

**COURSE SCHEME
EXAMINATION SCHEME
ABSORPTION SCHEME**

&

Syllabus to be implemented from June, 2018 - 19

First, Second, Third & Fourth Semester

Choice Base Credit System (CBCS)

Of

Master of Technology (M.Tech)

In

CIVIL ENGINEERING

(CONSTRUCTION AND MANAGEMENT)

CIVIL ENGINEERING – CBCS PATTERN

SEMESTER – I																						
Sr. No	Course (Subject Title)	TEACHING SCHEME						EXAMINATION SCHEME														
		THEORY			TUTORIAL			PRACTICAL			THEORY			PRACTICAL			TERM WORK					
		Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Hours	Mode	Marks	Total Marks	Min	Hours	Max	Min	Hours	Max	Min	
1	CPM-CM101	3	3	3				1	2	2		CIE	30	100	40	As per BOS Guidelines	-	-	2	25	10	
											ESE	70										
2	CE-CM102	3	3	3				1	2	2		CIE	30	100	40			-	-	2	25	10
											ESE	70										
3	PEF-CM103	3	3	3				1	2	2		CIE	30	100	40			-	-	2	25	10
											ESE	70										
4	CMOT-CM104	3	3	3				1	2	2		CIE	30	100	40		-	-	2	25	10	
											ESE	70										
5	PCE-CM	3	3	3				-	-	-		CIE	30	100	40		-	-				
											ESE	70										
6	SEM-CM106	-	-	-	-	-	-	1	2	2		-	-	-	-		-	-	2	50	20	
	TOTAL	15	15	15				5	10	10				500			-			150		
SEMESTER – II																						
1	CCLA-CM201	3	3	3				1	2	2		CIE	30	100	40	As per BOS Guidelines	-	-	2	25	10	
											ESE	70										
2	SARM-CM202	3	3	3				1	2	2		CIE	30	100	40			-	-	2	25	10
											ESE	70										
3	CMT-CM203	3	3	3				1	2	2		CIE	30	100	40			-	-	2	25	10
											ESE	70										
4	PCE-CM	3	3	3				1	2	2		CIE	30	100	40		-	-	2	25	10	
											ESE	70										
5	SL-CM205							1	2	2							-	-	2	25	10	
6	MP-CM206	-	-	-				2	4	4		-	-	-	-				2	50	20	
7	SEM II-CM 207							1	2	2									2	50	20	
	TOTAL	12	12	12				8	16	16				400						250		
	TOTAL	27	27	27				13	26	26				900						400		

• Candidate contact hours per week : 24 Hours (Minimum)	• Total Marks for M.Tech. Sem I & II : 1300
• Theory and Practical Lectures : 60 Minutes Each	• Total Credits for M.Tech. Sem I & II : 40
• In theory examination there will be a passing based on separate head of passing for examination of CIE and ESE.	
• There shall be separate passing for theory and practical (term work) courses.	

CIVIL ENGINEERING – CBCS PATTERN

SEMESTER – III																						
Sr. No	Course (Subject Title)	TEACHING SCHEME									EXAMINATION SCHEME											
		THEORY			TUTORIAL			PRACTICAL			THEORY					PRACTICAL			TERM WORK			
		Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Hours	Mode	Marks	Total Marks	Min	Hours	Max	Min	Hours	Max	Min	
1	IT-CM301	2	-	-	-	-	-	-	2	4	4	-	-	-	-	-	-	4	50	20		
2	CC-CM302	2	-	-	-	-	-	-	2	4	4	-	-	-	-	-	-	4	50	20		
3	DP I- CM303	8	-	-	-	-	-	-	8	16	16	-	-	-	-	-	-	16	100	40		
	TOTAL	-	-	-	-	-	-	-	12	24	24	-	-	-	-	-	-	200				
SEMESTER –IV																						
1	DP II-CM 401	-	-	-	-	-	-	-	16	32	32	-	-	-	-	-	-	100	40	2	100	40
	TOTAL	-	-	-	-	-	-	-	16	32	32	-	-	-	-	-	-	100			100	
	TOTAL	-	-	-	-	-	-	-	28	56	56	-	-	-	-	-	-	100			300	

CIE- Continuous Internal Evaluation
ESE – End Semester Examination

- | | |
|---|--|
| • Candidate contact hours per week : 24 Hours (Minimum) | • Total Marks for M.Tech. Sem III & IV : 400 |
| • Theory and Practical Lectures : 60 Minutes Each | • Total Credits for M.Tech. Sem III & IV : 28 |
| • In theory examination there will be a passing based on separate head of passing for examination of CIE and ESE. | |
| • There shall be separate passing for theory and practical (term work) courses. | |

COURSE CODE AND DEFINITION

Semester I

Sl. No	Code No.	Subject	Semester	Credits
1.	CPM- CM101	Construction Project Management	1	4
2.	CE- CM102	Construction Equipment	1	4
3.	PEF- CM103	Project Economics and Financing	1	4
4.	CMOT-CM104	Computational Methods and Optimization techniques	1	4
5.	PCE-CM	Professional Core Electives	1	3
6.	SEM- CM106	Seminar I	1	1
			Total	20

Semester II

Sl. No	Code No.	Subject	Semester	Credits
1.	CCLA- CM201	Construction Contracts and Legal Aspects	2	4
2.	SARM- CM202	Statistical Analysis and Research Methodology	2	4
3.	CMT- CM203	Construction Methods and Techniques	2	4
4.	PCE-CM	Professional Core Electives	2	4
5.	SL- CM205	Software Lab	2	1
6.	MP- CM206	Mini Project	2	2
7.	SEM II- CM 207	Seminar II	2	1
			Total	20

Semester III

Sr. No	Code No.	Subject	Semester	Credits
1.	IT- CM301	Industrial Training	3	2
2.	CC- CM302	Certified Course/ STTP	3	2
3.	DP I- CM303	Dissertation Phase I	3	8
			Total	12

Semester IV

Sr. No	Code No.	Subject	Semester	Credits
1.	DPII-CM401	Dissertation Phase II	4	16
			Total	16

**List of
Professional Core Electives (PCE)**

Semester –I	
PCE-CM101	Entrepreneurship in Construction
PCE-CM102	Human Resource Development in Construction
PCE-CM103	Repair and Rehabilitation of Structures
PCE-CM104	Ground Improvement Techniques
Semester –II	
PCE-CM201	Advanced Construction
PCE-CM202	Environmental Impact Assessment
PCE-CM203	Advance Construction Materials & Building Services

Shivaji University, Kolhapur
First Year M. Tech. Civil Engineering (Construction and Management)
CM 101: Construction Project Management

Teaching scheme		Examination scheme
Lectures	: 3 Hours per week	CIE: 30 Marks ESE : 70 Marks
Practical	: 2 Hours per week	
Credits	: 04	Term work : 25 Marks

