

Date:30/08/2018

To,

**The Dean Academics
R.I.T. Rajaramnagar.**

Sub:- Submission Revised Curriculum Syllabus Structure of Civil-Construction Management Year
2018- 19

Respected Sir,

We are Submitting herewith curriculum structure of Civil- Construction Management for
the Year 2018-19

Kindly acknowledge the same.

Thanking You,

Head,

Department of Civil Engineering



Encl:

PG Civil Construction Management Syllabus



K.E. Society's
Rajarambapu Institute of Technology, Sakharale
(An Autonomous Institute, affiliated to Shivaji University, Kolhapur)
Proposed Curriculum Structure and Evaluation Scheme
Academic Year 2018-19

Rev: Civil-Construction Management/Course Structure/RIT/01/2018-19

Department: Civil Engineering

Class: F. Y. M. Tech Civil-Construction Management

Semester: I

Course Code	Course	Teaching Scheme				Evaluation Scheme					
		L	T	P	Credits	Scheme	Theory (Marks %)		Practical (Marks %)		
							Max	Min. for passing	Max.	Min. for passing	
CCM1014	Construction Project Management	3	-	-	3	ISE	20	40	40	----	----
						UT1	15			----	----
						UT2	15	----	----		
						ESE	50	40	----	----	
CCM1024	Construction Equipment's and Techniques	3	-	-	3	ISE	20	40	40	----	----
						UT1	15			----	----
						UT2	15	----	----		
						ESE	50	40	----	----	
PE-I	Program Elective I	3	-	-	3	ISE	20	40	40	----	----
						UT1	15			----	----
						UT2	15	----	----		
						ESE	50	40	----	----	
PE-II	Program Elective II	3	-	-	3	ISE	20	40	40	----	----
						UT1	15			----	----
						UT2	15	----	----		
						ESE	50	40	----	----	
CCM1114	Research Methodology & IPR	1	1	-	2	ISE	50	40	40	----	----
						ESE	50			40	----
SHP551	Technical Communication	2	-	-	Audit Course	P/NP			----	----	
CCM1124	Quantity Surveying Lab	-	-	4	2	ISE	---	---	---	50	50
						ESE	---	---	---	50	50
CCM1134	Project Planning Lab 1	-	-	4	2	ISE	----	----	----	50	50
						ESE	---	---	---	50	50
	TOTAL	15	1	08	18						

Total Contact Hours/week : 24
Total Credits : 18

ISE = In Semester Evaluation, MSE (UT1+UT2) UT-I = Unit Test-I, UT-II = Unit Test-II

ESE = End Semester Exam, P = Pass, N/P = Not Pass





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Department: Civil Engineering

Class: F. Y. M. Tech Civil-Construction Management

Semester: II

Course Code	Course	Teaching Scheme				Evaluation Scheme					
		L	T	P	Credits	Scheme	Theory (Marks %)		Practical (Marks %)		
							Max	Min. for passing	Max.	Min. for passing	
SHP526	Statistical Analysis	3	-	-	3	ISE	20	40	40	----	----
						UT1	15			----	----
						UT2	15	----	----		
						ESE	50	40	----	----	
CCM2014	Project Economics and Financial Management	3	-	-	3	ISE	20	40	40	----	----
						UT1	15			----	----
						UT2	15	----	----		
						ESE	50	40	----	----	
CCM2024	Construction Contracts	3	-	-	3	ISE	20	40	40	----	----
						UT1	15			----	----
						UT2	15	----	----		
						ESE	50	40	----	----	
PE III	Program Elective III	3	-	-	3	ISE	20	40	40	----	----
						UT1	15			----	----
						UT2	15	----	----		
						ESE	50	40	----	----	
PE-IV	Program Elective IV	3	-	-	3	ISE	20	40	40	----	----
						UT1	15			----	----
						UT2	15	----	----		
						ESE	50	40	----	----	
CCM2094	Project Planning Lab II	-	-	4	2	ISE	----	----	50	50	
						ESE	---	----	50	50	
CCM2104	Geographic Information System Lab	-	-	4	2	ISE	----	----	50	50	
						ESE	---	----	50	50	
CCM2114	Mini project	-	-	4	2	ISE	----	----	50	50	
						ESE	---	----	50	50	
TOTAL		15	-	12	21						

Total Contact Hours/week : 27

Total Credits : 21

ISE = In Semester Evaluation, MSE (UT1+UT2) UT-I = Unit Test-I, UT-II = Unit Test-II

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Program Elective-I

Sr. No.	Course Code	Domain	Course
01	CCM1034	Construction	Ground Improvement Techniques
02	CCM1044	Management	Operations Research
03	CCM1054		Resource Management
04	CCM1064		Total Quality Management

Program Elective-II

Sr. No.	Course Code	Domain	Course
01	CCM1074	Construction	Bridge Construction
02	CCM1084	Materials	Construction Materials
03	CCM1094	Management	Project Formulation and Appraisal
04	CCM1104		Construction Waste Management

Program Elective-III

Sr. No.	Course Code	Domain	Course
01	CCM2034	Construction	Special Construction Methods
02	CCM2044	Management	Health and Safety Management
03	CCM2054		Lean Construction

Program Elective-IV

Sr. No.	Course Code	Domain	Course
01	CCM2064	Management	Construction Project Development
02	CCM2074		Value Engineering
03	CCM2084		Building Maintenance





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Class: F. Y. M. Tech Civil-Construction Management

Semester: III

Course Code	Course	Teaching Scheme				Evaluation Scheme				
		L	T	P	Credits	Scheme	Theory (Marks %)		Practical (Marks %)	
							Max	Min. for passing	Max.	Min. for passing
CCM3014	Industry Internship	--	-	2	Audit Course	ISE			P/NP	
CCM3024	MOOC Course	--	-	-	3	ESE*	--	--	100	50
CCM3034	Dissertation Phase-I	--	-	8	4	ISE		----	100	50
CCM3044	Dissertation Phase-II	--	-	12	6	ISE	----	----	100	50
						ESE	---	----	100	50
TOTAL		--	-	22	13					

*Indicates that, student needs complete Online/Certification course approved by DPGC and produce certificate of online or certification course at the time of ESE. If student fails to produce this certificate, he or she will not be eligible to give ESE of Online/certification course

Total Contact Hours/week : 22
 Total Credits : 13





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Class: F. Y. M. Tech Civil-Construction Management

Semester: IV

Course Code	Course	Teaching Scheme				Evaluation Scheme				
		L	T	P	Credits	Scheme	Theory (Marks %)		Practical (Marks %)	
							Max	Min. for passing	Max.	Min. for passing
CCM4014	Dissertation Phase-III	--	--	12	6	ISE		----	100	50
CCM4024	Dissertation Viva-Voce	--	--	20	10	ISE	----	----	100	50
						ESE	---	----	100	50
	TOTAL	--	--	32	16					

Total Contact Hours/week : 32
Total Credits : 16

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SEMESTER I





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Rev: Civil-Construction Management/Course Structure/RIT/01/2018-19

Class: -First Year M. Tech. Civil-CM	Semester-I
Course Code : CCM1014	Course Name : Construction Project Management

L	T	P	Credits
3	---	--	3

Course Description:

This is the core course offered in first semester of M. Tech construction management. This course focuses on guidelines for managing individual projects and project management related key concepts. It also covers the project management life cycle and related processes.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Implement project management framework.
2. Define scope of project and develop different time schedules of project.
3. Identify and control project cost, quality, human resources and communications.
4. Explain project management information system

Course Content

Unit No	Description	Hrs
1.	Project Management Framework: Concept Of Project And Project Management. Role of the project manager. Organizational influences on project management and project life cycle. Project management processes.	06
2.	Project Scope and Time management: Project scope planning- Project requirements, WBS etc. Project time management-defining activities, sequencing activities, estimating activity resources and durations.	06
3.	Advanced Project Scheduling: CPM scheduling, Precedence network and its applications. Control of schedule-Earn value management.	06
4.	Project Cost and Quality Management: Planning project costs-estimating cost, determining budget and control costs. (Activity Base Costing)	06





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5.	Project Human Resource and Communication Management: Planning human resources-Acquire, develop and manage project team. Planning project communications- Manage and control communications.	06
6.	Project Management Information System (PMIS): Importance of PMIS, PMIS framework, project data structuring, Information retrieval and communication using project management software. Project document management. Role of project management office. (PMO) Factors influencing PMIS success.	06

Text Books:

1. A Guide To A Project Management Body of Knowledge – Published By Project Management Institute – 5th edition
2. K. Chitakara “Construction Project Management (Planning, scheduling and controlling)” McGraw Hill Education (India),1998
3. B. Sengupta and H. Guha “Construction Management and Planning”, McGraw Hill Education (India), 1995.
4. B. C. Punmia& K. K. Khandelwal Project Planning and Control with PERT & CPM
5. K.K. Khandelwal and Dr. B.C.Punmia “PERT AND CPM”, Laxmi Publication, New Delhi, 2002.
6. L. S. Srinathan “PERT AND CPM (Principles and Applications)”, Affiliated east-west press Pvt Ltd, Third edition, (2001).





