Government College of Engineering, Karad

(An Autonomous Institute of Government of Maharashtra)

First Year M. Tech. Civil - Construction Management

Semester I

Sr. No.	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Credits	EXAM SCHEME				
								CT1	CT2	TA/CA	ESE	TOTAL
1	CM101	Project Evaluation and Financing	3	1	-	4	4	15	15	10	60	100
2	CM102	Planning and Management of Projects	3	1	-	4	4	15	15	10	60	100
3	CM 103	Construction Methods	3	1	-	4	4	15	15	10	60	100
4	CM104	Construction Equipments	3	1	-	4	4	15	15	10	60	100
5	CM107	Environmental Impact Assessment and Management	3	-	-	3	3	15	15	10	60	100
6	CM 106	Laboratory Practice	-	-	4	4	2	-	-	50	50	100
		Total	15	4	4	23	21	75	75	100	350	600

CT1- Class Test 1 TA/CA- Teacher Assessment/Continuous Assessment

CT2- Class Test 2 ESA- End Semester Examination (For Laboratory: End Semester Performance)

Government College of Engineering, Karad

(An Autonomous Institute of Government of Maharashtra)

First Year M. Tech. Civil - Construction Management

Semester II

Sr. No.	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Credits	EXAM SCHEME				
								CT1	CT2	TA/CA	ESE	TOTAL
1	CM201	Construction Techniques	3	1	-	4	4	15	15	10	60	100
2	CM202	Legal Aspects in Construction engineering	3	1	-	4	4	15	15	10	60	100
3	CM 203	Management Information Systems for Construction Management	3	1	-	4	4	15	15	10	60	100
4	CM204	Computational Methods and Optimization Techniques	3	1	-	4	4	15	15	10	60	100
5	CM2*5	Elective-I	3	1	-	4	4	15	15	10	60	100
6	CM 206	Laboratory Practice	-	-	4	4	2			50	50	100
7	CM 207	Seminar I	-	-	2	2	1			50		50
		Total	15	5	4	24	23	75	75	150	350	650

*- Elective - I list is provided at the end of structure

CT1- Class Test 1 TA/CA- Teacher Assessment/Continuous Assessment

CT2- Class Test 2 ESA- End Semester Examination (For Laboratory: End Semester Performance)

Government College of Engineering, Karad

(An Autonomous Institute of Government of Maharashtra)

Second Year M. Tech. Civil - Construction Management

Semester III

Sr. No.	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Credits	EXAM SCHEME				
								CT1	CT2	TA/CA	ESE	TOTAL
1	CM301	Seminar II	-	-	2	2	1	-	-	50	-	50
2	CM302	Dissertation Phase I	-	-	20	20	10	-	-	100	-	100
		Total	-	-	22	22	11	-	-	150	-	150

Government College of Engineering, Karad

(An Autonomous Institute of Government of Maharashtra)

Second Year M. Tech. Civil - Construction Management

Semester IV

Sr. No.	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Credits	EXAM SCHEME				
								CT1	CT2	TA/CA	ESE	TOTAL
1	CM401	Dissertation Phase II	-	-	30	30	20	-	-	100	200	300
		Total	-	-	30	30	20	-	-	100	200	300

CT1- Class Test 1 TA/CA- Teacher Assessment/Continuous Assessment

CT2- Class Test 2 ESA- End Semester Examination (For Laboratory: End Semester Performance)

Government College of Engineering, Karad

(An Autonomous Institute of Government of Maharashtra)

Programme: Construction Management

List of Elective

Elective - I
Semester- II
CM215 Human Resource Development in Construction
CM225 Entrepreneurship in Construction
CM235 Maintenance and Rehabilitation of Structures

Government College of Engineering Karad
First year M. Tech. Civil-Construction Management
CM101: Project Evaluation & Financing

Teaching Scheme		Examination Scheme	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60

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 Contents

		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.	6
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.	4
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.	5
Unit IV	**Financing Projects -** Sources of finance, equity, debit, securities, borrowings, debentures, Working capital requirement, Financial institutes, direct and indirect financial assistance	5
Unit V	**Accounting -** Site Accounts, Preparation, Reporting, Accounting records, Depreciations, Classification of construction costs, Standard budgeting and control	5
Unit VI	**Public Private Participation in Projects-** PPP Models, BOOT, BOT, Joint Ventures, BOOT, BOT, Annuity, DBFO, External Commercial Borrowings, International Finance.	5