Course Objectives

1. To study the different Site organizational structures and services required
2. To study the material and personnel management
3. To study the total construction quality management
4. To study the different aspects of safety in construction and health codes

Course Contents

Hours

Unit I Site Organization: Organizational structures for construction Field, Site layout, Services required on site.	6
Unit II Material Management: Functions, Inventory control, EOQ, ABC analysis, Estimating requirements, Procurement and Storage of materials.	8
Unit III Personnel Management: Functions, Special characteristics, Manpower planning, Recruitment, Placement, Training and induction, Performance appraisal, Relevant labour laws.	6
Unit IV Construction Quality Management: SQC charts, Sampling techniques, Quality circles, ISO 9000, Management aspects.	6
Unit V Safety in Construction: Safety Requirements, Safety and health codes, Occupational diseases, Economic aspects, Management of accidents, Safety department.	6
Unit VI Work Study: Method study and Work measurement, Definitions, Objectives, Basic procedure, Standard time, Performance rating. Computers in Construction Management, Application in office, Field Computerized construction management.	8

Course Outcome (CO):

1. The students will be well versed with different Site Organizational structures and services required at site
2. The students will be able to manage material and personnel issues
3. The students will be acquainted with total construction quality management
4. Students will be aware of different aspects of Safety in Construction and health codes

Text Books

1. Critical path methods in construction, ANTILL AND WOODHEADS.
2. CPM in construction management, J. J. O. BRIEN.
3. Principles of management and personal management, A. S. DESHPANDE
4. Accounting for management, S. K. BHATTARCHARYA
5. Work study, R. M. CURRIE
6. Principles of management, KOONTZ AND O DONNEL.
7. Personal management and industries relations, DALE.

Shivaji University, Kolhapur
First Year M. Tech. Civil Engineering (Construction and Management)
CM 102: Construction Equipment

Teaching scheme		Examination scheme
Lectures	: 3 Hours per week	CIE: 30 Marks ESE : 70 Marks
Practical	: 2 Hours per week	
Credits	: 04	Term work : 25 Marks

Course Objectives

- 1 To expose the students to various excavating, hauling, compacting and conveying equipment
- 2 To teach piles and pile driving equipment
- 3 To make the students familiar with tunnelling
- 4 To make the students familiar with concreting equipment

Course Contents

Hours

Unit I	Excavating Equipments - Excavator, Shovels- Different types – back hoe Draglines- Clamshell- Cycles of operations, excavators and their use in different soil conditions. Output criteria, Rippers, Trenchers, Graders. Hauling Equipments: Tractor Dumpers, Trailers, Bulldozer, Scrapers, Operation of cycles, matching of Excavating and hauling equipments.	10
Unit II	Compacting Equipments – Properties of soil Soil Stabilization, Soil Compaction, Different types of compacting Equipments Rollers, Sheep foot rollers, pneumatic rollers, vibratory rollers, vibrating plates/ shoes. Vibratory compaction	6
Unit III	Conveying and Hosting Equipments - Different types of conveyors, power requirement damages during operations, Economy of transportations, Cableways and Ropeways, Different types of Hosting Equipments, such as winch, derricks and cranes. Rating of cranes and power requirement of cranes.	8
Unit IV	Piles and Pile Driving Equipments - Pile Classifications, Types of Piles, Pile driving and extracting equipments, Pile driving rigs, Pile driving hammers, Rating of pile hammers, Hammer accessories, Pile extractors.	
Unit V	Tunnelling - Method of Tunnelling, Equipments of Convention of tunnelling, Jumbo, explosives, Temporary & permanent support and lining, Mucking Equipments, Using of moles, Use of laser beams to guide moles, Ventilations of Tunnels. advantages and disadvantages in using moles. Use of TBM's.	8

Unit VI Concreting Equipment - i) Various types of mixers ii) Various types of vibrators, their selection under different conditions. Selection of construction equipments : Advantages and disadvantages of using machines, Planning of Construction Equipments, Cost Analysis, Economic Life and Replacement, Preventative maintenance, System approach to planning and application. Problems of Equipment Management.

8

Course Outcome (CO):

1. The students will be able to understand the various excavating, hauling, compacting and conveying equipment
2. The students will be able to know about piles and piling equipment
3. The students will be able to study tunneling technology
4. The students will be able to understand concreting equipment

Text Books

1. Peurify – Construction Planning, Equipment and Methods Second edition McGraw Hill Book Co., New York.
2. Ackerman and Locher – Construction Planning and Plant McGraw- Hill Book Co., New York.
3. Verma M.- Construction Planning and Management Techniques Metropolitan Book, Co. P. Ltd., New Delhi.
4. Jagann Singh – On and with the Earth (W. Newman & Co., Calcutta)
5. Kellogg – Construction Methods & Machinery (Prentice-Hall Inc., New York)
6. Handbook of Earth-moving Machinery (Ministry of Irrigation and Power, Central Water and Power commission, New-Delhi)

Shivaji University, Kolhapur
First Year M. Tech. Civil Engineering (Construction and Management)
CM 103: Project Economics and Financing

Teaching scheme		Examination scheme
Lectures	: 3 Hours per week	CIE: 30 Marks ESE : 70 Marks
Practical	: 2 Hours per week	
Credits	: 04	Term work : 25 Marks

Course Objectives

1. To study fundamentals of engineering economics
2. To understand the concepts of economic appraisal of projects and get expertise in using appraisal techniques.
3. To understand the importance of risk and study fundamentals of risk management
4. To make students aware about various options available for financing projects.

Course Content

Hours

- Unit I Economics of Engineering Projects** - Nominal and effective rate of interest, Discrete and continuous compounding, Inflation and real rate of interest, Capitalized cost. Economic factors, Equivalence and use of multiple factors. **8**
- Unit II Financial Appraisal Criteria** - Discounting and Non-discounting criteria (Payback period, NPV, AW, ROR, IRR, Benefit- cost ration, Break even analysis). MARR & it's estimation. **6**
- Unit III Risks in Construction Projects** - Types of risk, Measures of project risk, Risk estimation, Risk analysis and Risk management. Sensitivity analysis, Simulation, Decision tree analysis, Selection of projects, Fuzzy Systems applications. **8**
- Unit IV Financing Projects** - Sources of finance, equity, debit, securities, borrowings, debentures, Working capital requirement, Financial institutes, direct and indirect financial assistance. **6**
- Unit V Accounting** - Site Accounts, Preparation, Reporting, Accounting records, Depreciations, Classification of construction costs, Standard budgeting and control. **6**
- Unit VI Public Private Participation in Projects**- PPP Models, BOOT, BOT, Joint Ventures, Annuity, DBFO, External Commercial Borrowings, International Finance. **6**

Course Outcome (CO):

1. The students will be able to understand concepts of project economics
2. Able to use appraisal methods for financial feasibility studies of projects
3. The students will be able to understand the role of risk management in projects
4. Able to understand accounting concepts and financial sources
5. The students will be able to become familiar about various PPP models

Text Books

1. Engineering Economy By E. Paul Degarmo, William G. Sullivan
2. Project preparation Appraisal Implementation by Prasanna Chandra.
3. Principles of Construction Management by Roy Pilcher.
4. Construction Project Management By Chitkara
5. Engineering economics by Riggs
6. Corporate finance by Kuchal S. C.
7. Principles of Corporate Finance by Brealey R. A.
8. Principles of Engineering Economy by Grant Ireson/ Leavenworth.