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Class: - First Year M. Tech. Civil-CM	Semester-I
Course Code : CCM1024	Course Name : Construction Equipment's & Techniques

L	T	P	Credits
3	---	--	3

Course Description:

Construction equipment's and methods is a core subject offered in first semester of M. Tech. This subject deals with construction methods and equipment's used on construction projects. This course is designed to fulfill the requirements of construction managers to select appropriate equipment based on the construction technique and site condition. Major emphasis in the course is on various earthwork operations and equipment's and equipment performance.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Compute productivity of various earthmoving equipment's,
2. Analyze economics of project execution
3. Select optimum equipment for construction of particular task,
4. Develop method statement for construction task,
5. Select equipment and method based on method statement

Course Content		
Unit No	Description	Hrs
1.	Earthwork equipments: Fundamentals of Earth Work Operations-Earth Moving Operations-Types of Earth Work Equipment-Dozers, Rippers, Excavators, dragline and clamshell, Trucks and hauling equipments, Scrappers, Earthwork finishing equipments, Compaction equipments.	06
2.	Rock Excavation: Introduction, Planning, Drilling: process and equipments, Blast design, Special blasting techniques, blasting procedure. Mechanical excavation for tunneling in hard and soft strata.	06





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3.	Construction Plants and Applications: Ready mix concrete plants, Hot mix asphalt plants, Aggregate production plants. Operations and production planning.	06
4.	Trenchless Technology: Introduction to Trenchless Technology, Concept, Methods used in Trenchless technology, equipments and applications of trenchless technology.	06
5.	Construction Dewatering: Introduction, Various methods of dewatering, Pumps for dewatering, Design of dewatering system, cost of dewatering. Vacuum dewatering in concrete slab construction, its process and Equipment.	06
6.	Offshore Construction: Dredging operation: Methods and Equipments, Piles and Pile driving: Method and equipments, Construction of Docks and Harbor, Floating docks	06

References -

Text Books:

1. C. Peurifoy, R. L. Ledbetter, W. B. and Schexnayder "Construction Planning, Equipment and Methods", TataMcGrawHill,Singapore,2006.
2. Sharma S. C. "Construction Equipment and Management", KhannaPublishers,NewDelhi,1988.
3. Deodhar, S. V. "Construction Equipment and Job Planning", KhannaPublishers,NewDelhi,1988
4. Sankar, S. K. and Saraswati, S. "Construction Technology", Oxford University Press, NewDelhi,2008.

Reference Books:

1. James J. O'Brien, John A. Haversand Frank W. Stubbs "StandardhandbookofHeavyconstruction", Thirddedition,McGraw-HillPublication, 1996
2. Patrick Powers. J. "Construction Dewatering: New Methods and Applications", John Wiley&Sons, 1992.
3. Jerry Irvine "Advanced Construction Techniques", CARocketr,1984





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Class: - First Year M. Tech. Civil-CM	Semester-I
Course Code : CCM1034	Course Name :Ground improvement Techniques

L	T	P	Credits
3	---	--	3

Course Description:

This is the introductory course of ground improvement techniques for marginal and problematic soil. The content includes the basics of laboratory and in situ tests for geotechnical projects. Then, surface compaction, admixture stabilization and deep densification are covered. Ground modification by consolidation and vertical drains are then covered. Various types of in-situ reinforcement techniques such as stabilization of soil using different material & methods, soil nailing, stone columns

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Classify the basic principles of various ground improvement techniques applied for Civil Engineering.
2. Assess the most appropriate ground improvement techniques to be used in specific circumstances.
3. Describe the laboratory and in situ tests for soil improvement projects.
4. Justify the surface compaction for the soil improvement
5. Illustrate the concept of admixture stabilization.
6. Discuss the concept of in-situ reinforcement.

Course Content		
Unit No	Description	Hrs
1.	Principles and objectives of ground improvement: Principles and objectives of ground improvement; Introduction to ground improvement developments. Classification of ground improvement techniques. Factors affecting ground improvement	06
2.	Mechanical modification: Mechanical modification; Principles of densification, Properties of compacted soils; Compaction control tests; Specifications for compaction	06





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3.	Hydraulic modification: Hydraulic modification; dewatering systems; Filtration, drainage and seepage control with Geo-synthetics, preloading and vertical drains. Electrical dewatering	06
4.	Chemical Modification: Chemical Modification: Factors affecting chemical modification, Lime stabilization, Cement stabilization, Bitumen stabilization, Stabilization with calcium chloride, sodium chloride, lignin and other synthetic polymers, Methods of construction- mix in place method, traveling plant and stationary plant methods	06
5.	Grouting: Factors affecting grouting, Grout ability, Grouting materials and their properties, Pressure grouting, Compaction grouting, grouting procedures, Applications of grouting. Grouting Modification, inclusion and Confinement; Soil reinforcements	06
6.	Geo-synthetics Applications: Introduction to Geo-synthetics, Applications of Geo-synthetics for ground improvement. Miscellaneous: Rock cutting, anchoring, heating, soil nailing	06

References -

Text Books:

1. Dr. P. Purushothama Raj "Ground Improvement Techniques", Firewall Media, 2005.
2. Manfired R.H. "Engineering Principles of Ground Modification", McGraw-Hill Pub. 1990.
3. Belt "Methods of Treatment of Unstable Ground", Butterworths, 1975
4. Hausmann, M R "Engineering Principles of Ground Modifications", McGraw Hill Pub Co New York, 1990
5. Rao, G. V. and Raju, V. V. S. "Engineering with geosynthetics", Tata McGraw Hill Book Co., New Delhi, 1990.

Reference Books:

1. Koener R M. "Construction and Geotechnical Methods in Foundation Engineering", McGraw Hill Pub Co New York, 1985
2. Ingles O G and Metcalf J B. "Soil Stabilisation: Principles and practice", Butterworths, London, 1972.
3. Ell F G. "Methods of Treatment of Unstable ground", Newness Butterworths, London, 1975.





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Class: - First Year M. Tech. Civil-CM	Semester-I
Course Code : CCM1044	Course Name: Operation Research

L	T	P	Credits
3	---	--	3

Course Description:

In today's complex business environment, most management decisions cannot be made by simply applying personal experience, guesswork or intuition, because the consequences of wrong decisions are serious and costly. Operations Research as one of the quantitative aid to decision-making offers the decision maker method of evaluating every possible alternative by using various techniques to know the potential outcomes.

Operation research as such is applicable to all fields, here we are emphasizing on construction applications of OR, this course will help students to take optimal decisions in favor of the project.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Formulate and analyze the managerial problem through OR models and arrive at an optimal solution or decision.
2. Discuss the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
3. Apply various methods to select and execute optimal strategies to win the game.
4. Explain various dynamic programming models and their applications in solving a decision-problem.
5. Explain applications of Queuing theory and waiting theory to industries.