Course Outcome (CO):

1 Understand concepts of project economics
2 Able to use appraisal methods for financial feasibility studies of projects
3 Understand the role of risk management in projects
4 Able to understand accounting concepts and financial sources

5 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

References

1 Engineering economics by Riggs
2 Corporate finance by Kuchal S. C.
3 Principles of Corporate Finance by Brealey R. A.
4 Principles of Engineering Economy by Grant Ireson/ Leavenworth.

Useful Links

1 **nptel**.ac.in
2 freevideo**lectures**.com
3 www.youtube.com

Mapping of CO and PO

	A	b	C	D	e	f	g	h	i	j	k
CO1	√	√		√	√		√		√		√
CO2	√	√	√	√	√		√	√	√	√	√
CO3	√	√	√	√	√	√	√	√	√	√	√
CO4	√		√	√		√		√	√	√	

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	0	10
Understand	3	3	2	10
Apply	3	3	2	10
Analyze	3	2	2	10
Evaluate	2	3	1	10
Create	1	1	3	10
Total	15	15	10	60

Government College of Engineering Karad
First year M. Tech. Civil – Construction Management
CM 102: Planning and Management Of Projects

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60

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.	8
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.	8
Unit IV	**Construction Quality Management**: SQC charts, Sampling techniques, Quality circles, ISO 9000, Management aspects.	8
Unit V	**Safety in Construction**: Safety Requirements, Safety and health codes, Occupational diseases, Economic aspects, Management of accidents, Safety department.	8
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 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

References

1 Accounting for management, S. K. BHATTARCHARYA
2 Work study, R. M. CURRIE
3 Principles of management, KOONTZ AND O DONNEL.
4 Personal management and industries relations, DALE.

Mapping of CO and PO

	a	B	c	D	e	f	g	h	i	j	k
CO1	√	√		√	√		√		√		√
CO2	√	√	√	√	√		√	√	√	√	√
CO3	√	√	√	√	√	√	√	√	√	√	√
CO4	√		√	√		√		√	√	√	

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	0	10
Understand	3	3	2	10
Apply	3	3	2	10
Analyze	3	2	2	10
Evaluate	2	3	1	10
Create	1	1	3	10
Total	15	15	10	60

Government College of Engineering Karad
First year M. Tech. Civil – Construction Management
CM103: Construction Methods

Teaching Scheme		Examination Scheme	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60

Course Objectives

1. To study underground and underwater construction methods
2. To study grouting methods and its applications
3. To study dewatering methods
4. To study bridges and cofferdams construction methods
5. To study caissons design and construction methods
6. To study construction methods of piles

Course Contents		**Hours**
Unit I	**Underground and Underwater Construction** : Tunnels- Shaft sinking, Tunnel drying 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 water.	8
Unit II	**Grouting**: Drilling pattern, procedure, Grouting pressure. Applications, Limitation, Efficiency of grouting for dams, tunnels, shafts, mines, Grouting for water control, soil stability and increase in bearing pressure of soils. Grouting types – Cement- Injection with high pressure screen grouting of alluvial – Clay, Types of clays used. Alluvial grouting test – Chemical grouting- Grouts for injection of fine sands. Resin grouting Polymerization, Technique of solutions of grouting Problems. Formulations, selection and application, case studies.	8
Unit III	**Dewatering** – Dewatering of shallow and deep open excavations. Effects of ground water movement, methods of ground water control, shallow and deep well points, Horizontal drainage, vacuum dewatering by electro osmosis, analysis design and formulaic well point system.	8
Unit IV	**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,	8

Unit V **Coffer Dams and Caissons –** Cofferdams- Types Design and Construction of single/ double wall sheet pile cofferdams, cellular sheet piles. Concrete wall movable cofferdam. Land cofferdams, soldier beam and horizontal sheeting techniques, Design considerations, sinking rate, open caissons, pneumatic caissons. Machine bored caissons. Drop caissons. Details design and construction Case Studies. 8