Useful Links

- i) nptel.ac.in
- ii) freevideolectures.com
- iii) www.youtube.com

Shivaji University, Kolhapur

First Year M. Tech. Civil Engineering (Construction and Management) CM 104: Computational Methods and Optimization Techniques

Teaching scheme		Examination scheme
Lectures	: 3 Hours per week	CIE: 30 Marks ESE : 70 Marks
Practical	: 2 Hours per week	
Credits	: 04	Term work : 25 Marks

Course Objectives

1. To study the different computational methods
2. To study optimization techniques
3. To study applications of computational methods
4. To study different applications of optimization techniques

Course Contents

Hours

Unit I Error and its propagation - solving Non-Linear equations, curve fitting, Linear and Non-Linear regression, latest squares regression, Gauss-Newton method, Interpolation, Statistical concepts, Linear correlation.	8
Unit II Linear & Non linear Equations - Solution of simultaneous linear and non-linear equation, direct and iterative methods.	6
Unit III Numerical Differentiation and Numerical Integration - Numerical solutions of ordinary differential equations, systems of ODEs, Runge-kutta method.	7
Unit IV Optimization – Types of optimization models, objective function and constraints set, Convex and Concave functions, Objectives of optimization models.	6
Unit V Linear Programming - Simplex Method, Duality, Sensitivity Analysis, Transportation and assignment models. Non Linear Programming- Single variable and multiple variable, Optimization, Quadratic Programming.	7
Unit VI Dynamic Programming – Principle of optimality. Integer Programming – Cutting Plane Algorithm. Simulation – Monto Carlo Method.	6

Course Outcome (CO):

1. The students will be able to understand the concept of computational methods.
2. The students will be able to use optimization techniques.
3. To become familiar with different applications of optimization techniques.

Text Books:

1. Operation Research by Taha.
2. Numerical Methods for engineers, Chapra and Kanale
3. Quantitative Techniques - J. K. Sharma
4. Optimisation – S. S. Rao.
5. Numerical Methods – E Balaguruswamy.

Shivaji University, Kolhapur
First Year M. Tech. Civil Engineering (Construction and Management)
PCE - CM101: Entrepreneurship in Construction

Teaching scheme		Examination scheme
Lectures	: 3 Hours per week	CIE: 30 Marks ESE : 70 Marks
Practical	-	
Credits	: 03	

Course Objectives

1. To understand the importance of entrepreneurship
2. To study Cost and time scheduling
3. To study Feasibility of projects
4. To Analyze financial practices
5. To Develop Civil engineering entrepreneurship Course Contents.

Course Contents	Hours
Unit I General: Meaning and importance of entrepreneurship. Deflection and objectives of industrial estates, awareness and requirements of an entrepreneur, organization dealing with entrepreneurship Govt. and private. Socio-economic bases: Occupation Impact on line of manufacture, the impact of education.	8
Unit II Project: Selection by identification, size appropriate technology, Cost and time scheduling. Project Report: Backing market survey, demand and supply relation, equipment cost space and merit analysis recommendations.	6
Unit III Project Appraisal: Technical feasibility, commercial soundness, financial capability, economic viability, managerial aspects.	6
Unit IV Financial Analysis: Resources, loans, terms and conditions, working capital, repayment, security, financial institutes.	7
Unit V Problems Faced by Enterprise: Marketing, finance and taxes, raw and finished materials etc.	7
Unit VI Civil Engineering Entrepreneurship: Small scale, large scale, optimum size, typical areas and preparation of specialized aspects.	6

Course Outcome (CO):

1. Student will be able to understand importance of entrepreneurship in construction industry.
2. Student will be able to understand concept of project appraisal, financial analysis, problems in construction industry.
3. Student will be aware of different aspects of civil engineering entrepreneurship for small and large scale areas.

Text Books

1. Entrepreneurship & growth of enterprise in industrial estates, Dr. N. Gangadhar Rao (Deep & deep Publ.)
2. A complete guide to successful entrepreneurship, G.N. Pandey (Vikas Publ. House)
3. Project Appraisal Prasanna Chandra.
4. Entrepreneurship, Government of India Publication.

Shivaji University, Kolhapur

First Year M. Tech. Civil Engineering (Construction and Management)

PCE - CM 102: Human Resource Development in Construction

Teaching scheme		Examination scheme
Lectures	: 3 Hours per week	CIE: 30 Marks ESE : 70 Marks
Practical	-	
Credits	: 03	

Course Objectives

1. To study Human Resources Development in construction industry
2. To study Job description and future needs
3. To study Recruitment procedures
4. To study Training & Development
5. To study Welfare of employees
6. To study Management relations

Course Contents

Hours

- Unit I Introduction:** Definition, history of human resource management, Objectives sections, HRD in construction industry, status of construction labour. **7**
- Unit II Human Resource Planning:** Formulating human resource plans, various methods, job analysis, job specifications, and job design in construction projects, forecasting personal needs and supply in construction sector. **7**
- Unit III Recruitment and Selection:** Selecting the project manager and project team, external and internal recruitment, data gathering methods, skill requirements of construction personnel. **6**
- Unit IV Training and Development:** The training process, individual and organizational development, performance appraisal, use of performance appraisal information, establishing the evaluation system. **7**
- Unit V Employee Benefits:** Employee health and safety, wage and salary, administration, incentive system, wages of construction industry, retirement and pensions. **7**
- Unit VI Employee Management Relations:** Collective bargaining, trade unions, connected with construction industry, trade unions act, Labour Welfare Act, Payment of Wages Act, Worker's compensation Act, Contract Labour Act, management on conflict. **6**

Course Outcome (CO):

1. The students will be able to know the history of HRD and necessity of HRD in Construction Industry.
2. The students will be able to plan human resource in construction activity.
3. The students will be able to study about recruitment and selection
4. Students will be aware of different training processes
5. Students will be aware of employee benefits and their health.
6. Students will be able to study employee management relations

Text Books

1. Personnel human resources management, Terry L. Deep, Mical D Crino, MacMillan Pub. Company.
2. Personnel management, Edwin B. Flippo, McGraw Hill Book Company
3. Human Behavior at work Keith Davis, Tata McGraw Hill Pub. Company
4. Construction planning and management P.S. Gahlot, B.M. Dhir, Wiley Eastern Ltd.
5. Personnel management managing human resources Paul S., Greenlaw, John P. Kohl harper and Row Pub.

