

**SONA COLLEGE OF TECHNOLOGY, SALEM-5**

**(An Autonomous Institution)**

**M.E-Civil Engineering**

**(Construction Engineering and Management)**

**CURRICULUM and SYLLABI**

**[For students admitted in 2020-2021]**

**M.E / M.Tech Regulation 2019**

**Approved by BOS and Academic Council meetings**

**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for ME I Semester under Regulations 2019**  
**Civil Engineering**  
**Branch: Construction Engineering and Management**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
<b>Theory</b>						
1	P19CEM101	Project Formulation and Appraisal	3	1	0	4
2	P19CEM102	Construction Planning, Scheduling and Control	3	1	0	4
3	P19CEM502	<b>Elective</b> : Advanced Concrete Technology	3	0	0	3
4	P19CEM507	<b>Elective</b> : Construction Project Management	3	0	0	3
5	P19GE101	Research Methodology and IPR	2	0	0	2
6	P19GE701	<b>Audit Course:</b> English for Research Paper Writing	2	0	0	0
<b>Practical</b>						
7	P19CEM103	Construction Engineering Laboratory	0	0	4	2
<b>Total Credits</b>						<b>18</b>

Approved by

Chairperson, Civil Engineering BOS

**Dr.R.Malathy**

Member Secretary, Academic Council

**Dr.R.Shivakumar**

Chairperson, Academic Council & Principal

**Dr.S.R.R.Senthil Kumar**

Copy to:-

HOD/Civil, First Semester ME CEM Students and Staff, COE

**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for ME II Semester under Regulations 2019**  
**Civil Engineering**  
**Branch: Construction Engineering and Management**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1	P19CEM201	Resource Management and Control in Construction	3	0	0	3	45
2	P19CEM202	Construction Laws and Regulations	3	0	0	3	45
3	P19CEM510	<b>Elective</b> – Project Safety Management	3	0	0	3	45
4	P19CEM515	<b>Elective</b> – Modern Construction Materials	3	0	0	3	45
5	P19GE702	<b>Audit Course</b> – Stress Management by Yoga	2	0	0	0	30
<b>Practical</b>							
6	P19CEM203	Structural Software Application Laboratory	1	0	4	3	75
7	P19CEM204	Mini Project	0	0	4	2	60
<b>Total Credits</b>						<b>17</b>	

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**Sona College of Technology, Salem**  
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**Courses of Study for ME III Semester under Regulations 2019**  
**Civil Engineering**  
**Branch: Construction Engineering and Management**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1	P19CEM301	Advanced Construction Techniques	3	0	0	3	45
2	P19CEM517	<b>Elective:</b> Quality Control and Quality Assurance in Construction	3	0	0	3	45
3	P19END601	<b>Open Elective:</b> Product Design and Manufacturing	3	0	0	3	45
4	P19ISE601	<b>Open Elective:</b> Transport Safety					
<b>Practical</b>							
5	P19CEM302	Technical Seminar	0	0	2	1	30
6	P19CEM303	Practical Training	0	0	4	2	60
7	P19CEM304	Project Phase – I	0	0	16	8	240
<b>Total Credits</b>						<b>20</b>	

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**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for ME IV Semester under Regulations 2019**  
**Civil Engineering**  
**Branch: Construction Engineering and Management**

<b>S. No</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credit</b>	<b>Total Contact Hours</b>
<b>Practical</b>							
1	P19CEM401	Project Phase – II	0	0	28	14	420
<b>Total Credits</b>						<b>14</b>	

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**Chairperson, Academic Council & Principal**

**Dr.S.R.R.Senthil Kumar**

Copy to:-

HOD/Civil, Fourth Semester ME CEM Students and Staff, COE

**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for ME I Semester under Regulations 2019**  
**Civil Engineering**  
**Branch: Construction Engineering and Management**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
<b>Theory</b>						
1	P19CEM101	Project Formulation and Appraisal	3	1	0	4
2	P19CEM102	Construction Planning, Scheduling and Control	3	1	0	4
3	P19CEM502	<b>Elective</b> : Advanced Concrete Technology	3	0	0	3
4	P19CEM507	<b>Elective</b> : Construction Project Management	3	0	0	3
5	P19GE101	Research Methodology and IPR	2	0	0	2
6	P19GE701	<b>Audit Course:</b> English for Research Paper Writing	2	0	0	0
<b>Practical</b>						
7	P19CEM103	Construction Engineering Laboratory	0	0	4	2
<b>Total Credits</b>						<b>18</b>

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Chairperson, Academic Council & Principal

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Copy to:-

HOD/Civil, First Semester ME CEM Students and Staff, COE

<b>P19CEM101</b>	<b>PROJECT FORMULATION AND APPRAISAL</b>	<b>3 1 0 4</b>
<b>COURSE OUTCOMES</b>		
<i>Upon completion of this course, the student will be able to...</i>		
CO1 Explain the process the formulation of project.		
CO2 Describe about the concepts of cash flows, time value of money and cost of capital		
CO3 Determine the various theories of project appraisal		
CO4 Interpret the various means of financing for a project		
CO5 Explain the private sector participation in projects		
<b>Unit – I: PROJECT FORMULATION</b>		<b>9</b>
Project – Concepts – Capital investments - Generation and Screening of project Ideas - Project identification – Preliminary analysis, Market, Technical, Financial, Economic and ecological - Pre-Feasibility report and its Clearance, Project estimates and Techno-economic Feasibility report, Detailed project report – Different project clearances required.		
<b>Unit –II: PROJECT COSTING</b>		<b>9</b>
Project cash flows – Time value of money – Cost of capital.		
<b>Unit –III: PROJECT APPRAISAL</b>		<b>9</b>
NPV – BCR – IRR – ARR – Urgency – Pay Back Period – Assessment of various methods – Indian practice of investment appraisal – International practice of appraisal – Analysis of risk – Different methods – Selection of a project and risk analysis in practice.		
<b>Unit –IV: PROJECT FINANCING</b>		<b>9</b>
Project financing – Means of finance – Financial institutions – Special schemes – Key financial Indicators - Ratios.		
<b>Unit –V: PRIVATE SECTOR PARTICIPATION</b>		<b>9</b>
Private sector participation in Infrastructure Development Projects – PPP- BOT, BOLT, BOOT - Technology transfer and foreign collaboration - Scope of technology transfer.		
		<b>Total: 45 hrs.</b>
<b>REFERENCE BOOKS:</b>		
1. Ambrish Gupta, Project Appraisal and Financing Paperback – 2017		
2. Prasanna Chandra, Projects – Planning, Analysis, Selection, Implementation Review, McGraw Hill Publishing Company Ltd., New Delhi. 2017.		
3. Barcus, S.W. and Wilkinson.J.W., Hand Book of Management Consulting Services, McGraw Hill, New York, 1986.		
4. Joy P.K., Total Project Management - The Indian Context, New Delhi, Macmillan India Ltd., 1994		
5. Manual for the Preparation of Industrial Feasibility Studies, (IDBI Reproduction)United Nations Industrial Development Organisation (UNIDO) Bombay, 2012.		

