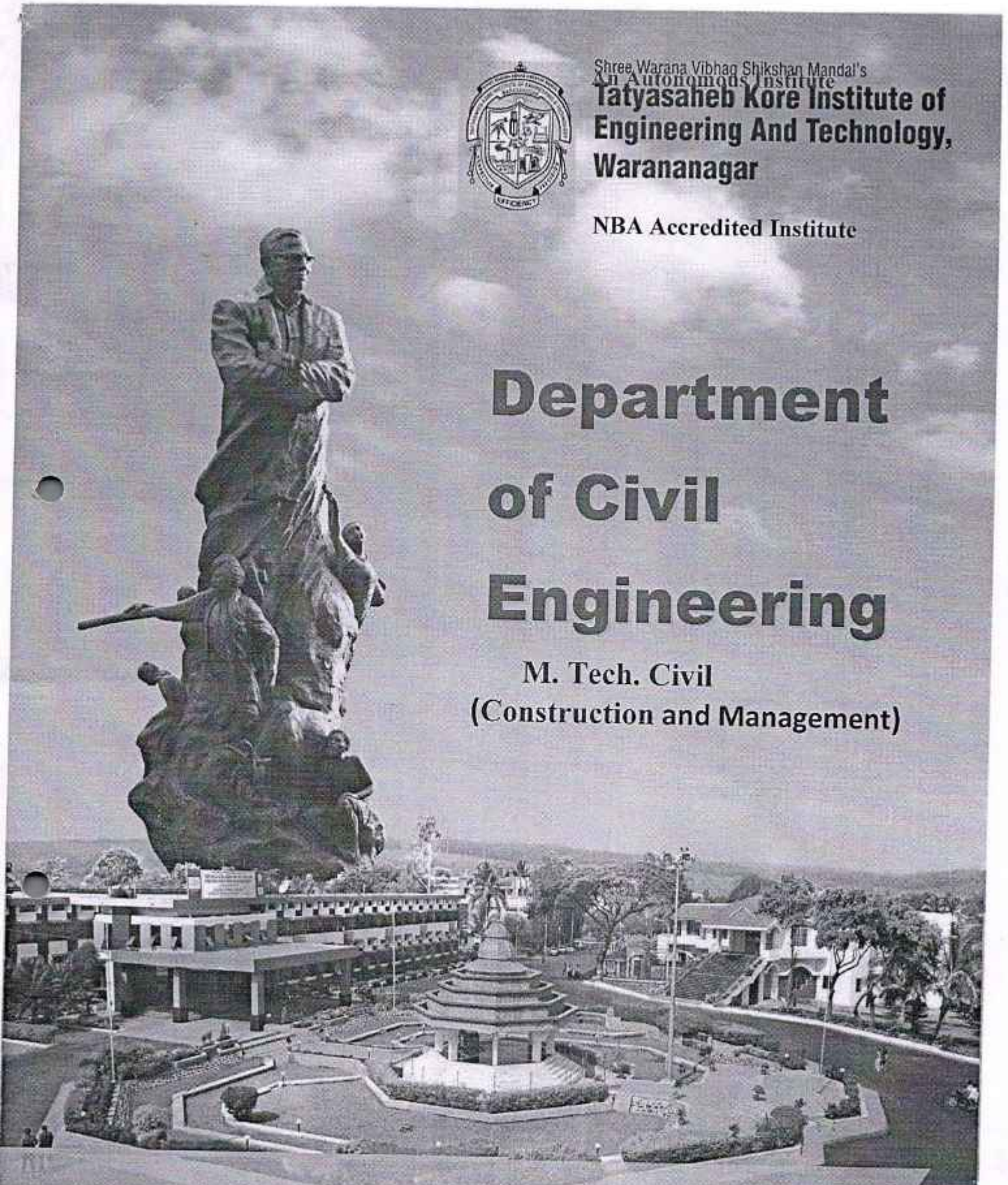
Shree Warana Vibhag Shikshan Mandal's
An Autonomous Institute

Tatyasaheb Kore Institute of Engineering And Technology, Warananagar

NBA Accredited Institute



Department of Civil Engineering

M. Tech. Civil (Construction and Management)

M. Tech. Civil (Construction and Management)

Syllabus Structure and Curriculum under NEP 2020

M. Tech. Civil (Construction and Management)

Syllabus Structure under NEP 2020 of TKIET, Warananagar

Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

M. Tech. Civil Engineering (Construction and Management)

AS per NEP 2020

(To be implemented from 2024-25)

Abbreviations

Sr. No	Acronym	Definition
1	ISE	In-Semester Examination
2	ISE -I	In-Semester Examination I
3	ISE-II	In-Semester Examination II
4	ESE	End Semester Examination
5	TH	Theory Lecture
6	Tut	Tutorial
7	PH	Practical Hours
8	P	Practical
9	O	Oral
10	TW	Term Work
11	CH	Contact Hours
12	C	Credit

Course/ Subjects Categories

Sr.No	Acronym	Definition
1	PCC	Professional Core Course
2	PE	Program Elective
3	OEC	Open Elective Course
4	LC	Laboratory Course
5	MC	Mandatory Course
6	SW	Seminar work
7	II	Industrial Internship
8	PC	Dissertation
9	SLC/AC	Self Learning Course/Audit course

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Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

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

AS per NEP 2020

(To be implemented from 2024-25)

SEMESTER-I

CreditScheme

Course Code	Category	Course Title	Teaching Scheme				Credit Scheme			
			TH	Tut	P	Total Contact Hours	TH	Tut	PH	Total Credit Assigned
24PGPCC-CCM-101	PCC	Construction Project Management.	3	---	--	3	3	---	--	3
24PGPCC-CCM-101T	PCC	Construction Project Management.		1	--	1	---	1		1
24PGPCC-CCM-102	PCC	Project Economics and Financing.	3	---	--	3	3	--	--	3
24PGPCC-CCM-102T	PCC	Project Economics and Financing.	--	1	--	1	---	1		1
24PGPE-CCM-103	PE	Program Elective-I	3		--	3	3	-	--	3
24PGPE-CCM-104	PE	Program Elective- II	3	--	--	3	3	--	--	3
24PGPE-CCM-105	PE	Program Elective-III	3	--	--	3	3	--	--	3
24PG LC-CCM-106	LC	Laboratory Practice.	--	--	4	4	--	--	2	2
24PGSW-CCM-107	SW	Seminar-I	--	--	2	2	--	--	--	1
			15	02	06	23	15	2	2	20

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Evaluation Scheme

Course Code	Category	Course Title	Examination Scheme							
			ISE			ESE	TW	O	PH	Total
			ISE-I	ISE-II	Avg					
24PGPCC-CCM-101	PCC	Construction Project Management.	40	40	40	60	---	--	--	100
24PGPCC-CCM-101T	PCC	Construction Project Management.	---	----	---	---	25	---	---	25
24PGPCC-CCM-102	PCC	Project Economics and Financing.	40	40	40	60		--	--	100
24PGPCC-CCM-102T	PCC	Project Economics and Financing.	---	---	---	---	25	--	---	25
24PGPE-CCM-103	PE	Program Elective – I	40	40	40	60	-	--	--	100
24PGPE-CCM-104	PE	Program Elective - II	40	40	40	60	--	--	--	100
24PGPE-CCM-105	PE	Program Elective - III	40	40	40	60	--	--	--	100
24PG LC-CCM-106	LC	Laboratory Practice.	--	--	--	--	25	25	--	50
24PGSW-CCM-107	SW	Seminar-I	--	--	--	--	50	--	--	50
			--	--	200	300	125	25	--	650

Sr. No	Program Elective-I	Program Elective-II	Program Elective-III
1	Construction Equipment **(24PGPE-CCM-1031)**	Human Resource Development In Construction. **(24PGPE-CCM-1041)**	Entrepreneurship In Construction. **(24PGPE-CCM-1051)**
2	Construction Safety **(24PGPE-CCM-1032)**	Advanced Construction Materials and Building Services. **(24PGPE-CCM-1042)**	Advanced Construction Techniques. **(24PGPE-CCM-1052)**
3	Construction Disaster Management **(24PGPE-CCM-1033)**	Repair and Rehabilitation of Structures. **(24PGPE-CCM-1043)**	Value Engineering And Valuation. **(24PGPE-CCM-1053)**

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SEMESTER-II

Credit Scheme

Course Code	Category	Course Title	Teaching Scheme				Credit Scheme			
			TH	Tut	P	Total Contact Hours	TH	Tut	PH	Total Credit Assigned
24PGPCC-CCM-201	PCC	Construction Contracts and Legal Aspects.	3	--	--	3	3	--	--	3
24PGPCC-CCM-201T	PCC	Construction Contracts and Legal Aspects.	--	1	--	1	--	1	--	1
24PGPCC-CCM-202	PCC	Construction Methods and Techniques.	3	--	--	3	3	--	--	3
24PGPCC-CCM-202T	PCC	Construction Methods and Techniques.	--	1	---	1	--	1	--	1
24PGPE-CCM-203	PE	Program Elective - IV	3		--	3	3	-	--	3
24PGPE-CCM-204	PE	Program Elective -V	3	--	--	3	3	--	--	3
24PGOEC-CCM-205	OEC	Open Elective Course.	3*	--	--	3	2	--	--	2
24PGLC-CCM-206	LC	Software Lab	--	--	4	4	--	--	2	2
24PGSW-CCM-207	SW	Seminar-II	--	--	2	2	--	--	1	1
24PGS-CCM-208		Comprehensive Viva.	--	1		1	--	1		1
			15	03	06	24	14	3	3	20

*Indicates having extra lecture without having any credit.