Shivaji University, Kolhapur
First Year M. Tech. Civil – (Construction and Management)
PCE - CM103: Repair and Rehabilitation of Structures

Teaching scheme		Examination scheme
Lectures	: 3 Hours per week	CIE: 30 Marks ESE : 70 Marks
Practical	-	
Credits	: 03	

Course Objectives

1. To study Serviceability and Durability Quality assurance
2. To understand Maintenance and Repair Strategies
3. To study Materials for Repair Special concretes
4. To study and understand techniques of repairs
5. To study the concept of Repairs to structures

Course Contents

Hours

Unit I Influence on Serviceability And Durability: Quality assurance for concrete construction as built environment concrete properties viz strength, permeability, thermal properties and cracking. Effects due to climate, temperature, chemicals, wear and erosion on, Design and construction errors, corrosion mechanism, Effects of cover thickness and cracking, methods of corrosion Protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection	8
Unit II Maintenance And Repair Strategies: Definition Maintenance, repair and rehabilitation, Factors of Maintenance importance of Maintenance Preventive measures on various aspects Inspection, Assessment procedure for evaluating a damaged structure causes of deterioration testing techniques.	6
Unit III Materials For Repair: Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain , Expansive cement, polymer concrete, sulphur in Filtrated concrete, ferro cement, Fibre reinforced concrete.	6
Unit IV Techniques For Repair: Rust eliminators and polymers coating for rebars during repair foamed concrete, mortar and dry pack, vacuum concrete,	7
Unit V Grout, Gunite and Shotcrete: Epoxy injection, Mortar repair for cracks, shoring and underpinning. Maintenance and rehabilitation of bridges, dams and offshore structures.	7
Unit VI. Examples of Repair To Structures: Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering wear, fire, leakage, marine exposure. Engineered demolition techniques for dilapidated structures case studies.	6

Course Outcome (CO):

1. Student will able to Understand the various techniques of Serviceability And Durability.
2. Student will able to Know about Maintenance and Repair Strategies.
3. Student will able to Study techniques of Repairs.
4. Student will able to understand the repairing techniques of structures.

Text Books

1. Concrete Structures Denison Campbell, Allen and Harold Roper Materials, Maintenance and repair, Longman Scientific and Technical UK, 1991.
2. Training Course notes on Damage Assessment and repair in Low Cost Ho using Santhakumar, A.R.
3. Repair of Concrete Structures R.T.Allen and S.CEdwards Blakie and Sons, UK, 1987.

Shivaji University, Kolhapur

First Year M. Tech. Civil Engineering (Construction and Management) PCE – CM104: GROUND IMPROVEMENT TECHNIQUES

Teaching scheme		Examination scheme
Lectures	: 3 Hours per week	CIE: 30 Marks ESE : 70 Marks
Practical	-	
Credits	: 03	

Course objectives

1. To convey the importance of ground improvement to the students.
2. To make the students familiar with different ground improvement techniques.
3. To make the students understand the theoretical background for different ground improvement techniques such as stone column, soil nailing.
4. To elaborate the design methods for some ground improvement techniques.
5. To make the students aware of the applications of ground improvement techniques.

	Course Contents	Hours
Unit I	Definition of ground improvement: objectives, classification of ground improvement techniques, suitability of different techniques, preloading: need, preloading without vertical drain, preloading with vertical drain, dynamic consolidation	7
Unit II	Stone column: Design of stone column: unit cell concept, area replacement ratio, spacing and diameter, depth, stress ratio, Load bearing capacity of individual stone column, settlement of stone column, Failure mechanism	6
Unit III	Ground anchors: components, load transfer mechanism, rock anchors, anchors in granular soil, anchors in cohesive soil, Rock bolt, types, action of rock bolt, Soil nailing, analysis of nailed soil.	7
Unit IV	Soil stabilization: cement, lime, fly ash, factors affecting. Grouting: classification, types of grouts, Equipments, grouting design and layout, applications, case histories.	6
Unit V	Earth reinforcement: mechanism and concept, stress strain relationship of reinforced soil, design theories, stability analysis of retaining wall: tie back analysis, coherent gravity analysis, application areas of earth reinforcement.	7
Unit VI	Geosynthetics: – Types, functions, Application of geosynthetics: reinforcement, separator, filter, drainage, Selection of geosynthetics; damage and durability of geosynthetics.	7

Course Outcome (CO):

1. Students will be able to understand importance of ground improvement to the students
2. Students will be able to understand different ground improvement techniques
3. Students will be able to understand the theoretical background for different ground Improvement techniques such as stone column, soil nailing
4. Students will be able to elaborate the design methods for some ground improvement Techniques.
5. Students will be able to understand the applications of ground improvement techniques

Text Books:

1. Ground improvement techniques by Dr. P Purushothma Raj
2. Ground improvement by Klaus Kirsch
3. An introduction to ground improvement engineering by Satyendra Mittal
4. Ground improvement techniques by NiharRanjanPatra
5. Reinforced soil and its engineering applications by Swami Saran
6. Earth reinforcement and soil structures by Colin JFP Jones
7. An introduction to soil reinforcement and geosynthetics by G. L. SivakumarBabu
Geotechnical engineering by Shashi K Gulhati and ManojDatta

Shivaji University, Kolhapur
First Year M. Tech. Civil Engineering (Construction and Management)
CM 106: Seminar- I

Teaching scheme		Examination scheme
Lectures	-	
Practical	2 Hours per week	
Credits	: 01	Term work : -50 Marks

Course objectives

1. Post graduate students should know the state of the art in the relevant subjects of construction & management.
2. Post graduate students should know the experimental procedure to validate theories related to construction & management.
3. Post graduate students should learn how to prepare and present research project.

Course Contents

1. Seminar-I to be delivered by the students on general topic related to civil (construction & management) to be evaluated by three members committee headed by HOD wherein guide should be one of the members.

List of Submission

1. Seminar report duly signed by respective guide and head of department

Course Outcome (CO):

1. Post graduate will know the state of the art in the relevant subjects of construction & management.
2. Post graduate will know the experimental procedure to validate theories related to construction & management.
3. Post graduate will be able to prepare and present research topic.