Unit VI **Pilling** – 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 Multiple under reamed piles. Racker piles, sand piles. Anchor piles, Loads of piles, static, vibrating loads, cyclic loading, safe bearing loads. Method of pile driving by vibration over water under water and through different grounds. 8

Course Outcome (CO):

1 Understand underground and underwater construction methods
2 Understand grouting methods and its applications
3 Understand dewatering methods
4 Understand bridges and cofferdams construction methods
5 Understand caissons design and its construction methods
6 Understand construction methods of piles

Text Books

1 Bridge Engineering – S.K.Pounuswamy, Tata Mcgraw Hill Co. Ltd.
2 Wells and Caissons – Vijaya Singh, New Chand & Bros, Roorkee
3 Design and Construction of R. C. Bridges – A. W. Legal, G. Dunn W. A. Kaihursh Pub. Concrete Publications

References

1 Grouts and Drilling Mud in Engineering Practice- Symposium by Inst. of Engineers-1963. Butter Worth's.
2 Modem 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 Modem Foundation Methods- R. Hammond Pub. Oxford & IBH Pub. Co
6 Foundation Engineering by SJ*. Brahma, Tata mcgraw Hill Pub. Co
7 Construction & Geotechnical Methods in Foundation Engineering R. M. Koeme : Mcgraw Hill Book Co
8 Construction Planning Equipments and Methods Peurifey RI
9 Hand Book of Civil Engineering- stubb
10 Formwork Design and Construction-Wynn
11 Foundation Engineering- Tomlinson
12 Cofferdams- While and prentice- Columbia University Press New-York
13 Art of Tunnelling- Karl Szechy

Mapping of CO and PO

	a	b	c	D	e	f	g	h	i	j	k
CO1	√	√	√	√	√	√	√	√	√	√	√
CO2	√	√	√	√	√	√	√	√	√	√	√
CO3	√	√	√	√	√	√	√	√	√	√	√
CO4	√	√	√	√	√	√	√	√	√	√	√
CO5	√	√	√	√	√	√	√	√	√	√	√
CO6	√	√	√	√	√	√	√	√	√	√	√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	√	√	√	√
Understand	√	√	√	√
Apply	√	√	√	√
Analyze	√	√	√	√
Evaluate	√	√	√	√
Create	√	√	√	√
Total	15	15	10	60

Government College of Engineering Karad
First year M. Tech. Civil- Construction Management
CM 104: Construction Equipment

Teaching Scheme		Examination Scheme	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60

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, Vibrating 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.	8
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.	
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.	

Course Outcome (CO):

1 Understand the various excavating, hauling, compacting and conveying equipment
2 Know about piles and piling equipment
3 Study tunnelling technology
4 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 Jagamn Singh – On and with the Earth (W. Newman & Co., Calcutta)

References

1 Kellog – Construction Methods & Machinery (Prentice-Hall Inc., New York
2 Handbook of Earth-moving Machinery (Ministry of Irrigation and Power, Central Water and Power commission, New-Delhi)

Mapping of CO and PO

	a	B	c	D	e	f	g	h	i	j	K
CO1	√	√		√		√	√	√	√	√	
CO2	√	√	√	√	√	√		√		√	√
CO3	√	√	√		√		√		√	√	√
CO4	√			√	√	√		√	√		√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	10
Understand	5	3	2	10
Apply	2	3	3	10
Analyze	3	3	1	10
Evaluate	2	2	1	10
Create	0	1	1	10
Total	15	15	10	60

Government College of Engineering Karad
First year M.Tech - Construction management
CM 107: Environment Impact Assessment & Management

Teaching Scheme		Examination Scheme	
Lectures	3 Hrs./week	**CT1**	15
Tutorial	-	**CT2**	15
Total Credits	3	**TA**	10
		ESE	60

Course Objectives:

Students should able to

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.	**8**
Unit VI	**Environment Management System** - EMS Standards: IS14000, Benefits of Implementing ISO 14001	**6**

Course Outcome (CO):

Students will

1. understand the fundamental concepts of EM and EIA by studying scope, goals and tools
2. able trace the evolution of EIA as EM tool in world over as well as in India
3. plan and carry out an environment impact assessment study for construction projects such as roads, dams, bridges, power plants etc.
4. 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

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Government College of Engineering Karad
First year M. Tech. Civil Construction Management
CM 106: Laboratory Practice I

Teaching Scheme		**Examination Scheme**	
Practicals	4 hrs/week	**TA**	50
Total Credits	2	**ESE**	50

Course Objectives

1 To expose the students to various elements of project planning and management.
2 To carryout the study of material/personnel management.
3 To study the different methods of construction and infrastructures.
4 To study the live construction projects through field visits.