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Evaluation Scheme

Course Code	Category	Course Title	Examination Scheme							
			ISE			ESE	TW	O	PH	Total
			ISE-I	ISE-II	Avg					
24PGPCC-CCM-201	PCC	Construction Contracts and Legal Aspects.	40	40	40	60	--	--	--	100
24PGPCC-CCM-201T	PCC	Construction Contracts and Legal Aspects.	--	--	--	--	25	--	--	25
24PGPCC-CCM-202	PCC	Construction Methods and Techniques.	40	40	40	60	--	--	--	100
24PGPCC-CCM-202T	PCC	Construction Methods and Techniques.	--	--	--	--	25	--	--	25
24PGPE-CCM-203	PE	Program Elective - IV	40	40	40	60	-	--	--	100
24PGPE-CCM-204	PE	Program Elective -V	40	40	40	60	--	--	--	100
24PGOEC-CCM-205	OEC	Open Elective Course.	40	40	40	60	--	--	--	100
24PGLC-CCM-206	LC	Software Lab	--	--	--		25	--	--	25
24PGSW-CCM-207	SW	Seminar - II	--	--	--	--	50	--	--	50
24PGS-CCM-208		Comprehensive Viva	--	--	--	--	--	25	--	25
			--	--	200	300	125	25	--	650

Sr. No	Program Elective-IV
1	Computational Methods and Optimization Techniques (**24PGPE-CCM-2031**)
2	Management Information System (**24PGPE-CCM-2032**)
3	Resource Management (**24PGPE-CCM-2033**)

Sr. No	Program Elective-V
1	Ground Improvement Techniques. (**24PGPE-CCM-2041**)
2	Site Investigation Methods and Practices. (**24PGPE-CCM-2042**)
3	Environmental Impact Assessment. (**24PGPE-CCM-2043**)

Sr. No	Open Elective Course
1	Cryogenics
2	Design for Manufacture & Assembly
3	Waste To Energy.(**OEC-2053**)
4	Water Power Engineering.(**OEC-2054**)
5	Advanced Operating Systems
6	Artificial Intelligence
7	Project Management
8	Operational Research

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SEMESTER-III

Credit Scheme

Course Code	Category	Course Title	Teaching Scheme				Credit Scheme			
			TH	Tut	P	Total Contact Hours	TH	Tut	PH	Total Credit Assigned
24PGMC-CCM-301	MC	Research Methodology	3			3	3			3
24PGMC-CCM-302	MC	Intellectual Property Rights	3			3	3			3
24PGIT-CCM-303	II	Industrial Training	--	--	4	8	--	--	4	4
24PGSLC/AC-CCM-304	SLC/AC	One Course from MOOC/SWAYAM	--	--			--	--	--	--
24PGPC-CCM-305	PC	Dissertation Phase-I	--	--	8	16	--	--	10	10
			6	--	12	30	06	--	14	20

Evaluation Scheme

Course Code	Category	Course Title	Examination Scheme							
			ISE			ESE	TW	O	PH	Total
			ISE-I	ISE-II	Avg					
24PGMC-CCM-301	MC	Research Methodology	40	40	40	60				100
24PGMC-CCM-302	MC	Intellectual Property Rights	40	40	40	60				100
24PGIT-CCM-303	II	Industrial Training	--	--	--	--	75	--	--	75
24PGSLC/AC-CCM-304	SLC	One Course from MOOC/SWAYAM	--	--	--	--	25	--	--	25
24PGPC-CCM-305	PC	Dissertation Phase-I	--	--	--	--	50	50	--	100
			--	--	80	120	150	50	--	400

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SEMESTER-IV

Credit Scheme

Course Code	Category	Course Title	Teaching Scheme				Credit Scheme			
			TH	Tut	P	Total Contact Hours	TH	Tut	PH	Total Credit Assigned
24PGPC-CCM-401	PC	Dissertation Phase-II	--	--	15	30	--	--	20	20
			--	--	15	30	--	--	20	20

Evaluation Scheme

Course Code	Category	Course Title	Examination Scheme							
			ISE			ESE	TW	O	PH	Total
			ISE-I	ISE-II	Avg					
24PGPC-CCM-401	PC	Dissertation Phase-II	--	--	--	--	100	100	--	200
			--	--	--	--	100	100	--	200

Chairman
Boardof Studies

AcademicDean
T.K.I.E.T.,Warananagar

Principal
T.K.I.E.T.,Warananagar

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M. Tech. Civil (Construction and Management)

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Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M.Tech Civil (Construction & Management) Semester- I

24PGPCC-CCM-101:Construction Project Management

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/Week		ISE	40 Marks
Tutorials	01 Hrs/Week		ESE	60 Marks
Total Credits	04		TW	25 Marks
			Duration of ESE	02 Hrs.

Course Objectives (CO):

1. To understand different aspects of site organizational structures, services required on site, personnel management, safety in construction and work study.
2. To Determine EOQ, perform ABC analysis, understand SQC charts and compute standard time.
3. To understand procurement procedure, Quality circles, ISO 9000 and Performance appraisal.
4. To study different aspects of material storage, management of accidents, safety in construction, Network analysis concepts and role of computers in construction field.

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

Course Outcomes (CO): At the end of course students will

1. Identify different aspects of site organizational structures, services required on site, personnel management, safety in construction and work study.
2. Determine EOQ, perform ABC analysis, understand SQC charts and compute standard time.
3. Understand procurement procedure, Quality circles, ISO 9000 and Performance appraisal.
4. Appreciate different aspects of material storage, management of accidents, and safety in construction, Network analysis concepts and role of computers in construction field.

Term Work: The term work part should include two assignments on unit nos. 1 2 & 3 and one assignment on unit nos. 4, 5 & 6) , Total = 09

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.
3. Project Planning and Control with PERT and CPM by Dr. B. C. Punmia and K.K. Khandelwal.

Useful Websites

1	http://nptel.ac.in/
2	http://swayam.gov.in/
3	http://www.courses.com/civil-engineering
4	http://www.youtube.com/user/nptelhrd
5	www.khanacademy.org

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First Year M.Tech Civil (Construction & Management) Semester- I

24PGPCC-CCM-102:Project Economics and Financing

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/Week		ISE	40 Marks
Tutorials	01 Hrs/Week		ESE	60 Marks
Total Credits	04		TW	25 Marks
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. To understand concepts of project economics, risk management and PPP in projects.
2. To understand use of appraisal methods for financial feasibility studies, risk estimation techniques and financing methods of projects.
3. To understand the concepts of finance and accounting in management of projects.
4. To make students aware about knowledge of PPP in infrastructure projects.

	Course Contents	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.	(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.	(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.	(08)
Unit 4	**Financing Projects:** Sources of finance, equity, debit, securities, borrowings, debentures, Working capital requirement, Financial institutes, Direct and indirect financial assistance.	(06)
Unit 5	**Accounting:** Site Accounts - preparation, reporting, Accounting records, Depreciations, Classification of construction costs, Standard budgeting and control.	(06)
Unit 6	**Public Private Participation in Projects-** PPP Models, BOOT, BOT, Joint Ventures, Annuity, DBFO, External Commercial Borrowings, International Finance.	(06)

Course Outcomes (CO): At the end of course students will

1	Understand concepts of project economics, risk management and PPP in projects.
2	Use appraisal methods 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

Term Work: The term work part should include two assignments on unit nos. 1 2 & 3 and one assignment on unit nos. 4, 5 & 6) , Total = 09

Text Books

1	Engineering Economy By E. Paul Degarmo, William G. Sullivan

2	Project preparation Appraisal Implementation by Prasanna Chandra.
3	Principles of Construction Management by Roy Pilcher.
4	Engineering Economy By E. Pannerselvam.
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 Websites	
1	http://nptel.ac.in/
2	nptel.ac.in
3	www.youtube.com
4	freevideolectures.com

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M.Tech Civil (Construction & Management) Semester- I

24PGPE-CCM-1031:Construction Equipment

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/Week		ISE	40 Marks
Tutorials	--		ESE	60 Marks
Total Credits	03		TW	--
			Duration of ESE	02 Hrs.

Course Objectives (CO):

1. To understand working of various excavating, hauling, compacting, conveying, hoisting and pile driving equipment.
2. To compute cycle time of operations, rating and output of equipment.
3. To understand selection of equipments for excavation, compacting, pile driving, tunnelling and concreting.
4. To apply the knowledge of equipment management.