Shivaji University, Kolhapur
First Year M. Tech. Civil Engineering (Construction and Management)
CM 201: Construction Contracts and Legal Aspects

Teaching scheme		Examination scheme
Lectures	: 3 Hours per week	CIE: 30 Marks ESE : 70 Marks
Practical	: 2 Hours per week	
Credits	: 04	Term work : 25 Marks

Course Objectives

1. To expose the students to Indian Contract and Arbitration act
2. To provide knowledge about bailment and international contracting
3. To expose the students to Labour laws
4. To provide the knowledge about safety acts

Course Contents

Hours

- Unit I Professional Practice and Administration Contracts:** The standard form of building contracts. The right of building owner, Third parties, Indian contract Act, Sale of Goods Act, Professional Ethics. RERA. **8**
- Unit II Arbitration and Award :** Indian Arbitration Act, Arbitration Agreement, Conduct of Arbitration, Power and Duties of Arbitration, Rules of Evidence, E- Tendering, Preparation and publication of award, Methods of Enforcement impending and Awards. **6**
- Unit III Bailment:** Nature of Transactions, Delivery of Bailee, care to be taken, Bailee's Responsibility, Termination, Bailment of pledges. International Contracting : Meaning Scope, Nature, Distinctive Features of FIDIC. **6**
- Unit IV Injunction:** Types Temporary, Perpetual, Mandatory when referred. Indemnity and Guarantee :Difference between the two, The Contract of Guarantee and Indemnity, Consideration of Guarantee, Surety's Liability, Discharge of Surety. **6**
- Unit V Industrial Act and Labour Laws:** Industrial Dispute Act, Payment of Wages Act. **6**
- Unit VI Safety Engineering:** Sources, Classification, Cost of Accident and Injury, Workmen's Compensation Act, Safety Programme, Safety Organization. Employers Liability Act, Employers Insurance Act, Safety and Health Standards Occupations Hazards, personal Protective equipments, preventive measures Factory Act, Fatal accidents. **8**

Course Outcome (CO):

1. Students will learn Indian contract act, Arbitration act and contract administration
2. Student will gain knowledge about bailment and FIDIC
3. Students will understand the labour laws
4. Students will be exposed to safety engineering and relevant acts.

Text Books:

1. Indian arbitration Act by B. S. Patil
2. Indian Contract Act.
3. Safety Engineering, Govt. of India Publicaiton
4. Professional Practice, RoshanNamavati.
5. Legal Aspects of building and Engineering Contracts by B. S. Patil
4. Indian contract Act Avatar singh
5. Indian contract Act Jhamb

Shivaji University, Kolhapur

First year M. Tech. Civil Engineering (Construction and Management) CM 202: Statistical Analysis and Research Methodology

Teaching scheme		Examination scheme
Lectures	: 3 Hours per week	CIE: 30 Marks ESE : 70 Marks
Practical	: 2 Hours per week	
Credits	: 04	Term work : 25 Marks

Course objectives

1. To understand the concept of Probability & its Distribution.
2. To understand Testing of Hypothesis and its Tests.
3. To understand the concept of Research Methodology & Literature Survey.
4. To understand the importance of Data collection.

Course Contents

Hours

Unit I	Probability: Probability theory and its importance: Definition of probability, Rules of Probability, The Baye's theorem. Random variable. Probability distribution. Mean or Expectation of Random variable. Properties of Mean of Expectation.	8
Unit II	Distributions: Theoretical probability Distributions: Binomial Distribution, Poisson distribution. Normal Distribution, Exponential Distribution, Beta, Gamma.	6
Unit III	Testing: Testing Hypothesis: Sampling of distribution – Test based on Normal Distribution, students- t test, chisquare, K-S test for goodness of fit and distribution. Analysis of variance- one way & two way classification.	6
Unit IV	Introduction to Research: Meaning of research ,types of research, process of research, Sources of research problem, Criteria / Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem, formulation of research hypotheses. Search for causation.	8
Unit V	Literature survey: Definition of literature and literature survey, need of literature survey, sources of literature, elements and objectives of literature survey, styles of literature survey, and strategies of literature survey.	6
Unit VI	Data collection: Measuring, Sampling and Scaling—Classification of data, benefits and drawbacks of data, evaluation of data, qualitative methods of data collection, methods of qualitative research, Sampling,sample size, sampling strategy, attitude measurement and scaling, types of measurements, criteria of good measurements, classification of scales.	6

Course Outcomes (CO):

1. Students will be able to study the concept of Probability & its Distribution
2. Students will be able to understand Hypothesis Testing.
3. Students will be able to know about Research Methodology & Literature Survey.
4. Students will be able to understand the importance of Data collection.

Text Books:**I. Statistical Methods:**

1. Applied Statistics and Probability for Engineers---Montgomery and Runger—Wiley,India.
2. Probability and Statistics for Engineers –Miller, Freund-Hall, Prentice India Ltd. 2009
3. Applied Mathematics for Engineers and Physiscists-pipes and Harvill. McGraw Hill International Edition, 1970
4. Sampling techniques-Cochran, Wiley Series, 2008.
5. Statistics-Concepts and Controversies-David S. Moore-Freeman Company, New York.
6. Reliability Principles and practices-Calabro-McGraw Hill Book Company, 1963
7. Shrivastava, Shenoy & Sharma, Quantitative Techniques for Managerial Decisions, Wiley, 1989.
8. Applied Statistics for Civil and Environmental Engineers by Kottegoda.- Stratford

II. Research Methodology:

9. Research Methodology: concepts and cases—Deepak Chawla and Neena Sondhi,Vikas Publishing House Pvt.Ltd. (ISBN 978-81-259-5205-3)
10. Research Methods for Business—Sekaran—Wiley,India
11. Research Methodology: Methods and Trends', by Dr. C. R. Kothari--- New Age International Publishers.
12. Research Methods in Education---Louis Cohen,Manion,Morrison---Routledge(Taylor &Francis Group) / -- Cambridge University Press India Pvt. Ltd.-ISBN-978-0-415-58336-7
13. Research Methodology: An Introduction' by Wayne Goddard and Stuart Melville
14. Research Methodology: A Step by Step Guide for Beginners', by Ranjit Kumar
15. Research in Education---John Best and James Kahn,Prentice Hall of India Pvt.Ltd.

Shivaji University, Kolhapur

First Year M. Tech. Civil Engineering (Construction and Management) CM 203: Construction Methods and Construction Techniques

Teaching scheme		Examination scheme
Lectures	: 3 Hours per week	CIE: 30 Marks ESE : 70 Marks
Practical	: 2 Hours per week	
Credits	: 04	Term work : 25 Marks

Course Objectives

1. To study underground and underwater construction methods
2. To understand techniques & methods of Steel Construction.
3. To understand cofferdams construction, caissons design & Piles
4. To study pre fabricated construction techniques
5. To study forces and design in vibration controlled foundation.
6. To study formwork, retaining wall construction techniques.

