Government College of Engineering, Karad

First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)

CM 2101 Construction Project Management

Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
		Duration of ESE	02.30hrs

Course Outcomes (CO) : Students will able to

1. Understand how site organization is carried out.
2. Apply knowledge of various material and personnel management techniques.
3. Analyse SQC charts, sampling techniques and understand importance of quality and safety in construction.
4. Carry out network analysis using various techniques.

	Course Contents	CO	Hours
Unit 1	**Site Organization:** Organizational structures for construction field, Site layout, Services required on site.	CO1	(06)
Unit 2	**Material Management:** Functions, Inventory control, EOQ, ABC analysis, Estimating requirements, Procurement and storage of materials.	CO2	(08)
Unit 3	**Personnel Management:** Functions, Special characteristics, Manpower planning, Recruitment, Placement, Training and induction, Performance appraisal, Relevant labour laws.	CO2	(06)
Unit 4	**Construction Quality Management:** SQC charts, Sampling techniques, Quality circles, ISO 9000, Management aspects.	CO3	(06)
Unit 5	**Safety in Construction:** Safety Requirements, Safety and health codes, Occupational diseases, Economic aspects, Management of accidents, Safety department.	CO3	(06)
Unit 6	**Network Analysis:** Network compression, Resource allocation, Cost control, Monitoring of projects, PERT in construction projects.	CO4	(08)

Text Books

1. Principles of Management, KOONTZ AND O DONNEL.
2. Personal Management and Industries Relations, DALE
3. Critical Path Methods in Construction ANTILL and WOODHEADS

Reference Books

1. Accounting for management, S. K. BHATTARCHARYA
2. Principles of Management and Personal Management, A. S. DESHPANDE

Useful Links

1. https://swayam.gov.in/
2. https://nptel.ac.in/
3. https://www.youtube.com/user/nptelhrd
4. https://online.stanford.edu/
5. https://www.mooc-list.com/tags/civil-engineering
6. https://www.courses.com/civil-engineering
7. www.khanacademy.org

Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	3	-	1	-	-	-
CO 2	-	-	-	2	-	3
CO 3	1	-	-	-	2	-
CO 4	2	-	-	1	-	1

DEPARTMENT OF CIVIL ENGINEERING Board of Studies Year 2025-26 GCE KARAD

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Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

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Government College of Engineering, Karad

First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)

CM 2102 Construction Equipment

Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
		Duration of ESE	02.30hrs

Course Outcomes (CO) : Students will able to

1.	Understand working of various excavating, hauling, compacting, conveying, hoisting and pile driving equipment.
2.	Evaluate rating and output construction equipment, compute cycle time of operations.
3.	Select equipment for excavation, compacting, pile driving, tunneling and concreting.
4.	Apply the knowledge of equipment management.

	Course Contents	CO	Hours
Unit 1	**Excavating Equipment:** 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 Equipment: Tractor Dumpers, Trailers, Bulldozer, Scrapers, Operation cycles times, Matching of Excavating and hauling equipment.	**CO1**	**(10)**
Unit 2	**Compacting Equipment:** Properties of soil, Soil stabilization, Soil compaction, Different types of compacting equipment - Rollers, Sheep foot rollers, pneumatic rollers, vibratory rollers, vibrating plates/ shoes. Vibratory compaction.	**CO1, CO2**	**(06)**
Unit 3	**Conveying and Hoisting Equipment:** Different types of conveyors, Power requirement, Damages during operations, Economy of transportations, Cableways and Ropeways, Different types of hosting equipment - winch, derricks and cranes. Rating of cranes and power requirement of cranes.	**CO1, CO2**	**(08)**
Unit 4	**Piles and Pile driving equipment:** Pile Classifications and types, Pile driving and extracting equipment, Pile driving rigs, Pile driving hammers, Rating of pile hammers, Hammer accessories, Pile extractors. Concrete Mixers and Vibrators,	**CO3**	**(06)**
Unit 5	**Tunneling:** Methods of tunnelling, Equipment for conventional tunnelling, Jumbo, Explosives, Temporary & permanent support, Lining, Mucking Equipment, Moles and use of laser beams to guide moles, Ventilations of tunnels. Use of TBM"s	**CO3**	**(06)**
Unit 6	**Equipment Management :** Selection of equipment, Advantages and limitations of using machines, Planning of equipment – buying Vs hiring, Cost analysis, Economic life and Replacement, Preventative maintenance, System approach to planning. Problems of Equipment Management	**CO3, CO4**	**(08)**

Text Books

1.	Construction Planning, Equipment and methods – Peurifoy-Tata McGraw Hill Publication
2.	Construction Equipment Planning and Applications – Dr. Mahesh Varma
3.	Construction Technology by Roy Chudley and Roger Greeno, Prentice Hall, 2005

Reference Books

1.	Manuals, brochures, publications from construction companies, firms etc.
2.	

Useful Links

1.	https://swayam.gov.in/
2.	https://nptel.ac.in/
3.	https://www.youtube.com/user/nptelhrd
4.	https://online.stanford.edu/
5.	https://www.mooc-list.com/tags/civil-engineering
6.	https://www.courses.com/civil-engineering
7.	www.khanacademy.org

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Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	1	1	-	3	-
CO 2	-	1	1	3	-	-
CO 3	3	-	-	2	-	2
CO 4	2	-	-	1	-	3

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

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First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)

CM 2113 Computational Methods and Optimization Techniques

Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
		Duration of ESE	02.30hrs

Course Outcomes (CO) : Students will able to

1. Understand the concept of error and its propagation
2. Solve linear, nonlinear and differential equations using various methods.
3. Apply optimization techniques in problems of engineering and technology
4. Apply linear programming and dynamic programming to solve mathematical models.

	Course Contents	CO	Hours
Unit 1	**Error and its Propagation** - Solving non-linear equations, curve fitting, Linear and non-linear regression, Least squares regression, Gauss- Newton method, Interpolation, Statistical concepts, Linear correlation	**CO1**	**(08)**
Unit 2	**Linear & Nonlinear Equations** - Solution of simultaneous linear and non-linear equations, direct and iterative methods	**CO2**	**(06)**
Unit 3	**Numerical Differentiation and Numerical Integration** - Numerical solutions of ordinary differential equations, systems of ODEs, Runge-kutta method.	**CO2**	**(07)**
Unit 4	**Optimization**– Types of optimization models, objective function and constraints set, Convex and Concave functions, Objectives of optimization models.	**CO3**	**(06)**
Unit 5	**Linear Programming** - Simplex Method, Duality, Sensitivity analysis, Transportation and assignment models. Nonlinear programming- Single variable and multiple variable, Quadratic Programming.	**CO4**	**(07)**
Unit 6	**Dynamic Programming** – Principle of optimality. Integer programming Cutting plane algorithm. Simulation – Monto Carlo Method.	**CO4**	**(06)**

Text Books

1. Operation Researh by Taha.
2. Numerical Methods for engineers, Chapra and Kanale
3. Quantitate Techniques - J. K. Sharma

Reference Books

1. Optimisation – S. S. Rao.
2. Numerical Methods – E Balaguruswamy.
3. Topics in Management Science – Markland

Useful Links

1. https://swayam.gov.in/
2. https://nptel.ac.in/
3. https://www.youtube.com/user/nptelhrd
4. https://online.stanford.edu/
5. https://www.mooc-list.com/tags/civil-engineering
6. https://www.courses.com/civil-engineering
7. www.khanacademy.org

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Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	3	1	1	-	-	-
CO 2	-	-	1	1	-	3
CO 3	2	1	-	3	-	-
CO 4	-	-	1	2	-	3

Assessment Pattern: **(with revised Bloom's Taxonomy)**

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

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Government College of Engineering, Karad				
First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)				
CM 2123 Human Resource Development in Construction				
Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/week		MSE	20
Tutorials	-		ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02.30hrs

Course Outcomes (CO) : Students will able to

1. Understand importance of HRD and HR planning in construction industry.
2. Know how recruitment, selection, training process is carried out.
3. Apply knowledge of performance appraisal and various employee benefits.
4. Apply knowledge of various acts to develop relation between employee and management