Course Contents

Students are expected to carryout any five of the following :

Experiment 1 To perform the assignment related to either works study/ motion study or bar chart. 4

Experiment 2 To perform PERT/CPM of any assigned live construction project. 4

Experiment 3 To carry out an assignment related to inventory of material management (preferably computer/software based). 4

Experiment 4 To study and prepare the assignment of working principles of prominent construction equipment (at least four equipment are expected). 4

Experiment 5 To prepare a research based assignment on construction methodologies. 4

Experiment 6 To perform field visit of live major construction project/infrastructure and submission of report thereof. 4

Course Outcome (CO):

1 The students will able to study various elements of project planning and management.
2 The students will able to carryout the study of material/personnel management.
3 The students will able to study the different methods of construction and infrastructures.
4 The students will able to study the live construction projects through field visits.

Mapping of CO and PO

	a	B	C	D	e	f	g	h	i	j	k
CO1	√	√		√		√	√	√	√	√	
CO2	√	√	√	√	√	√		√		√	√
CO3	√	√	√		√		√		√	√	√
CO4	√			√	√	√		√	√		√

Assessment Pattern

Knowledge Level	TA	ESE
Remember	8	8
Understand	10	10
Apply	10	10
Analyze	10	10
Evaluate	6	6
Create	6	6
Total	50	50

Government College of Engineering Karad
First year M. Tech. Civil Construction Management
CM 201: Construction Techniques

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60

Course Objectives

1 To study dams and its construction techniques
2 To study river training works and off shore structures construction techniques
3 To study forces and design in vibration controlled foundation
4 To study pre fabricated construction techniques
5 To study concreting techniques
6 To study formwork, retaining wall construction techniques

Course Contents		**Hours**
Unit I	**Dams:** Type of dams, their foundations constructions of dam, seepage from embankment dams, seepage from impound ants. Techniques of seepage control, preventive measures, piping phenomenon.	8
Unit II	**River Training Works**: Design criteria for guide bunds, design criteria of repelling spurs, special types of cut-offs, pitched Islands, bank protection techniques. **Off-shore Structures**, types, techniques of construction and their maintenance.	8
Unit III	**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.	8
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	**Concrete and Concreting Methods** : Mass concrete and its temperature control, special types of concrete. Like concrete, shotcrete pumpcrete etc., guniting, techniques of prestressing, testing of concrete (Destructive and Non-Destructive)	8
Unit VI	**Formwork:** Types components, design of formwork, special types of formwork such as slip form : Removal of formwork, cost aspect of formwork. (A) Retaining Walls: Types, construction techniques. (B) Steel Construction: Planning and field operations, various joints. (C) Preservation of structures in various climatic conditions.	8

Course Outcome (CO):

1 Understand dams and its construction techniques
2 Understand river training works and off shore structures construction techniques

3 Determination of forces and design in vibration controlled foundation
4 Understand pre fabricated construction techniques
5 Understand concreting techniques
6 Understand formwork, retaining wall construction techniques

Text Books

1 Modern Foundations – N. P. Kurion (Tata Megraw Hill Publication)
2 Foundation Engg. – G. A. Leondards (Megraw Hill Publication)
3 Cofferdams – White and Prentice (Columbia University Press, Newyork)
4 Construction Planning Equipments and Methods – Peurifoy
5 Handbook of Civil Engg.- Stubbs