<b>P19CEM102</b>	<b>CONSTRUCTION PLANNING SCHEDULING AND CONTROL</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>COURSE OUTCOMES</b>					
<i>Upon completion of this course, the student will be able to...</i>					
CO1 Explain the concepts of construction Planning					
CO2 Compute the construction Schedules using CPM					
CO3 Formulate scheduling Procedures with uncertain durations					
CO4 Plan the project budget, cash flow and schedule information					
CO5 Explain the various types of Project information and organize the database of the project					
<b>Unit – I: CONSTRUCTION PLANNING</b>					<b>9</b>
Basic Concepts in the development of construction plans – Choice of technology and construction method – Defining work tasks – Defining precedence relationships among activities – Estimating activity Durations – Estimating resource requirements for work activities – Coding systems.					
<b>Unit –II: SCHEDULING PROCEDURES USING CPM</b>					<b>9</b>
Construction schedules – Critical Path Method – Scheduling calculations – Float – Presenting project schedules – Scheduling for Activity-on-Node and with leads, lags, and windows – Scheduling with resource constraints and precedence – Use of advanced scheduling techniques					
<b>Unit –III: SCHEDULING PROCEDURES WITH UNCERTAINTY</b>					<b>9</b>
Scheduling with uncertain durations – Calculations for Monte Carlo schedule simulation – Crashing and time/cost Trade-offs – Improving the scheduling process.					
<b>Unit –IV: COST CONTROL, MONITORING AND ACCOUNTING</b>					<b>9</b>
Cost control problem – Project budget – Forecasting for activity cost control – Financial accounting systems and cost accounts – Control of project cash flows –Schedule control – Schedule and budget updates – Relating cost and schedule information.					
<b>Unit –V: ORGANIZATION AND USE OF PROJECT INFORMATION</b>					<b>9</b>
Types of project information – Accuracy and use of information – Computerized organization and use of information – Organizing information in databases – Relational model of databases – Other conceptual models of databases – Centralized database management systems – Databases and applications Programs – Information transfer and flow.					
					<b>Total: 45 hrs.</b>
<b>REFERENCE BOOKS:</b>					
1. Calin M. Popescu, Chotchai Charoenngam, Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications, Wiley, New York, 1995					
2. Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, McGraw-Hill Publishing Company, New Delhi, 2019.					
3. Chris Hendrickson and Tung Au, Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2000.					
4. Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985. Willis, E. M., Scheduling Construction Projects, John Wiley & Sons, 2011.					



<b>P19CEM103</b>	<b>CONSTRUCTION ENGINEERING LABORATORY</b>	<b>0 0 4 2</b>
<b>COURSE OUTCOMES</b>		
<i>Upon completion of this course, the student will be able to...</i>		
CO1 Design high strength concrete and study the parameters affecting its performance		
CO2 Conduct Non-Destructive tests on existing concrete structures		
CO3 Apply Engineering principles to understand behaviour of structural elements		
<b>CONTENTS:-</b>		<b>60</b>
Study of stress-strain curve of high strength concrete		
Correlation between cube strength, cylindrical strength, split tensile strength and modulus of rupture		
Effect of cyclic loading on steel		
Non-Destructive testing of existing concrete members		
Behaviour of beams under flexure, shear and torsion		
		<b>Total: 60 hrs.</b>
<b>REFERENCE BOOKS:</b>		
1. Properties of Concrete, Neville A.M, 5 <sup>th</sup> Edition, Prentice Hall, 2013.		
2. Concrete Technology, Shetty M.S., S.Chand and Co., 2018.		

<b>P19CEM502</b>	<b>ADVANCED CONCRETE TECHNOLOGY</b>	<b>3 0 0 3</b>
<b>COURSE OUTCOMES</b>		
<i>Upon completion of this course, the student will be able to...</i>		
CO1 discuss microstructure concrete and dimensional stability		
CO2 prepare a mix design for the various mix proportions		
CO3 enumerate the properties of ingredients used in concretes		
CO4 explain the different types of special concrete and their applications in construction.		
CO5 explain different types of non-destructive testing methods.		
<b>UNIT-I: CONCRETE CHARACTERIZATION</b>		<b>9</b>
Microstructure of concrete: Aggregate phase, hydrated cement paste, interfacial transition zone. Strength: strength-porosity relationship, failure modes in concrete, factors affecting compressive strength, behavior of concrete under various stress states. Dimensional stability: Elastic behavior, drying shrinkage and creep, thermal shrinkage and thermal properties of concrete.		
<b>UNIT-II: PROPORTIONING CONCRETE MIXTURES</b>		<b>9</b>
Significance and objectives, general considerations, procedures, Methods of concrete mix design, design of high strength and high performance concrete using relevant codes. Testing and control of concrete quality: Methods and significance, accelerated strength testing, core tests and quality control charts.		
<b>UNIT-III: DURABILITY OF CONCRETE</b>		<b>9</b>
Water as an agent of deterioration: structure of water, permeability, causes of deterioration of concrete: surface wear, crystallization of salts in pores, frost action, effect of fire, sulfate attack, alkali aggregate reaction, and corrosion of embedded steel in concrete: Mechanism-control, development of holistic model of concrete deterioration, concrete in the marine environment. Methods of providing durable concrete, short-term tests to assess long-term behaviour.		
<b>UNIT-IV: SPECIAL TYPES OF CONCRETE</b>		<b>9</b>
Roller compacted concrete-self compacted concrete-shrinkage compensation concrete, pervious concrete-concrete containing polymers-heavy weight concrete for radiation shielding-high performance concrete, high strength concrete, shotcrete, fibre reinforced concrete- bacterial concrete-Mass concrete – their materials, mix proportions, properties, applications and limitations.		
<b>Unit-V: Non-destructive methods</b>		<b>9</b>
Surface hardness methods, Penetration resistance techniques, pull out tests, maturity method, stress wave propagation methods, electrical methods, electrochemical methods, electromagnetic methods, Tomography of reinforced concrete.		
		<b>Total: 45 hrs.</b>
<b>REFERENCE BOOKS:</b>		
1. .Kumar Mehta, Paulo J.M Monteiro., Concrete Microstructure,properties and Materials,McGraw Hill Education(India) Pvt Ltd, New Delhi,2014		
2. Gambhir.M.L., Concrete Technology, McGraw Hill Education, 2011.		
3. Gupta.B.L., Amit Gupta, “Concrete Technology, Jain Book Agency, 2010.		
4. Neville, A.M., Properties of Concrete, Prentice Hall, 2013, London.		
5. Shetty M.S., Concrete Technology, S.Chand and Company Ltd. Delhi, 2008		