	Course Contents	CO	Hours
Unit 1	**Introduction**: Definition, history of human resource management, Objectives, HRD in construction industry, Status of construction labour in India.	**CO1**	**(07)**
Unit 2	**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.	**CO2**	**(07)**
Unit 3	**Recruitment and Selection**: Selection of project manager and project team, External and internal recruitment, Data gathering methods, Skill requirements of construction personnel.	**CO3**	**(06)**
Unit 4	**Training and Development**: Training process, Individual and organizational development, Performance appraisal and use of performance appraisal information, Establishing the evaluation system.	**CO3**	**(07)**
Unit 5	**Employee Benefits**: Employee health and safety, Wage and salary administration, Incentive system, Wages in construction industry, Retirement and pensions.	**CO4**	**(07)**
Unit 6	**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 of conflict.	**CO4**	**(06)**

Text Books

1. Personnel and 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

Reference Books

1. Construction Planning and Management P.S. Gahlot
2. Personnel Management Managing Human Resources, Paul S., Greenlaw, John P. Kohl harper and Row Pub

Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	-	2	-	1	-	1
CO 2	-	3	-	1	2	2
CO 3	3	-	1	-	1	2
CO 4	2	-	1	-	-	2

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Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

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First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)

CM 2114 Advanced Construction Techniques

Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
		Duration of ESE	02.30hrs

Course Outcomes (CO) : Students will able to

1.	Understand composite construction process and design formwork techniques.
2.	Apply the knowledge of new construction material, land reclamation techniques and slip formwork.
3.	Apply the knowledge of construction techniques of power plants, retaining structures, concrete pavements and rehabilitation of bridges.
4.	Apply knowledge of advanced techniques like compacted concrete reinforced earth construction etc.

	Course Contents	CO	Hours
Unit 1	**Composite Construction:** Composite Vs Non composite action, Composite steel - concrete construction. **Formwork:** Materials for formwork, special types of formwork, design of formwork.	**CO1**	**(07)**
Unit 2	**New Materials for construction:** such as Geosyntetics, 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	**CO2**	**(07)**
Unit 3	**Construction of Power Plant:** Generation, structures, Atomic Power Stations, Thermal Power Stations, Wind- Mills	**CO3**	**(06)**
Unit 4	**Rehabilitation of Bridges:** Necessity and methods of strengthening, Preservation of Bridges. **Retaining Structures:** Diaphragm walls, Advanced methods of construction.	**CO3**	**(06)**
Unit 5	**Advanced Techniques:** Compacted concrete, Vaccum, Ready Mix, Concrete dewatering in concrete slab construction, Reinforced earth construction, Foundation strengthening.	**CO4**	**(07)**
Unit 6	**Construction of Concrete Pavement:** Vacuum processing, Revibrated concrete, Roller – compacted concrete. **Slip Formwork:** Slip form paving in pavement construction using wet mix macadam in road construction.	**CO4**	**(07)**

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.

Reference Books

1.	Water Power Engineering by Dandekar, Sharma.
2.	Bridge Engineering by Ponnuswamy,
3.	Monthly: Civil Engineering & Construction Review
4.	Handbook of composite construction Enginnering by G. M. Subnis.
5.	Water Power Engineering by Dandekar, Sharma.

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Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	3	2	-	1	-	-
CO 2	2	-	1	3	1	-
CO 3	3	2	-	1	-	1
CO 4	-	-	1	3	2	-

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

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Government College of Engineering, Karad				
First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)				
CM 2124 Repair and Rehabilitation of Structures				
Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/week		MSE	20
Tutorials	-		ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02.30hrs

Course Outcomes (CO) : Students will able to

1.	Understand various techniques of serviceability and durability of structures.
2.	Apply maintenance and repair strategies and identify materials for repair.
3.	Apply knowledge of corrosion protection, grouting, gunting and shotcreting for choosing feasible techniques
4.	Identify types of problem and suggest techniques of repairs for deflection, cracking, etc.

	Course Contents	CO	Hours
Unit 1	**Serviceability and Durability of Concrete Structures**: 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, Cathode protection.	**CO1**	**(07)**
Unit 2	**Maintenance and Repair Strategies:** Definitions - 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.	**CO2**	**(07)**
Unit 3	**Materials for Repair**: Special concretes and mortar, Concrete chemicals, Special elements for accelerated strength gain , Expansive cement, Polymer concrete, Sulphur infiltrated concrete, Ferro cement, Fibre reinforced concrete.	**CO2**	**(06)**
Unit 4	**Techniques for Repair:** Rust eliminators and polymers coating for rebars during repair, Foamed concrete, Mortar and dry pack, Vacuum concrete.	**CO3**	**(06)**
Unit 5	**Grout, Gunite and Shotcrete:** Epoxy injection, Mortar repairfor cracks, Shoring and underpinning. Maintenance and rehabilitation of bridges, dams and offshore structures.	**CO3**	**(07)**
Unit 6	**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.	**CO4**	**(07)**

Text Books

1.	Concrete Structures Denison Campbell
2.	Training Course notes on Damage Assessment and repair in Low Cost Ho using Santhakumar
3.	Repair of Concrete Structures R.T. Allen and S.C Edwards Blakie and Sons

Mapping of Cos and Pos

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	3	-	-	1	-	2
CO 2	2	-	2	-	-	-
CO 3	1	-	-	-	2	3
CO 4	2	1	-	2	-	1

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Assessment Pattern: **(with revised Bloom's Taxonomy)**

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

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First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)

CM 2134 Ground Improvement Techniques

Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
		Duration of ESE	02.30hrs

Course Outcomes (CO) : Students will able to

1.	Understand various aspects of ground improvement techniques.
2.	Choose suitable site of constructions.
3.	Understand the theoretical background for different ground improvement techniques
4.	Design and apply ground improvement techniques.

	Course Contents	CO	Hours
Unit 1	**Ground Improvement:** Definition, objectives, classification. Suitability of different techniques, Preloading - need, preloading without vertical drain, preloading with vertical drain, Dynamic consolidation.	**CO1**	**(07)**
Unit 2	**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	**CO1**	**(06)**
Unit 3	**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.	**CO2**	**(07)**
Unit 4	**Soil Stabilization:** Cement, lime, fly ash, Factors affecting. Grouting - classification, types of grouts, Equipment, design and layout, applications, case histories.	**CO3**	**(06)**
Unit 5	**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.	**CO3, CO4**	**(07)**
Unit 6	**Geo Synthetics**: Types, functions, Application of geo synthetics: reinforcement, separator, filter, drainage, Selection of geo synthetics; damage and durability of geo synthetics.	**CO4**	**(08)**

Text Books

1. Ground improvement techniques by Dr. P Purushothma Raj
2. An introduction to ground improvement engineering by Satyendra Mittal
3. Ground improvement techniques by Nihar Ranjan Patra

Reference Books

1. Earth reinforcement and soil structures by Colin JFPJones
2. An introduction to soil reinforcement and geosynthetics by G. L.Sivakumar Babu Geotechnical engineering by Shashi K Gulhati and Manoj Datta

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Mapping of COs and POs

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	-	2	-	-	2
CO 2	3	-	1	-	2	-
CO 3	2	-	1	3	-	1
CO 4	1	2	-	1	2	-

Assessment Pattern: **(with revised Bloom's Taxonomy)**

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

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First Year (Sem – I) M. Tech. All (CM/SE/HPE/DE/PE/EPS/CSE)

RM2105: Research Methodology

Teaching Scheme		Examination Scheme	
Lectures	02 Hrs./week	MSE	20
Tutorials	--	ISE	20
Total Credits	02	ESE	60
		Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO): Students will able to

1.	Understand basic concepts of various research areas, identify and define appropriate research topics concerned to Engineering and related areas.
2.	Prepare a research proposal to investigate the problem and achieve results/outcomes from the project.
3.	Develop skill of writing/publishing a research paper/topic in conferences and reputed journals.
4.	Illustrate need of information about Intellectual Property Right, Patent rights.