Course Content		
Unit No	Description	Hrs
1.	Introduction: Introduction to OR history, nature, scope and phases of OR, classification of OR models. Use of Operations Research in Civil Engineering and Managerial Decision making process. Introduction to Optimization Techniques and their application in Engineering Planning, Design and Construction	06





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2.	Linear Programming: Linear programming: Formulation of Linear optimization models, Civil engineering Applications. Simplex method, special cases in simplex method, Method of Big M, duality, sensitivity analysis	06
3.	Models: Transportation Model and its variants, Assignment Model and its variants.	06
4.	Decision strategies: Decision strategies–decision under certainty –decision under risk–decision under uncertainty– formulation–decision criterion and decision under competitive situation	06
5.	Games Theory: Games Theory-Classification of games. Two–person, zero–sum games–formulation of pay off matrix–saddle points–games with pure strategies and mixed strategies–value of the game. Solution to 2x2 matrix, 2xn matrix, mx2 matrix and mxn pay-off matrix. Graphical method, Decision theory.	06
6.	Non-Linear programming: Queuing theory and waiting time–application to industries. Introduction to dynamic programming and network analysis, Monte Carlo Simulation	06

References -

Text Books:

1. Er. Prem Kumar Gupta, Dr. D. S. Hira, "Operations Research" S. Chand publications,
2. Taha, H.A., "Operations Research - An Introduction", Prentice Hall, (7th Edition), 2002
3. J. K. Sharma, "Quantitative Techniques-for managerial decisions", Macmillan Business books, Reprint 2010, ISBN: 978-0333-93503-3
4. Singiresu S. Rao, "Engineering Optimization", New Age International Publishers, Reprint 2012, ISBN: 978-81-224-2723-3





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Class: - First Year M. Tech. Civil-CM	Semester-I
Course Code : CCM1054	Course Name :Resource Management

L	T	P	Credits
3	---	--	3

Course Description:

Resources contribute 90% of the project cost; of the five major resources this course covers two, Material and Human. Projects cannot be completed without handling these resources, this course deals with proper handling and development of resources in order to help managers to control and successfully complete the project.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Codify materials,
2. Select vendor for material purchase,
3. Manage inventory,
4. Describe employee development and welfare,
5. Design performance appraisal matrix,

Course Content		
Unit No	Description	Hrs
1.	Basics of Material Management: Importance of materials management, functions, objectives and organizations for materials management, codification and standardization: process and advantages, stores management: layout, material handling.	06
2.	Purchasing and vendor development: Functions, steps, purchasing cycle. Procedure, Relevance of Good Supplier – Need for Vendor Evaluation-Goals of Vendor Rating-Advantages of Vendor Rating – Cost-ratio Method –Forced Decision Matrix,	06





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3.	Inventory Management: ABC analysis- advantages, mechanism, purpose, objectives Importance & Scope of Inventory Control, Types of Inventory, Costs Associated with Inventory, Inventory Control, Selective Inventory Control, Economic Order Quantity, Safety Stocks	06
4.	HRM Basics: Manpower Planning, functions of HRM, Development and Operation of human resources - Managerial Staffing - Recruitment - Selection - Placement, Training and Development.	06
5.	Welfare Measures: Compensation - Safety and health, Wages and Salary, GPF - EPF - Group Insurance - Housing - Pension - Laws related to welfare measures. Employee Benefits, employee appraisal and assessment	06
6.	Performance Appraisal: Performance appraisal - Employee hand book and personnel manual - Job descriptions and organization structure and human relations - Productivity of Human resources. Special Human resource problems,	06

References -

Text Books:

1. Materials Management, An Integrated approach, Gopalkrishna & Sudarsan, PHI
2. Materials Management-Procedures, Texts & Cases, A.K. Dutta, Pearson
3. Hand Book of Materials Management - Gopal Krishnan - PHI
4. Memoria, C.B. "Personnel Management", Himalaya Publishing Co., 1997.
5. K. Aswathappa "Human resource and personnel management", Fourth edition TATA McGraw Hill publication, ISBN 978-0-07-059930-7, 2005.
6. Josy.J. Familaro "Handbook of Human Resources Administration", McGraw-hill International Edition, 1987.
7. Charles D Pringle, Justin Gooderi Longenecter "Management", CE Merrill Publishing Co. 1981.
8. Materials and Financial Management, C. M. Sadiwala, Ritesh C. Sadiwala, New Age International Publishers. 2007





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Class: - First Year M. Tech. Civil-CM	Semester-I
Course Code : CCM1064	Course Name :Total Quality Management

L	T	P	Credits
3	---	--	3

Course Description:

Today managers of many manufacturing and service organizations have overhauled the structure of their organization, changed their organization climates and redirected their products/ service quality programs toward becoming global quality leaders, through an effort that is known as "Total Quality Management".

The growing importance of quality management has emphasized the need for the study of principles and techniques of total quality management both by students of management program in universities and management institutions and also by practicing managers in the manufacturing and service industries.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Discuss TQM in detail.
2. Discuss seven QC tools of continuous improvement and solving problems.
3. Discuss analysis of registration requirements.

Course Content

Unit No	Description	Hrs
1.	Introduction: Introduction to Quality, dimensions of quality, Managing quality, The quality cycle, Evolution of TOC, Scope of TOC, TQM framework, Benefits of TQM	06
2.	Management Issues in Quality I: Managing for quality and high performance, Focusing on customers, Leadership and strategic planning for TQM, HRD and management for TQM,	06





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3.	Management Issues in Quality II: Process management, Measurement and strategic information management, organizing for TQM, Building and sustaining Total Quality Organization.	06
4.	Technical issues in Quality: Quality assurance and control, Statistical Process Control, Introduction to reliability and maintenance.	06
5.	Management of Total Quality: Just-In-Time systems, Benchmarking, Business-Process-Reengineering, Supply Chain Management, Total Quality Management in services, World-Class Manufacturing	06
6.	Quality Management Systems: Introduction, Benefits of ISO registration, ISO 9000 series of standards, ISO requirements, Implementation, Documentation, Quality manuals	06

References -

Text Books:

1. K. Shridhara Bhat, "Total Quality Management- Text & Cases", Himalaya Publishing House, Edition 2012,
2. Dale H. Besterfield, Glen H. Besterfield, Hemant Urdhwareshe, "Total Quality Management", Pearson, Seventh impression, Revised Third Edition, 2013
3. Shankar D. Bagade, "Total Quality Management", Himalaya Publishing House, First Edition Reprint 2011.





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Class: - First Year M. Tech. Civil-CM	Semester-I
Course Code : CCM1074	Course Name :Bridge Construction

L	T	P	Credits
3	---	--	3

Course Description:

The first course in Bridge engineering generally introduces the fundamental concepts, principles and application of superstructure and substructure analysis and design for the undergraduate students of civil engineering.

This course "Bridge Engineering" goes deeper into the various aspects of Bridge engineering along with bringing out the advanced theories and practical knowledge of Bridge engineering. Each topic will be developed in logical progression with up-to-date information with reference to codal provisions and journals.

The topics cover overall analysis of Bridge engineering including analysis of super-structure, sub-structure, foundation, geotechnical properties, hydrological properties along with details of other bridge components on RC and Pre-stressed Concrete structures.

The advanced course material on bridge engineering will be very useful to undergraduate students, post-graduate students, teachers and practitioners. A number of chosen problems will be solved to illustrate the concepts clearly

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Describe impact of bridge construction on society,
2. Classify bridges,
3. Select bridge type based on site condition,
4. Maintain bridges

Course Content		
Unit No	Description	Hrs
1.	Introduction: History of Bridges; Components of a Bridge and its definitions, Classification of Road Bridges, related structures, span length, Classical Examples Survey and Alignment- Geotechnical Investigations and Interpretations. River Bridge, Selection of Bridge site and planning	06





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2.	Site Selection and Data Collection: Collection of Bridge design data; Hydrological calculation. Waterway calculation; Scour calculation; Depth of foundation; Freeboard, Road Bridge, Selection of Bridge site and planning; Collection of Bridge design data; Vertical clearance.	06
3.	Standard Loading for Bridge Design as per different codes: Road Bridges: IRC, BS code, AASHTO code. Dead load, Live load, Impact factor, Centrifugal force, Wind loads, hydraulic forces, Longitudinal forces, Seismic forces; Earth pressure. Buoyancy; Lane concept, equivalent loads, traffic load; Width of Roadway and Footway. Influence lines for statically; determinate structures. I.L. for statically indeterminate structures. Transverse distribution of Live loads among deck longitudinal, Load combinations for different working state and limit state designs. Railway Bridges: Loadings for Railway Bridges; Railroad data, Pre-design considerations; Railroad vs. Highway bridges	06
4.	Superstructures: Selection of main bridge parameters, design methodologies, Choices of superstructure types, Slab bridge and voided slab bridge; Beam-Slab bridge; Box Girder Bridge, Typical Details, Slab Bridge. Slab-Girder Bridge (Straight/Skew), Box Girder Bridge (Straight/ Skew).	06
5.	Pier; Abutment; Wing walls; Importance of Soil-Structure Interaction; Types of foundations, Open foundation; Pile foundation; Well foundation; Examples - Simply supported bridge, Continuous Bridge.	06
6.	Bearings and Deck Joints: Different types of bridge bearings and expansion joints; Design of bearings and joints, Parapets and Railings for Highway Bridges: Definitions; Classification of Highway Bridge parapets; Various Details.	06

References -

Text Books:

1. E.C Hambly, "Bridge Deck Behaviour", E & FN SPON Publications.
2. V.K. Raina , "Concrete Bridge Practice, Analysis, Design and Economics", Tata McGraw- Hills Publishing Company Limited.
3. M.J. RYALL, G.A.R PARKE, J.E. HARDING, "The Manual of Bridge Engineering", Thomas Telford Publishers.
4. R. RAJAGOPALAN, "Bridge Superstructure", Tata McGraw- Hills Publishing Company Limited.
5. S. PONNUSWAMY , "Bridge Engineering", Tata McGraw - Hills Publishing Company Limited.
6. M. G. Aswani, V.N.Vazirani, M.M. Ratwani, "Design of Concrete Bridges", Khanna Publishers.
7. E.C Hambly, "Bridge Deck Behaviour", E & FN SPON Publications.