P19CEM507	CONSTRUCTION PROJECT MANAGEMENT	3 0 0 3
<b>COURSE OUTCOMES</b>		
<i>Upon completion of this course, the student will be able to...</i>		
CO1 Explain the concept of project and role of project managers		
CO2 Develop the project plan and controlling systems		
CO3 illustrate the characteristics of working systems and monitoring contracts		
CO4 Describe the project direction and control the process at various stages		
CO5 Explain the various resource management and inventory control		
<b>Unit- 1: INTRODUCTION TO PROJECT</b>		<b>9</b>
Concept of a Project – Characteristic features – Project life cycle – Phases – Project management – tools and techniques for project management – Role of project managers.		
<b>Unit –II: ROLE OF PROJECT MANAGEMENT</b>		<b>9</b>
Development of project plan and objectives – Programming – Scheduling – Project organization – Organization and project team – Role of communication in project management – Controlling systems.		
<b>Unit –III: WORKING SYSTEMS</b>		<b>9</b>
Working systems – Characteristics – Class of systems – Design of systems – Work break down system (WBS) – Project execution plan – Project procedure manual –Sub systems of project management- monitoring of projects- Networks – Monitoring contracts.		
<b>Unit –IV: PROJECT DIRECTION</b>		<b>9</b>
Project direction – Direction during production stage – Value engineering review – Stages – Directives – Project coordination – Procedure – Interface management – Project control – Scope for progress control – Overall project progress control – Stages – Methods.		
<b>Unit –V: RESOURCE MANAGEMENT</b>		<b>9</b>
Basic concept – Labour requirements – Labour productivity – Site productivity – Equipment Management – Material management- Procurement organization – Procurement planning – Functions of material management – Inventory control		
		<b>Total: 45 hrs.</b>
<b>REFERENCE BOOKS:</b>		
1. Prasanna Chandra, “Project Planning, Analysis, Selection, Implementation and review”, Tata Mcgraw Hill ,2017.		
2. Chitkara, K.K “Construction Project Management: Planning Scheduling and control”, Tata McGraw-Hill Publishing Company, New Delhi- 2019..		
3. Frederick E. Gould, “Construction Project Management”, Pearson Publications, Vary E. Joyce, Massachusetts Institute of Technology, 2000.		
4. Choudhury, S “Project Management”, Pearson Publishing company New Delhi 2008.		
5. Sengutha .B, Guha .H, “Construction Management and Planning”, Tata Mc Graw Hill, 2001.		

**COURSE OUTCOMES**

At the end of the course, the student will be able to

1. Review the literature of the research problem
2. Choose appropriate data collection and sampling method according to the research problem.
3. Interpret the results of research and communicate effectively with their peers
4. Explain the Importance of intellectual property rights
5. Evaluate trade mark, develop and register patents

**UNIT 1 INTRODUCTION TO RESEARCH METHODS 6**

Definition and Objective of Research, Various steps in Scientific Research, Types of Research, Criteria for Good Research, Defining Research Problem, Research Design , Case Study Collection of Primary and Secondary Data, Collection Methods: Observation, Interview, Questionnaires, Schedules,

**UNIT 2 SAMPLING DESIGN AND HYPOTHESIS TESTING 6**

steps in Sampling Design, Types of Sample Designs, Measurements and Scaling Techniques - Testing of hypotheses concerning means (one mean and difference between two means -one tailed and two tailed tests), concerning variance – one tailed Chi-square test.

**UNIT 3 INTERPRETATION AND REPORT WRITING 6**

Techniques of Interpretation, Precaution in Interpretation, Layout of Research Report, Types of Reports, Oral Presentation, Mechanics of Writing Research Report

**UNIT 4 INTRODUCTION TO INTELLECTUAL PROPERTY 6**

Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights, Innovations and Inventions trade related intellectual property rights.

**UNIT 5 TRADE MARKS, COPY RIGHTS AND PATENTS 6**

Purpose and function of trade marks, acquisition of trade mark rights, trade mark registration processes, trademark claims –trademark Litigations- International trademark law

Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

**THEORY: 30 Hours****TUTORIAL: -****PRACTICAL: -****TOTAL: 30 Hours**

## **TEXT BOOKS**

1. C.R. Kothari, Gaurav Garg, Research Methodology Methods and Techniques ,4<sup>th</sup> Edition, New Age International Publishers, 2019.
2. Deborah E. Bouchoux, “Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets”, Delmar Cengage Learning, 4<sup>th</sup> Edition, 2012.
3. Prabuddha Ganguli, “Intellectual Property Rights: Unleashing the Knowledge Economy”, Tata Mc Graw Hill Education, 1<sup>st</sup> Edition, 2008.