	Course Contents	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, and Operation cycles times, Matching of Excavating and hauling equipment.	(09)
Unit 2	**Compacting Equipment:** Properties of soil, Soil stabilization, Soil compaction, and Different types of compacting equipment - Rollers, Sheep foot rollers, pneumatic rollers, vibratory rollers, vibrating plates/ shoes. Vibratory compaction.	(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.	(06)
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.	(06)
Unit 5	**Tunnelling :** 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.	(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.	(07)

Course Outcomes (CO): At the end of course students will

1.	Understand working of various excavating, hauling, compacting, conveying, hoisting and pile driving Equipment.

2	Compute cycle time of operations, rating and output of equipment.
3	Select equipment for excavation, compacting, pile driving, tunnelling and concreting.
4	Apply the knowledge of equipment management.
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
4	Construction Equipment by Sharma.
Reference Books	
1	Manuals, brochures, publications from construction companies, firms etc.
2	Construction Methods & Machinery - Kellog (Prentice-Hall Inc. New York.
Useful Websites	
1	http://nptel.ac.in/
2	http://swayam.gov.in/
3	http://www.courses.com/civil-engineering
4	http://www.youtube.com/user/nptelhrd
5	www.khanacademy.org

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First Year M.Tech Civil (Construction & Management) Semester- I

24PGPE-CCM-1032:Construction Safety

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/Week		ISE	40 Marks
Tutorials	--		ESE	60 Marks
Total Credits	03		TW	--
			Duration of ESE	02 Hrs.

Course Objectives (CO):

1. To understand construction accidents, accident prevention.
2. Follow the concept of construction safety management, safety in civil structures.
3. Understand safety use of equipments on construction sites.
4. Study and understand Designing for safety, Safety Training Programmes and Policies

	Course Contents	**Hours**
Unit 1	**Construction Accidents:** Accidents and their Causes, Human Factors in Construction Safety, Costs of Construction Injuries, Occupational and Safety Hazard Assessment, Legal Implications. Accident Prevention: Principles of accident prevention; job safety analysis; fault tree analysis; accident management.	(06)
Unit 2	**Construction Safety Management:** Introduction to Construction Safety and Safety Technology Government's policy in industrial safety, safety & health legislation in India, Construction Sites (Safety) Regulations, Codes of practice, Role of various parties, duties and responsibilities of top management, site managers, supervisors etc. role of safety officers, responsibilities of general employees, safety committee, safety training, incentives and monitoring, Writing safety manuals, preparing safety checklists and inspection reports.	(09)
Unit 3	**Safety in Typical Civil Structures:** Safety of accidents on various construction sites such as buildings, dams, tunnels, bridges, roads, water Tanks, Retaining walls, etc. safety at various stages of construction, Critical factors for failure, Prevention of accidents, Regular Inspection and monitoring, Safety measures.	(06)
Unit 4	**Safety in Use of Construction Equipment:** Vehicles, cranes, hoist and lifts etc., Safety of scaffolding and working platforms, Safety in Erection and closing operation, Safety while using electrical appliances, Explosives.	(06)
Unit 5	**Designing for Safety:** Workplace ergonomics, first aid and emergency preparedness, Safety Culture, Safe Workers, Safety and First Line Supervisors, Safety and Middle Managers, Top Management Practices, Company Activities and Safety, Safety Personnel, Sub contractual Obligation, Project Coordination and Safety Procedures, Workers Compensation.	(06)
Unit 6	**Safety Training Programmes and Safety Policies:** Construction Safety Management and Accident Prevention Safety training, safety policy, Safety Meetings, safety committees, safety inspection, safety audit, reporting accidents and dangerous occurrences, Safety Incentives. Problem areas in Construction Safety, Elements of an Effective Safety Programme , Job-Site Safety Assessment, , Methods, equipment, and training provided on any ISO approved Construction Company, safety in office	(07)

Course Outcomes (CO): At the end of course students will	
1	Understand construction accidents, accident prevention.
2	Follow the concept of construction safety management, safety in civil structures.
3	Understand safety use of equipments on construction sites.
4	Study Designing for safety, Safety Training Programmes and Policies
Reference Books	
1	Safety Management in Construction Industry – A manual for project managers. NICMAR Mumbai
2	Davies V. S. Thomasin ,K, Thomas, Construction Safety Handbook – (Telford, London.)
3	ISI for safety in Construction – Bureau of Indian Standards
4	Giri maldi and Simonds, Safety management
5. Construction Safety Manual - Published by National Safety Commission of India.	
Useful Websites	
1	http://nptel.ac.in/
2	http://www.courses.com/civil-engineering
3	http://www.youtube.com/user/nptelhrd
4	www.khanacademy.org

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M.Tech Civil (Construction & Management) Semester- I

24PGPE-CCM-1033:Construction Disaster Management

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/Week		ISE	40 Marks
Tutorials	--		ESE	60 Marks
Total Credits	03		TW	--
			Duration of ESE	02 Hrs.

Course Objectives (CO):

1. To learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. Understand how to 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	**Hours**
Unit 1	**Introduction:** Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.	(06)
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.	(09)
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.	(06)
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.	(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.	(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.	(06)

Course Outcomes (CO): At the end of course students will

1. Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.

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2. Understand how to 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	
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.
3	
Reference Books	
1	Goel S. L. , Disaster Administration And Management Text And Case Studies" ,Deep &Deep Publication Pvt. Ltd., New Delhi.
Useful Websites	
1	NPTEL/ Swayam/ Moocs on Disaster Managments.

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar				
First Year M.Tech Civil (Construction & Management) Semester- I				
24PGPE-CCM-1041:Human Resource Development In Construction				
Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/Week		ISE	40 Marks
Tutorials	--		ESE	60 Marks
Total Credits	03		TW	--
			Duration of ESE	02 Hrs.

Course Objectives (CO):

1. To identify the history of HRD in construction industry.
2. To understand development of human resource plans, forecast personnel needs and recruitment process.
3. To Evaluate methods of recruitment, training process, and Prepare evaluation and employee benefit system.
4. To make Familiars with various acts governing employee management relations.

	Course Contents	Hours
Unit 1	**Introduction**: Definition, history of human resource management, Objectives, HRD in construction industry, Status of construction labour in India.	(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.	(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.	(06)
Unit 4	**Training and Development**: Training process, Individual and organizational development, Performance appraisal and use of performance appraisal information, Establishing the evaluation system.	(07)
Unit 5	**Employee Benefits**: Employee health and safety, Wage and salary administration, Incentive system, Wages in construction industry, Retirement and pensions.	(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.	(06)

Course Outcomes (CO): At the end of course students will

1. Identify the history of HRD in construction industry.
2. Able to develop human resource plans, forecast personnel needs and understand recruitment process.
3. Evaluate methods recruitment, training process, and Prepare evaluation and employee benefit system.
4. Familiars with various acts governing employee management relations.

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.

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar				
First Year M.Tech Civil (Construction & Management) Semester- I				
24PGPE-CCM-1042:Advanced Construction Materials and Building Services				
Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/Week		ISE	40 Marks
Tutorials	--		ESE	60 Marks
Total Credits	03		TW	--
			Duration of ESE	02 Hrs.

Course Objectives (CO):

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

	Course Contents	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.	(08)
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	(06)
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.	(06)
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	(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.	(06)
Unit 6	**Intelligent Buildings** 6 Intelligent buildings-Building automation-Smart buildings-Building services in high rise buildings-Green buildings-Energy efficient buildings for various zones- Case studies of residence, office buildings and other buildings in each zones.	(06)

Course Outcomes (CO): At the end of course students will

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.

Text Books

1	R. K. Rajput, Engineering Materials, S. Chand & Company Ltd., 2000
2	M. S. Shetty, Concrete Technology (Theory and Practice), S. Chand & Company Ltd,2003
3	Construction Technology by Roy Chudley and Roger Greeno, Prentice Hall, 2005.
4	William H.Severns and Julian R.Fellows, "Air conditioning and refrigeration", 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.
4	Manuals, brochures, publications from construction companies, firms etc.

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar				
First Year M.Tech Civil (Construction & Management) Semester- I				
24PGPE-CCM-1043:Repair and Rehabilitation of Structures				
Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/Week		ISE	40 Marks
Tutorials	--		ESE	60 Marks
Total Credits	03		TW	--
			Duration of ESE	02 Hrs.

Course Objectives (CO):

1. To study various techniques of serviceability and durability of structures.
2. To understand maintenance and repair strategies and identify materials for repair.
3. To Suggest techniques of repairs for deflection, cracking, etc.
4. Understand knowledge of corrosion protection, grouting, gunting and shotcreting.

	Course Contents	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.	(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.	(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.	(06)
Unit 4	**Techniques For Repair:** Rust eliminators and polymers coating for rebars during repair foamed concrete, mortar and dry pack, vacuum concrete,	(06)
Unit 5	**Grout, Gunite and Shotcrete:** Epoxy injection, Mortar repairfor cracks, Shoring and underpinning. Maintenance and rehabilitation of bridges, dams and offshore structures.	(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.	(07)

Course Outcomes (CO): At the end of course students will

1. Follow various techniques of serviceability and durability of structures.
2. Use maintenance and repair strategies and identify materials for repair.
3. Suggest techniques of repairs for deflection, cracking, etc.
4. Possess knowledge of corrosion protection, grouting, gunting and shotcreting.

