry.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	Demonstrate engineering properties, behavior and applications of FRC and Ferro cement.	Applying
CO2	Differentiate applications of silica fume concrete and polymer concrete by knowing their properties.	Analyzing
CO3	Propose importance of light weight and high strength concrete in modern constructions.	Creating

Module	Module Contents	Hours
I	Fiber Reinforced Concrete Introduction, Properties of constituent materials, Mix proportion, mixing, casting methods, properties of freshly mixed concrete (fiber reinforced concrete), workability tests, mechanical properties, behavior of fiber reinforced concrete under compression, tension flexure, research findings, and application of fiber reinforced concrete.	7
II	Ferro Cement concrete Introduction, materials used, mechanical properties, construction techniques, design in direct tension, applications, and merits as structural materials	7
III	Silica Fume Concrete Introduction, physical and chemical properties of silica Hume, reaction mechanism of silica fume, properties of silica fume concrete in fresh state, mechanical properties and durability of silica fume concrete.	7
IV	Polymer Concrete Introduction, classification, properties of constituent materials, polymer impregnated concrete, polymer concrete, application.	6
V	Light Weight Concrete Introduction, classification, properties of constituent materials, artificial aggregates, application.	6
VI	High Strength Concrete Introduction, properties of constituent materials, Mix Design, application.	6

Textbooks

I	Rafat Siddique, "Special Structural Concretes", Galgotia Publication Private Ltd.,2000
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References

I	R. N. Swamy, "Concrete Technology & Design", Surrey University Press., illustrated, 1984.
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2	P.N. Balaguru, S.P. Shah, "Fiber Reinforced Cement Composites, McGraw Hill., illustrated, 1992.
3	D. J. Hannant, "Fiber Cement and Fiber Concrete", John Wiley & Sons.illustrated,1978
Useful Links	
1	NPTEL :: Civil Engineering - Concrete Engineering and Technology
2	NPTEL :: Civil Engineering - NOC:Advanced Concrete Technology
3	NPTEL :: Metallurgy and Material Science - NOC:Theory and Practice of Non Destructive Testing
4	Module 12 (nptel.ac.in)

CO-PO Mapping						
Programme Outcomes (PO)						
	1	2	3	4	5	6
CO1	3					
CO2	2			2		
CO3			2	2		

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment	
<p>The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3. ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6. For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)</p>	

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Walchand College of Engineering, Sangli

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AY 2023-24

Course Information

Programme	M. Tech. Civil (Structural Engineering)
Class, Semester	Second Year M. Tech., Semester III
Course Code	6ST613
Course Name	Design of Tall Structures
Desired Requisites:	Mechanics of Structures

Teaching Scheme		Examination Scheme (Marks)			
Lecture	3 Hrs/week	MSE	ISE	ESE	Total
Tutorial	----	30	20	50	100
Credits: 3					

Course Objectives

1	To impart the overall knowledge about the material used in tall structural systems and its components.
2	To provide advanced knowledge for analyzing different types of Tall structures.
3	To impart advanced knowledge for design of different types of Tall structures using prevailing IS Codes.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	Demonstrate design philosophy & loading on tall structures.	Applying
CO2	Analyse tall structures for vertical and lateral loads.	Analyzing
CO3	Justify design of tall structures.	Evaluating

Module	Module Contents	Hours
I	Introduction: Design Philosophy - History - advantages and disadvantages - Vertical city concepts - essential amenities - fire safety - water supply - drainage and garbage disposal - service systems - structural and foundation systems. Factors affecting height, growth and form - Human comfort criteria.	6
II	Loads And Materials: Gravity loading - Dead and Live load - calculation - Impact and construction loads. Wind loading - static and dynamic approach - Analytical and wind tunnel experimental method. Earthquake loading - Equivalent lateral force, Modal analysis - combination of loading in various design philosophies. Materials for tall buildings - High strength concrete - Lightweight concrete - Fibre reinforced concrete Composite Materials.	6
III	Structural Systems: Behaviour of High Rise structures - Different system for load distribution in steel and concrete - Vertical and horizontal load resistant systems - Rigid frames - braced frames - in filled frames - shear walls - wall frames - tubular systems - outrigger braced systems - Mega systems.	8
IV	Analysis And Design: Analysis and Design principles of various horizontal load transfer systems - approximate methods - Modeling for accurate analysis - 3D analysis - Member forces - displacements. Analysis for various secondary effects - Creep, shrinkage and temperature.	6
V	Stability Analysis - Overall buckling analysis of frames, wall frames, approximate methods, second order effects of gravity loading, P - effect and various methods of analysis - influence of foundation instability, out of plumb effects - Elastic Deformations. Dynamic Analysis - Principles of design of tall braced frames for earthquake and blast resistant design.	7
VI	Advanced Topics: Structural systems for future generation buildings - Expert systems for consultations - Economics - Research needs in tall building materials, systems and designs.	6

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Textbooks	
1	Schuller.W.G., "High Rise Building Structures", John Wiley & sons, 1977
2	Lynn.S. Beedle, "Advances in Tall Buildings", CBS Publishers and Distributors, New Delhi, 1986.