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Class: - First Year M. Tech. Civil-CM	Semester-I
Course Code : CCM1084	Course Name Construction Materials

L	T	P	Credits
3	---	--	3

Course Description:
 Materials play important role in projects; they cost around 60% of total project cost. Type and quality of materials will influence the performance and sustainability of construction. It is important to study new materials being developed by industry for application in project construction.

Course Learning Outcomes:
 After successful completion of the course, students will be able to,

1. Describe necessity of new material development,
2. Describe Material property analysis and modification as required,
3. Select proper material for the job.

Course Content		
Unit No	Description	Hrs
1.	Introduction: Necessity and importance of sustainable construction materials. Material composition and properties, production, storage, distribution, testing, acceptance criteria, limitations of use, economic consideration, recent development related to the following materials to be studied	06
2.	Construction Chemicals: Various construction chemicals/admixtures , Fly ash and its use in concrete ,Silica fume concrete ,Self-compacting concrete, Fiber Reinforced plastics and concrete ,Light weight concrete	06
3.	Modified Materials: Crumb modified bitumen Rubber, Glenium Concrete, Materials used in nuclear-containment structures	06
4.	High performance materials: High performance concrete, Nano technology in cement concrete, Ferro cement Technology	06





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5.	Ceramic Materials: Classification, Refractories, glass, glass wool, mechanical, thermal and electrical properties, fire resistant materials, Uses and application New types of floor finishes and tiling, liquid granite	06
6.	Non Structural Materials: Thermal insulation and acoustic absorption materials, Sound barriers used on motorway railways. Materials for intelligent buildings- Sensi tile, aluminums radiant barriers, solar panel roof tiles, use of old jeans for roofing, flexi comb-electrical installation, kinetic glass, unfired clay bricks, richlite (recycled paper), carbon fibers.	06

References -

Text Books:

1. Concrete Structure properties & Materials by Mehta P.K & Manteio P.J.M, Prentice hall.
2. Building Materials by M L Gambhir, Neha Jamwal, Tata McGraw Hill Publ.
3. Concrete Technology by Neville
4. Ferrocement Construction Mannual-Dr. D.B.Divekar-1030, Shivaji Nagar, Model Colony, Pune
5. Construction Materials, Methods & Techniques(3e) by William P Spence, Yesdee
6. Engineering Materials: An introduction to Properties, applications and designs by Ashby, M.F. and Jones. D.R., H.H. Elsevier Publications, 2005
7. Materials for Civil and Construction Engineers by Mamlouk, M.S. and Zaniewski, J.P., Prentice Hall.





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Class: - First Year M. Tech. Civil-CM	Semester-I
Course Code : CCM1094	Course Name :Project Formulation and Appraisal

L	T	P	Credits
3	---	--	3

Course Description:

This course has been introduced as an elective course to train students in identification, evaluation, structuring and appraisal of various construction, building, infrastructure and engineering projects.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Perform technical and financial analysis of construction projects,
2. Perform BC ratio analysis,
3. Select project based on appraisal,
4. Administer the project execution

Course Content		
Unit No	Description	Hrs
1.	Introduction: Identification of needs, present availability, additional requirements, alternatives and their comparative study, project identification.	06
2.	Technical Feasibility: Technical analysis market and demand analysis, project location resource requirement and their fulfillment technology, know how requirements technical study of alternatives and their suitability.	06
3.	Financial Feasibility: Financial analysis interest, compounding and discounting, investment and capital outlay cash flow of the project and its significance profit, Probability and break even analysis, internal rate of return, of shadow pricing benefit cost ratio, influence of inflation on profitability influence of inflation and escalation on the projects.	06
4.	Cost-Benefit Analysis: Social cost benefit analysis, objectives, direct – indirect costs and benefits – tangibles, intangibles and their conversion, levy subsidy concepts	06





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5.	Appraisal: criteria and selection from alternatives, discounting non discounting criteria selection under capital restriction, social restriction and other restriction risk analysis, sensitivity analysis, application of decision tree analysis and game theory.	06
6.	Administration: Project administration organization and control during execution period maintenance and care taker operational set up, project management after completion. Preparation of project report and norms and its presentation. Definition of entrepreneurship and entrepreneur qualities.	06

References -

Text Books:

1. Project Preparation, Appraisal, Budgeting and implementation –Prasanna Chandra
2. Cost Benefit Analysis – E. J. Mishan
3. Chandra P. (2007) Projects, planning, analysis, financing, implementation and review, Tata McGraw-hill New Delhi
4. Tiffin R. (2007), Practical techniques of effective project investment appraisal, Viva Books, New Delhi
5. Khatua S. (2011) Project Management and Appraisal, Oxford University Press, New Delhi





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Class: - First Year M. Tech. Civil-CM	Semester-I
Course Code : CCM1104	Course Name : Construction waste management

L	T	P	Credits
3	---	--	3

Course Description:

Waste management is the need of the hour, construction waste generated is huge in amount and needs to be planned for its reuse, recycle before sending for land filling. Students should be aware of policies of government and how waste can be minimized. This course is designed to achieve following objectives.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Focus on the principles of sustainable construction and demolition waste management and resource efficiency
2. Examining the environmental impact of building materials;
3. Formulating and designing pre-construction and site waste management plans

Course Content		
Unit No	Description	Hrs
1.	Environmental impact: Environmental Impact of Building Materials Embodied energy of materials; impact on the local environment; toxicity of the material;	06
2.	Waste Assessment: Life cycle assessment. Nature and Source, Direct and indirect waste; site types and origins; composition; quantity; current recycling/reuse potential of building materials.	06
3.	Construction and Demolition Waste Management Plans International good practice; planning requirements; DOEHLG guidance document; company policy; demolition plans; Site implementation; supplier agreements; sub-contractor management.	06
4.	Roles and Responsibility: Role of waste management contractor; training; auditing; skip management; current markets; current disposal options;	06





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	health and safety; reporting to local authorities. Treatment of Construction and Demolition Waste, waste permits; waste licenses; waste transfer facilities; landfills; treatment technologies; hazardous waste facilities; reporting to EPA	
5.	Waste minimization: Designing for Waste Prevention and Minimization Waste prevention and minimization; client, contractor and designer attitudes; proper maintenance of existing buildings; reuse of existing building structure; design flexibility; design for reuse and recycling; dimensional Co-ordination and standardization; modular design; material selection and control.	06
6.	Waste forecasting: Waste Forecasting Tools Application of WRAP's designing out waste tool for buildings and civil engineering; WRAP net waste tool; BRE SMART Waste; WRAP Site Waste Management Plan Tracker	06

References -

Text Books:

1. Springer, "Recycling and Resource Recovery Engineering", Springer-Verlag Berlin Heidelberg (1996)
2. Greg Winkler, "Recycling Construction and Demolition waste: A LEED-Based Toolkit (Green Source) (Google ebook), Mc Graw Hill Professional
3. V M Tam, Chi Ming Tam, "Reuse of Construction and Demolition Waste in Housing Development", Nova Science Publishers, 2008





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Class: - First Year M. Tech. Civil-CM	Semester-I
Course Code : CCM1114	Course Name :Research Methodology & IPR

L	T	P	Credits
2	---	--	2

Course Description:

This course offered in first semester of F. Y. M. Tech. is designed to make graduates aware of various steps involved in Research Process along with software used for Statistical Analysis. Also report and research proposal writing is incorporated in the syllabi.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Formulate a research problem.
2. Analyze research related information
3. Prepare and present research proposal/paper by following research ethics
4. Make effective use of computers and computing tools to search information, analyze information and prepare report.
5. Describe nature and processes involved in development of intellectual property rights

Course Content

Unit No	Description	Hrs
1.	Meaning of research problem, Sources of research problem, Criteria and Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem.	06
2.	Effective literature studies approaches, Plagiarism, Research ethics, Approaches of investigation of solutions for research problem, data collection, Data analysis with software, interpretation, Necessary instrumentations	06
3.	Effective technical writing, how to write technical report and paper, Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee	06
4.	Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation,	06





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	patenting, development. International Scenario: International cooperation on Intellectual Property, Procedure for grants of patents, Patenting under PCT.	
5.	Patent Rights: Scope of Patent Rights, Licensing and transfer of technology, Patent information and databases, Geographical Indications.	06
6.	New Developments in IPR: Administration of Patent System, New developments in IPR; IPR of Biological Systems, Computer Software etc., Traditional knowledge Case Studies, IPR and IITs.	06

References -

Text Books:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students", Juta & Co Ltd
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction", Juta Academic
3. Ranjit Kumar, 2nd Edition , "Research Methodology: A Step by Step Guide for beginners", SAGE Publication
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd, 2007.
5. Mayall , "Industrial Design", McGraw Hill, 1992.
6. Niebel , "Product Design", McGraw Hill, 1974.
7. Asimov , "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", Wolters Kluwar,2016.
9. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008





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Class: - First Year M. Tech. Civil-CM	Semester-I
Course Code : SHP551	Course Name : Technical Communication

L	T	P	Credits
2	---	--	0

Course Description:

This is the core course offered in first semester of M. Tech construction management to enhance corporate communication of students.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Acquire skills required for good oral and written communication
2. Demonstrate improved writing and reading skills
3. Ensure the good quality of oral and written communication

Course Content		
Unit No	Description	Hrs
1.	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	06
2.	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism,	06
3.	Sections of a Paper, Abstracts, Introduction, Review of the Literature, Methods, Results, Discussion, Conclusions and The Final Check.	06
4.	Key skills needed when writing a Title, key skills needed when writing an Abstract, key skills needed when writing an Introduction, skills needed when writing a Review of the Literature	06
5.	Key skills needed when writing the Methods, skills needed when writing the Results, skills needed when writing the Discussion, skills needed when writing the Conclusions, useful phrases, how to ensure good quality of the	06





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	paper at the time of submission	
6.	Resume Writing, e-Mails, Interview skills , Dos and Don'ts while Answering, FAQs, GROUP DISCUSSION: Structured and Unstructured GD, Opening and Closure, Showing Agreement and Disagreement	06

References -

Text Books:

1. Goldbort R ,Writing for Science, Yale University Press (available on Google Books), 2006
2. Day R , How to Write and Publish a Scientific Paper, Cambridge University Press, 2006
3. Highman N, Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book, 1998.
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011
5. John Seely, Oxford Guide to Effective Writing and Speaking; Oxford University Press, 2009.
6. Thomas N. Huckin and Leslie A. Olsen, Technical Writing and Professional Communication for Nonnative Speakers of English; Tata McGraw Hills, International Edition, 1991.
7. Jeff Butterfield, Soft Skills for Everyone, Cengage Learning India Private Limited, 2010





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Class: - First Year M. Tech. Civil-CM	Semester: I
Course Code : CCM1124	Course Name : Quantity Surveying Lab

L	T	P	Credits
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Course Description:

This laboratory has been introduced to update quantity estimation skills of students, here in students will learn software Auto Steel & Auto scan to gain expertise in the branch of quantity estimation.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Develop drawings as per software requirement
2. Compute quantities of building items
3. Additionally compare output with manual calculations.

Course Content		
Experiment No.	Description	Hrs
1.	Learning Auto scan and Auto steel software	12
2.	Quantity estimation using Auto scan for small project	08
3.	Quantity estimation using Auto scan for multistory building project	08
4.	Verification of quantities using excel formats	08
5.	Steel quantity estimation using Auto steel for above projects.	12





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Class: - First Year M. Tech. Civil-CM	Semester: I
Course Code : CCM1134	Course Name : Project Planning Lab I

L	T	P	Credits
--	--	4	2

Course Description:

Computer based project management is vital in construction industry. Microsoft project software analyses complex projects. In this manager has to give input regarding project. Microsoft project software offers planning, scheduling and controlling of civil engineering projects. This lab course offered in first semester of F.Y. M.Tech. is designed to make graduates familiar with the current planning software's used in industry; in this course students will acquire knowledge and expertise/hands-on in Microsoft project software.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Acquire knowledge of Microsoft project,
2. Compute resource requirement for building construction
3. Plan the project duration and resources,
4. Update the plan based on various constraints,

Course Content		
Experiment No.	Description	Hrs
1.	Acquiring expertise in Microsoft Project	16
2.	Solving assignments given on Construction planning and control	16
3.	Plan two projects using Microsoft Project	16





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SEMESTER II





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Class: - First Year M. Tech. Civil-CM	Semester-II	L	T	P	Credits
Course Code : SHP526	Course Name : Statistical Analysis	3	---	--	3

Course Description:

Advanced Engineering Mathematics is a core subject introduced at Semester II of First year M. Tech. Construction Management. This course will help students to take decisions by using Statistical techniques and Optimization requirements.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Identify, formulate and analyze the engineering problem; and apply Mathematical concepts effectively to engineering fields.
2. Explain and identify random variables, discriminate between discrete and continuous random variables; and fit probability distributions.
3. Apply the techniques of Data Interpolation to solve specific engineering problems.
4. To understand the concept of Regression analysis; and apply the techniques of Correlation to solve specific engineering problems.
5. To understand the concept of Game Theory and Decision Theory; and apply the techniques of Decision Theory to solve specific engineering problems.

Course Content		
Unit No	Description	Hrs
1.	Probability Probability theory and its importance: Definition of probability, Rules of Probability, The Baye's theorem. Random variable. Probability distribution. Mean or Expectation of Random variable. Properties of Mean of Expectation. Theoretical probability Distributions: Binomial Distribution, Poisson Distribution. Normal Distribution, Exponential Distribution, Beta, Gamma.	08





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2.	Sampling Sampling and sampling distribution: Probability samples, Non-probability Samples, sample Random sampling, other sampling schemes, sampling distribution and Standard error, some Sampling and Quality control. Use of concepts of standard deviation, Coefficient of variance, range in quality control of concreting and similar such activities.	08
3.	Testing Testing Hypothesis: Sampling of distribution–Test based on Normal Distribution, Students-t test, chi-square, K-S test for goodness of fit and distribution. Analysis of variance one Way & two way classification.	08
4.	Analysis Correlation Analysis: Correlation types, co-efficient. Bi-variate Frequency Distribution, Scatter Diagram, Correlation Analysis, Practical applications in civil engineering projects. Regression Analysis: Regression and Multivariate Analysis, Multiple Regression Analysis Nonlinear Regression. Use of regression analysis in Construction Projects.	08

References -

Text Books:

1. Applied Statistics and Probability for Engineers---Montgomery and Runger—Wiley, India
2. Probability and Statistics for Engineers –Miller, Freund-Hall, Prentice India Ltd. 2009
3. Applied Mathematics for Engineers and Physiscists-pipes and Harvill. McGraw Hill International Edition, 1970
4. Sampling techniques-Cochran, Wiley Series, 2008

Reference Books:

1. Statistics-Concepts and Controversies-David S. Moore-Freeman Company, New York
2. Applied Statistics for Civil and Environmental Engineers by Kottegoda.- Stratford Books





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Class: - First Year M. Tech. Civil-CM	Semester-II	L	T	P	Credits
Course Code : CCM2014	Course Name :Project Economics & Financial Management	3	---	--	3

Course Description:

Project Economics and Finance Management is offered as regular subject for semester two, Aim of including this subject is to make graduates familiar with Project Economics and its comparison in civil engineering. This course will help graduates to understand, manage and control the project finance in appropriate manner. Divided into six units this takes care of major roles played by project managers

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Describe foundation of engineering economy.
2. Select the best project of different alternatives.
3. Analyze projects using different techniques.
4. Identify and suggest sources of finance.
5. Analyze different financial statement.
6. Prepare and maintain different site accounts for civil engineering projects.