	Course Contents	CO	Hours
Unit 1	**Introduction:** Meaning and objectives of research, Types of research, Research approaches, Research process, Research problem, Selection of research problem, defining research problem, Literature review, Meta-analysis, Effect sizes, Integrating research findings, identification of Research gaps, Errors in research.	CO1	(04)
Unit 2	**Data Collection and Analysis:** Primary data collection through observations and interviews, Questionnaire surveys, Secondary data collection, Data processing, Measures of central tendency and dispersion, mean, median, mode, range, variance, standard deviation, inter-quartile range, histogram.	CO1	(04)
Unit 3	**Research Design:** Meaning, need, and features of good design, Dependent, independent, and extraneous variables, Experimental and control groups, Treatments, Experiment, Research designs in exploratory studies, Research designs in descriptive studies, Experimental research designs **Sampling:** Need for sampling, Population, Normal distribution, Steps in sampling, sample size, errors in sampling, measurement techniques.	CO2	(05)
Unit 4	**Hypothesis Testing**: Null and alternative hypothesis, Level of significance, Type I and type II error, Two-tailed and one-tailed tests, Procedure of hypothesis testing, Preparation of ANOVA Table and calculation of F-ratio.	CO3	(05)
Unit 5	**Effective Technical Writing:** Research proposal, Technical Paper writing, Review paper, Report writing, Referencing **Research and publication Ethics:** Plagiarism, Citation, Journal indexing, Open access publishing. SCI journals, research ethics, principals and practice.	CO3	(05)
Unit 6	**IPR Patent Rights:** Patents, Trade and Copyright, Process of patenting, Licensing and transfer of technology, Geographical indications. New developments in IPR	CO4	(05)

Text Books

1. C.R. Kothari, "Research Methodology Methods and Techniques, Second revised edition, New Age International Publisher, 2006 (Units 1 to 4)
2. Montgomery, Douglas C. & Runger, George C. "Applied Statistics & Probability", 2007 (Unit 2 &3)
3. S. K. Yadav, "Research and Publication Ethics", 1st edition, Springer publication, 2024 (Unit 5, 6)
4. Paneer Selvam – Research Methodology

Reference Books

1. Ranjit Kumar, (2006), "Research Methodology- A Step-By-Step Guide for Beginners", Pearson Education, Delhi
2. Trochim, William M.K., "Research Methods", Biztantra, Dream tech Press, New Delhi, 2nd Edition, 2003
3. Kalyan. C. Kanakala, "Fundamentals of Intellectual Property", Asia Law House, ISBN: 9789381849514, 1st edition, 2012
4. Krishnaswamy, K. N., Sivakumar, Appa Iyer and Mathi Rajan, M. "Management Research Methodology:Integration of Principles, Methods and Techniques", Pearson Education, New Delhi, 2006
5. Donald R. Cooper, Pamela S. Schindler, "Business Research Methods", Tata McGraw-Hill Co. Ltd., 8th Edition,2006

Useful Links

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1.	https://www.explorable.com/research-methodology
2.	http://www.socscidiss.bham.ac.uk/methodologies.html
3.	http://www.humanities.manchester.ac.uk/studyskills/methodology.html
4.	http://www.palgrave.com/choosing-appropriate-research-methodologies

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	1	-	2	-	3	-
CO 2	3	-	2	-	-	1
CO 3	2	-	1	2	-	3
CO 4	-	-	1	2	-	1

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	10
Understand	5	4	10
Apply	5	4	10
Analyse	5	4	10
Evaluate	-	4	10
Create	-	-	10
TOTAL	20	20	60

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Year 2025-26
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CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)				
CM 2106 Construction Project Management Laboratory				
Teaching Scheme			**Examination Scheme**	
Practical	04 Hrs/week		ISE	25
Tutorials	-		ESE	25
Total Credits	02			
			Duration of ESE	-

Course Outcomes (CO) : Students will able to

1. Formulate project report.
2. Apply theoretical concepts of project management to a case study.

	Course Contents	CO	Hours
	Student will visit one or more construction projects and prepare a visit reports covering following aspects of projects. i. Site Organization ii. Materials Management iii. Personnel Management iv. Quality Management v. Safety Measures	**CO1, CO2**	**(40)**

Mapping of COs and Pos:

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	-	3	-	-	-	-
CO2	1	-	-	2	-	-

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

DEPARTMENT OF CIVIL ENGINEERING * GCE KARAD * Board of Studies Year 2025-26

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)				
CM 2107: Laboratory 2 (Computational Methods and Optimization Lab)				
Teaching Scheme			**Examination Scheme**	
Practical	04 Hrs/week		ISE	50
Tutorials	-		ESE	-
Total Credits	02			
			Duration of ESE	-

Course Outcomes (CO) : Students will able to

1. Formulate project report.
2. Apply theoretical concepts of Computational Methods and Optimization to a case study.

	Course Contents	CO	Hours
	Student will visit one or more construction projects and prepare a visit reports covering following aspects of Computational Methods and Optimization used on projects. i. Error and its Propagation i. Linear & Nonlinear Equations ii. Optimization iii. Linear Programming iv. Dynamic Programming	**CO1, CO2**	**(40)**

Mapping of COs and Pos:

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	2	-	-	1	-
CO2	2	1	-	2	2	-

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

DEPARTMENT OF CIVIL ENGINEERING ★ GCE KARAD ★ Board of Studies Year 2025-26

CHAIRMAN
Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)				
CM 2107: Laboratory 2 (Human Resource Development in Construction Lab)				
Teaching Scheme			**Examination Scheme**	
Practical	04 Hrs/week		ISE	50
Tutorials	-		ESE	-
Total Credits	02			
			Duration of ESE	-

Course Outcomes (CO) : Students will able to

1. Formulate project report.
2. Apply theoretical concepts of Human Resource Development to a case study.

	Course Contents	Hours
	Student will visit one or more construction projects and prepare a visit reports covering following aspects of Human Resource Development used on projects. i. Human Resource Planning ii. Recruitment and Selection iii. Training and Development iv. Employee Benefits v. Employee Management Relations	(40)

Mapping of COs and Pos:

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	2	-	-	1	-
CO2	2	1	-	2	2	-

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

DEPARTMENT OF CIVIL ENGINEERING Board of Studies Year 2025-26 GCE KARAD

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Board of Studies
Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)				
CM 2107: Laboratory 2 (Advanced Construction Techniques Lab)				
Teaching Scheme			**Examination Scheme**	
Practical	04 Hrs/week		ISE	50
Tutorials	-		ESE	-
Total Credits	02			
			Duration of ESE	-

Course Outcomes (CO) : Students will able to

1. Formulate project report.
2. Apply theoretical concepts of Advanced Construction Techniques to a case study.

	Course Contents	CO	Hours
	Student will visit one or more construction projects and prepare a visit reports covering following aspects of Advanced Construction Techniques used on projects. i. Formwork ii. New Materials for construction iii. Land Reclamation iv. Retaining Structures etc.	**CO1, CO2**	**(40)**

Mapping of COs and Pos:

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	2	-	-	1	-
CO2	2	1	-	2	2	-

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

DEPARTMENT OF CIVIL ENGINEERING Board of Studies Year 2025-26 GCE KARAD

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Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)				
CM 2107: Laboratory 2 (Repair and Rehabilitation of Structures Lab)				
Teaching Scheme			**Examination Scheme**	
Practical	04 Hrs/week		ISE	50
Tutorials	-		ESE	-
Total Credits	02			
			Duration of ESE	-

Course Outcomes (CO) : Students will able to

1.	Formulate project report.
2.	Apply theoretical concepts of Repair and Rehabilitation of Structures to a case study.

	Course Contents	**Hours**
	Student will visit one or more construction projects and prepare a visit reports covering following aspects of Repair and Rehabilitation of Structures used on projects. i. Maintenance and Repair Strategies ii. Materials for Repair iii. Techniques for Repair iv. Grout, Gunite and Shotcrete etc.	**(40)**

Mapping of COs and Pos:

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	2	-	-	1	-
CO2	2	1	-	2	2	-

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

DEPARTMENT OF CIVIL ENGINEERING Board of Studies Year 2025-26 GCE KARAD

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Department of Civil Engineering
Govt. College of Engineering, Karad.