References

1 Modern foundation Methods – R. Hammond (Oxford & IBH Publication)
2 Foundation Engg. by S. P. Behma (Tata Megraw Hill Publication)
3 Construction & Geotechnical Methods in foundation Engg. – R. M. Kocmc (Megraw Hill Publication)
4 Formwork Design and Construction _ Wynn
5 Formwork Construction and Practice – John G. Richardson
6 The Engg. of large Dams (vol I & II) by Hemy H. Thomas
7 Foundation Engg. – Tomlinson
8 Design of Irrigation Structures, Varshaney, Gupta
9 Introduction to off-shore structure – D. Fautner, M. I. Cowlines & P. A. Frieze
10 Seepage and leakage from Dams and importments by Kelly Volpe
11 Concrete Technology by Nevilee
12 Prefaricated Construction by Mokk

Mapping of CO and PO

	A	B	C	d	e	f	g	h	i	j	k
CO1	√	√	√	√	√	√	√	√	√	√	√
CO2	√	√	√	√	√	√	√	√	√	√	√
CO3	√	√	√	√	√	√	√	√	√	√	√
CO4	√	√	√	√	√	√	√	√	√	√	√
CO5	√	√	√	√	√	√	√	√	√	√	√
CO6	√	√	√	√	√	√	√	√	√	√	√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	√	√	√	√
Understand	√	√	√	√
Apply	√	√	√	√
Analyze	√	√	√	√
Evaluate	√	√	√	√
Create	√	√	√	√
Total	15	15	10	60

Government College of Engineering Karad
First year M. Tech. Civil Construction Management
CM 202: Legal Aspects In Construction Engineering

Teaching Scheme		Examination Scheme	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60

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 from of building contracts. The right of building owner, Third parties, Indian contract Act, Sale of Goods Act, Professional Ethics.	10
Unit II	**Arbitration and Award :** Indian Arbitration Act, Arbitration Agreement, Conduct of Arbitration, Power and Duties of Arbitration, Rules of Evidence, Preparation and publication of ward, 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	8
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.	8
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

References

1 Indian contract Act Avatar singh
2 Indian contract Act Jhamb

Mapping of CO and PO

	a	b	C	d	e	f	g	h	i	j	k
CO1	√	√		√		√	√	√		√	√
CO2		√	√	√	√				√		
CO3	√	√	√			√	√	√		√	√
CO4	√	√	√		√	√	√		√	√	

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	10
Understand	5	3	2	10
Apply	2	3	3	10
Analyze	3	3	1	10
Evaluate	2	2	1	10
Create	0	1	1	10
Total	15	15	10	60

Government College of Engineering Karad
First year M. Tech. Civil -Construction Management
CM203: Management Information Systems for Construction Management

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60

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 aware about various options available for financing projects

Course Contents		**Hours**
Unit I	**Introduction** - Definition Role, Impact, Evolution, Structure of MIS in organization.	5
Unit II	**Decision Making -** Programmed and Non programmed decisions, Stages in decision making, Concepts of Information, Systems Theory, Decision Support System	6
Unit III	**Computers in MIS -** Hard ware, Software, Communication networks Office automation.	4
Unit IV	**Data Management -** Collection and analysis of data, Database Management system.	5
Unit V	**Applications of MIS** - Materials, Finance, HRD, Marketing and Service sector.	6
Unit VI	**Implementation and Maintenance of MIS** - Socio-technical approach, Factors of success and failure, Quality assurance of MIS.	4

Course Outcome (CO):

1 Understand concepts of MIS
2 Able to use MIS for decision making in projects
3 Understand the importance of MIS for project success
4 Able to learn various applications of MIS in construction

Text Books

1 Management Information System, Jawadekar W. S. (Tata McGraw Hill)
2 Information System For Modern Management, Robert G. Murdick. Joel E Ross, Janes R. Claggeett.
3 Management Information System, Jerome Kanter.
4 The Management Information System Gary W. Dickson Janes C. Weatherbe, McGraw Hill Book company.