Text Books

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

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M.Tech Civil (Construction & Management) Semester- I

24PGPE-CCM-1051: Entrepreneurship In Construction

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/Week		ISE	40 Marks
Tutorials	--		ESE	60 Marks
Total Credits	03		TW	--
			Duration of ESE	02 Hrs.

Course Objectives (CO):

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

	Course Contents	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.	(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.	(06)
Unit 3	**Project Appraisal**: Technical feasibility, Commercial soundness, Financial capability, Economic viability, Managerial aspects.	(06)
Unit 4	**Financial Analysis**: Resources - loans, terms and conditions, Working capital, Repayment, Security, Financial institutes.	(07)
Unit 5	**Problems Faced by Enterprise**: Marketing, Finance and taxes, Raw and finished materials. Government policies.	(07)
Unit 6	**Civil Engineering Entrepreneurship**: Small scale, Large scale, Optimum size, Typical areas and preparation of specialized aspects.	(06)

Course Outcomes (CO): At the end of course students will

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

Text Books

1. Entrepreneurship & Growth of Enterprise in Industrial Estates, Dr. N. Gangadhar Rao (Deep & deep Publ.)
2. A Complete Guide To Successful Entrepreneurship, G.N. Pandey (Vikas Publ. House)

Reference Books

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

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First Year M.Tech Civil (Construction & Management) Semester- I

24PGPE-CCM-1052: Advanced Construction Techniques

Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/Week	ISE	40 Marks
Tutorials	--	ESE	60 Marks
Total Credits	03	TW	--
		Duration of ESE	02 Hrs.

Course Objectives (CO):

1. To understand various composite construction process and design formwork.
2. To aware about new construction material and familiar with land reclamation techniques as well as slip formwork.
3. To Familiar with construction techniques of power plants, retaining structures, concrete pavements and rehabilitation of bridges.
4. To study advanced techniques like compacted concrete reinforced earth construction etc.

	Course Contents	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.	(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	(07)
Unit 3	**Construction of Power Plant:** Generation, structures, Atomic Power Stations, Thermal Power Stations, Wind- Mills.	(06)
Unit 4	**Rehabilitation of Bridges:** Necessity and methods of strengthening, Preservation of Bridges. **Retaining Structures:** Diaphragm walls, Advanced methods of construction.	(06)
Unit 5	**Advanced Techniques:** Compacted concrete, Vaccum, Ready Mix, Concrete dewatering in concrete slab construction, Reinforced earth construction, Foundation strengthening.	(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.	(07)

Course Outcomes (CO): At the end of course students will

1. Understand various composite construction process and design formwork.
2. Use new construction material and familiar with land reclamation techniques as well as slip formwork.
3. Familiar with construction techniques of power plants, retaining structures, concrete pavements and rehabilitation of bridges.
4. Possess knowledge advanced techniques like compacted concrete reinforced earth construction etc.

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.

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First Year M.Tech Civil (Construction & Management) Semester- I

24PGPE-CCM-1053: Value Engineering and Valuation

Teaching Scheme		**Examination Scheme**	
Lectures	03 Hrs/Week	ISE	40 Marks
Tutorials	--	ESE	60 Marks
Total Credits	03	TW	--
		Duration of ESE	02 Hrs.

Course Objectives (CO):

1. To understand the concept of Value engineering, Value analysis and Methodologies.
2. To understand life cycle costing techniques.
3. To study the applications of value engineering to construction projects.
4. To understand valuation and valuation report preparation for different types of assets.

	Course Contents	**Hours**
Unit 1	**Value Engineering:** Importance to contractors, Potential VE applications value: Basic and secondary functions, Factors contributing to value such as Asthetic, Ergonomic, Technical. **Value Analysis:** 10 Commandments of value analysis, Value analysis team; principles of value analysis, Elements of job plan Viz. orientation, Information, presentation. Implementation, Follow up action, benefits of value analysis.	(08)
Unit 2	**Life Cycle Costing:** Forecasting of Capital as well as Operating and Maintenance cost, time value, Present worth analysis, DCF methods, ROR analysis, sensitivity analysis concept.	(07)
Unit 3	**Value Engineering Methodology:** Orientation phase, Information phase, Function Analysis phase, Creative Phase, Evaluation Phase, Development Phase, Presentation Phase, Implementation Phase.	(06)
Unit 4	**Application of Value Engineering to Construction Projects:** VE during the Planning Phase of a Construction Project , VE during the Design Phase of a Construction Project, VE during the Construction Phase of a Construction Project.	(06)
Unit 5	**Valuation:** Types of value, purposes of valuation factors affecting value. Different methods of valuation for different types of assets such as land and building, horticulture, historical places.	(07)
Unit 6	**Valuation Report:** Valuation Report, contents, standard formats, Case study of any one Report.	(06)

Course Outcomes (CO): At the end of course students will

1. Understand the concept of Value engineering, Value analysis and Methodologies.
2. Possess knowledge of life cycle costing techniques.
3. Understand the applications of value engineering to construction projects.
4. Understand valuation and valuation report preparation for different types of assets.

Text Books

1	Value Engineering: Analysis And Methodology By Del Younke.

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2	Industrial Engg. & Mgt., O.P.Khanna, Dhanpat Rai Publ.
3	Industrial Organization & Engg. Economics, T.R.Banga, S.C.Sharma, Khanna Publ.
4	Estimating and Costing in Civil Engineering: Theory and Practice B.N Dutta Published S. Dutta & Company, Lucknow.
5	Estimating and Costing By: Rangwala Published By: Charotar Publishing House.
Reference Books	
1	Estimating, Costing Specifications & valuation in Civil EngineeringBy: M.Chakraborty.
2	Estimating and Costing By: G.S.Birdie.
3	Practical Information for Quantity Surveyors, Property valuers, Architects Engineers and Builders, P.T.Joglekar, Pune Vidyarthi Griha Prakashan, 2008 reprint.

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First Year M.Tech Civil (Construction & Management) Semester- I

24PG LC-CCM-106: Laboratory Practice

Teaching Scheme		Examination Scheme	
Lectures	--	ISE	--
Practicals	04 Hrs/Week	ESE	--
Total Credits	02	Term Work	25 Marks
		OE	25 Marks

Course Objectives (CO):

1. To formulate report on construction project site undertaken.
2. To apply theoretical concept of project management and equipment management to a case study.

	Course Contents	Hours
	Students are required to visit one or more construction project site and prepare visit reports covering following aspects of live construction projects. 1. Site organization. 2. Material management. 3. Personnel Management. 4. Detailed Specification of Equipments. 5. Cycle Time and Output Calculation. 6. Quality Management. 7. Safety Measures on Construction Site.	40

Course Outcomes (CO): At the end of course students will

1. Formulate report construction project site undertaken.
2. Apply theoretical concept of project management and equipment management to a case study.

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First Year M.Tech Civil (Construction & Management) Semester- I

24PGSW-CCM-107: Seminar-I

Teaching Scheme			**Examination Scheme**	
Lectures	--		ISE	--
Practicals	02 Hrs/Week		ESE	--
Total Credits	01		Term Work	50 Marks
			--	--

Course Objectives (CO):

1. To understand, develop research ability and present the knowledge gained from curriculum.
2. To study the recent trends, technological innovations in civil engineering construction management field.
3. To learn how to prepare, seminar research project topic report and enhance presentation skills.

	Course Contents	**Hours**
	i) Seminar - I should be based on the literature survey on any topic relevant to civil engineering (construction & management) (Should be helpful for selecting a probable title of the dissertation). For this course, postgraduate is expected to learn, investigation, methodologies, study relevant research papers, correlate work of various authors/researchers critically, study the concepts techniques & prevailing results, analyze those and prepare a seminar report (25-30 pages of A4 size sheets and submit it in IEEE format) on all these aspects. ii) Postgraduate has to deliver seminar presentation in front of the faculty of the department and his classmates. The concerned faculty should assess the candidates based on quality of seminar work carried out, preparation and understanding of candidates. Some marks should be reserved for the candidate's attendance.	(--)

Course Outcomes (CO): At the end of course students will

1. Understand, develop research ability and present the knowledge gained from curriculum.
2. Study the recent trends, technological innovations in civil engineering construction management field.
3. Learn how to prepare seminar research project topic report and enhance presentation skills.
4. Prepare final report (25-30 pages) and PPT in hard and soft format.

References:

1. Relevant reference books, journal publications, conferences publications, magazines, open web site sources, ASCE. Sciencedirect, NPTEL on selected topic of seminar.

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First Year M.Tech Civil (Construction & Management) Semester- II

24PGPCC-CCM-201:Construction Contracts and Legal Aspect

Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/Week	ISE	40 Marks
Tutorials	01 Hrs/Week	ESE	60 Marks
Total Credits	04	TW	25 Marks
		Duration of ESE	02 Hrs..