Government College of Engineering, Karad				
First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)				
CM 2107: Laboratory 2 (Ground Improvement Techniques Lab)				
Teaching Scheme			**Examination Scheme**	
Practical	04 Hrs/week		ISE	50
Tutorials	-		ESE	-
Total Credits	02			
			Duration of ESE	-

Course Outcomes (CO) : Students will able to

1. Formulate project report.
2. Apply theoretical concepts of Ground Improvement Techniques to a case study.

	Course Contents	CO	Hours
	Student will visit one or more construction projects and prepare a visit reports covering following aspects of Ground Improvement Techniques used on projects. i. Stone Column ii. Ground Anchors iii. Soil Stabilization iv. Earth Reinforcement v. Geo Synthetics	**CO1, CO2**	**(40)**

Mapping of COs and Pos:

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	2	-	-	1	-
CO2	2	1	-	2	2	-

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

DEPARTMENT OF CIVIL ENGINEERING Board of Studies Year 2025-26 GCE KARAD

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Department of Civil Engineering
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Government College of Engineering, Karad

First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)

OE2118: Open Elective- Business Analytics

Teaching Scheme		Audit course	
Lectures	03Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
		TOTAL	100

Course Outcomes (CO): Student will be able to

1.	Students will demonstrate knowledge of data analytics.
2.	Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.
3.	Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.
4.	Students will demonstrate the ability to translate data into clear, actionable insights

Course Contents		CO	Hours
Unit 1	Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organization, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.	**CO1**	**(07)**
Unit 2	Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology	**CO2**	**(06)**
Unit 3	Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.	**CO2**	**(07)**
Unit 4	Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with aLinear Trend, Forecasting Time Series with Seasonality, Regression Model Curriculum of Engineering & Technology PG Courses [Volume -II] [29] Forecasting with Casual Variables, Selecting Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte CarleSimulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.	**CO3**	**(09)**
Unit 5	Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making.	**CO3**	**(07)**
Unit 6	Recent Trends in : Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.	**CO4**	**(04)**

Reference Books

1.	Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press.

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2.	Business Analytics by James Evans, persons Education.
Useful Links	
1.	nptel.iitk.ac.in/
2.	www.myeducationkey.com/
3.	www.wikipedia.Newton.com/

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	1	-	2	-	3	-
CO 2	3	-	2	-	-	1
CO 3	2	-	1	2	-	3
CO 4	-	-	1	2	-	1

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyse	2	2	6
Evaluate	2	2	6
Create	5	5	15
TOTAL	20	20	60

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Government College of Engineering, Karad

First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)

OE2128: Open Elective - Industrial Safety

Teaching Scheme		Audit course	
Lectures	03Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
		TOTAL	100

Course Outcomes (CO): Students will able to

1.	Discus about the importance of safety management in construction.
2.	Adapt safety culture safety assurance in construction project.
3.	Recommend various safety activities for different construction work.
4.	Describe various safety standards and acts.

Course Contents		CO	Hours
Unit 1	Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc., Safety color codes. Fire prevention and firefighting, equipment and methods.	**CO1**	**(07)**
Unit 2	Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.	**CO1**	**(07)**
Unit 3	Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.	**CO2**	**(07)**
Unit 4	Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.	**CO3**	**(07)**
Unit 5	Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing,cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance	**CO4**	**(07)**

Text Books

1.	1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2.	2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3.	3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.

Useful Links

1.	nptel.iitk.ac.in/
2.	www.myeducationkey.com/
3.	www.wikipedia.Newton.com/

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Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	1	-	2	-	3	-
CO 2	3	1	2	-	-	1
CO 3	2	-	1	2	1	3
CO 4	-	-	1	2	-	1

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyse	2	2	6
Evaluate	2	2	6
Create	5	5	15
TOTAL	20	20	60

DEPARTMENT OF CIVIL ENGINEERING
Board of Studies
Year 2025-26
GCE KARAD

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Government College of Engineering, Karad

First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)

OE2138: Open Elective : Operations Research

Teaching Scheme		Audit course	
Lectures	03Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
		TOTAL	100

Course Outcomes (CO): Students will able to

1.	Apply the dynamic programming to solve problems of discreet and continuous variables.
2.	Apply the concept of non-linear programming.
3.	Carry out sensitivity analysis.
4.	Model the realworld problem and simulate it.

	Course Contents	CO	Hours
Unit 1	Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models	**CO1**	**(07)**
Unit 2	Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models	**CO2**	**(07)**
Unit 3	Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT	**CO2**	**(07)**
Unit 4	Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.	**CO3**	**(08)**
Unit 5	Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation	**CO4**	**(07)**

Text Books

1	H.A. Taha, Operations Research, An Introduction, PHI, 2008
2	H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3	J.C. Pant, Introduction to Optimization: Operations Research, Jain Brothers, Delhi, 2008
4	Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5	Pannerselvam, Operations Research: Prentice Hall of India 2010
6	Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

Useful Links

1.	nptel.iitk.ac.in/
2.	www.myeducationkey.com/
3.	www.wikipedia.Newton.com/

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Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	1	2	-	-	1	-
CO 2	2	1	2	2	2	1
CO 3	1	2	-	-	1	-
CO 4	2	1	1	2	2	-

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyse	2	2	6
Evaluate	2	2	6
Create	5	5	15
TOTAL	20	20	60

DEPARTMENT OF CIVIL ENGINEERING Board of Studies Year 2025-26 GCE KARAD

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Government College of Engineering, Karad

First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)

OE2158 Open Elective : Composite Materials

Teaching Scheme		Audit course	
Lectures	03Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
		TOTAL	100

Course Outcomes (CO): Students will able to

1.	Property of various composite materials.
2.	Manufacturing process of metal and polymer matrix composites.
3.	Laminate strength and its failure criteria.
4.	Compare various composite material with different failure criteria.

Course Contents		CO	Hours
Unit 1	Introduction: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.	**CO1**	**(06)**
Unit 2	REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.	**CO1**	**(06)**
Unit 3	Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.	**CO2**	**(06)**
Unit 4	Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepress – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications	**CO3**	**(06)**
Unit 5	Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure.	**CO4**	**(06)**
Unit 6	Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.	**CO4**	**(06)**

Text Books

1.	Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany. 2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

Reference Books

1.	Hand Book of Composite Materials-ed-Lubin. 2. Composite Materials – K.K.Chawla. 3. Composite Materials Science and Applications – Deborah D.L. Chung. 4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi

Useful Links

1.	nptel.iitk.ac.in/
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Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	1	-	2	-	3	1
CO 2	3	-	2	-	-	1
CO 3	2	-	1	2	1	3
CO 4	-	-	1	2	1	1

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	3	3	9
Apply	3	3	9
Analyse	2	2	6
Evaluate	2	2	6
Create	5	5	15
TOTAL	20	20	60

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First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)

OE 2168 Open Elective : Waste to Energy

Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
		Duration of ESE	02.30hrs

Course Outcomes (CO): Students will able to

1. Understand the knowledge about the operations of Waste to Energy Plants
2. Carry out Techno-economic feasibility for Waste to Energy Plants
3. Analyze the various aspects of Waste to Energy Management Systems.
4. Apply the knowledge in planning and operations of Waste to Energy plants

	Course Contents	CO	Hours
Unit 1	Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors	**CO1**	**(07)**
Unit 2	Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.	**CO1, CO2**	**(06)**
Unit 3	Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.	**CO1, CO2**	**(07)**
Unit 4	Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.	**CO3, CO4**	**(06)**
Unit 5	Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification	**CO3, CO4**	**(07)**
Unit 6	Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.	**CO3, CO4**	**(08)**

Text Books

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.

Reference Books

1. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

Useful Links

1. MOOCS/ Swayam Courses on Waste to Energy

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Mapping of COs and POs

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	2	-	-	1	-
CO 2	2	1	-	2	2	-
CO 3	1	2	-	-	1	-
CO 4	2	1	-	2	2	-

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

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First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)

AU: 2119 Research Paper Writing

Teaching Scheme		Examination Scheme	
Lectures	02 Hrs/week	MSE	-
Tutorials	-	ISE	-
Total Credits	02	ESE	-
		Duration of ESE	-

Course Outcomes (CO): Students will able to

1.	Understand that how to improve your writing skills and level of readability
2.	Learn about what to write in each section
3.	Apply the skills needed while research paper writing.