References

1 Management Information System, S. Sadagopan.

2 Management Information System, George Scoff, McGraw Hill Book company.

3 Principles of Information System Management, Ward Jonh, Routledge.

Mapping of CO and PO

	a	B	C	d	e	f	g	h	i	j	k
CO1	√	√	√	√	√	√	√	√	√	√	√
CO2	√	√	√	√	√	√	√	√	√	√	√
CO3	√	√	√	√	√	√	√	√	√	√	√
CO4	√	√	√	√	√	√	√	√	√	√	√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	√	√	√	√
Understand	√	√	√	√
Apply	√	√	√	√
Analyze	√	√	√	√
Evaluate	√	√	√	√
Create	√	√	√	√
Total	15	15	10	60

Government College of Engineering Karad
First year M. Tech. Civil -Construction Management
CM204: Computational Methods & Optimization Techniques

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60

Course Objectives

1 To study the different computational methods
2 To study optimisation techniques
3 To study applications of computational methods
4 To study the different applications of optimisation 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.	8
Unit III	**Numerical Differentiation and Numerical Integration -** Numerical solutions of ordinary differentiate equations, systems of ODEs, Runge-kutta method.	8
Unit IV	**Optimization–** Types of optimization models, objective function and constraints set, Convex and Concave functions, Objectives of optimization models.	8
Unit V	Linear P**rogramming** - Simplex Method, Duality, Sensitivity Analysis, Transportation and assignment models. Non Linear Programming- Single variable and multiple variable, Optimization, Quadratic Programming.	8
Unit VI	**Dynamic Programming** – Principle of optimality. Integer Programming - Cutting Plane Algorithm. Simulation – Monto Carlo Method.	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 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 Operation Researh by Taha.
2 Numerical Methods for engineers, Chapra and Kanale
3 Quantitave Techniques - J. K. Sharma

References

1 Optimisation – S. S. Rao.
2 Numerical Methods – E Balaguruswamy.

Mapping of CO and PO

	a	b	C	d	e	F	g	h	i	j	k
CO1	√	√	√	√		√	√	√	√	√	√
CO2	√	√	√	√	√		√	√	√	√	√
CO3	√	√	√		√	√	√		√	√	√
CO4	√	√	√	√		√	√	√	√	√	

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	0	10
Understand	3	3	2	10
Apply	3	3	2	10
Analyze	3	2	2	10
Evaluate	2	3	1	10
Create	1	1	3	10
Total	15	15	10	60

Government College of Engineering Karad
First year M. Tech. Civil -Construction Management
CM215: Elective-I Human Resource Development

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60

Course Objectives

1 Human Resources Development in construction industry

2 Job description and future needs

3 Recruitment procedures

4 Training & Development

5 Welfare of employees

6 Management relations

Course Contents		**Hours**
Unit I	**Introduction:** Definition, history of human resource management, objectives sections, HRD in construction industry, status of construction labour.	**8**
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.	**8**
Unit III	**Recruitment and Selection:** Selecting the project manager and project team, external and internal recruitment, data gathering methods, skill requirements of construction personnel.	**8**
Unit IV	**Training and Development:** The training process, individual and organizational development, performance appraisal, use of performance appraisal information, establishing the evaluation system.	**8**
Unit V	**Employee Benefits:** Employee health and safety, wage and salary, administration, incentive system, wages of construction industry, retirement and pensions.	**8**
Unit VI	**Employee Management Relations:** Collective bargaining, trade unions, connected with construction with construction industry, trade unions act, Labour Welfare Act, Payment of Wages Act, Worker's compensation Act, Contract Labour Act, management on conflict.	**8**

Course Outcome (CO):

1 The students will able to know the history of HRD and necessity of HRD in Construction Industry.
2 The students will able to plan human resource in construction activity.
3 The students will able to study about recruitment and selection
4 Students will be aware of different training process
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

References

1 Human Behavior at work Keith Davis, Tata McGraw Hill Pub. company

Mapping of CO and PO

	a	b	C	d	e	f	g	h	i	j	k
CO1	√	√	√	√		√	√	√	√	√	√
CO2	√	√	√	√	√		√	√	√	√	√
CO3	√	√	√		√	√	√		√	√	√
CO4	√	√	√	√		√	√	√	√	√	

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	0	10
Understand	3	3	2	10
Apply	3	3	2	10
Analyze	3	2	2	10
Evaluate	2	3	1	10
Create	1	1	3	10
Total	15	15	10	60

Government College of Engineering Karad
First Year M. Tech. Civil-Construction Management
CM:225 Entrepreneurship In Construction

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hrs/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60