Course Content		
Unit No	Description	Hrs
1.	Foundation of Engineering Economy Concept of Engineering economy, Interest rate- Simple and compound, Cash flow, Factors-Single payment Factors, Uniform series factors, gradient factors, Nominal and effective interest rate.	06
2.	Analysis of Engineering Projects Present worth analysis, capitalized cost analysis, Annual worth analysis, Rate of return analysis.	06





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3.	Evaluation of Engineering project Benefit cost analysis, Breakeven, Sensitivity and payback analysis, Replacement and retention decisions, Inflation and its effects.	06
4.	Capital Structure Sources of finance (long term and short term sources) available for construction projects, Sources of long term finance – Securities (Ordinary shares, Preference shares, Debentures or bonds), Loan capital. Short term Sources of finance- Trade Credit, Accruals, Commercial Paper, Bank credit, Public Deposit, Inter-Corporate Deposits, Private Institutions, Factoring. Working capital management, Importance of Working capital management in construction projects.	06
5.	Financial Statement Analysis Financial Statements (Trading & Profit & Loss A/c, Balance Sheet etc.) and its uses, Techniques of financial statement analysis- comparative financial statement, common size statement, ratio analysis, Ratio Analysis-computation of liquidity ratios, leverage ratios, activity ratios & profitability ratios.	06
6.	Practical Accounting Book Keeping & Accountancy, Preparation of different Site accounts for receiving materials, allocation of materials for various activities, stock records, day to day expenditures etc. Preparation of reports, budgets and budgetary control system in construction firms	06

References -

Text Books:

1. Managerial Economics by D.M.Mithani, Himalaya publication.
2. Financial Management by Prasanna Chandra, Tata McGraw Hill, New Delhi.
3. Financial Management by Khanand Jain, Tata McGrawHill, New Delhi.
4. Financial Management by I.M.Pande, Vikas House Publication.

Reference Books:

1. Basics of Engineering Economy- by Leland Blank and Anhony Tarquin, Tata McGraw Hill, New Delhi
2. Projects planning, Analysis Selection, Implementation and Review by Prasanna Chandra, Tata Mc Graw Hill, New Delhi..





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Class: - First Year M. Tech. Civil-CM	Semester-II	L	T	P	Credits
Course Code : CCM2024	Course Name :Construction Contracts	3	---	--	3

Course Description:

Contracts form the foundation of all business relationships. But with a growing number of contracts, an increasing complexity and the ongoing need for amendments, it becomes challenging to manage the valuable information in the contracts. Contract management is the process that enables both parties to a contract to meet their obligations in order to deliver the objectives required from the contract.

The contract manager should understand the contract terms and work with the customer's internal legal department to make sure that the customer is able to use the tools that the contract provides.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Discuss types of contract and its features.
2. Discuss duties and responsibilities of arbitrator.

Course Content		
Unit No	Description	Hrs
1.	Introduction Essential of valid contract, Types of Contract, Void, Voidable & Valid contract, Offer, Proposal, All in contract, Lump sum contract, Cost plus contract, Item rate contract, Labour contract, BOT, BOOT, DBT contract.	06
2.	Tender Tender documents, Invitation of tenders, requalification of contractor, Tender Notice, Preparation of tender, Submission of Tender, Opening Tender, Acceptance/ Rejection of tender.	06
3.	Contract Documents Role of an Engineer, Contractor & Owner, Conditions of contract, Performance security, Security deposit, General conditions of contract,	06





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	Specific conditions of contract, Suspension of work, Time limit for completion, Liquidated damage, Measurement & Payment, Additions, Alterations or variation & deviations, Defects, Maintenance & Improper work, Subletting, Breach of contract, Settlement of account of final payment, Claims	
4.	Contract of Indemnity & Guarantee Indemnity and Guarantee-Difference between the two contracts, consideration for guarantee, surety's liability, discharge of surety. Bailment- Nature of transactions, delivery of bailee, Bailee's responsibility, Termination, Bailment of pledges.	06
5.	Arbitration Meaning of arbitration, Advantages of arbitration, Types of arbitration, Distinction between arbitration & expert determination, Arbitrator, Valuer, Engineer, Architect, Referee, Conciliator, Mediator, Arbitral award, arbitral tribunal.	06
6.	Arbitration Agreement Composition of arbitral tribunals, termination of mandate & substitution of arbitrator, Conduct of Arbitrator proceedings, Termination of proceedings, Setting aside awards.	06

References -

Text Books:

1. Patil B. S., "Contracts & Estimates", 3rd Edition, 2006
2. Dr. B .P. Saraf, S. M. Jhunjhunuwala, "Law of Arbitration and Conciliation", 6th Edition 2012

Reference Books:

1. Roshan H. Namawati, "Professional practice with Elements of Estimating Valuation Contract and the arbitration Act", 9th Edition 2009.





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Class: - First Year M. Tech. Civil-CM	Semester-II	L	T	P	Credits
Course Code : CCM2034	Course Name :Special Construction Methods	3	---	--	3

Course Description:

This course has been offered to make students aware of various new construction techniques used in industry, course aims at providing students insight of various special areas of Construction engineering and methods adopted to execute such projects.

Course Learning Outcomes:

- After successful completion of the course, students will be able to,
1. Select proper technique and equipment for a project,
 2. Decide type of pile foundation for a project,
 3. Perform/plan site investigation

Course Content		
Unit No	Description	Hrs
1.	Concreting Techniques and Equipment Concrete placing underwater, concrete pumps, boom placers, mixers, conventional methods.	06
2.	Grouting and Shortereting Grouting: Field procedures, methods, materials and applications and limitations, Col-Crete process. Resin grouting Polymerization technique.	06
3.	Pile foundations Construction details: precast piles, pre-stressed piles, steel piles, and friction piles. Driven and bored piles, large diameter piles, and negative and positive skin friction. Multiple under reamed piles, raker piles, sand piles and Anchor piles. Methods of pile driving through different strata, Concept of micro piles	06
4.	Highway construction Highway planning, geometric design of highways, highway construction materials, Various Road Types, construction of flexible pavement, construction of rigid pavements.	06





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5.	Construction Cranes Cranes: Mobile cranes, Tower cranes, Hydraulic cranes, Sizes and capacity, Application and operations	06
6.	Site investigation techniques Objectives of the site investigation, Desk study, Site Reconnaissance, Ground investigation Methods, Reporting	06

References -

Text Books:

1. Robert Wade Brown "Practical foundation engineering hand book", McGraw Hill Publications, 1995
2. Sankar, S. K. and Saraswati, S. "Construction Technology", Oxford University Press, New Delhi, 2008
3. V. N. Vajirani and S. P. Chandola, Transportation engineering vol I, 1981, Khanna Publications, Delhi
4. C. Peurifoy, R. L. Ledbetter, W. B. and Schexnayder "Construction Planning, Equipment and Methods", Tata McGraw Hill, Singapore, 2006.

Reference Books:

1. James J. O'Brien, John A. Havers and Frank W. Stubbs "Standard handbook of Heavy construction", Third edition, McGraw-Hill Publication, 1996





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Class: - First Year M. Tech. Civil-CM	Semester-II	L	T	P	Credits
Course Code : CCM2044	Course Name :Health and Safety Management	3	---	--	3

Course Description:

Major accidents in industries across the world during the last two or three decades have led to generation of enormous interest in Occupational Safety and Health, as well as in the environment.

Whatever sort of business you are, there is always the possibility of an accident or damage to someone's health. All work exposes people to hazards, be they: loads which have to be manually handled; dangerous machinery; toxic substances; electricity; working with display screen equipment or even psychological hazards such as stress.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Identify hazards to employees on construction site
2. Determine safe practices necessary for a project site
3. Illustrate the causes of accidents and preventive measures
4. Develop safety plan for a project.