Course Objectives (CO):

1. To study salient features of Indian contract act, Arbitration act and process of contract administration.
2. Understand knowledge about bailment and FIDIC.
3. To understand provisions of labour laws and relevant acts.
4. To study safety engineering provisions and knowledge.

	Course Contents	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, and Professional Ethics. RERA.	(09)
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.	(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.	(06)
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.	(06)
Unit 5	**Industrial Act and Labour Laws:** Industrial Dispute Act, Payment of Wages Act.	(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 equipments, preventive measures Factory Act, Fatal accidents	(07)

Course Outcomes (CO): At the end of course students will

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.

Term Work: The term work part should include two assignments on unit nos. 1 2 & 3 and one assignment on unit nos. 4, 5 & 6) , Total = 09

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 Jhamb.

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First Year M.Tech Civil (Construction & Management) Semester- II

24PGPCC-CCM-202:Construction Methods and Techniques

Teaching Scheme		**Examination Scheme**	
Lectures	03 Hrs/Week	ISE	40 Marks
Tutorials	01 Hrs/Week	ESE	60 Marks
Total Credits	04	TW	25 Marks
		Duration of ESE	02 Hrs.

Course Objectives (CO):

1. To understand underground, underwater and steel construction methods.
2. To study the use of cofferdams, caissons and piles for foundation construction.
3. To understand, follow and apply prefabrication construction method.
4. To make Familiarise with vibration controlled foundation, formworks and retaining walls.

	Course Contents	**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.	(09)
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, centering. Dismantling for maintenance, repairs and inspection of bridges. Testing of bridges.	(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	(07)
Unit 4	**Pre-fabricated Construction:** Types, Standardization of components, Size and economy, Fabrication techniques, Transportation, Erection, Jointing, Fabrication techniques.	(05)
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.	(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.	(07)

Course Outcomes (CO): At the end of course students will

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

Term Work: The term work part should include two assignments on unit nos. 1 2 & 3 and one assignment on unit nos. 4, 5 & 6) , Total = 09

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.
4	Prefabricated Construction by Mokk.
Reference Books	
1	Construction Planning Equipments and Methods R.L Peurifey.
2	Formwork Design and Construction-Wynn
3	Hand Book of Civil Engineering- stubb
4	Foundation Engineering- Tomlinson
5	Cofferdams- While and prentice- Columbia University Press New-York
Useful Websites	
1	http://nptel.ac.in/
2	http://www.courses.com/civil-engineering
3	www.youtube.com

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M.Tech Civil (Construction & Management) Semester- II

24PGPE-CCM-2031:Computational Methods and Optimization Techniques

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/Week		ISE	40 Marks
Tutorials	--		ESE	60 Marks
Total Credits	03		TW	--
			Duration of ESE	02 Hrs.

Course Objectives (CO):

1. To understand the concept of error and its propagation.
2. To understand various methods to solve linear, nonlinear and differential equations.
3. To make Familiar with optimization models.
4. To study the Applications of linear programming and dynamic programming for solving mathematical models.

	Course Contents	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.	(08)
Unit 2	**Linear & Nonlinear Equations** - Solution of simultaneous linear and non-linear equations, direct and iterative methods.	(06)
Unit 3	**Numerical Differentiation and Numerical Integration** - Numerical solutions of ordinary differential equations, systems of ODEs, Runge-kutta method.	(07)
Unit 4	**Optimization**– Types of optimization models, objective function and constraints set, Convex and Concave functions, Objectives of optimization models.	(06)
Unit 5	**Linear Programming** - Simplex Method, Duality, Sensitivity analysis, Transportation and assignment models. Nonlinear programming- Single variable and multiple variables, Quadratic Programming.	(07)
Unit 6	**Dynamic Programming** – Principle of optimality. Integer programming Cutting plane algorithm. Simulation – Monto Carlo Method.	(06)

Course Outcomes (CO): At the end of course students will

1. Understand the concept of error and its propagation.
2. Use various methods to solve linear, nonlinear and differential equations.
3. Familiar with optimization models.
4. Apply linear programming and dynamic programming to solve mathematical models.

Text Books

1	Operation Research 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.

Useful Websites

	http://nptel.ac.in/
	http://swayam.gov.in/
	http://www.courses.com/civil-engineering
	http://www.youtube.com/user/nptelhrd
	www.khanacademy.org

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M.Tech Civil (Construction & Management) Semester- II

24PGPE-CCM-2032:Management Information System

Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/Week	ISE	40 Marks
Tutorials	--	ESE	60 Marks
Total Credits	03	TW	--
		Duration of ESE	02 Hrs.

Course Objectives (CO):

1. Understand fundamentals of engineering economics
2. Study the concepts of economic appraisal of projects and get expertise in using appraisal techniques
3. Understand the importance of risk and study fundamentals of risk management
4. Aware about various options available for financing projects

	Course Contents	Hours
Unit 1	**Introduction:** Definition Role, Impact, Evolution, Structure of MIS in organization.	(06)
Unit 2	**Decision Making:** Programmed and Non programmed decisions, Stages in decision making, Concepts of Information, Systems Theory, Decision Support System	(09)
Unit 3	**Computers in MIS:** Hard ware, Software, Communication networks Office automation	(07)
Unit 4	**Data Management:** Collection and analysis of data, Database Management system.	(06)
Unit 5	**Applications of MIS:** Materials, Finance, HRD, Marketing and Service sector	(06)
Unit 6	**Implementation and Maintenance of MIS:** Socio-technical approach, Factors of success and failure, Quality assurance of MIS.	(06)

Course Outcomes (CO): At the end of course students will

1. Understand fundamentals of engineering economics
2. Study the concepts of economic appraisal of projects and get expertise in using appraisal techniques
3. Understand the importance of risk and study fundamentals of risk management
4. Aware about various options available for financing projects

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.

Useful Websites

1	http://www.courses.com/civil-engineering
2	http://www.youtube.com/user/nptelhrd
3	www.khanacademy.org

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M.Tech Civil (Construction & Management) Semester- II

24PGPE-CCM-2033:Resource Management

Teaching Scheme		**Examination Scheme**	
Lectures	03 Hrs/Week	ISE	40 Marks
Tutorials	--	ESE	60 Marks
Total Credits	03	TW	--
		Duration of ESE	02 Hrs.

Course Objectives (CO):

1. Understand the resource requirements of different kinds of civil engineering projects.
2. Know different techniques of classification and codification of materials. They will be able to understand the purchase and procurement procedures and get acquainted with the concept of MRP, EOQ, JIT, MMS, QC, etc
3. Understand the different kinds of equipments and knowledge gained will help them to make optimum utilization of equipments on construction site.
4. Understand the Human resource management (HRM) processes, functions, changes and challenges in today's emerging organizational perspective.

	Course Contents	**Hours**
Unit 1	**Material Management:** Importance of materials management and its role in construction industry-scope, objectives and functions, integrated approach to materials management, Role of materials manager.	(06)
Unit 2	**Material Planning and Analysis:** Classification and Codification of materials of construction, ABC analysis-Procedure and its use, Standardization in materials and their management, Procurement, identification of sources of procurement, vendor analysis, Vendor analysis concept of (MRKP) Material requirement planning, planning, purchase procedure, legal aspects.	(09)
Unit 3	**Inventory Management:** Inventory Control techniques. EOQ, Advantages and limitation of use of EOQ, Periodic ordering, order point control, safety stock, stock outs, application of ABC analysis in inventory control, Stores Management: Receipt and inspection, care and safety in handling, loss on storage, wastage, Bulk purchasing, site layout and site organization, scheduling of men, materials and equipment	(07)
Unit 4	**Applications of MMS:** Materials Management Systems in materials planning, procurement, inventory, control, cost control etc.	(06)
Unit 5	**Equipment Management:** Working out number of construction equipment required based on the individual equipment work cycle, and based on the total time available and quantum of work, working out the total hourly cost and the cost per unit of item for the various construction machinery, Concept of equipment log book, Concept of equipment selection based on optimal used.	(06)
Unit 6	**Human Resource Development:** Flow diagram of human resource development and human resource management, Training, competency development, capacity building of resources required at grass root level and at the managerial level in construction.	(06)

Course Outcomes (CO): At the end of course students will

1. Understand the resource requirements of different kinds of civil engineering projects.
2. Know different techniques of classification and codification of materials. They will be able to understand the purchase and procurement procedures and get acquainted with the concept of MRP, EOQ, JIT, MMS, QC, etc

3. Understand the different kinds of equipments and knowledge gained will help them to make optimum utilization of equipments on construction site.	
4. Understand the Human resource management (HRM) processes, functions, changes and challenges in today's emerging organizational perspective.	
Reference Books	
1	K. S. Menon, Purchasing and Inventory Control , Wheeler Publication
2	Dr. Mahesh Verma, Construction equipment planning and applications
3	Peurifoy, Construction planning, equipment and methods, Tata McGraw Hill pub
4	Biswajeet Pattanayak, Human Resource Management
5	Bohlander & Snell, Managing Human Resources
Useful Websites	
1	http://www.courses.com/civil-engineering
2	http://www.youtube.com/user/nptelhrd
3	www.khanacademy.org

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M.Tech Civil (Construction & Management) Semester- II

24PGPE-CCM-2041: Ground Improvement Techniques

Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/Week	ISE	40 Marks
Tutorials	--	ESE	60 Marks
Total Credits	03	TW	--
		Duration of ESE	02 Hrs.