Course Objectives

1 To understand the importance of entrepreneurship
2 Cost and time scheduling
3 Feasibility of projects
4 Analysis of financial practices
5 Development of Civil engineering entrepreneurship

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.	8
Unit III	**Project Appraisal**: Technical feasibility, commercial soundness, financial capability, economic viability, managerial aspects.	8
Unit IV	**Financial Analysis:** Resources, loans, terms and conditions, working capital, repayment, security, financial institutes.	8
Unit V	**Problems Faced by Enterprise**: Marketing, finance and taxes, raw and finished materials etc.	8
Unit VI	**Civil Engineering Entrepreneurship**: Small scale, large scale, optimum size, typical areas and preparation of specialized aspects.	8

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.

References

1 Entrepreneurship, Gort of India Publ

Mapping of CO and PO

	a	b	c	d	e	f	g	h	i	j	k
CO1		√	√	√	√		√	√	√	√	√
CO2			√	√		√		√	√	√	√
CO3	√	√	√	√	√	√	√	√	√	√	√
CO4	√		√	√		√		√	√	√	
CO5	√		√	√				√	√	√	

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	2		24
Understand	3	3	4	12
Apply	3	4	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	
Create				
Total	15	15	10	60

Government College of Engineering Karad
First Year M. Tech. Civil-Construction Management
CM:235 Maintenance And Rehabilitation Of Structures

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hrs/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60

Course Objectives

1 Serviceability And Durability Quality assurance
2 Maintenance And Repair Strategies
3 Materials For Repair Special concretes
4 Techniques of repairs
5 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 Definitions : Maintenance, repair and rehabilitation, Facets of Maintenance importance of Maintenance Preventive measures on various aspects Inspection, Assessment procedure for evaluating a damaged structure causes of deterioration testing techniques.	8
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.	8
Unit IV	Techniques For Repair Rust eliminators and polymers coating for rebars during repair foamed concrete, mortar and dry pack, vacuum concrete,	8
Unit V	Grout, Gunite and Shotcrete Epoxy injection, Mortar repair for cracks, shoring and underpinning. Maintenance and rehabilitation of bridges, dams and offshore structures.	8
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.	8

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.

References

1 Repair of Concrete Structures R.T.Allen and S.CEdwards Blakie and Sons, UK, 1987.

Useful Links

1

Mapping of CO and PO

	a	B	C	d	e	f	g	h	i	j	k
CO1		√	√	√	√		√	√	√	√	√
CO2			√	√		√		√	√	√	√
CO3	√	√	√	√	√	√	√	√	√	√	√
CO4	√		√	√		√		√	√	√	
CO5	√		√	√				√	√	√	

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	2		24
Understand	3	3	4	12
Apply	3	4	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	
Create				
Total	15	15	10	60

Government College of Engineering Karad
First year M. Tech Civil - Construction management
CM 206: Laboratory Practice

Teaching Scheme		Examination Scheme	
Practical	4 hrs/week	**TA**	50
Total Credits	2	**ESE**	50

Course Objectives

1 To expose the students to various elements of construction techniques of major works.
2 To prepare the contract document along with arbitration clauses
3 To prepare computer based MIS of assigned/selected construction project.
4 To study the live construction projects through field visits.

Course Contents

Students are expected to carryout any five of the following :

Expt.1 To perform the assignment related to elements of construction techniques of major works, namely dams, river training works, tunnelling, docks & harbours, prefabricated structures, modular housing (any two). 4

Expt.2 To prepare the complete the tender document of a major construction/infrastructure project along with terms and condition(including arbitration clauses). 4

Expt.3 To prepare and design computer based MIS of a given/assigned/selected construction projects. 4

Expt.4 To carryout and assignment related to construction project using anyone methods of optimization techniques (preferably computer based). 4

Expt.5 To prepare a an assignment of selection criteria for different cadre employed in construction industry (preferably major projects). 4

Expt.6 To perform field visit of live major construction project/infrastructure and submission of report thereof. 4

Course Outcome (CO):

1 The students will able to aware of various elements of construction techniques of major works.
2 The students will able to study the preparation of contract document along with arbitration clauses
3 The students will able to aware of to MIS of construction project.
4 The students will able to study the live construction projects through field visits.