	Course Contents	CO	Hours
Unit 1	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	**CO1**	**(07)**
Unit 2	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	**CO1, CO2**	**(06)**
Unit 3	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.	**CO1, CO2**	**(07)**
Unit 4	Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,	**CO2**	**(06)**
Unit 5	Skills needed when writing the Methods, skills needed when writing the Results, skills needed when writing the Discussion, skills needed when writing the Conclusions	**CO3**	**(07)**
Unit 6	useful phrases, how to ensure paper is as good as it could possibly be the first-time submission	**CO3**	**(08)**

Text Books

1.	Goldbort R (2006) Writing for Science, Yale University Press
2.	Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3.	Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman"sbook

Reference Books

1.	Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

Useful Links

1.	Moocs/ Swayam Courses on Technical English and Research paper writing.

Mapping of COs and POs

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	3	2	-	1	-
CO 2	1	3	-	-	1	1
CO 3	2	3	-	-	1	-

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First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)

AU 2129 Disaster Management

Teaching Scheme		Examination Scheme	
Lectures	02 Hrs/week	MSE	-
Tutorials	-	ISE	-
Total Credits	02	ESE	-
		Duration of ESE	-

Course Outcomes (CO): Students will able to

1.	Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2.	Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives
3.	Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations

	Course Contents	CO	Hours
Unit 1	**Introduction:** Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.	**CO1**	**(07)**
Unit 2	**Repercussions of Disasters And Hazards**: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.	**CO1, CO2**	**(06)**
Unit 3	**Disaster Prone Areas in India :** Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics	**CO1, CO2**	**(07)**
Unit 4	**Disaster Preparedness and Management:** Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.	**CO3**	**(06)**
Unit 5	**Risk Assessment:** Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People"s Participation In Risk Assessment. Strategies for Survival.	**CO3**	**(07)**
Unit 6	**Disaster Mitigation:** Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.	**CO3**	**(08)**

Text Books

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies ""New Royal book Company
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.

Reference Books

1. Goel S. L. , Disaster Administration And Management Text And Case Studies" ,Deep &Deep Publication Pvt. Ltd., New Delhi.

Useful Links

1. NPTEL/ Swayam/ Moocs on Disaster Managments.

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Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	2	1	2	1	1	3
CO 2	2	1	3	2	1	3
CO 3	1	1	2	2	3	3

DEPARTMENT OF CIVIL ENGINEERING
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Year 2025-26
GCE KARAD

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Government College of Engineering, Karad

First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)

AU 2139 Sanskrit for Technical Knowledge

Teaching Scheme		Examination Scheme	
Lectures	02 Hrs/week	MSE	-
Tutorials	-	ISE	-
Total Credits	02	ESE	-
		Duration of ESE	-

Course Outcomes (CO): Students will able to

1. Understand structure of vedic language
2. Use information about Sanskrit Literature
3. Apply technical knowledge of vedic mathematics

	Course Contents	CO	Hours
Unit 1	Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences	**CO1**	**(8)**
Unit 2	Order, Introduction of roots,Technical information about Sanskrit Literature	**CO2**	**(8)**
Unit 3	Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics	**CO3**	**(8)**

Text Books

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication

Reference Books

1. "India"s Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

Useful Links

1. Swayam/ NPTEL Courses

Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	**1**	-	-	-	-	-
CO 2	-	-	-	-	-	-
CO 3	-	-	-	-	-	-

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Government College of Engineering, Karad					
First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)					
AU 2149 Value Education					
Teaching Scheme			**Examination Scheme**		
Lectures	02 Hrs/week		MSE	-	
Tutorials	-		ISE	-	
Total Credits	00		ESE	-	
			Duration of ESE	-.	

Course Outcomes (CO): Students will able to

1.	Knowledge of self-development
2.	Learn the importance of Human values
3.	Developing the overall personality

	Course Contents	CO	Hours
Unit 1	Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements	**CO1**	**(05)**
Unit 2	Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature ,Discipline	**CO1**	**(05)**
Unit 3	Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking.	**CO2**	**(04)**
Unit 4	Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits.	**CO2**	**(04)**
Unit 5	Association and Cooperation. Doing best for saving nature, Character and Competence – Holy books vs Blind faith. Self-management and Good health. Science of reincarnation.	**CO3**	**(04)**
Unit 6	Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively	**CO3**	**(04)**

Text Books

1.	Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi

Useful Links

1.	NPTEL/ Swayam Courses dedicated to value Education.

Mapping of COs and POs

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	-	2	2	-	3
CO 2	2	-	1	-	-	-
CO 3	-	-	1	2	3	1

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

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First Year (Sem –II) M. Tech. Civil Engineering (Construction Management)

CM 2201 Project Economics and Financing

Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
		Duration of ESE	02.30hrs

Course Outcomes (CO) : Students will able to

1.	Knowledge of project economics, risk management and PPP in projects.
2.	Apply appraisal techniques for financial feasibility studies, risk estimation techniques and financing methods of projects.
3.	Apply knowledge of finance and accounting in management of projects
4.	Possesses knowledge of PPP in infrastructure projects

	Course Contents	CO	Hours
Unit 1	**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.	CO1	(08)
Unit 2	**Financial Appraisal Criteria** - Discounting and non- discounting criteria (Payback period, NPV, AW, ROR, IRR, Benefit- cost ration, Break even analysis). MARR & it"s estimation	CO2	(06)
Unit 3	**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.	CO2	(08)
Unit 4	**Financing Projects** - Sources of finance, equity, debit, securities, borrowings, debentures, Working capital requirement, Financial institutes, Direct and indirect financial assistance.	CO3	(06)
Unit 5	**Accounting** - Site Accounts - preparation, reporting, Accounting records, Depreciations, Classification of construction costs, Standard budgeting and control.	CO3	(06)
Unit 6	**Public Private Participation in Projects**- PPP Models, BOOT, BOT, Joint Ventures, Annuity, DBFO, External Commercial Borrowings, International Finance.	CO4	(06)

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.

Reference Books

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

Useful Links

1.	nptel.ac.in
2.	freevideolectures.com
3.	www.youtube.com

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Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	-	-	2	3	-
CO 2	1	2	1	-	-	1
CO 3	-	1	-	2	-	3
CO 4	2	-	1	-	-	2

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

DEPARTMENT OF CIVIL ENGINEERING
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Government College of Engineering, Karad

First Year (Sem – II) M. Tech. Civil Engineering (Construction Management)

CM 2202 Construction Methods and Techniques

Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
		Duration of ESE	02.30hrs

Course Outcomes (CO) : Students will able to

1. Knowledge of underground, underwater and steel construction methods.
2. Use of cofferdams, caissons and piles for foundation construction.
3. Follow and Apply prefabrication construction method for suitable construction project.
4. Familiarise with vibration controlled foundation, formworks and retaining walls

	Course Contents	CO	Hours
Unit 1	**Underground and Underwater Construction :** 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 and welding, Underwater structural concrete walls. Protection of structures against attack by ground.	**CO1**	**(08)**
Unit 2	**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 and inspection of bridges. Testing of bridges.	**CO2**	**(06)**
Unit 3	**Coffer Dams and Caissons**: Land cofferdams, Soldier beam and horizontal sheeting techniques, Design considerations, Sinking rate, Open caissons, Pneumatic caissons. Machine bored caissons. Drop caissons. Details of design and construction, Case Studies. 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.	**CO2**	**(06)**
Unit 4	**Pre-fabricated Construction:** Types, Standardization of components, Size and economy, Fabrication techniques, Transportation, Erection, Jointing, Fabrication techniques.	**CO3**	**(06)**
Unit 5	**Vibration Controlled Foundation:** Free and forced vibration, Damping, Vibrating machine, Weight of foundation, Natural frequency of machine foundation and soil system, Design procedure, Causes and effects of vibration transmitted through soil.	**CO4**	**(06)**
Unit 6	**Formwork:** Types, components and design of formwork, Special types of formwork such as slip form: Removal of formwork, Cost aspect of formwork. **Retaining Walls:** Types, Construction techniques.	**CO4**	**(08)**

Text Books

1. Wells and Caissons – Vijaya Singh, New Chand & Bros,Roorkee
2. Modem Foundations- N-P-Kurion, Tata McGraw, Hill pub, co.Ltd.
3. Foundation Engineering- G. A. Leonards Mcgraw Hills Co.Ltd.