Course Objectives (CO):

1. To understand the importance of ground improvement.
2. To make Familiar with different ground improvement techniques.
3. Understand the theoretical background for different ground improvement techniques.
4. To Design and apply ground improvement techniques.

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

Course Outcomes (CO): At the end of course students will

1. Follow the importance of ground improvement.
2. Familiar with different ground improvement techniques.
3. Understand the theoretical background for different ground improvement techniques.
4. Design and apply ground improvement techniques.

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.
4. Ground improvement by Klaus Kirsch.

5	Reinforced soil and its engineering applications by Swami Saran.
Reference Books	
1	Earth reinforcement and soil structures by Colin JFPJones
2	An introduction to soil reinforcement and geosynthetics by G. L.SivakumarBabu Geotechnical engineering by Shashi K Gulhati and Manoj Datta.

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First Year M.Tech Civil (Construction & Management) Semester- II

24PGPE-CCM-2042: Site Investigation Methods and Practices

Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/Week	ISE	40 Marks
Tutorials	--	ESE	60 Marks
Total Credits	03	TW	--
		Duration of ESE	02 Hrs.

Course Objectives (CO):

1. To study importance of site investigation in Civil Engineering process.
2. Describe different site investigation methods & Non destructive tests.
3. To identify the various soil exploration methods for soil sampling.
4. Examine the various field and lab test on soil also interpret how to write the technical report for site investigation.

	Course Contents	Hours
Unit 1	**Introduction to Site investigation:** The importance of site investigation, purposes of a site investigation, Objectives, Need for site investigation, Advantages of site investigation, Phases in site investigation process, Approach to site investigation.	(07)
Unit 2	**Methodology of Site Investigation:** Preliminary site investigation, preliminary desk study, Topographical maps, Geological records, Mining records, Air-photography and remote sensing, Photogrammetry, Air-photo interpretation, Site walk-over survey, Reconnaissance of site works.	(07)
Unit 3	**Site Investigation using Non-Destructive Tests:** Introduction, Electrical Methods, Magnetic Methods, Gravity Methods, Acoustic Emission Methods, Seismic Methods.	(06)
Unit 4	**Site investigation using in situ testing:** Introduction, Penetration testing - Standard penetration test & Cone penetration test, Strength and compressibility testing - Field vane shear test, Pressure meter test, Plate loading test.	(06)
Unit 5	**Sampling:** Introduction , Sample sizes, Soil Disturbance, Soil disturbance during drilling , Soil disturbance during sampling ,Disturbance after sampling , Undisturbed sampling techniques , Sand Sampling , Preparation of disturbed samples for testing ,Preparation of undisturbed samples for testing .	(07)
Unit 6	**Laboratory testing for site investigation:** Introduction, Purpose of soil testing, Purpose & Significance of following test – Soil classification tests , Particle size distribution tests (Sieve analysis, Hydrometer analysis) , Plasticity tests (Liquid limit, Cone penetrometer test, Plastic limit) ,Compaction tests (Proctor compaction test) , Particle density(Specific gravity) determination ,Tests for Geotechnical parameters - Strength tests (CBR test, Lab vane test, Direct shear test, Triaxial test) ,Seepage and permeability tests. **Technical Report writing:** Standard format for a Site Investigation.	(07)

Course Outcomes (CO): At the end of course students will

1. State the importance of site investigation in Civil Engineering process.

	2. Describe different site investigation methods & Non destructive tests.
	3. Identify the various soil exploration methods for soil sampling.
	4. Examine the various field and lab test on soil also interpret how to write the technical report for site investigation.
Text Books	
1	Site investigation by Clayton, Mathews and Simons.
2	Instrumentation in geotechnical engineering by K.R. Saxena and V.M. Sharma.
3	Site Investigation Practice by Joyce, M.D.; ESFN. SPON Publishers, 1982.
Reference Books	
1	Hvorslev M.J. Subsurface exploration and sampling of soils for Civil Engg purposes.
2	Geotechnical Engineering Investigation Manual by R.E. Hunt, Mc Graw Hill Co. New York.
3	Compendium of Indian Standards on Soil Engineering Parts 1 and II 1987 - 1988.
4	Geotechnical and Geophysical Site Characterization, An-Bin Huang, Paul W Mayne, CRC Press, 2008, ISBN 0415469368.

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First Year M.Tech Civil (Construction & Management) Semester- II

24PGPE-CCM-2043: Environmental Impact Assessment

Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/Week	ISE	40 Marks
Tutorials	--	ESE	60 Marks
Total Credits	03	TW	--
		Duration of ESE	02 Hrs.

Course Objectives (CO):

1. To understand the fundamental concepts of EM and EIA.
2. To trace the evolution of EIA and use it as EM tool.
3. To apply environment impact assessment process for construction projects.
4. To prepare project report which is comply with environmental clearance procedure?

	Course Contents	Hours
Unit 1	**Introduction:** Environmental Management, Definition, Scope, Goals and need. International Environmental Movement, Environmental concerns in India.	(08)
Unit 2	**Policies & Programmes:** Environmental Policies and Programmes in India, Environmental laws and Legislations, Evolution of Indian Legislations, Constitution of India.	(06)
Unit 3	**Environmental Impact Assessment:** Introduction, Purpose, Evolution, Forecasting environmental changes, Environment Impact Statement (EIS), Strategic Environmental Assessment (SEA). Screening and Scoping.	(07)
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.	(06)
Unit 5	**Environmental Auditing:** Audit Methodology, Life Cycle Assessment (LCA) – Purpose, Evolution and Stages. Environment Impact Statement (EIS), Requisites of good EIS.	(07)
Unit 6	**Environment Management System:** EMS Standards: IS14000, Benefits of Implementing ISO 14001.	(06)

Course Outcomes (CO): At the end of course students will

1. Understand 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?

Text Books

1. Canter L (1996) Environmental Impact Assessment (Second Edition). McGrawHill 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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First Year M.Tech Civil (Construction & Management) Semester- II

24PGOEC-CCM[illegible]2053: Waste To Energy

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/Week		ISE	40 Marks
Tutorials	--		ESE	60 Marks
Total Credits	03		TW	--
			Duration of ESE	02 Hrs.

Course Objectives (CO):

1. Understand how to generate energy from various wastes.
2. Learn the concept of Biomass pyrolysis, biomass gasification and combustion.
3. Understand design construction and operation biogas plant.
4. Learn biomass conservation processes applications, Energy programme.

	Course Contents	**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.	(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.	(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.	(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.	(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.	(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.	(07)

Course Outcomes (CO): At the end of course students will

1. Understand how to generate energy from various wastes.
2. Learn the concept of Biomass pyrolysis, biomass gasification and combustion.
3. Understand design construction and operation biogas plant.
4. Learn biomass conservation processes applications, Energy programme.

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 Websites	
1	Moocs/ Swayam Courses on Waste to Energy

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First Year M.Tech Civil (Construction & Management) Semester- II

24PGOEC-CCM-2054: Water Power Engineering

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/Week		ISE	40 Marks
Tutorials	--		ESE	60 Marks
Total Credits	03		TW	--
			Duration of ESE	02 Hrs.

Course Objectives (CO):

1. To understand Energy sources, hydropower scheme, hydrographs & load duration curve.
2. Understand Intake, Surge tank, Design criteria, surge tank, Forebay.
3. To study Water conveyance systems, Tunnel and types of Powerstations
4. To understand use of turbines, Pumped storage plants, & Tidal power stations.

	Course Contents	**Hours**
Unit 1	**Introduction:** Sources of energy, types of power station, types of hydro power schemes, Estimation of hydro power available, gross head, net head, storage and pondage, hydrographs, mass curves, flow duration curves. Nature of demand: Load curve, load duration curves, load factor, plant capacity factor, plant use factor, firm power, secondary power.	(09)
Unit 2	**Intake:** types, hydraulics of intake, trash rack, transition from gate to conduit, intake gates. Surge Tank : Functions and behavior of the surge tanks, location, types of surge tanks, basic design criteria of simple surge tank, forebay	(06)
Unit 3	**Water Conveyance Systems:** Power canals – Hydraulic Design **Pen-stock** : types , hydraulic design and economic diameter pipe, supports, anchor blocks, **Tunnels:** classification, location and hydraulic design, tunnel linings.	(06)
Unit 4	**Power station:** General arrangements of power station, power house, substructure and super structure, main dimensions Underground power station – necessity, types, development and economics. Advantages and disadvantages.	(07)
Unit 5	**Turbines:** Classification of turbines, characteristics of different types, choice of type of turbine, turbine setting and cavitation, Tail Race ,draft tubes, function and types, Hydraulic Design	(06)
Unit 6	**Pumped storage plants:** purpose and general layout of pumped storage schemes, types, economics of pumped storage plants. **Tidal power stations:** Classification, general description of different types, depression power plants.	(06)

Course Outcomes (CO): At the end of course students will

1. Understand Energy sources, hydropower scheme, hydrographs & load duration curve.
2. Understand Intake, Surge tank, Design criteria, surge tank, Forebay.
3. Familiar with Water conveyance systems, Tunnel and types of Powerstations
4. Understand use of turbines, Pumped storage plants, & Tidal power stations.