Mapping of CO and PO

	a	b	C	D	e	f	G	h	i	j	k
CO1	√	√		√		√	√	√	√	√	
CO2	√	√	√	√	√	√		√		√	√
CO3	√	√	√		√		√		√	√	√
CO4	√			√	√	√		√	√		√

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	CA	ESE
Assembling	√	√		√	√	√	05	05
Testing	√	√	√	√	√	√	05	05
Observing		√	√	√	√	√	10	10
Analyzing	√	√	√	√	√	√	10	10
Interpreting	√	√	√	√		√	05	05
Designing	√	√	√		√	√	10	10
Creating	√	√		√	√	√	05	05
Deducing conclusions	√	√	√	√	√	√	50	50

Government College of Engineering Karad
First Year M. Tech. Civil-Construction management
CM 207: Seminar-I

Seminar Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	50
Total Credits	1		

Course Objectives

1 Post graduate students should know the state of the art in the relevant subjects of structural engineering.
2 Post graduate students should know the experimental procedure to validate theories related to structural engineering.
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 structural 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 structural engineering.
2 Post graduate will know the experimental procedure to validate theories related to structural engineering.
3 Post graduate will be able to prepare and present research project.

Mapping of CO and PO

	A	b	C	D	e	f	G	h	i	j	K
CO1	√	√	√	√	√	√	√	√		√	√
CO2	√	√	√	√	√		√	√	√	√	√
CO3	√	√	√	√	√	√	√	√	√	√	√
CO4	√	√	√	√				√	√	√	

Assessment Pattern

Knowledge Level	CT1	CT2	CA/TA	ESE
Remember			09	
Understand			09	
Apply			08	
Analyze			08	
Evaluate			08	
Create			08	
Total			50	

Government College of Engineering Karad
Second Year M. Tech. Civil-Construction management
CM 301: Seminar-II

Laboratory Scheme
Practical 2 Hrs/week
Total Credits 1

Examination Scheme
CA 50

Course Objectives

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

Mapping of CO and PO

	A	b	C	D	e	F	g	h	i	j	k
CO1	√	√	√	√	√		√	√	√		√
CO2	√	√	√	√	√	√	√	√	√	√	
CO3	√	√	√	√	√	√		√	√	√	√
CO4	√	√	√	√				√		√	√

Assessment Pattern

Knowledge Level	CT1	CT2	CA/TA	ESE
Remember			09	
Understand			09	
Apply			08	
Analyze			08	
Evaluate			08	
Create			08	
Total			50	

Government College of Engineering Karad
Second Year M. Tech. Civil-Construction management
CM 302: Dissertation Phase-I

Laboratory Scheme | **Examination Scheme**
Practical 20 Hrs/week | **TA/CA** 100
Total Credits 10

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

Mapping of CO and PO

	a	b	C	d	e	f	g	h	i	j	k
CO1	√	√	√	√	√		√	√	√	√	√
CO2	√	√	√	√	√	√	√	√	√	√	
CO3	√	√	√	√		√	√	√	√	√	√
CO4	√	√	√	√				√			

Assessment Pattern

Knowledge Level	CT1	CT2	CA/TA	ESE
Remember			18	
Understand			17	
Apply			16	
Analyze			17	
Evaluate			16	
Create			16	
Total			100	

Government College of Engineering Karad
Second Year M. Tech. Civil-Construction management
CM 401: Dissertation Phase-II

Laboratory Scheme		**Examination Scheme**	
Practical	30 Hrs/week	**TA/CA**	100
Total Credits	10	**ESE**	200

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 200 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. Please see Appendix- C of Rules & Regulation For Further information.

List of Submission

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

Course Outcome(CO):

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

Mapping of CO and PO

	a	b	c	d	e	f	g	h	i	j	k
CO1	√	√	√	√	√		√	√	√		√
CO2	√	√	√	√	√	√	√	√	√	√	
CO3	√	√	√	√	√	√	√	√	√	√	√
CO4	√	√	√	√				√			

Assessment Pattern

Knowledge Level	CT1	CT2	CA/TA	ESE
Remember			18	36
Understand			17	34
Apply			16	32
Analyze			17	34
Evaluate			16	32
Create			16	32
Total			100	200