## **REFERENCE BOOKS**

1. Panneerselvam, R., Research Methodology, Second Edition, Prentice-Hall of India, New Delhi, 2013.
2. Ranjith Kumar, Research Methodology – A step by step Guide for Begineers, 4<sup>th</sup> edition, Sage publisher, 2014.
3. D Llewelyn & T Aplin W Cornish, “Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights”, Sweet and Maxwell, 1<sup>st</sup> Edition, 2016.
4. Ananth Padmanabhan, “Intellectual Property Rights-Infringement and Remedies”, Lexis Nexis, 1<sup>st</sup> Edition, 2012.
5. Ramakrishna B and Anil Kumar H.S, “Fundamentals of Intellectual Property Rights: For Students, Industrialist and Patent Lawyers”, Notion Press, 1<sup>st</sup> Edition, 2017.
6. M.Ashok Kumar and Mohd.Iqbal Ali :”Intellectual Property Rights” Serials Pub

**Course Outcomes:**

At the end of the course, the students will be able to

- Demonstrate research writing skills both for research articles and thesis
- Frame suitable title and captions as sub-headings for articles and thesis
- Write each section in a research paper and thesis coherently
- Use language appropriately and proficiently for effective written communication
- Exhibit professional proof-reading skills to make the writing error free

**Unit – I**

6

Planning and preparation, word order, breaking up long sentences, organising ideas into paragraphs and sentences, being concise and avoiding redundancy, ambiguity and vagueness

**Unit – II**

6

Interpreting research findings, understanding and avoiding plagiarism, paraphrasing sections of a paper/ abstract.

**Unit- III**

6

Key skills to frame a title, to draft an abstract, to give an introduction

**Unit – IV**

6

Skills required to organise review of literature, methods, results, discussion and conclusions

**Unit – V**

6

Usage of appropriate phrases and key terms to make the writing effective - proof-reading to ensure error-free writing.

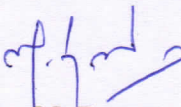
**Text Books:**

1. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011
2. Highman N , Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book, 1998.
3. Day R, How to Write and Publish a Scientific Paper, Cambridge University Press, 2006.
4. Goldbort R, Writing for Science, Yale University Press, 2006. (available on Google Books)

**REFERENCES**

Martin Cutts, Oxford Guide to Plain English, Oxford University Press, Second Edition, 2006

**Total: 30 hours**



**Dr. M. Renuga**

BoS – Chairperson,  
Science & Humanities  
HOD / H&L

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**Civil Engineering**  
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<b>Practical</b>							
6	P19CEM203	Structural Software Application Laboratory	1	0	4	3	75
7	P19CEM204	Mini Project	0	0	4	2	60
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<b>P19CEM201</b>	<b>Resource Management and Control in Construction</b>	<b>L T P C</b> <b>3 0 0 3</b>
<b><i>COURSE OUTCOMES</i></b>		
At the end of the course, the student will be able to: CO1 know the management and planning of various resources involved in construction. CO2 describe the effect of resource planning. CO3 illustrate the management of materials and equipment. CO4 explain the effect of time management. CO5 identify the process of resource allocation and resource levelling in construction		
<b>UNIT-I: RESOURCE PLANNING</b>		<b>9 Hrs</b>
Resource Planning, Procurement, Identification, Personnel, Planning for material, Labour, time schedule and cost control, Types of resources, manpower, Equipment, Material, Money, Time.		
<b>UNIT –II: LABOUR MANAGEMENT</b>		<b>9 Hrs.</b>
Systems approach, Characteristics of resources, Utilization, measurement of actual resources required, Tools for measurement of resources, Labour, Classes of Labour, Cost of Labour, Labour schedule, optimum use Labour- Productivity analysis for labour.		
<b>UNIT –III: MATERIALS AND EQUIPMENT</b>		<b>9 Hrs.</b>
Material: Time of purchase, quantity of material, sources, Transportation, Delivery and Distribution. Equipment: Planning and selecting by optimistic choice with respect to cost, Time, Source and handling.		
<b>UNIT –IV: TIME MANAGEMENT</b>		<b>9 Hrs.</b>
Personnel time, Management and planning, managing time on the project, forecasting the future, Critical path measuring the changes and their effects – Cash flow and cost control-Fast track construction.		
<b>UNIT –V: RESOURCE ALLOCATION AND LEVELLING</b>		<b>9 Hrs.</b>
Time-cost trade off, Computer application – Resource levelling, resource list, resource allocation, Resource loading, Cumulative cost –Value Management.		
		<b>Total: 45 hrs.</b>
<b>REFERENCE BOOKS:</b>		
<ol style="list-style-type: none"> <li>1. Andrew, D. Szilagg, “Hand Book of Engineering Management”, 2002.</li> <li>2. Glenn .A, Sea's and Reichard, Clough .H, “Construction Project Management”, John Wiley and Sons, Inc, 2009.</li> <li>3. Harvey, A. Levine, “Project Management using Micro Computers”, Obsome McGraw Hill C.A. Publishing Co., Inc. 2008.</li> <li>4. James, A., Adrain, “Quantitative Methods In Construction Management”, American Elsevier Publishing Co., Inc., 2003.</li> </ol>		