Course Content		
Unit No	Description	Hrs
1.	Introduction Hazards and causes of accidents, safety measures	06
2.	Safety Laws Safety legislation and standards for construction industry	06
3.	Safety in Construction I Safety precautions and practices in various construction activities like excavation, concreting	06
4.	Safety in Construction II scaffold erection and dismantle, concreting, steel erection and demolition of structures	06
5.	Accident Management Management of accidents Organization for safety	06





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6.	Construction site Safety Occupational hazards and personal protective equipment, site management, safety manual and check lists safety officer, safety committee, safety training, safety audit	06
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References -

Text Books:

1. Accident Prevention Manual for Industrial Operations, NSC, Chicago, 1982
2. Fulman, J.B., Construction Safety, Security, and Loss Prevention, John Wiley and Sons, 1979
3. Safety and Health in Construction, ILO, 1992

Reference Books:

1. Construction hazard & Safety handbook, R Hudson and R W King, Butterworths





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Class : - First Year M. Tech. Civil-CM	Semester-II	L	T	P	Credits
Course Code : CCM2054	Course Name :Lean Construction	3	---	--	3

Course Description:

The construction industry has experienced an increased number of complex, dynamic construction projects in recent years, which require advanced management methods beyond the conventional methods. To meet the demand, this course aims to introduce lean construction principles and methods that students can use to improve the effectiveness and reliability of their project management.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Describe theory of production management.
2. Identify craft production & mass production from construction industry.
3. Apply lean construction techniques to construction projects.

Course Content		
Unit No	Description	Hrs
1.	Introduction Overview of Production Management, Theory of Production: Search in Economics, New Production Philosophy: An Integrated View,	06
2.	Lean Production Introduction, From Craft Production to Mass Production, The Development of Lean Production	06
3.	Lean Construction I What is Lean Construction?, Peculiarities of the Construction Industry, Criticisms of Lean Construction, Lean Construction	06
4.	Lean Construction II Lean Construction: Tools, Techniques, and Implementation Frameworks, Lean Construction and Enhanced Performance, Lean Construction in Developing Countries.	06
5.	Case Study Any four case studies of Lean Construction	06
6.	Case Study Any four case studies of Lean Construction	06





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References -

Text Books:

1. Lean Construction Management, Shang Gao & Sui Pheng Low, ISBN 978-981-287-013-1





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Class: - First Year M. Tech. Civil-CM	Semester-II	L	T	P	Credits
Course Code : CCM2064	Course Name :Construction Project Development	3	---	--	3

Course Description:

This is the core course offered in first semester of M. Tech construction management. This course focuses on guidelines for managing individual projects and project management related key concepts. It also covers the project management life cycle and related processes.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Implement project management framework.
2. Define scope of project and develop different time schedules of project.
3. Identify and control project cost, quality, human resources and communications.
4. Explain project management information system

Course Content		
Unit No	Description	Hrs
1.	Project Management Framework Concept Of Project And Project Management. Role of the project manager. Organizational influences on project management and project life cycle. Project management processes. Project integration management. (Project charter, project management plan, direct and manage project work, close of project.)	06
2.	Project Scope and Time management Project scope planning- Project requirements, WBS etc. Project time management-defining activities, sequencing activities, estimating activity resources and durations. CPM scheduling.	06
3.	Advanced Project Scheduling Precedence network and its applications. Linear scheduling, Multiple project scheduling. Control of schedule-Earn value management.	06
4.	Project Cost and Quality Management Planning project costs- estimating cost, determining budget and control costs. (Activity Base Costing) Planning project quality-quality assurance and quality control.	06





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5.	Project Human Resource and Communication Management Planning human resources-Acquire, develop and manage project team. Planning project communications- Manage and control communications.	06
6.	Project Management Information System (PMIS) Importance of PMIS, PMIS framework, project data structuring, performance reporting and trend analysis. Information retrieval and communication using project management software. Project document management. Role of project management office. (PMO) Factors influencing PMIS success.	06

References -

Text Books:

1. A Guide To A Project Management Body of Knowledge – Published By Project Management Institute – 5th edition
2. K. Chitakara “Construction Project Management (Planning, scheduling and controlling)” McGraw Hill Education (India),1998
3. B. Sengupta and H. Guha “Construction Management and Planning”, McGraw Hill Education (India), 1995.
4. Sandra C Weber “Scheduling Construction Projects (Principle and Practices)”, PEARSON, 1st Edition, 2004.
5. B. C. Punmia& K. K. Khandelwal Project Planning and Control with PERT & CPM

Reference Books:

1. K.K. Khandelwal and Dr. B.C.Punmia “PERT AND CPM”, Laxmi Publication, New Delhi, 2002.
2. L. S. Srinathan “PERT AND CPM (Principles and Applications)”, Affiliated east-west press Pvt Ltd, Third edition, (2001).





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Class: - First Year M. Tech. Civil-CM	Semester-II	L	T	P	Credits
Course Code : CCM2074	Course Name :Value Engineering	3	---	--	3

Course Description:

The value is a function of cost. Therefore, it can be increased either by improving the function or reducing cost. The **maximum value** is achieved when the function performs reliably at the **lowest cost**. A key principle of value engineering that basic functions must be preserved and not reduced as a result of improvements in value.

Thus **Value Engineering (VE)** is a systematic method to improve the "value" of goods, products or services through an examination of the function. Value engineering concepts can be applied to business as well as technical situations and consequently lead management to informed, result oriented decisions. "**Value engineering has to be treated as future investment for gaining technology leadership in the industry**".

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Perform value analysis,
2. Explain life cycle process of a project,
3. Apply VE methods,
4. Perform valuation

Course Content

Unit No	Description	Hrs
1.	<p>Value Analysis</p> <p>Value Engineering: Definition, Importance to Contractors, Potential VE Applications Value : basic and secondary functions, factor contributing to value such as aesthetic, ergonomic, technical, economic : identifying reasons or unnecessary costs :</p> <p>Value Analysis: 10 Commandments of value analysis; value analysis team; principles of value analysis, elements of a job plan viz. orientation, Information, presentation. Implementation, follow-up action, benefits of value analysis, various applications; assessing effectiveness of value analysis.</p>	06





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2.	Life cycle costing Life cycle costing – Forecasting of Capital as well as operating & maintenance costs, time value, present worth analysis, DCF methods, ROR analysis, sensitivity analysis. Different methods of performing value engineering	06
3.	VE Methodology Orientation phase, Information phase, Function Analysis phase, Creative Phase, Evaluation Phase Development Phase, Presentation Phase, implementation Phase	06
4.	Application of Value Engineering to a Construction Project 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
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	06
6.	Valuation Report Valuation Report, contents, standard formats, Case study of any one Report	06

References -

Text Books:

1. Value Engineering: Analysis And Methodology By Del Younke
2. Industrial Engg. & Mgt., O. P. Khanna, Dhanpat Rai Publications
3. Estimating, Costing Specifications & valuation in Civil Engineering By: M. Chakraborty Published
4. Estimating and Costing in Civil Engineering: Theory and Practice B.N Dutta Published S. Dutta & Company, Lucknow

Reference Books:

1. Practical Information for Quantity Surveyors, Property valuers, Architects Engineers and Builders, P.T.Joglekar, Pune Vidyarthi Griha Prakashan, 2008 reprint.





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Class : - First Year M. Tech. Civil-CM	Semester-II	L	T	P	Credits
Course Code : CCM2084	Course Name : Building Maintenance	3	---	--	3

Course Description:
 Building services and maintenance is a course offered as an elective, this course deals with various building services and their maintenance activities. This course will help students to perform functional assessment of the buildings.