Reference Books

1. Construction Planning Equipments and Methods Peurifey RI
2. Hand Book of Civil Engineering-stubb
3. Formwork Design and Construction-Wynn 10 Foundation Engineering-Tomlinson
4. Cofferdams- While and prentice- Columbia University Press New-York
5. Construction Planning Equipments and Methods Peurifey RI

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Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	2	1	-	3	-	1
CO 2	2	1	1	1	-	-
CO 3	-	1	2	3	-	-
CO 4	2	1	-	-	1	2

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

DEPARTMENT OF CIVIL ENGINEERING Board of Studies Year 2025-26 GCE KARAD

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Government College of Engineering, Karad				
First Year (Sem – II) M. Tech. Civil Engineering (Construction Management)				
CM 2213 Construction Contracts and Legal Aspects				
Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/week		MSE	20
Tutorials	-		ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02.30hrs

Course Outcomes (CO) : Students will able to

1.	Identify salient features of Indian contract act, Arbitration act and process of contract administration
2.	Possess knowledge about bailment and FIDIC
3.	Asses provisions of labour laws and relevant acts
4.	Apply knowledge of safety engineering.

	Course Contents	CO	Hours
Unit 1	**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.	**CO1**	**(10)**
Unit 2	**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 ward, Methods of Enforcement impending and Awards.	**CO1**	**(06)**
Unit 3	**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.	**CO2**	**(08)**
Unit 4	**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.	**CO2**	**(06)**
Unit 5	**Industrial Act and Labour Laws:** Industrial Dispute Act, Payment of Wages Act.	**CO3**	**(06)**
Unit 6	**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 equipment, preventive measures Factory Act, Fatal accidents.	**CO4**	**(08)**

Text Books

1.	Indian arbitration Act by B. S.Patil
2.	Legal Aspects of building and Engineering Contracts by B. S.Patil
3.	Indian contract Act Avatarsingh

Reference Books

1.	Indian Contract Act.
2.	Safety Engineering, Govt. of India Publicaiton
3.	Professional Practice, Roshan Namavati.
4.	Indian contract Act Avatarsingh
5.	Indian contract Act Jhamb

Mapping of COs and POs

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	-	-	2	3	-
CO 2	2	3	1	1	-	1
CO 3	2	-	1	-	2	-
CO 4	1	-	-	1	-	3

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Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

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Government College of Engineering, Karad				
First Year (Sem – II) M. Tech. Civil Engineering (Construction Management)				
CM 2223 Advanced Construction Materials & Building Services				
Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		MSE	20
Tutorials			ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02.30hrs

Course Outcomes (CO) : Students will able to

1.	Understand characteristics of modern construction materials
2.	Familiarise with new construction techniques & understand concept of high-rise buildings.
3.	Identify components of water supply, sanitation arrangements in a building , ventilation, air conditioning and fire safety installations in a building
4.	Follow the concepts of intelligent building

	Course Contents	CO	Hours
Unit 1	**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, Aluminium and Other Metallic Materials Composition uses Market forms Mechanical treatment.	CO1	(10)
Unit 2	**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	CO1	(08)
Unit 3	**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.	CO2	(08)
Unit 4	**Water Supply Systems:** Water quality, Purification and treatment- water 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	CO3	(08)
Unit 5	**Ventilation** and Its Importance 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..	CO3	(08)
Unit 6	**Intelligent Buildings:** 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.	CO4	(08)

Text Books

1.	R. K. Rajput, Engineering Materials, S. Chand & Company Ltd., 2000
2.	Construction Technology by Roy Chudley and Roger Greeno, Prentice Hall, 2005.
3.	Air conditioning and refrigeration, William H.Severns and Julian R.Fellows, John Wily and sons, London, 2008.

Reference Books

1.	Reports of actual works executed
2.	NICMAR Publications on Construction Engineering
3.	Fair G.M., Geyer J.C. and Okun .D, "Water and waste Engineering", Vol. II, John Wiley & sons, Inc., New York.

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Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	-	2	3	-	1
CO 2	2	-	-	2	-	3
CO 3	-	1	-	2	-	2
CO 4	3	1	1	-	2	-

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

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First Year (Sem – II) M. Tech. Civil Engineering (Construction Management)

CM 2214 Cost Management of Engineering Projects

Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
		Duration of ESE	02.30hrs

Course Outcomes (CO) : Students will able to

1. Knowledge of cost management process
2. Applications of project management in context with cost
3. Quantitative techniques for cost management

	Course Contents	CO	Hours
Unit 1	Introduction and Overview of the Strategic Cost Management Process	**CO1**	**(10)**
Unit 2	Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.	**CO1**	**(08)**
Unit 3	Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and non- technical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process	**CO2**	**(08)**
Unit 4	Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision- making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing.	**CO2**	**(08)**
Unit 5	Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control;	**CO3**	**(08)**
Unit 6	Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing. Quantitative techniques for cost management, PERT/CPM, Linear Programming, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.	**CO4**	**(08)**

Text Books

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, NewDelhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting

Reference Books

1. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
2. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

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Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	-	1	-	2	2	3
CO 2	1	-	2	-	2	2
CO 3	1	-	-	2	2	3

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

DEPARTMENT OF CIVIL ENGINEERING
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Government College of Engineering, Karad				
First Year (Sem – II) M. Tech. Civil Engineering (Construction Management)				
CM 2224 Management Information Systems for Construction Management				
Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/week		MSE	20
Tutorials	-		ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02.30hrs

Course Outcomes (CO) : Students will able to

1.	Relate the basic concepts and technologies used in the field of management information systems.
2.	Understand the importance of decision making, hardware and software in MIS.
3.	Analyze database management system and application of MIS in various sectors.
4.	Use knowledge of system Implementation, Maintenance and overall quality assurance of MIS.

	Course Contents	CO	Hours
Unit 1	**Introduction** - Definition Role, Impact, Evolution, Structure of MIS in organization..	**CO1**	**(10)**
Unit 2	**Decision Making** - Programmed and Non programmed decisions, Stages in decision making, Concepts of Information, Systems Theory, Decision Support System	**CO2**	**(08)**
Unit 3	**Computers in MIS** - Hard ware, Software, Communication networks Office automation	**CO2**	**(08)**
Unit 4	**Data Management** - Collection and analysis of data, Database Management system.	**CO3**	**(08)**
Unit 5	**Applications of MIS** - Materials, Finance, HRD, Marketing and Service sector	**CO3**	**(08)**
Unit 6	**Implementation and Maintenance of MIS** - Socio-technical approach, Factors of success and failure, Quality assurance of MIS.	**CO4**	**(08)**

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.

Mapping of COs and POs

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	2	2	-	3	1
CO 2	1	2	2	-	2	1
CO 3	3	-	2	-	1	1
CO 4	3	-	2	-	1	-

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

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First Year (Sem – II) M. Tech. Civil Engineering (Construction Management)				
CM 2215 Entrepreneurship in Construction				
Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/week		MSE	20
Tutorials	-		ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02.30hrs

Course Outcomes (CO) : Students will able to

1.	Understand importance of entrepreneurship in construction industry.
2.	Follow concept of project appraisal, financial analysis, problems in construction industry.
3.	Aware of different aspect of civil engineering entrepreneurship for small and large scale areas.