<b>P19CEM202</b>	<b>Construction Laws and Regulations</b>	<b>L T P C 3 0 0 3</b>
<b>COURSE OUTCOMES</b>		
At the end of the course, the student will be able to: CO1 study the elements of concluding, and administering contracts CO2 know about the concepts of tendering procedures. CO3 achieve awareness on arbitrations and legal procedures CO4 explain the different taxes involved in construction activities CO5 gain knowledge on labour regulations and their impact on managing of contracts		
<b>UNIT-I: CONTRACT AGREEMENTS</b>		<b>9 Hrs</b>
Functions of Contracts in engineering- Introduction to Contract agreements, Terms involved in Contract agreements - Elements of Contracts -Types of Contracts – Standard Contract Document - Conditions of Contract-Law of Torts.		
<b>UNIT –II: TENDERING CONCEPTS</b>		<b>9 Hrs</b>
Tendering Process - tender documents – requirements for tendering –Methods of inviting tenders-Evaluation of Tender from Technical, financial aspects – Two Cover System- Preparation of the Documentation.		
<b>UNIT –III: APPOINTMENT OF ARBITRATOR</b>		<b>9 Hrs</b>
Earnest Money Deposit (EMD) – Security deposits - Arbitrator- appointment of arbitrator-power and duties of arbitrator – dispute review board- Violations – Certificates, Forms, and Schedules – Extension of time and extended stay-Case study.		
<b>UNIT –IV: TYPES OF TAX INVOLVED IN CONSTRUCTION</b>		<b>9 Hrs</b>
Potential Contractual Problems – price variation clause – fine and Liquidated Damages – insurance income tax – sales tax – VAT – Legal requirements of planning –Local government approval-Case study.		
<b>UNIT –V: LABOUR LAWS</b>		<b>9 Hrs</b>
Indian Contracts Act - Labour laws – workmen compensation act – minimum wages Act – Child labour Act- Industrial dispute Act- Maternity benefit Act – Domestic emerging on misconduct.		
		<b>Total:45 hrs.</b>
<b>REFERENCE BOOKS:</b>		
<ol style="list-style-type: none"> <li>1. John G. Betty., “Engineering Contracts”, McGraw Hill, 2003.</li> <li>2. Gajaria G.T., “Laws Relating to Building and Engineering Contracts in India”, M. M. Tripathi Private Ltd., Bombay, 1982 Tamilnadu PWD Code, 2006.</li> <li>3. Jimmie Hinze, “Construction Contracts”, McGraw Hill, 2001</li> <li>4. Joseph T. Bockrath, “Contracts, the Legal Environment for Engineers and Architects”, McGraw Hill, 2000.</li> <li>4. Joseph T. Bockrath, “Contracts, the Legal Environment for Engineers and Architects”, McGraw Hill, 2000.</li> </ol>		

<b>P19CEM203</b>	Software Application Laboratory for Construction Management	<b>L T P C</b> <b>1 0 4 3</b>
<b><i>COURSE OUTCOMES</i></b>		
At the end of the course, the student will be able to: CO1 Prepare quantity takeoff and delivery of bid for construction projects. CO2 Prepare track project report using Primavera software. CO3 Plan scheduling and track construction projects using MS project and analyze the risks factors in projects		
<ol style="list-style-type: none"> <li>1. Quantity takeoff, Preparation and delivery of the bid or proposal of an engineering construction project.</li> <li>2. Design of a simple equipment information system for a construction project.</li> <li>3. Scheduling of a small construction project using Primavera scheduling systems including reports and tracking.</li> <li>4. Scheduling of a small construction project using tools like MS project scheduling systems including reports and tracking.</li> <li>5. Simulation models for project risk analysis.</li> </ol>		
		<b>Total: 75 hrs.</b>
<b>REFERENCE BOOKS:</b>		
<ol style="list-style-type: none"> <li>1. Krishnamoorthy .C.S and Rajeev .S, Computer Aided Design, Narosa publishing house, New Delhi, 2001.</li> <li>2. Harrison .H .B, Structural Analysis and Design, vol. I &amp; II, Pergamon press, 2001.</li> <li>3. Billy E. Giliet Introduction to Operation Research - Computer Oriented Algorithmic Approach, Tata McGraw Hill, 2000.</li> <li>4. Paulson. B.R., Computer Applications in Construction, McGraw Hill, 2005.</li> <li>5. Feigenbaum .L, Construction Scheduling with Primavera Project Planner, Prentice Hall Inc., 2009.</li> </ol>		

<b>P19CEM204</b>	<b>Mini Project</b>	<b>L T P C</b> <b>0 0 4 2</b>
<b><i>COURSE OUTCOMES</i></b>		
<p>At the end of the course, the student will be able to:</p> <p>CO1. Identify Construction Engineering problems reviewing available literature.</p> <p>CO2. Study different techniques used to analyze complex construction systems.</p> <p>CO3. Work on the solutions given and present solution by using his/her technique applying engineering principles.</p>		
<b>Syllabus Contents:</b>		<b>60 Hrs.</b>
<p>Mini Project will have mid semester presentation and end semester presentation. Mid Semester presentation will include identification of the problem based on the literature review on the topic referring to latest literature available.</p> <p>End semester presentation should be done along with the report on identification of topic for the work and the methodology adopted involving scientific research, collection and analysis of data, determining solutions highlighting individuals' contribution.</p> <p>Continuous assessment of Mini Project at Mid Semester and End Semester will be monitored by the departmental committee.</p>		

<b>P19CEM510</b>	<b>Project Safety Management</b>	<b>L T P C</b> <b>3 0 0 3</b>
<b><i>COURSE OUTCOMES</i></b>		
At the end of the course, the student will be able to: CO1 study the accountabilities and responsibilities for the delivery of safety strategy and performance. CO2 know appropriate safety information and training related programme. CO3 describe the safety measurements and record keeping. CO4 ensure that all staff is provided with adequate and appropriate safety information CO5 provide the necessary training to build and maintain meaningful aerodrome operational safety leadership skills.		
<b>UNIT-I: CONSTRUCTION ACCIDENTS</b>		<b>9 Hrs</b>
Accidents and their Causes – Human Factors in Construction Safety – Costs of Construction Injuries – Occupational and Safety Hazard Assessment – Legal Implications.		
<b>UNIT –II: SAFETY PROGRAMMES</b>		<b>9 Hrs</b>
Problem Areas in Construction Safety – Elements of an Effective Safety Programme – Job-Site Safety Assessment – Safety Meetings – Safety Incentives-Implementation of 5’S		
<b>UNIT –III: CONTRACTUAL OBLIGATIONS</b>		<b>9 Hrs</b>
Contractual obligations - Safety in Construction Contracts – Substance Abuse – Safety Record Keeping.		
<b>UNIT –IV: DESIGNING FOR SAFETY</b>		<b>9 Hrs</b>
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.		
<b>UNIT –V: OWNERS’ AND DESIGNERS’ OUTLOOK</b>		<b>9 Hrs</b>
Owner’s responsibility for safety – Owner preparedness – Role of designer in ensuring safety – Safety clause in design document.		
		<b>Total: 45 hrs.</b>
<b>REFERENCE BOOKS:</b>		
1. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, Construction Safety and Health Management, Prentice Hall Inc., 2001. 2. TamilNadu Factory Act, Department of Inspectorate of factories, Tamil Nadu. Health Management, Prentice Hall Inc., 2001. 3. Jimmy W. Hinze, Construction Safety, Prentice Hall Inc., 1997.		