Course Learning Outcomes:
 After successful completion of the course, students will be able to,

1. Identify design factors influencing services selection,
2. Assess buildings for their maintenance

Course Content		
Unit No	Description	Hrs
1.	Integrated Design Integrated design: factors affecting selection of services / systems, Provision of space in the building to accommodate building services, Structural integrity of building services equipment. Sound and vibration attenuation features, Provisions for safe operation and maintenance,	06
2.	Building Services Building services engineering system for intelligent buildings: Introduction to information transmission systems, communication and protection system, call systems, public address system and Building automation/management systems	06
3.	Energy conservation and energy efficiency I The concepts and importance of energy conservation and energy efficiency for environmental protection, environmental protection and maintenance of building services systems, selection of environmentally friendly products and materials used in building services systems.	06
4.	Energy conservation and energy efficiency II Co-ordination and management of design and installation of various	06





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	building services systems during the design and construction stages in particular the builder's works. Computer-aided design and installations of building services.	
5.	Testing and commissioning I Testing and commissioning of building services systems: fire safety systems, vertical transportation equipment ventilation systems, etc. Sick building syndrome.	06
6.	Testing and commissioning II The impacts of life-cycle-cost on planning and implementation. An appreciation of capital and operating costs. Implication of low cost, inefficient equipment, poor installation, inadequate access for maintenance.	06

References -

Text Books:

1. Building Services—S. M. Patil---(ISBN-978-81-7525-980-5), 1-C,102,Saamana Pariwar Society, Gen A. K. Vaidya Marg, Goregaon (E),Mumbai-65
2. Building Maintenance Management, 2nd edition,---Chanter, Wiley India

Reference Books:

1. Maintenance of Buildings—A. C. Panchodhari—New Age International Publishers





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Class: - First Year M. Tech. Civil-CM	Semester: II
Course Code : CCM2094	Course Name : Project Planning Lab II

L	T	P	Credits
--	--	4	2

Course Description:

Project management software has the capacity to help plan, organize, and manage resource tools and develop resource estimates. Depending on the sophistication of the software, it can manage estimation and planning, scheduling, cost control and budget management, resource allocation, collaboration software, communication, decision-making, quality management and documentation or administration systems. Primavera is one of the computer based PM software used worldwide to handle construction projects. By this software complex civil engineering problems are handled. Project Planning lab course offered in first semester of F.Y. M. Tech. is designed to make graduates familiar with the current planning software's used in industry; in this course students will acquire knowledge and expertise/hands-on in Primavera software.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Discuss significance of Primavera software in project management.
2. Plan construction project in Primavera software.
3. Carry-out resource optimization.
4. Analyze construction projects through Primavera.

Course Content

Experiment No.	Description	Hrs
1.	Learning basics of Primavera.	16
2.	Solving assignments given in Construction planning and control	16
3.	Planning of any two projects	16





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Class: - First Year M. Tech. Civil-CM	Semester: II
Course Code : CCM2104	Course Name : Geographic Information System Lab

L	T	P	Credits
--	--	4	2

Course Description:

This lab course offered in second semester of F.Y.M.Tech. is designed to make graduates familiar with advanced surveying equipments and Geographic information system software's and its application in civil engineering.

Course Learning Outcomes:

After successful completion of the course, students will be able to:

1. Use instrument/software for task performance.
2. Apply software knowledge to a project.

Course Content

Experiment No.	Description	Hrs
1.	Learning use of instrument/software	16
2.	Application of instrument/software to complete a given task,	12
3.	Apply knowledge of software to a given project	20





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Class: - First Year M. Tech. Civil-CM	Semester-II	L	T	P	Credits
Course Code : CCM2114	Course Name : Mini project	-	-	4	2

Course Description:

This lab course offered in second semester of F. Y. M. Tech. It is in common interest of guide and students to decide mini project topic/area. The course is designed to make graduates perform self-study in the area of their interest to understand and acquire expert knowledge in the area. A report is expected on completion of the course.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Identify research problem/Idea
2. Prepare and present statement of Purpose,
3. Perform analysis work
4. Develop a model
5. Generate report and
6. Present the work carried out

Course Content

Unit No.	Description	Hrs
1.	The topic for the Mini projects may be related to Civil Construction Management area and interdisciplinary area related to Civil Engineering or an innovative idea; Student should perform analysis/design work. Student should prepare model of their work. Evaluation of Mini projects report will be done by the Departmental Committee at the end of semester I.	48





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SEMESTER III





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Class: - First Year M. Tech. Civil-CM	Semester-III	L	T	P	Credits
Course Code : CCM3014	Course Name : Industry Internship	--	--	--	0

Course Description:

The course has been introduced so as to give exposure of industry culture and various tasks and departments in the industry. Students will be inducted through the training program and will be able to relate theory and its applications in the industry.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Identify training area
2. Prepare on site work report of training,
3. Perform analysis work
4. Communicate with agencies
5. Generate report and
6. Present the work

Course Content

Unit No.	Description	Hrs
1.	In the industry training work, the student is expected to undergo training in industry, related to subject specialization for duration of 21 days (minimum) for at least 6 hrs. Per day. Student should write a report on the industry training and submit to department for ISE evaluation at the beginning of third semester. Student should include the certificate from company regarding satisfactory completion of the industry training.	





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Class: - First Year M. Tech. Civil-CM	Semester-III	L	T	P	Credits
Course Code : CCM3024	Course Name :MOOCS Course	--	-	-	3

Course Description:

In a world where change is constant, there is a perpetual need to learn new skills, acquire knowledge and gain qualifications that are relevant in today's technologically driven marketplace. In a thriving digital economy, the demand for skilled professionals with both technical and analytical skills is stimulating job creation and creating competition amongst employers looking to secure valuable talent.

All of this means that students, from working professionals to recent high school graduates, find many reasons to take all or some of their courses online.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Identify need of lifelong learning
2. Gain knowledge of advance course in construction industry.

Course Content

Unit No.	Description	Hrs
1.	Students to undergo one online certificate course and produce a certificate of passing.	





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Class: - First Year M. Tech. Civil-CM	Semester-III	L	T	P	Credits
Course Code : CCM3034	Course Name :Dissertation Phase-I	-	-	8	4

Course Description:

Synopsis approval presentation:

Under the guidance of faculty called as 'Supervisor', PG student from second year is required to do innovative and research oriented work related to various theory and laboratory courses he/she studied during previous semesters. Dissertation work should not be limited to analytical formulation, experimentation or software based project. Student can undertake an interdisciplinary type project with the prior permission of DPGC from both departments.

Synopsis:

Student need to carry out exhaustive literature survey with consultation of his/her supervisor for not less than 25 reputed national international journal and conference papers. Student should make the Synopsis Submission Presentation (SSP) with literature survey report to DPGC and justify about the innovativeness, applicability, relevance and significance of the work. At the time of presentation, student shall also prepare Synopsis of the work and submit to department for approval. Student shall submit synopsis of dissertation as per the prescribed format in 02 copies to department.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Identify research problem through literature survey,
2. Prepare research design for above problem
3. Generate synopsis report
4. Present the work carried out





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Class: - First Year M. Tech. Civil-CM	Semester-III	L	T	P	Credits
Course Code : CCM3044	Course Name :Dissertation Phase-II	-	-	12	6

Course Description:

Phase II evaluation is based on End semester Examination (ESE) which is based on the work during the semester. It is expected that student shall present preliminary results from his/her work during the semester with report as per prescribed format. DPGC including 1 external examiner as expert will approve the report and progress of student.

ISE will be evaluated DPGC and ESE will be evaluated by DPGC and one external expert. Student will submit a report (soft bound before 1 week of date of presentation) as per prescribed format and present to DPGC for ISE and ESE. If student is not showing satisfactory performance in then he/she will be given grace period of two weeks. After two weeks student will again evaluated with grade penalty.

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Prepare the set up for experimentation/software
2. Perform experimental/software analysis for validation of research work
3. Draft a report
4. Present the work carried out





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SEMESTER IV





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Class: - First Year M. Tech. Civil-CM	Semester-IV	L	T	P	Credits
Course Code : CCM4014	Course Name :Dissertation Phase-III	-	-	12	6

Course Description:

Student is required to give a presentation on the progress of his/her dissertation work in front of supervisor and DGPC. It is expected that up to this stage almost 90% of dissertation work is almost completed. Student will make the presentation and seek the suggestions from the supervisor and DPGC. Supervisor and DPGC will ensure that work carried out by the student till this stage is satisfactory and in compliance with synopsis of the dissertation submitted by student. This is In Semester Evaluation (ISE).

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Perform experimental/software analysis for developing research work
2. Communicate with outside agencies
3. Generate report
4. Present the work carried out





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Class : - First Year M. Tech. Civil-CM	Semester-IV	L	T	P	Credits
Course Code : CCM4024	Course Name :Dissertation Viva-Voce	-	-	20	10

Course Description:

In Dissertation Phase-IV, it is expected that student should complete

1. 100% implementation of the proposed system
2. Simulation/ experimentation work on the proposed system
3. Performance evaluation of the proposed system
4. Comparison of the proposed system with existing systems
5. Writing of the conclusion
6. Preparation of a draft-copy of the dissertation report with Plagiarism report

Course Learning Outcomes:

After successful completion of the course, students will be able to,

1. Perform experimental/software analysis for developing research work
2. Communicate with outside agencies
3. Generate report
4. Publish a research paper in journals/conference
5. Prepare dissertation report
6. Present the work carried out