	Course Contents	CO	Hours
Unit 1	General: Meaning and importance of entrepreneurship. Definition 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.	**CO1**	**(08)**
Unit 2	**Project**: Selection by identification, Size, Appropriate technology, Cost and time scheduling. Project reports - Backing market survey, demand and supply relation, equipment cost, space and merit analysis recommendations.	**CO1**	**(06)**
Unit 3	**Project Appraisal**: Technical feasibility, Commercial soundness, Financial capability, Economic viability, Managerial aspects.	**CO2**	**(06)**
Unit 4	**Financial Analysis**: Resources - loans, terms and conditions, Working capital, Repayment, Security, Financial institutes.	**CO2**	**(07)**
Unit 5	**Problems Faced by Enterprise**: Marketing, Finance and taxes, Raw and finished materials. Government policies.	**CO2**	**(07)**
Unit 6	**Civil Engineering Entrepreneurship**: Small scale, Large scale, Optimum size, Typical areas and preparation of specialized aspects.	**CO3**	**(06)**

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)

Reference Books

1.	Project Appraisal Prasanna Chandra.
2.	Entrepreneurship, Government of India Publication.

Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	-	-	2	-	3
CO 2	1	2	-	2	-	1
CO 3	3	-	2	-	1	2

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Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

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First Year (Sem – II) M. Tech. Civil Engineering (Construction Management)

CM 2225 Environment Impact Assessment

Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/week	MSE	20
Tutorials	-	ISE	20
Total Credits	03	ESE	60
		Duration of ESE	02.30hrs

Course Outcomes (CO) : Students will able to

1. Knowledge of the fundamental concepts of EM and EIA
2. Trace the evolution of EIA and use it as EM tool
3. Apply environment impact assessment process for construction projects
4. Prepare project report which is comply with environmental clearance procedure

	Course Contents	CO	Hours
Unit 1	**Introduction:** Environmental Management, Definition, Scope, Goals and need. International Environmental Movement, Environmental concerns in India.	CO1	(10)
Unit 2	**Policies & Programmes:** Environmental Policies and Programmes in India, Environmental laws and Legislations, Evolution of Indian Legislations, Constitution of India.	CO1	(06)
Unit 3	**Environmental Impact Assessment:** Introduction, Purpose, Evolution, Forecasting environmental changes, Environment Impact Statement (EIS), Strategic Environmental Assessment (SEA). Screening and Scoping.	CO2	(08)
Unit 4	**EIA Documentation and Processes:** Preliminary Stages of EIA, Impact Prediction, Evaluation and Mitigation, Impact on Decisions, Cost Benefit Analysis of EIA of Construction Projects.	CO2	(06)
Unit 5	**Environmental Auditing:** Audit Methodology, Life Cycle Assessment (LCA) – Purpose, Evolution and Stages. Environment Impact Statement (EIS), Requisites of good EIS.	CO3	(06)
Unit 6	**Environment Management System:** EMS Standards: IS14000, Benefits of Implementing ISO 14001.	CO4	(08)

Text Books

1. Canter L (1996) Environmental Impact Assessment (Second Edition). McGraw Hill Publishing Company, NewYork.
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.

Reference Books

1. World Bank (1997) Environmental Performance Monitoring and Supervision.Update. Environmental Assessment Sourcebook. World Bank, Washington,DC.
2. 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 DevelopmentBank.
3. EIA Notification Published in the Gazette of India, Extraordinary, Part-II, andSection 3, Sub-section (ii) by MINISTRY OF ENVIRONMENT AND FORESTS New Delhi 14th September,2006

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Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	-	-	2	-	2
CO 2	3	2	1	2	-	1
CO 3	2	2	1	-	-	3
CO 4	3	-	2	-	1	1

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	15
Understand	5	4	15
Apply	5	4	12
Analyse	3	4	9
Evaluate	2	4	9
Create	-	-	-
Total	20	20	60

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Government College of Engineering, Karad				
First Year (Sem – II) M. Tech. Civil Engineering (Construction Management)				
CM 2208 Seminar				
Teaching Scheme			**Examination Scheme**	
Practical	02 Hrs/week		MSE	-
Tutorials	-		ISE	100
Total Credits	02		ESE	-
			Duration of ESE	-

Course Outcomes (CO) : Students will able to

1.	Evaluate knowledge that they gain from curriculum
2.	Apply theoretical knowledge to practical cases in respective subjects
3	Learn to write technical reports.
4	Develop skills to present and defend their work in front of technically qualified audience.

	Course Contents	CO	Hours
	The topic for the seminar may be related to Civil Engineering field such as – 1. Construction Management 2. Project Management 3. Infrastructural Management 4. Construction Engineering 5. Legal Aspects in Civil Engineering 6. Surveying & Remote Sensing Techniques 7. Water Resources Engineering 8. Disaster Management 9. Repairs and Rehabilitation of buildings 10. Town & Country Planning 11. Environmental Engineering 12. IT Applications to Civil Engineering 13. Any other relevant subject to recent development and advances in civil engineering	**CO1, CO2, CO3, CO4**	**(40)**
List of Submission:			
1.	Technical report in prescribed format as decided by guide		

Mapping of COs and Pos:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	-	2	2	-	3
CO2	2	-	2	-	3	1
CO3	-	2	-	1	3	3
CO4	1	-	2	2	1	-

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

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Assessment Pattern: **(with revised Bloom's Taxonomy)**

Knowledge Level	MSE	ISE	ESE
Remember	-	20	-
Understand	-	20	-
Apply	-	20	-
Analyse	-	20	-
Evaluate	-	20	-
Create	-	-	-
Total	-	100	-

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Government College of Engineering, Karad				
First Year (Sem – II) M. Tech. Civil Engineering (Construction Management)				
CM 2206 Project Economics and Financing Laboratory				
Teaching Scheme			**Examination Scheme**	
Practical	04 Hrs/week		MSE	-
Tutorials	-		ISE	50
Total Credits	02		ESE	-
			Duration of ESE	-

Course Outcomes (CO) : Students will able to

1. Write detail project report.
2. Apply theoretical concepts of equipment management to a case study.

	Course Contents	CO	Hours
	Student will visit one or more construction projects and prepare a detail project report based on data collected from visit to projects which will cover i. Financial feasibility of project ii. Method of collecting finance iii. Estimation of working capital iv. Possibility of private financing v. Scope for International financing	**CO1, CO2**	**(40)**

Mapping of COs and Pos:

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	2	1	-	-	2
CO2	3	1	-	-	-	3

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

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Government College of Engineering, Karad				
First Year (Sem – II) M. Tech. Civil Engineering (Construction Management)				
CM2207: Laboratory 4 (Construction Contracts and Legal Aspects Lab)				
Teaching Scheme			Examination Scheme	
Practical	04 Hrs/week		MSE	-
Tutorials	-		ISE	50
Total Credits	02		ESE	-
			Duration of ESE	-

Course Outcomes (CO) : Students will able to

1. Write detail project report.
2. Apply theoretical concepts of Construction Contracts and Legal Aspects to a case study.

	Course Contents	CO	Hours
	Student will visit one or more construction projects and prepare a detail project report basedon data collected from visit to projects which will cover i. Professional Practice and Administration Contracts ii. Arbitration and Award iii. Bailment iv. Injunction v. Industrial Act and Labour Laws vi. Safety Engineering	CO1, CO2	(40)

Mapping of COs and Pos:

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	3	-	-	1	2
CO2	1	1	-	-	2	1

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

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Government College of Engineering, Karad				
First Year (Sem – II) M. Tech. Civil Engineering (Construction Management)				
CM2207: Laboratory 4 (Advanced Construction Materials and Building Services Lab)				
Teaching Scheme			**Examination Scheme**	
Practical	04 Hrs/week		MSE	-
Tutorials	-		ISE	50
Total Credits	02		ESE	-
			Duration of ESE	-

Course Outcomes (CO) : Students will able to

1. Write detail project report.
2. Apply theoretical concepts of Advanced Construction Materials and Building Services to a case study.