<b>P19CEM515</b>	<b>Modern Construction Materials</b>	<b>L T P C 3 0 0 3</b>
<b><i>COURSE OUTCOMES</i></b>		
At the end of the course, the student will be able to: CO1 study the properties and applications of special concrete. CO2 understand the various concepts of steels. CO3 study the concepts of composites on FRP. CO4 study the usage of materials on construction activities. CO5 understand the concepts of smart and intelligent materials		
<b>UNIT-I: SPECIAL CONCRETE</b>		<b>9 Hrs</b>
Concretes, Behaviour of concretes – Properties and Advantages of High Strength and High Performance Concrete – Properties and Applications of Fibre Reinforced Concrete, Self compacting concrete, Alternate Materials to concrete on high performance & high Strength concrete.		
<b>UNIT –II: METALS</b>		<b>9 Hrs</b>
Types of Steels – Manufacturing process of steel – Advantages of new alloy steels –Properties and advantages of aluminium and its products – Types of Coatings & Coatings to reinforcement – Applications of Coatings.		
<b>UNIT –III: COMPOSITES</b>		<b>9 Hrs</b>
Types of Plastics – Properties & Manufacturing process – Advantages of Reinforced polymers – Types of FRP – FRP on different structural elements – Applications of FRP.		
<b>UNIT –IV: OTHER MATERIALS</b>		<b>9 Hrs</b>
Types and properties of Water Proofing Compounds – Types of Non-weathering Materials and its uses – Types of Flooring and Facade Materials and its application, concrete admixtures and construction chemicals.		
<b>UNIT –V: SMART AND INTELLIGENT MATERIALS</b>		<b>9 Hrs</b>
Types & Differences between Smart and Intelligent Materials – Special features – Case studies showing the applications of smart & Intelligent Materials.		
		<b>Total: 45 hrs.</b>
<b>REFERENCE BOOKS:</b>		
<ol style="list-style-type: none"> <li>1. Ashby, M.F. and Jones. D.R.H.H. “Engineering Materials 1: An introduction to Properties, applications and designs”, Elsevier Publications, 2005.</li> <li>2. Ganapathy, C., Modern Construction Materials, Eswar Press, 2015.</li> <li>3. Mamlouk, M.S. and Zaniewski, J.P., Materials for Civil and Construction Engineers, Prentice Hall Inc., 1999.</li> <li>4. Santhakumar.A.R., Concrete Technology, Oxford University press, New Delhi, 2005.</li> <li>5. Shan Somayaji, Civil Engineering Materials, Prentice Hall Inc., 2001</li> <li>6. Shetty M.S, Concrete Technology: Theory and Practice, S.Chand &amp; Company Ltd., 2005.</li> </ol>		

**Course Outcomes:**

At the end of completion of this course, students will be able to

1. Develop physical and mental health thus improving social health
2. Increase immunity power of the body and prevent diseases
3. Accelerate memory power
4. Achieve the set goal with confidence and determination
5. Improve stability of mind, pleasing personality and work with awakened wisdom

**UNIT – I****6**

Yoga-Introduction - Astanga Yoga- 8 parts-Yam and Niyam etc.- Do's and Don'ts in life- Benefits of Yoga and Asana- Yoga Exercise- and benefits- Pranayam Yoga- Nadi suthi, Practice and Spinal Sclearance Practice- Regularization of breathing techniques and its effects-Practice and kapalapathy practice.

**UNIT – II****6**

Neuromuscular breathing exercise and Practice- Magarasa Yoga, 14 points Acupressure techniques and practice- Body relaxation practice and its benefits- Raja Yoga- 1.Agna – explanation and practice- Activation of Pituitary- Raja Yoga- 2. Santhi Yoga-Practice- Balancing of physical and mental power.

**UNIT – III****6**

Raja Yoga- 3. Sagasrathara yoga –practice- Activation of dormant brain cells-Kayakalpa-theory- Kayakalpa –practice-Yogic exercise to improve physical and mental health and practice-Asanas –explanation-Practice-benefits

**UNIT –IV****6**

Sun namaskar- 12 poses-explanation and practice-Yoga –Asana-Padmasana, vajrasana,chakrasana, viruchasana etc-Stress management with Yoga-Role of women and Yoga  
Equality, nonviolence, Humanity, Self- control- Food and yoga Aware of self-destructive habits  
Avoid fault thinking (thought analysis-Practice)-Yoga Free from ANGER (Neutralization of anger)& practice


**UNIT – V****6**

Moralisation of Desire & practice- Punctuality-Love-Kindness-Compassion Eradication of worries-Practice -Personality development, positive thinking-Good characters to lead a moral life  
How to clear the polluted mind- Benefits of blessing- Five- fold culture –explanation- Karma Yoga Practice In Geetha- Sense of duty-Devotion, self- reliance, confidence, concentration, truthfulness, cleanliness.

**Reference Books**

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

**Total: 30 hours**

  
Dr. M. Renuga  
BoS – Chairperson,  
Science & Humanities  
HOD / H&L

**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for ME III Semester under Regulations 2019**  
**Civil Engineering**  
**Branch: Construction Engineering and Management**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1	P19CEM301	Advanced Construction Techniques	3	0	0	3	45
2	P19CEM517	<b>Elective:</b> Quality Control and Quality Assurance in Construction	3	0	0	3	45
3	P19END601	<b>Open Elective:</b> Product Design and Manufacturing	3	0	0	3	45
4	P19ISE601	<b>Open Elective:</b> Transport Safety					
<b>Practical</b>							
5	P19CEM302	Technical Seminar	0	0	2	1	30
6	P19CEM303	Practical Training	0	0	4	2	60
7	P19CEM304	Project Phase – I	0	0	16	8	240
<b>Total Credits</b>						<b>20</b>	