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Text Books	
1	Water Power Development – E. Mosoni, Vol. I & II.
2	Hydro-electric Engineering Practice – G. Brown, Vol. I, II & III.
3	Water Power Engineering – M. M. Dandekar, Vikas Pub. House PVt. Ltd.
4	Water Power Engineering – P. K. Bhattacharya, Khanna Pub., Delhi
5	Water Power Engineering – M. M. Deshmukh, DhanpatRai and Sons
Reference Books	
1	Hydro – Electric Hand Book – Creager and Justin.
2	Hydro Power Structures – Varshney
Useful Websites	
1	http://nptel.ac.in/
2	http://online.stanford.edu/
3	http://www.courses.com/civil-engineering
4	http://www.youtube.com/user/nptelhrd

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First Year M.Tech Civil (Construction & Management) Semester- II

24PGLC-CCM-206: Software Lab

Teaching Scheme		Examination Scheme	
Lectures	--	ISE	--
Practicals	04 Hrs/Week	ESE	--
Total Credits	02	Term Work	25 Marks
		--	--

Course Objectives (CO):

1. To study, understand and develop software skills in construction management.
2. To achieve knowledge of planning, scheduling, tracking progress in live construction project.

	Course Contents	Hours
	The students are required to prepare an assignments based on live construction projects using software's like Microsoft project (MSP), Primavera, BIM, GIS. **List of Experiments.** • To practice on creating Bar Charts/Gantt Charts. • To creating CPM/PERT charts for finding out critical path. • Practice on resource allocation and leveling of resources. • Practice on Project Monitoring (Cost &Time). • Plotting and printing of various charts and project. • Filters and layouts- formatting the display- printing and reports. • Tracking progress- scheduling options and sequence of progress.	40

References

1. "Software Manuals" on MSP, Primavera, BIM, reference books.

Course Outcomes (CO): At the end of course students will

1. Able to understand and develop software skills in construction management.
2. Able to achieve knowledge of planning, scheduling, tracking progress in live construction project.

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First Year M.Tech Civil (Construction & Management) Semester- II

24PGSW-CCM-207: Seminar-II

Teaching Scheme			Examination Scheme	
Lectures	--		ISE	--
Practicals	02 Hrs/Week		ESE	--
Total Credits	01		Term Work	50 Marks
			--	--

Course Objectives (CO):

1. To understand, develop research ability and present the knowledge gained from curriculum.
2. To study the recent trends, technological innovations in civil engineering construction management field.
3. To learn how to prepare, seminar research project topic report and enhance presentation skills.

	Course Contents	Hours
	i) Seminar - II should be based on the tentative topic of dissertation literature relevant to civil engineering (construction & management).Each postgraduate is expected to learn, investigation, methodologies, study relevant research papers, correlate work of various authors/researchers critically, study the concepts techniques & prevailing results, analyze those and prepare a seminar report (25-30 pages of A4 size sheets and submit it in IEEE format) on all these aspects. ii) Postgraduate has to deliver seminar presentation in front of the faculty of the department and his classmates. The concerned faculty should assess the candidates based on quality of seminar work carried out, preparation and understanding of candidates. Some marks should be reserved for the candidate's attendance.	(--)

Course Outcomes (CO): At the end of course students will

1. Understand, develop research ability and present the knowledge gained from curriculum.
2. Study the recent trends, technological innovations in civil engineering construction management field.
3. Learn how to prepare seminar research project topic report and enhance presentation skills.
4. Prepare final report (35-40 pages) and PPT in hard and soft format.

References:

1. Relevant reference books, journal publications, conferences publications, magazines, open web site sources, ASCE. Sciencedirect, NPTEL on selected topic of seminar.

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First Year M.Tech Civil (Construction & Management) Semester- II

24PGS-CCM-208: Comprehensive Viva

Teaching Scheme		Examination Scheme	
Lectures	--	ISE	--
Practicals	1	ESE	--
Total Credits	1	OE	25 Marks
		--	--

Course Objectives (CO):

1. To verify the continuous assessment and performance of students by External examiner and Internal examiner.

	Course Contents	Hours
	1. The students have to prepare on all subjects which they have studied in I[st] and II[nd] semesters The viva will be conducted by the External/Internal Examiner jointly and their appointments will be made by university. 2. The in-depth knowledge, preparation and subjects understanding will be assessed by the Examiners.	(--)

Course Outcomes (CO): At the end of course students will

1. Able to Verify their knowledge based on the subjects they have studied in Semester-I and Semester-II.

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Second Year M.Tech Civil (Construction & Management) Semester- III

(MC) 24PGMC-CCM-301: Research Methodology

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/Week		ISE	40 Marks
Tutorials	---		ESE	60 Marks
Total Credits	03		Duration of ESE	02Hrs.

Course Objectives (CO):

1. To acquire basic understanding of research problem formulation.
2. To conduct a literature review to identify gaps, debates, and original works in the chosen field of study.
3. To formulate research questions or hypotheses based on theoretical frameworks and literature reviews.
4. To collect data using chosen methods and tools with attention to validity and reliability.

	Course Contents	**Hours**
Unit 1	**Introduction to Research:** Meaning of research, types of research, By Purpose or Goal, By Methodology, By Research Design, By Time Horizon, By Scope, By Data Collection Method, By Subject Area. Steps in research process, Creativity in Research, Ethics in research.	(06)
Unit 2	**Research Problem:** Concept of Research Problem, Need of research problem, Defining research Problem, Identifying research problem, Formulating research problem, Conditions and Components of research problem,	(06)
Unit 3	**Research Design:** Concept of research Design, Need and Features of Research Design, Components of Research design, Types of Research Design, Research design for Exploratory Studies, Research Design for Descriptive and Diagnostic Studies, Research Design for Experimental Studies.,	(06)
Unit 4	**Literature survey:** Definition of literature and literature survey, need of literature survey, sources of literature, elements and objectives of literature survey, styles of literature survey, and strategies of literature survey.	(06)
Unit 5	**Methods of Data Collections:** Concept of Data collection, Types of data, Methods of Primary Data Collection, Methods of Secondary Data Collection, Selecting an Appropriate Method of Data Collection.	(06)
Unit 6	**Concept of Hypothesis:** Defining Hypothesis, Characteristics of Hypothesis, Types of Hypothesis, Hypothesis testing, Null Hypothesis and Alternative Hypothesis, Decision Rule, Two-tailed Test, One – tailed Test, Procedure of Hypothesis Testing.	(06)

Course Outcomes (CO): At the end of course students will

1. Understand research problem formulation and approaches of investigation of solutions for research problems.
2. Learn ethical practices to be followed in research and apply research methodology in case studies and acquire skills required for presentation of research outcomes.
3. Conduct a comprehensive literature review to identify gaps in knowledge and inform research questions.
4. Critically assess research studies and their implications for theory and practice.

Text Books

1	Research Methodology-G. C. Ramamurthy (Deramtech Press)
2	Research Methodology- Ranjit Kumar (Sage publishing)

3	C. R. Kothari: Research Methodology: Methods & Techniques.
Reference Books	
1	Research Methodology: concepts and cases—Deepak Chawla and Neena Sondhi.
2	Research Methods for Business—Sekaran—Wiley.
3	Research Methodology: Methods and Trends'
4	Research Methods in Education---Louis Cohen

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Second Year M.Tech Civil (Construction & Management) Semester- III

(MC) 24PGMC-CCM-302: Intellectual Property Rights

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/Week		ISE	40 Marks
Total Credits	03		ESE	60 Marks
			Duration of ESE	02Hrs.

Course Objectives (CO):

1. Understand meaning of Intellectual property.
2. Learn administration process for Intellectual property.
3. Process for Patent filling.
4. Introduction to Trademarks, Copyrights & Trade Secrets.
5. Understand innovations in Intellectual property rights.
6. Learn global scenario in Intellectual property rights.