	Course Contents	CO	Hours
	Student will visit one or more construction projects and prepare a detail project report based on data collected from visit to projects which will cover i. Modern Materials ii. Concrete iii. High rise buildings iv. Water Supply Systems v. Ventilation vi. Intelligent Buildings	**CO1 CO2**	**(40)**

Mapping of COs and Pos:

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	3	-	-	1	2
CO2	1	1	-	-	2	1

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

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Government College of Engineering, Karad				
First Year (Sem – II) M. Tech. Civil Engineering (Construction Management)				
CM2207: Laboratory 4 (Cost Management of Engineering Projects Lab)				
Teaching Scheme			Examination Scheme	
Practical	04 Hrs/week		MSE	-
Tutorials	-		ISE	50
Total Credits	02		ESE	-
			Duration of ESE	-

Course Outcomes (CO) : Students will able to

1.	Write detail project report.
2.	Apply theoretical concepts of equipment management to a case study.

	Course Contents	CO	Hours
	Student will visit one or more construction projects and prepare a detail project report based on data collected from visit to projects which will cover Cost Management of Engineering Projects	**CO1 CO2**	**(40)**

Mapping of COs and Pos:

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	3	-	-	1	2
CO2	1	1	-	-	2	1

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

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Government College of Engineering, Karad				
First Year (Sem – II) M. Tech. Civil Engineering (Construction Management)				
CM2207: Laboratory 4 (MIS for Construction Management Lab)				
Teaching Scheme			Examination Scheme	
Practical	04 Hrs/week		MSE	-
Tutorials	-		ISE	50
Total Credits	02		ESE	-
			Duration of ESE	-

Course Outcomes (CO) : Students will able to

1. Write detail project report.
2. Apply theoretical concepts of MIS for Construction Management to a case study.

	Course Contents	CO	Hours
	Student will visit one or more construction projects and prepare a detail project report basedon data collected from visit to projects which will cover i. Decision Making ii. Computers in MIS iii. Data Management iv. Applications of MIS v. Implementation and Maintenance of MIS	CO1 CO2	(40)

Mapping of COs and Pos:

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	3	-	-	1	2
CO2	1	1	-	-	2	1

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

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First Year (Sem – II) M. Tech. Civil Engineering (Construction Management)

AU 2219 Constitution of India

Teaching Scheme		Examination Scheme	
Lectures	02 Hrs/week	MSE	-
Tutorials	-	ISE	-
Total Credits	00	ESE	-
		Duration of ESE	-

Course Outcomes (CO): Students will able to

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. Address the growth of Indian opinion regarding modern Indian intellectuals" constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism
3. Identify the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

	Course Contents	CO	Hours
Unit 1	• **History of Making of the Indian Constitution:** History Drafting Committee, (Composition & Working)	**CO1**	**(07)**
Unit 2	• **Philosophy of the Indian Constitution:** Preamble Salient Features	**CO1**	**(06)**
Unit 3	• **Contours of Constitutional Rights & Duties:** • Fundamental Rights • Right to Equality • Right to Freedom • Right against Exploitation • Right to Freedom of Religion • Cultural and Educational Rights • Right to Constitutional Remedies • Directive Principles of State Policy • Fundamental Duties.	**CO2**	**(07)**
Unit 4	• **Organs of Governance:** • Parliament • Composition • Qualifications and Disqualifications • Powers and Functions • Executive • President • Governor • Council of Ministers • Judiciary, Appointment and Transfer of Judges, Qualifications • Powers and Functions	**CO2**	**(06)**
Unit 5	• **Local Administration:** • District"s Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. • Pachayati raj: Introduction, PRI: ZilaPachayat. • Elected officials and their roles, CEO ZilaPachayat: Position and role. • Block level: Organizational Hierarchy (Different departments), • Village level: Role of Elected and Appointed officials, • Importance of grass root democracy	**CO3**	**(07)**

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Unit 6	• **Election Commission:** • Election Commission: Role and Functioning. • Chief Election Commissioner and Election Commissioners. • State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.	**CO3**	**(08)**
Text Books			
1.	The Constitution of India, 1950 (Bare Act), Government Publication		
2.	Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.		
3.	M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.		
Reference Books			
1.	D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.		
Useful Links			
1.	NPTEL/ Swayam Courses		

Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	-	2	-	3	3
CO 2	-	2	1	1	1	-
CO 3	-	2	2	3	1	-

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First Year (Sem – II) M. Tech. Civil Engineering (Construction Management)

AU 2229 Pedagogy Studies

Teaching Scheme		Examination Scheme	
Lectures	02 Hrs/week	MSE	-
Tutorials		ISE	-
Total Credits	00	ESE	-
		Duration of ESE	-

Course Outcomes (CO): Students will able to

1. Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
2. Identify critical evidence gaps to guide the development.

	Course Contents	CO	Hours
Unit 1	• **Introduction and Methodology:** • Aims and rationale, Policy background, Conceptual framework and terminology • Theories of learning, Curriculum, Teacher education. • Conceptual framework, Research questions. • Overview of methodology and Searching.	**CO1**	**(04)**
Unit 2	• Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. • Curriculum, Teacher education.	**CO1**	**(04)**
Unit 3	• Evidence on the effectiveness of pedagogical practices • Methodology for the in depth stage: quality assessment of included studies. • How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? • Theory of change. • Strength and nature of the body of evidence for effective pedagogical practices. • Pedagogic theory and pedagogical approaches. • Teachers" attitudes and beliefs and Pedagogic strategies.	**CO1**	**(05)**
Unit 4	• Professional development: alignment with classroom practices and follow- up support • Peer support • Support from the head teacher and the community. • Curriculum and assessment • Barriers to learning: limited resources and large class sizes	**CO2**	**(05)**
Unit 5	• **Research gaps and future directions** • Research design • Contexts • Pedagogy	**CO2**	**(04)**
Unit 6	• Teacher education • Curriculum and assessment • Dissemination and research impact.	**CO2**	**(04)**

Text Books

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London; DFID.

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Reference Books	
1.	Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282
2.	Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
3.	Chavan M (2003) Read India: A mass scale, rapid, „learning to read" campaign
Useful Links	
1.	www.pratham.org/images/resource%20working%20paper%202.pdf.

Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	-	-	-	1	-
CO 2	2	1	-	2	-	3

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Government College of Engineering, Karad				
First Year (Sem – I) M. Tech. Civil Engineering (Construction Management)				
AU 2239 Stress Management by Yoga				
Teaching Scheme			**Examination Scheme**	
Lectures	02 Hrs/week		MSE	-
Tutorials	-		ISE	-
Total Credits	00		ESE	-
			Duration of ESE	-

Course Outcomes (CO): Students will able to

1.	Develop healthy mind in a healthy body thus improving social health also
2.	Improve efficiency

	Course Contents	CO	Hours
Unit 1	• Definitions of Eight parts of yoga. (Ashtanga)	**CO1**	**(8)**
Unit 2	• Yam and Niyam. Do`s and Don"t"s in life. i) Ahinsa, satya, astheya, bramhacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan	**CO2**	(8)
Unit 3	• Asan and Pranayam i) Various yog poses and their benefits for mind & body ii) Regularization of breathing techniques and its effects-Types of pranayam	**CO2**	(8)

Text Books

1.	„Yogic Asanas for Group Tarining-Part-I" : Janardan Swami Yogabhyasi Mandal, Nagpur
2.	"Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	-	-	2	-	-
CO 2	2	-	2	1	-	3

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CM 2249 Personality Development through Life Enlightenment Skills.

Teaching Scheme		Examination Scheme	
Lectures	02 Hrs/week	MSE	-
Tutorials	-	ISE	-
Total Credits	00	ESE	-
		Duration of ESE	-

Course Outcomes (CO): Students will able to

1.	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
2.	The person who has studied Geeta will lead the nation and mankind to peace and prosperity
3.	Study of Neetishatakam will help in developing versatile personality of students.

	Course Contents	CO	Hours
Unit 1	Neetisatakam-Holistic development of personality • Verses- 19,20,21,22 (wisdom) • Verses- 29,31,32 (pride & heroism) • Verses- 26,28,63,65 (virtue) • Verses- 52,53,59 (dont"s) • Verses- 71,73,75,78 (do"s)	**CO1**	**(8)**
Unit 2	• Approach to day to day work and duties. • Shrimad BhagwadGeeta: Chapter 2-Verses 41, 47,48, • Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35, • Chapter 18-Verses 45, 46, 48.	**CO2**	(8)
Unit 3	• Statements of basic knowledge. • Shrimad BhagwadGeeta: Chapter2-Verses 56, 62, 68 • Chapter 12 -Verses 13, 14, 15, 16,17, 18 • Personality of Role model. Shrimad BhagwadGeeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, • Chapter 4- Verses 18, 38,39 Chapter18 – Verses 37,38,63	**CO2**	(8)

Text Books

1.	"Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata
2.	Bhartrihari"s Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

Mapping of COs and POs

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	-	2	-	2	-
CO 2	1	1	1	2	-	3
CO 3	2	-	2	3	3	1

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