**Approved by**

**Chairperson, Civil Engineering BOS**

**Dr.R.Malathy**

**Member Secretary, Academic Council**

**Dr.R.Shivakumar**

**Chairperson, Academic Council & Principal**

**Dr.S.R.R.Senthil Kumar**

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<b>P19CEM301</b>	<b>Advanced Construction Techniques</b>	<b>L T P C 3 0 0 3</b>
<b>COURSE OUTCOMES</b>		
At the end of the course, the student will be able to: CO1 To understand the various processes involved in sub-structure construction. CO2 To understand the various processes involved in super-structure construction. CO3 To understand the construction techniques carried in bridges, tunneling. CO4 To understand the construction process of special structures and offshore structures. CO5 To know about the rehabilitation techniques carried out for a structure.		
<b>UNIT-I: SUB STRUCTURE CONSTRUCTION</b>		<b>9 Hrs</b>
Box Jacking: Need – elements – concept – precautions – advantages. Pipe jacking: Technique – factors – applications – advantages. Diaphragm walls – methods – sheet piles – applications – advantages. Piling techniques: Classifications – factors. Well and caisson: Types – sinking method –precautions. Cofferdam: Purpose – types – techniques. Cable anchoring – screw anchor – necessity- applications. Grouting: Need – materials – techniques – applications – guniting and shotcreting. Well points - dewatering – techniques.		
<b>UNIT –II: TALL STRUCTURES CONSTRUCTION</b>		<b>9 Hrs</b>
Concrete in tall buildings – types of concrete pumps – factors – blockage – causes - clearing –safety. Slip form techniques: Vertical - chimney – horizontal – concrete paving methods. Suspended form work: Purpose – methods – advantages - erection techniques. Prestressing techniques – insitu prestressing in high rise structures.		
<b>UNIT –III: LARGE SPAN STRUCTURES CONSTRUCTION</b>		<b>9 Hrs</b>
Tunneling: Purpose – aspects – shafts – mucking – construction techniques – advantages – trenchless technology. Bow string bridges: Systems – arrangements – advantages. Suspension and cable stayed bridges: Parallel – radial patterns – concept. Domes: Types – structural framing – erection methods. Aerial transportations – components – advantages – applications.		
<b>UNIT –IV: SPECIAL STRUCTURE CONSTRUCTION</b>		<b>9 Hrs</b>
Lattice tower: Definition – techniques. Rigging of transmission line structures: Definition –precaution – stages involved. Advanced construction techniques in offshore construction practice: Various operations – under water concrete - vacuum dewatering of concrete flooring. Articulated structure – definition – mechanism.		
<b>UNIT –V: REPAIR AND STRENGTHENING TECHNIQUES</b>		<b>9 Hrs</b>
Mud Jacking: Techniques – behavior of slab – advantages. Micro piles: Uses – stages – applications- benefits. Shallow profile pipeline laying –procedure – specifications – sub aqueous pipe lines –laying methods. Sheet piles protection techniques. Water proofing: Need – above and below ground. Under pinning: Need – methods. Demolition and dismantling: Principles – methods – modern demolition techniques – controlled demolition – mechanical method – hydro demolition – advantages – sequence of demolition – beams – columns – walls – general sequence.		
		<b>Total: 45 hrs.</b>
<b>REFERENCE BOOKS:</b>		
<ol style="list-style-type: none"> <li>1. Sankar, S.K.&amp; Saraswati, S., Construction Technology, Oxford University Press, New Delhi, 2008.</li> <li>2. Gahlot .P.S &amp; Sanjay Sharma,"Building repair and maintenance management "CBS Publications.2006.</li> <li>3. Brown.R, "Practical Foundation Engineering Hand Book", Mcgraw Hill Publications, 2005.</li> <li>4. Patrick Powers .J, "Construction Dewatering: New Methods and Applications" John Wiley &amp; Sons, 2002.</li> </ol>		



<b>P19CEM517</b>	<b>Quality Control and Quality Assurance in Construction</b>	<b>L T P C</b> <b>3 0 0 3</b>
<b>COURSE OUTCOMES</b>		
At the end of the course, the student will be able to: CO1 To understand the elements of quality planning and the implication CO2 To study the various quality policy adopted in construction industries CO3 To become aware of objectives and advantage of quality assurance CO4 To be exposed to means of quality control CO5 To study the relationship between quality and safety management		
<b>UNIT-I: QUALITY MANAGEMENT SYSTEMS</b>		<b>9 Hrs</b>
Types of organizations-Inspection. control and enforcement -Quality Management Systems and method - Responsibilities and authorities In quality assurances and quality Control- Architects, engineers, contractors, and special consultants, Quality circle.		
<b>UNIT –II: QUALITY POLICY</b>		<b>9 Hrs</b>
Quality policy -Objectives and methods In Construction Industry -Consumers satisfaction, Economics- Time of Completion -Statistical tolerance -Taguchi's concept of quality -Codes and Standards - Documents -Contract and construction programming -Inspection procedures -Processes and products - Total QA I QC programme and cost implication.		
<b>UNIT –III: QUALITY OBJECTIVES</b>		<b>9 Hrs</b>
Objectives -Regularity agent, owner, design, contract and construction oriented objectives, methods - Techniques and needs of QA/QC -Different aspects of quality - Appraisals, Factors Influencing construction quality.		
<b>UNIT –IV: FAILURE ASPECTS</b>		<b>9 Hrs</b>
Critical, major failure aspects and failure mode analysis -Stability methods and tools, optimum design – Reliability testing- reliability coefficient and reliability prediction - Selection of new materials -Influence of drawings detailing, specification, standardization -Bid preparation- Reliability Based Design.		
<b>UNIT –V: CONSTRUCTION ACTIVITY</b>		<b>9 Hrs</b>
Construction activity, environmental safety. Social and environmental factors- Natural causes and speed of Construction -Life cycle costing- Reliability and Probabilistic methods-Value engineering and value analysis.		
		<b>Total: 45 hrs.</b>
<b>REFERENCE BOOKS:</b>		
<ol style="list-style-type: none"> <li>1. James, J.O Brian, “Construction Inspection Handbook -Quality Assurance and:Quality Control”, Van Nostrand, New York, 2009.</li> <li>2. Juran Frank, J.M. and Gryna, F.M. “Quality Planning and Analysis”, Tata McGraw Hill 2002.</li> <li>3. Hutchins.G, ISO 9000, Viva Books. New Delhi 2003.</li> <li>4. Clarkson H. Oglesby, “Productivity Improvement in Construction”, McGraw-Hill, 2009.</li> <li>5. John L. Ashford, “The Management of Quality in Construction”, E &amp; F.N, Spon. New York, 2009.</li> </ol>		