	Course Contents	**Hours**
Unit 1	**Introduction to Intellectual Property Rights:** Concepts of Property and Intellectual Property, Nature, Objectives and Importance of understanding Intellectual Property Rights.	(06)
Unit 2	**Administration in Intellectual Property:** -Patents-Indian Patent Office and its Administration, Administration of Patent System – Patenting under Indian Patent Act.	(06)
Unit 3	**Rights in Patent:** Patent Rights and its Scope, Licensing and transfer of technology, Patent information and database. Provisional and Non Provisional Patent Application and Specification, Plant Patenting, Idea Patenting, Integrated Circuits, Industrial Designs.	(06)
Unit 4	**Trademarks, Copyrights & Trade Secrets:** Trademarks, Registered and unregistered trademarks, Copyrights, Traditional Knowledge, Geographical Indications, Trade Secrets, Case Studies.	(06)
Unit 5	**Innovations in IPR:** New developments in IPR, Process of patenting and development, technological research, innovation.	(06)
Unit 6	**International Scenario in IPR:** WIPO, TRIPs, Patenting under PCT.	(06)

Course Outcomes (CO): At the end of course students will

1. Understand concept of Intellectual property.
2. Administration process for Intellectual property.
3. Detail process of Patent filling & rights.
4. Knowledge about Trademarks, Copyrights & Trade Secrets.
5. Learn innovations in Intellectual property rights.
6. Understand international scenario in Intellectual property rights.

Text Books

1	THE PRINCIPLES OF INTELLECTUAL PROPERTY LAW, T. Padma, K.P.C. Rao, Alt Publications
2	An Introduction to Intellectual Property Rights, JP Misra, Central Law Publication
3	Intellectual Property Rights under WTO by T. Ramappa, S. Chand.
4	Resisting Intellectual Property by Halbert ,Taylor & Francis.

5	Intellectual Property in New Technological Age by Robert P. Merges, Peter S. Menell, Mark A. Lemley
Reference Books	
1	Aswani Kumar Bansal : Law of Trademarks in India.
2	B L Wadehra : Law Relating to Patents, Trademarks, Copyright, Designs and Geographical Indications.
3	SatyawratPonkse: The Management of Intellectual Property.
4	Law relating to Intellectual Property Rights by M.K. Bhandari, Central Law Publication

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

Second Year M.Tech Civil (Construction & Management) Semester- III

24PGIT-CCM-303: Industrial Training

Teaching Scheme			**Examination Scheme**	
Lectures	--		ISE	--
Practicals	08 Hrs/Week		ESE	--
Total Credits	04		Term Work	75 Marks

Course Objectives (CO):

1. To expose the students to work on actual construction project environment and enhance their knowledge, technical skills and correlate the things learnt in the college.
2. To understand, learn to write technical reports, develop skills to present and defend their work in front of technically qualified audience.
3. To understand application of using software/analytical/computational tools for selected project.

	Course Contents	**Hours**
	• The students are required to complete Industrial training in any area related to Construction Management infrastructure projects (like, Housing development, Industrial unit, Power plant, Dam, Bridge, Highway, Tunnel etc) as mentioned in the syllabus for minimum (04 weeks) **OR** 25 working days beyond the academic schedule during third semester (after the completion of IInd semester and before end of IIIrd Semester). • Students can choose project started within last onr or two years from respective academic year of admission and submit the report of the Industrial Training undertaken and necessary training certificate from that organization. • Assessment will be done at the end of IIIrd semester by the project guide along with Assessment Committee appointed by Programme Head.	(--)

Course Outcomes (CO): At the end of course students will

1. Get opportunity to work in actual project environment
2. Ability to analyze a given engineering problem identifies an appropriate problem solving methodology, implement the methodology and propose a meaningful solution.
3. Able to Learn Develop, Preset skills for defending work in front of their technically qualified audience.
4. Able to use software/analytical/computational tools for selected project.

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Second Year M.Tech Civil (Construction & Management) Semester- III

24PGSLC/AC-CCM-304: One Course from MOOC/SWAYAM

Teaching Scheme			**Examination Scheme**	
Lectures	--		ISE	--
Practicals	--		ESE	--
Total Credits	--		Term Work	25 Marks
			--	--

Course Objectives (CO):

1. To learn use of Swayam/NPTEL as learning platform designed to provide educators, administrators and learners.
2. To create personalized learning environment.

	Course Contents	**Hours**
	• Students are required to choose course from Swayam/NPTEL and to be acquaintance with recent developments in Civil Engineering (Construction management) beyond syllabus. • Submission of the certificate for the course completed from Swayam/NPTEL to the respective guide. • Assessment will be done at the end of of III[rd] semester by the project guide along with Assessment Committee appointed by Programme Head.	(--)

Course Outcomes (CO): At the end of course students will

1. Learn use of Swayam/NPTEL platform designed for educators, administrators and learners.
2. Able to perform personalized learning environment in the specialized field

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

Second Year M.Tech Civil (Construction & Management) Semester-III

24PGPC-CCM-305: Dissertation Phase - I

Teaching Scheme			**Examination Scheme**	
Lectures	--		ISE	--
Practicals	16 Hrs/Week		ESE	--
Total Credits	10		Term Work	50 Marks
			Oral Exam	50 Marks

Course Objectives (CO):

1. To identify self learning topics in the field of construction and management.
2. Explore the literature survey and contact with resource person for selected research topic.
3. Identify problem statement & decide methodologies for the research work.
4. To develop oral and written communication skills and to present, defend their work in front of technically qualified audience.

	Course Contents	**Hours**
	• The project work undertaken should be a problem with research potential involving scientific research, design, generation, collection, analysis of data and determining solution. • The synopsis preparation on project undertaken containing covering page, Relevance, Literature review, Objectives, Methodology, A detailed problem statement and preliminary results (if available) are to be mentioned in it. Also Facilities available & approximate project expenditure. • Synopsis presentation in front of the examiners panel set by Head and PG coordinator. It is mandatory that the candidate has to be in regular contact with his guide and topic of dissertation must be mutually decided by guide and candidate. • The dissertation report submitted by the candidate on topic already approved by Universities/Institute authorities on the basis of synopsis submitted by the candidate shall according to following guidelines. **Format of Dissertation Phase-I Report Guidelines: (Phase-I: July to December)** • The dissertation work report shall be typed on A4 size bond paper. The total No. of minimum pages shall not less than 40. Introduction, Literature reviews, Questionnaire surveys, construction site visits details, methods, calculations, graphs, and annexure etc be as per the requirement. The report should be written in the standard format. 1. Title sheet 2. Certificate 3. Acknowledgement 4. List of figures, Photographs/Graphs/Tables 5. Abbreviations. 6. Abstract 7. Contents. 8. Text with usual scheme of chapters. 9. Discussion of the results and conclusions • Bibliography (the source of illustrative matter be acknowledged clearly at appropriate place IEEE/ASME/Elsevier Format)	--

Course Outcomes (CO): At the end of course students will

1. Able to decide topics in the field of construction and management

2. Able to perform extensive literature survey and contact with resource person for selected research topic.
3. Systematically identify relevant theory concepts, relate this to appropriate methodologies and evidence, apply suitable methods/ techniques for selected problem statement and draw suitable conclusions.
4. Involve in systematic finding and critical reviews of appropriate and relevant information sources.
5. Able to understand and apply ethical standards of conduct in the collection and evaluation of data and other resources.
6. Able to present research concepts, develop oral and written communication skills and defend their work clearly and effectively both in writing and orally.

Chairman
Board of Studies

Academic Dean
T.K.I.E.T.,Warananagar

Principal
T.K.I.E.T.,Warananagar

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Tatyasaheb Kore Institute of Engineering & Technology, Warananagar				
Second Year M.Tech Civil (Construction & Management) Semester-IV				
24PGPC-CCM-401: Dissertation Phase - II				
Teaching Scheme			**Examination Scheme**	
Lectures	--		ISE	--
Practicals	30 Hrs/week		ESE	--
Total Credits	20		Term Work	100 Marks
			Oral Exam	100 Marks

Course Objectives (CO):

1. To identify self learning topics in construction and management.
2. Explore the literature survey and contact with resource person for selected research topic.
3. To develop oral and written communication skills and to present, defend their work in front of Technically qualified audience.

	Course Contents	Hours
	• The dissertation submitted by candidate on topic already approved by University/Institute authorities on the basis of initial synopsis submitted by candidate shall be according to the following guidelines. **Format of Dissertation Phase-II Report Guidelines: (Phase-I: January to June)** • The dissertation work report shall be typed on A4 size bond paper. The total No. of minimum pages shall not less than 60. Introduction, Literature reviews, Questionnaire surveys, construction site visits details, methods, calculations, graphs, and annexure etc be as per the requirement. The report should be written in the standard format. 1. Title sheet 2. Certificate 3. Acknowledgement 4. List of figures, Photographs/Graphs/Tables 5. Abbreviations. 6. Abstract 7. Contents. 8. Text with usual scheme of chapters. 9. Discussion of the results, conclusions and future scope for the research topic. • Bibliography (the source of illustrative matter be acknowledged clearly at appropriate place IEEE/ASME/Elsevier Format) **Note: The Candidates should publish at least two international journal papers (UGC approved/SCOPUS index etc.)** • **The candidate has to present the research work in front of the examiners panel consisting of an approved external examiner, guide, co-guide etc. as decided by the department head.**	--

Course Outcomes (CO): At the end of course students will
1. Able to identify self learning topics in construction and management.
2. Explore the literature survey and contact with resource person for selected research topic.
3. Able to develop oral and written communication skills and to present , defend their work in front of Technically qualified audience.

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