Course Contents

Hours

Unit I	Underground and Underwater Construction : Tunnels- Shaft sinking, Tunnel driving in hard and soft strata, Surge chambers - Design criteria, Loads, Assumptions, Types of surge chambers. Underground power stations Principal types. Underground railway stations Construction and Maintenance, Parking places. Bedding of conduits. Underwater Construction _ Problems encountered, Underwater drilling, blasting, concreting welding, Underwater structural concrete walls. Protection of structures against attack by ground.	8
Unit II	Steel Construction: Launching of steel, Pre-stressed, Precast bridges. Site erection methods: Side showing method for road railway bridges. End launching Using cranes and gantries, Cantilever method, floatation method, Incremental launching for concrete girders. Case studies of steel cantilevers. Arches, simply supported beams, suspension, cable stayed bridge launching. Moving formwork staging shuttering, centring. Dismantling for maintenance, repairs inspection of bridges. Testing of bridges.	6
Unit III	Coffer Dams and Caissons: Land cofferdams, soldier beam and horizontal Sheet piling techniques, Design considerations, sinking rate, open caissons, pneumatic caissons. Machine bored caissons. Drop caissons. Details design and construction Case Studies. Piling – Behaviour of single pile and a group of piles during driving, under loads- Ultimate loads on driven and cast in situ piles, construction details of precast piles, Pre-stressed, piles steel piles, friction piles. Driven piles, Bored piles, Large diameter bored piles, negative and positive friction.	6

Unit IV Pre-fabricated Construction: Types, standardization of components, sized and economy, Fabrication techniques transport erection, jointing, fabrication, techniques, transports, erection, jointing of prefab components, light weight panels. 8

Unit V Vibration Controlled Foundation: Free vibration, forced, Damping vibrating machine, weight of foundation, Natural frequency of Machine foundation and soil system, Design Procedure, Causes and effects of vibration transmitted through soil. 6

Unit VI Formwork: Types components, design of formwork, special types of formwork such as slip form : Removal of formwork, cost aspect of formwork. 6
(A) Retaining Walls: Types, construction techniques.
(B) Preservation of structures in various climatic conditions.

Course Outcome (CO):

1. Students will be able to understand underground and underwater construction methods
2. Students will be able to study the techniques & methods of Steel Construction.
3. Students will be able to understand cofferdams construction, caissons design & Piles
4. Students will be able to know about pre fabricated construction techniques
- 5 Students will be able to understand the forces and design in vibration controlled foundation.
- 6 Students will be able to understand formwork, retaining wall construction techniques.

Text Books:

1. Wells and Caissons – Vijaya Singh, New Chand & Bros, Roorkee
2. Modern Foundations- N-P-Kurion, Tata McGraw, Hill pub, co. Ltd.
3. Foundation Engineering- G. A. Leonards McGraw Hills Co. Ltd.
- 4 Large Bored Piles-Institute of Civil Engineers 1966 London
- 5 Modern Foundation Methods- R. Hammond Pub. Oxford & IBH Pub. Co
- 6 Foundation Engineering by S.J*. Brahma, Tata mcgraw Hill Pub. Co
- 6 Construction & Geotechnical Methods in Foundation Engineering R. M. Koeme : McGraw Hill Book Co
7. Construction Planning Equipments and Methods Pourifey RI
8. Hand Book of Civil Engineering- stubb
9. Formwork Design and Construction-Wynn
- 10 Foundation Engineering- Tomlinson
- 11 Cofferdams- While and prentice- Columbia University Press New-York
- 12 Art of Tunnelling- Karl Szechy
13. Foundation Engg. by S. P. Behma (Tata McGraw Hill Publication)
14. Formwork Construction and Practice – John G. Richardson 6 The Engg. of large Dams (vol I & II) by Hemy H. Thomas
15. Prefabricated Construction by Mokk.

Shivaji University, Kolhapur
First Year M. Tech. Civil Engineering (Construction and Management)
PCE – CM201: Advanced Construction

Teaching scheme		Examination scheme
Lectures	: 3 Hours per week	CIE: 30 Marks ESE : 70 Marks
Practical	: 2 Hours per week	
Credits	: 04	Term work : - 25 Marks

Course Objectives:

1. To expose the students to various composite construction, formwork design.
2. To make students familiar with new materials for construction & Land Reclamation techniques.
3. To study Concept of Power generation & Understand the Techniques of Bridges
4. To understand the advanced techniques of concrete pavement.

Course Contents

Hours

Unit I	Composite Construction: Composite Vs Non composite action, composite steel Concrete construction. Formwork: Materials for formwork, special types of formwork, design of formwork.	7
Unit II	New Materials for construction: such as Geosynthetics, Epoxy resins, Adhesives, MDF(Medium Density Fibre), FRC (Fibre Reinforced Concrete) FRP (Fibre Reinforced Polymer) , Polymer based composites Land Reclamation: Technical progress, drainage for land reclamation, Structural Improvement.	7
Unit III	Construction of Power: Generation, structures, Atomic Power Stations, Thermal Power Stations, Wind- Mills	6
Unit IV	A) Rehabilitation of Bridges: Necessity and methods of strengthening, Preservation of Bridges. B) Retaining Structures Like: Diaphragm walls, advanced methods of their Construction.	6
Unit V	A) Construction of concrete pavement by techniques like: vaccum processing, Revibrated concrete Roller – compacted concrete. B) Use of Techniques Like: Slip form paving in pavement construction using Wet Mix Macadam in road construction.	7

Unit VI Advanced Techniques Like Roller: compacted concrete, vacuum, Ready Mix Concrete dewatering in concrete slab construction, Reinforced earth construction, foundation strengthening.

7

Course Outcome (CO)

1. Student will be able to learn various composite construction & concept of Formwork design.
2. Students will be able to understand new materials for construction & Land Reclamation Techniques.
3. Students will be able to study the Concept of Power generation & Understand the Techniques of Bridges
4. Understand the advanced techniques of concrete pavement.

Text Books:

1. Formwork design and construction – Wynn.
2. Formwork construction and practices – John. G. Richardson.
3. Technical progress in land reclamation by B. G. Shtepa.
4. Water Power Engineering by Dandekar, Sharma.
5. Bridge Engineering by Ponnuswamy
6. Bridge Engineering by Raina.
7. Monthly: Civil Engineering & Construction Review
8. Handbook of composite construction Engineering by G. M. Subnis.