<b>P19CEM302</b>	<b>Technical Seminar</b>	<b>0 0 2 1</b>
<b><i>COURSE OUTCOMES</i></b>		
The students will be trained to face an audience and to tackle any problem during group discussion in the Interviews		
<b>Syllabus</b>		
The students will work for two hours per week guided by a group of staff members. They will be asked to talk on any topic of their choice related to construction engineering and management and to engage in dialogue with the audience. A brief copy of their talk also should be submitted. Similarly, the students will have to present a seminar of not less than fifteen minutes and not more than thirty minutes on the technical topic. They will also answer the queries on the topic. The students as audience also should interact. Evaluation will be based on the technical presentation and the report and also on the interaction during the seminar.		
		<b>Total: 30 hrs.</b>

<b>P19CEM303</b>	<b>Practical Training</b>	<b>0 0 4 2</b>
<b><i>COURSE OUTCOMES</i></b>		
<p>To train the students in the field work so as to have a firsthand knowledge of practical problems related to Construction Management in carrying out engineering tasks.</p> <p>To develop skills in facing and solving the problems experiencing in the field.</p> <p>They are trained in tackling a practical field/industry orientated problem related to Construction Engineering.</p>		
<b>Syllabus</b>		
<p>The students individually undertake training in reputed engineering companies doing construction during the summer vacation for a specified duration of four weeks. At the end of training, a detailed report on the work done should be submitted within ten days from the commencement of the semester. The students will be evaluated through a viva-voce examination by a team of internal staff.</p>		
		<b>Total: 60 hrs.</b>

<b>P19CEM304</b>	<b>Project Phase - I</b>	<b>0 0 16 8</b>
<b>Course Outcomes</b>		
At the end of the course the students will have a clear idea of his/her area of work and they are in a position to carry out the remaining phase II work in a systematic way.		
<b>Syllabus</b>		
The student individually works on a specific topic approved by the head of the division under the guidance of a faculty member who is familiar in this area of interest. The student can select any topic which is relevant to the area of construction engineering and management. The topic may be theoretical or case studies. At the end of the semester, a detailed report on the work done should be submitted which contains clear definition of the identified problem, detailed literature review related to the area of work and methodology for carrying out the work. The students will be evaluated through a viva-voce examination by a panel of examiners including one external examiner.		

**Total: 240 hrs.**

## Open Electives

### CIVIL

<b>P19CEM601</b>	<b>DISASTER MITIGATION AND MANAGEMENT</b>	<b>3 0 0 3</b>
<b><i>COURSE OUTCOMES</i></b>		
<i>Upon completion of this course, the student will be able to...</i>		
<ul style="list-style-type: none"><li>• CO1 Identify the types of hazards, vulnerability and micro zonation</li><li>• CO2 Explain the causes and effects of disasters</li><li>• CO3. Discuss the preparedness and forecasting the disasters</li><li>• CO4 Explain various post disaster activities</li><li>• CO5 Discuss the disaster management solutions from case studies</li></ul>		
<b>Unit 1 INTRODUCTION</b>		<b>9 Hrs.</b>
.Meaning and types of hazards, disasters and catastrophes – Disaster Management; Earthquakes: causes and effects – measurements - earthquake zones India – vulnerability and micro zonation;- volcanic hazards		
<b>Unit –II CAUSES AND EFFECTS</b>		<b>9 Hrs.</b>
Landslides : Causes and effects – landslide prone zones in India –Cyclone: Origin and types - effects on land and sea – damage assessment; Flooding: Tsunami –Soil Erosion-Drought :Characteristics- Occurrence – Preventive measures		
<b>Unit –III PREPAREDNESS AND FORECASTING</b>		<b>9 Hrs.</b>
Emerging approaches in Disaster Management- Pre- disaster stage (preparedness) - Preparing hazard zonation maps, Predictability/forecasting& warning- Preparing disaster preparedness plan- Land use zoning- Disaster resistant house construction- Population reduction in vulnerable areas- Awareness		
<b>Unit –IV POST DISASTER ACTIVITIES</b>		<b>9 Hrs.</b>
Emergency Stage - Rescue training for search & operation at national & regional level-Immediate relief-Assessment surveys- Post Disaster stage-Rehabilitation- Political Administrative Aspect- Social Aspect-Economic Aspect- Environmental Aspect- Mitigation - Role of Media - Monitoring Management- Preventive Measures- A regional survey of Land Subsidence, Coastal Disaster, Cyclonic Disaster& Disaster in Hills with particular reference to India -Ecological planning for sustainability & sustainable development in India-Sustainable rural development		
<b>Unit –V CASE STUDIES</b>		<b>9 Hrs.</b>
Soft Solutions for Disaster Management - Case studies - Earthquake, volcano and landslide - Flood prone area analysis and management – risk assessment – cyclones and floods - Drought and desertification		
<b>Total: 45 hrs.</b>		
<b>Reference Books:</b>		
1. National Disaster Management Division (2004) Disaster Management in India - A Status Report, Ministry of Home Affairs, Government of India, New Delhi. 2. UNDR0 (1995) Guidelines for Hazard Evaluation Procedures, United Nations Disasters Relief Organization, Vienna. 3. Nagarajan, R., (2004) Landslide Disaster Assessment and Monitoring, Anmol Publications, New Delhi. 4. Ramkumar, Mu, (2009) Geological Hazards: Causes, Consequences and Methods of Containment, New India Publishing Agency, New Delhi.		

**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for ME IV Semester under Regulations 2019**  
**Civil Engineering**  
**Branch: Construction Engineering and Management**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Practical</b>							
1	P19CEM401	Project Phase – II	0	0	28	14	420
<b>Total Credits</b>						<b>14</b>	

**Approved by**

**Chairperson, Civil Engineering BOS**

**Dr.R.Malathy**

**Member Secretary, Academic Council**

**Dr.R.Shivakumar**

**Chairperson, Academic Council & Principal**

**Dr.S.R.R.Senthil Kumar**

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HOD/Civil, Fourth Semester ME CEM Students and Staff, COE