References	
1	Lin T.Y and StotesBurry.D, "Structural Concepts and Systems for Architects and Engineers", John Wiley and Sons, 1988
2	Dr.Gupta.Y.P, Editor, "Proceedings of National Seminar on High Rise Structures - Design and construction practices for Middle Level Cities", Nov - 14 - 16, 1955. New Age International Publishers Ltd., Chennai
3	Lecture Notes on "Tall Buildings" - Short Term Course organized by Civil Engineering Department, SRM Engg college, Kattankulathur. June 2002

Useful Links	
1	
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CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1	2		2			
CO2		3			2	2
CO3			3		2	2

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment	
<p>The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3. ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6. For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)</p>	

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11/9/23

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2023-24

Course Information

Programme	M.Tech. (Structural Engineering)
Class, Semester	Second year M. Tech., Semester IV
Course Code	6ST691
Course Name	Dissertation Phase IV
Desired Requisites:	Dissertation Phase III

Teaching Scheme		Examination Scheme (Marks)			Total
Practical	10 Hrs/week	LA1	LA2	ESE	100
		100			
Credits: 5					

Course Objectives

1	To analyze/experiment selected research topic further.
2	To review, classify and consolidate observations/results based on the detailed analytical/experimental work.
3	To document the research work in the prescribed format and present it effectively.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	Apprise analytical/experimental work in detail for the selected research problem.	Applying
CO2	Classify and assess research outcomes critically.	Analysing
CO3	Compose and conclude the results for presentation.	Evaluating

Contents

Dissertation Phase 4 will have a presentation based on the progress of work after Phase 3. The presentation should be done after completion of one more objective in continuation with the Phase 3. The literature review should continue to study the latest research material available in the chosen field.

References

1	National and International journals, Conference Proceedings in Structural Engineering.
2	Technical Reports of Professional societies.
3	International and national codes of Practices and Handbooks.
4	Published Ph.D. and M. Tech Thesis of Reputed Institutes.

CO-PO Mapping

	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1			2	2		3
CO2			2	2		3
CO3	1		2			2

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

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Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2023-24

Course Information

Programme	M.Tech. (Structural Engineering)
Class, Semester	Second year M. Tech., Semester IV
Course Code	6ST692
Course Name	Dissertation Phase V
Desired Requisites:	Dissertation Phase IV

Teaching Scheme		Examination Scheme (Marks)			
Practical	10 Hrs/week	LA1	LA2	ESE	Total
			100		100
Credits: 5					

Course Objectives

- 1 To analyze/experiment selected research topic further.
- 2 To review, classify and consolidate observations/results based on the detailed analytical/experimental work.
- 3 To document the research work in the prescribed format and present it effectively.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO	Course Outcome Statement/s	
CO1	Apprise analytical/experimental work in detail for the selected research problem.	Applying
CO2	Classify and assess research outcomes critically.	Analysing
CO3	Compose and conclude the results for presentation.	Evaluating

Contents

Dissertation Phase 5 will have a presentation based on the progress of work after Phase 4. The presentation should be done after completion of one more objective in continuation with the Phase 4. The research paper based on the completed work through 5 phases should be drafted and submitted to respective guide or communicated to reputed journal or conference.

References

- 1 National and International journals, Conference Proceedings in Structural Engineering.
- 2 Technical Reports of Professional societies.
- 3 International and national codes of Practices and Handbooks.
- 4 Internet sources and Distance Learning.
- 5 Published Ph.D. and M. Tech Thesis of Reputed Institutes.

CO-PO Mapping

	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1			2	2		3
CO2			2	2		3
CO3	1		2			2

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

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Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2023-24

Course Information

Programme	M.Tech. (Structural Engineering)
Class, Semester	Second year M. Tech., Semester IV
Course Code	6ST693
Course Name	Dissertation Phase VI
Desired Requisites:	Dissertation Phase V

Teaching Scheme		Examination Scheme (Marks)			
Practical	12 Hrs/week	LA1	LA2	ESE	Total
				100	100
Credits: 6					

Course Objectives

1	To analyze/experiment selected research topic further.
2	To review, classify and consolidate observations/results based on the detailed analytical/experimental work.
3	To document the research work in the prescribed format and present it effectively.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO	Course Outcome Statement/s	
CO1	Apprise analytical/experimental work in detail for the selected research problem.	Applying
CO2	Classify and assess research outcomes critically.	Analysing
CO3	Compose and conclude the results for presentation and dissertation report writing.	Evaluating

Contents

Dissertation Phase 6 will have end semester presentation. End semester presentation will include the presentation based on the entire dissertation work. The external examiner should evaluate the students based on the completion of work, findings of the study, report submission, contributions to the body of knowledge etc.

References

1	National and International journals, Conference Proceedings in Structural Engineering.
2	Technical Reports of Professional societies.
3	International and national codes of Practices and Handbooks.
4	Internet sources and Distance Learning.
5	Published Ph.D. and M. Tech Thesis of Reputed Institutes.

CO-PO Mapping

	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1			2	2		3
CO2			2	2		3
CO3	1		2			2

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

B. B. B.
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M. M. M.
11/9/23

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. Civil (Structural Engineering)
Class, Semester	Second year M. Tech., Sem. IV
Course Code	6ST671
Course Name	Internship
Desired Requisites:	Courses of Semester I and II of F. Y. M. Tech (Civil-Structures)

Teaching Scheme		Examination Scheme (Marks)			
Interaction	1 Hr/week	ISE	MSE	ESE	Total
		100			100

Credits: 1

Course Objectives

- 1 To provide acquaintance of real-life structural engineering problems in industry/society.
- 2 To provide an opportunity to work in collaborative and professional environment.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	Demonstrate knowledge to solve societal problems and apply it for efficient management of projects independently and in teams.	Applying
CO2	Inspect structural engineering activities effectively with industry/society and comprehend and write effective reports.	Analysing
CO3	Integrate ethical behavior with professional code of conduct and contribute to sustainable societal development.	Analysing

Contents

The objective of internship is to expose the students to industry environment and practices. Students will be sent to leading Structural Engineering organizations or research laboratories or design consultancy organizations to undergo a rigorous training for a minimum period of one month during summer or winter vacation. The evaluation should be carried out through a presentation and a detailed report about the internship.

References

- 1
- 2

CO-PO Mapping

	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1				2		
CO2		2				
CO3					2	

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

B. B. B.
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M. B. B.
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