Shivaji University, Kolhapur

First Year M. Tech. Civil Engineering (Construction and Management) PCE – CM202: Environmental Impact Assessment & Management

Teaching scheme		Examination scheme
Lectures	: 3 Hours per week	CIE: 30 Marks ESE : 70 Marks
Practical	: 2 Hours per week	
Credits	: 04	Term work : - 25 Marks

Course Objectives:

Student should be able

1. To have fundamental knowledge about EM &EIA
2. To trace the evolution of EIA as EM tool
3. To plan and carry out an environment impact assessment study for construction projects.
4. List and comply with environmental clearance procedure for construction Projects in India

Course Contents	Hours
Unit I Introduction: Environmental Management, Definition, Scope, Goals and need. International Environmental Movement, Environmental concerns in India.	6
Unit II Policies & Programmes: Environmental Policies and Programmes in India, Environmental laws and Legislations, Evolution of Indian Legislations, Constitution of India.	6
Unit III Environmental Impact Assessment: Introduction, Purpose, Evolution, Forecasting environmental changes, Environment Impact Statement(EIS), Strategic Environmental Assessment (SEA). Screening and Scoping.	8
Unit IV EIA Documentation and Processes: Preliminary Stages of EIA, Impact Prediction, Evaluation and Mitigation, Impact on Decisions, Cost Benefit Analysis of EIA of Construction Projects.	8
Unit V Environmental Auditing: Audit Methodology, Life Cycle Assessment (LCA) – Purpose, Evolution and Stages. Environment Impact Statement (EIS), Requisites of good EIS.	6
Unit VI Environment Management System: EMS Standards: IS14000, Benefits of Implementing ISO 14001.	6

Course Outcome (CO):

Students will be

1. Students will be able to understand the fundamental concepts of EM and EIA by studying scope, goals and tools
2. Students will be able to trace the evolution of EIA as EM tool in world over as well as in India
3. Students will be able to Plan and carry out an environment impact assessment study for construction projects such as roads, dams, bridges, power plants etc.
4. Students will be able to list and comply with environmental clearance procedure by studying EMS laws, legislations and standards.

Text Books:

1. Environment Impact Assessment- Open Educational Resource
file:///C:/Users/ADMINI~1/AppData/Local/Temp/Rar\$EXa0.821/eia-local
2. Environmental Management – Web course <http://NPTEL.iitm.ac.in>, Prof. T. V. Ramchandra
3. UNDP (1992) Handbook and Guidelines for Environmental Management and Sustainable Development. Environment and Natural Resources Group, UNDP, New York.
4. Canter L (1996) Environmental Impact Assessment (Second Edition). McGraw Hill Publishing Company, New York.

References:

1. World Bank (1997) Environmental Performance Monitoring and Supervision. Update. Environmental Assessment Sourcebook. World Bank, Washington, DC.
2. EIA Notification Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii) by MINISTRY OF ENVIRONMENT AND FORESTS New Delhi 14th September, 2006
3. Lohani, B., J.W. Evans, H. Ludwig, R.R. Everitt, Richard A. Carpenter, and S.L.Tu. 1997. Environmental Impact Assessment for Developing Countries in Asia. Volume 1, Asian Development Bank.

Shivaji University, Kolhapur

First Year M. Tech. Civil Engineering (Construction and Management) PCE–CM203: Advanced Construction Materials & Building Services

Teaching scheme		Examination scheme
Lectures	: 3 Hours per week	CIE: 30 Marks ESE : 70 Marks
Practical	: 2 Hours per week	
Credits	: 04	Term work : - 25 Marks

Course Objectives:

1. To study different modern construction materials.
2. To study characteristics, properties, design concept of concrete.
3. To study new construction techniques & understand concept of high-rise buildings.
4. To study the components of water supply and sanitation arrangements in a building
5. To study ventilation, air conditioning and fire safety installations in a building
6. To introduce the concepts of intelligent building

Course Contents

Hours

<p>Unit I: Modern Materials: Glass Ceramics, Sealants for joints, Fibre glass Reinforced plastic, Clay products , Refractories , Composite materials. Types Applications of laminar composites, Fibre textiles, Geosynthetics for Civil engineering applications. Timber And Other Materials Timber Market forms Industrial timber, Plywood, Veneer, Thermocole Panels of laminates Steel, Aluminum and Other Metallic Materials Composition uses Market forms Mechanical treatment.</p>	8
<p>Unit II: Concrete: Concrete Ingredients Manufacture, Batching plants, RMC. Properties of fresh concrete, Slump, Flow and compaction. Principles of hardened Concrete. Compressive, Tensile and shear strength. Modulus of rupture, Tests Mix specification, Mix proportioning – IS method – High Strength Concrete and HPC Other types of Concrete – Code Practices</p>	6
<p>Unit III: High rise buildings – Construction methods and techniques using in-situ concrete, Precast Concrete & Structural Steel, finished concrete, tunnel form, fire Fighting, Safety. Innovative methods of construction – Slip form technology, Jump form technology, Dry wall technology, Plastering Machines.</p>	6

- Unit IV: Water Supply Systems:** Water quality, Purification and treatment- water **8**
Supply systems-distribution systems in small towns –types of pipes used- laying
jointing ,testing-testing for water tightness plumbing system for building-internal
supply in buildings- municipal bye laws and regulations - Rain Water Harvesting-
Sanitation in buildings-arrangement of sewerage systems in housing -pipe systems-
storm water drainage from buildings - septic and sewage treatment plant – collection,
conveyance and disposal of town refuse systems
- Unit V: Ventilation and Its Importance** **6**
Ventilation and its importance-natural and artificial systems-Window type and
packaged air-conditioners-chilled water plant –fan coil systems-water piping–
cooling load –air conditioning systems for different types of buildings –protection
against fire to be caused by A.C.Systems..
- Unit VI: Intelligent Buildings** **6**
Intelligent buildings-Building automation-Smart buildings- Building services in
high rise buildings-Green buildings-Energy efficient buildings for various zones-
Case studies of residence, office buildings and other buildings in each zones.

Course Outcome (CO):

1. Students will be able to understand modern construction materials.
2. Students will be able to understand characteristics, properties, design concept of concrete.
3. Students will be able to know the new construction techniques & understand concept of high-rise buildings.
4. Students will be able to understand the components of water supply and sanitation arrangements in a building.
5. Students will be able to understand ventilation, air conditioning and fire safety installations in a building.
6. To introduce the concepts of intelligent building.

Text Books:

1. R. K. Rajput, Engineering Materials, S. Chand & Company Ltd., 2000.
2. M. S. Shetty, Concrete Technology (Theory and Practice), S. Chand & Company Ltd, 2003.
3. Construction Technology by Roy Chudley and Roger Greeno, Prentice Hall, 2005.
4. Construction Planning, Equipment and methods – Peurifoy-Tata McGraw Hill Publication
5. Construction Equipment Planning and Applications – Dr. Mahesh Varma
6. Manuals, brochures, publications from construction companies, firms etc.
7. Reports of actual works executed.
8. NICMAR Publications on Construction Engineering.
9. Fair G.M., Geyer J.C. and Okun .D, “Water and waste Engineering“, Vol. II, John Wiley & sons, Inc., New York. 2008.
10. “Hand book for Building Engineers in Metric systems”, NBC, New Delhi, 2008..
11. “Philips Lighting in Architecture Designs”, McGraw Hill, New York, 2004.
12. “Time saver Standards for Architecture Design Data”, Callendar JH, McGraw Hill, 2004.
13. William H. Severns and Julian R. Fellows, “Air conditioning and refrigeration”, John Wiley and sons, London, 2008.

Shivaji University, Kolhapur
First year M. Tech. Civil Engineering (Construction and Management)
CM 205: Software Lab

Teaching scheme		Examination scheme
Lectures	-	
Practical	2 Hours per week	
Credits	: 1	Term work : -25 Marks

Course Objectives

- 1. To study various advanced software's required in construction industry.**
- 2. To carry out practices of software's undertaken.**
- 3. To do activities based on software for live construction project.**

Course Contents

1. To prepare assignment on live construction project based on software's like Prima Vera, MSP, BIM, GIS.
2. To prepare report and submit it to respective guide.

Course Outcome (CO)

1. Student will be able to study advanced software's.
2. Student will be able to practice software's undertaken.
3. Student will be able to carry out software based activities on live construction project.

Shivaji University, Kolhapur
First year M. Tech. Civil Engineering (Construction and Management)
CM 206: Mini Project

Teaching scheme		Examination scheme
Lectures	-	
Practical	4 Hours per week	
Credits	: 2	Term work : - 50 Marks

Course Objectives

- 1. To study various infrastructure projects in construction industry.**
- 2. To carry out Detailed project report with case study undertaken.**

Course Contents

1. To prepare detailed Project Report (DPR) of any one Infrastructure project like, Housing development, Bridge, Highway, Tunnel etc.
2. With reference to above DPR any case study of project started within last two years from respective academic year of admission.
3. Submission of DPR & Case study report.

Course Outcome (CO)

1. Student will be able to study infrastructure projects in construction industry.
2. Student will be able to carry out Detailed project report with case study undertaken

Shivaji University, Kolhapur
First year M. Tech. Civil Engineering (Construction and Management)
CM 207: Seminar- II

Teaching scheme		Examination scheme
Lectures	-	
Practical	2 Hours per week	
Credits	: 01	Term work : -50 Marks

Course objectives:

- 1. Post graduate will able to know the art in the relevant subjects of construction & management**
- 2. Post graduate will know the experimental procedure to validate theories related to construction & Management**
- 3. Post graduate will know able to conduct extensive literature survey in subjects of Construction & Management**
- 4. Post graduate will know about how to prepare and present research project.**

Course Contents

- 1 . Seminar-II to be delivered by the students on general topic related to construction engineering to be evaluated by three members committee headed by HOD wherein guide should be one of the members.

List of Submission

1. Seminar report duly signed by respective guide and head of department

Course Outcome (CO):

1. Post graduate will know the state of the art in the relevant subjects of construction Engineering.
2. Post graduate will know the experimental procedure to validate theories related to Construction Engineering.
3. Post graduate will able to conduct extensive literature survey in subjects of construction engineering.
4. Post graduate will able to learn how to prepare and present research project.

Shivaji University, Kolhapur
Second Year M. Tech. Civil Engineering (Construction and Management)
CM 301: Industrial Training

Teaching scheme		Examination scheme
Lectures	-	
Practical	4 Hours per week	
Credits	: 02	Term work : -50 Marks

Course Objectives

- 1. To expose the students to various elements of construction techniques of major work.**
- 2. To study the live construction projects through field visits...**
- 3. To learn presentation skills for technical report.**
- 4. To prepare report of the industrial training.**

Course Content

The students are required to undergo training in any area related to Construction and Management as mentioned in the syllabus for 21 working days beyond the academic schedule after the completion of First year M. Tech. Civil Engineering (Construction and Management) .. Students shall submit the report of the Industrial Training taken and necessary certificate from the organization where such training is undertaken.

Assessment will be done at the end of IIIrd Semester by project guide along with Project Term Work Assessment Committee.

Course Outcome (CO)

1. Student will able to learn various construction techniques.
2. Students will able to read drawings of the various projects.

Shivaji University, Kolhapur
Second Year M. Tech. Civil Engineering (Construction and Management)
CM 302: Certified Course/STTPs

Teaching scheme		Examination scheme
Lectures	-	
Practical	4 Hours per week	
Credits	: 2	Term work : - 50 Marks

Course Objectives

1. To expose the students for Certified course/STTPs in Civil Engineering.
2. To prepare short project report and certificate copy of completed STTPs.

Course Contents

1. To carryout Certified course/STTPs organized by Reputed Institutes for more than minimum 3 Days.
2. Submission of 3-5 pages report & certificate copy to the respective Guide.

Course Outcome (CO)

1. Student will be able to complete Certified course/STTPs.
2. Student will be able to prepare short report & submit certificate copy.

Shivaji University, Kolhapur
Second Year M. Tech. Civil Engineering (Construction and Management)
CM 303: Dissertation Phase- I

Teaching scheme		Examination scheme
Lectures	-	
Practical	16 Hours per week	
Credits	: 08	Term work : -100 Marks

Course Objectives

1. To perform extensive literature survey on the research topic of work.
2. To identify the problem statement for the research work.
3. To decide methodology for the research work.
4. To carry out initial mathematical modelling or experimental set up.

Course Contents

1. Dissertation (Phase-I): Student has to submit the report and deliver the seminar based on 25% or more work on Dissertation topic. It is to be evaluated internally by three members panel of examiners headed by HOD wherein guide should be one of the members of the panel. Last date of submission of report shall be two weeks before the end of semester.

List of Submission

1. Dissertation report of phase-I duly signed by respective guide and head of department

Course Outcome (CO):

1. Post graduate will know will about how to perform extensive literature survey on the research topic of work.
2. Post graduate will able to identify the problem statement for the research work.
3. Post graduate will able to decide methodology for the research work.
4. Post graduate will able to carry out initial mathematical modelling or experimental set up.

Shivaji University, Kolhapur
Second Year M. Tech. Civil Engineering (Construction and Management)
CM 401: Dissertation Phase- II

Teaching scheme		Examination scheme
Lectures	-	POE : 100 Marks
Practical	32 Hours per week	
Credits	: 16	Term work : -100 Marks

Course Objectives

- 1. To perform further literature survey on the research topic of work.**
- 2. To carry out detailed mathematical modelling or experimental validation.**
- 3. To draw inferences from the findings and present conclusion.**
- 4 To learn presentation skills for technical report.**

Course Contents

1. Dissertation (Phase-II): Internal assessment of dissertation (complete work) is to be carried out by the guide for 100 marks. The external assessment of dissertation work is to be carried out by panel of examiners consisting of internal (guide) and external examiner for 100 marks. candidate shall present the entire work on Dissertation, followed by viva-voce. Last date of submission of dissertation will be the end of the semester.

List of Submission

1. Dissertation report of phase-II duly signed by respective guide and head of department

Course Outcome (CO)

1. Post graduate will able to study technical reports on the research topic of work.
2. Post graduate will able to carry out detailed mathematical modelling or experimental Validation.
3. Post graduate will able to draw inferences from the findings and present conclusion.
4. Post graduate will able to learn presentation skills for technical report.