

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

**(An Autonomous Institution)**

**M.E-Civil Engineering**

**(Construction Engineering and Management)**

**CURRICULUM and SYLLABI**

**[For students admitted in 2018-2019]**

**M.E / M.Tech Regulation 2015**

**Approved by BOS and Academic Council meetings**

**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for ME I Semester under Regulations 2015**  
**Civil Engineering**  
**Branch: Construction Engineering and Management**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
<b>Theory</b>						
1	P15CEM101	Statistical Methods for Engineers	3	2	0	4
2	P15CEM102	Modern Construction Materials	3	0	0	3
3	P15CEM103	Construction Equipments and Management	3	0	0	3
4	P15CEM104	Project Formulation and Appraisal	3	0	0	3
5	P15CEM105	Construction Planning, Scheduling and Control	3	0	0	3
6	P15CEM106	Advanced Concrete Technology	3	0	0	3
<b>Practical</b>						
7	P15CEM107	Advanced Construction Engineering Laboratory	0	0	4	2
<b>Total Credits</b>						<b>21</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 2015**  
**Civil Engineering**  
**Branch: Construction Engineering and Management**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
<b>Theory</b>						
1	P15CEM201	Advanced Construction Techniques	3	0	0	3
2	P15CEM202	Contract Laws and Regulations	3	0	0	3
3	P15CEM203	Quantitative Techniques in Management	3	0	0	3
4	P15CEM501	<b>Elective - Quality Control and Assurance in Construction</b>	3	0	0	3
	P15CEM511	<b>Elective - Environmental Impact Assessment of Civil Engineering Projects</b>				
5	P15CEM512	<b>Elective- Project Safety Management</b>	3	0	0	3
6	P15CEM604	<b>Open Elective - Total Quality Management</b>	3	0	0	3
<b>Practical</b>						
7	P15CEM204	Advanced Computing Techniques Laboratory	0	0	4	2
<b>Total Credits</b>						<b>20</b>

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

Copy to:-  
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**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for ME III Semester under Regulations 2015**  
**Civil Engineering**  
**Branch: Construction Engineering and Management**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
<b>Theory</b>						
1	P15CEM504	<b>Elective</b> – Energy Efficient Building	3	0	0	3
2	P15CEM506	<b>Elective</b> – Construction Personnel Management	3	0	0	3
3	P15CEM607	<b>Open Elective</b> - Human Resource Management	3	0	0	3
<b>Practical</b>						
4	P15CEM301	Practical Training	0	0	0	1
5	P15CEM302	Technical Seminar	0	0	4	2
6	P15CEM303	Project Work Phase – I	0	0	12	6
<b>Total Credits</b>						<b>18</b>

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Copy to:-

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

**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for ME IV Semester under Regulations 2015**  
**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>Practical</b>						
1	P15CEM401	Project Work Phase – II	0	0	24	12
<b>Total Credits</b>						<b>12</b>

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**Dr.R.Malathy**

**Member Secretary, Academic Council**

**Dr.R.Shivakumar**

**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 2015**  
**Civil Engineering**  
**Branch: Construction Engineering and Management**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
<b>Theory</b>						
1	P15CEM101	Statistical Methods for Engineers	3	2	0	4
2	P15CEM102	Modern Construction Materials	3	0	0	3
3	P15CEM103	Construction Equipments and Management	3	0	0	3
4	P15CEM104	Project Formulation and Appraisal	3	0	0	3
5	P15CEM105	Construction Planning, Scheduling and Control	3	0	0	3
6	P15CEM106	Advanced Concrete Technology	3	0	0	3
<b>Practical</b>						
7	P15CEM107	Advanced Construction Engineering Laboratory	0	0	4	2
<b>Total Credits</b>						<b>21</b>

**Approved by**

**Chairperson, Civil Engineering BOS**

**Dr.R.Malathy**

**Member Secretary, Academic Council**

**Dr.R.Shivakumar**

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

Copy to:-  
HOD/Civil, First Semester ME CEM Students and Staff, COE

**COURSE OUTCOMES:**

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

- Define the estimators, analyze the characteristics of the estimators, find the estimate of the parameters using M.L.E and method of moments.
- Test the attributes and variables of large and small samples.
- Describe multiple and partial correlation and plane of regression, multiple and partial regression
- Analyse the variances of several variables while applying standard designs like CRD,RBD and LSD
- Describe the multivariate density and its properties and also analyzing the principal components.

**UNIT I ESTIMATION THEORY 9+6**

Estimators: Unbiasedness, Consistency, Efficiency and Sufficiency – Maximum Likelihood Estimation – Method of moments.

**UNIT II TESTING OF HYPOTHESIS 9+6**

Tests based on Normal,  $t$ ,  $\chi^2$  and F distributions for testing of means, variance and proportions – Analysis of r x c tables – Goodness of fit.

**UNIT III MULTIPLE AND PARTIAL CORRELATION AND MULTIPLE AND PARTIAL REGRESSION 9+6**

Multiple and Partial Correlation – Method of Least Squares – Plane of Regression – Properties of Residuals – Coefficient of multiple correlation – Coefficient of partial correlation – Multiple correlation with total and partial correlations – Multiple and Partial Regression and Partial correlations in terms of lower order co-efficient.

**UNIT IV DESIGN OF EXPERIMENTS 9+6**

Analysis of variance – One-way and two-way classifications – Completely randomized design – Randomized block design – Latin square design.

**UNIT V MULTIVARIATE ANALYSIS 9+6**

Random vectors and Matrices – Mean vectors and Covariance matrices – Multivariate Normal density and its properties – Principal components: Population principal components – Principal components from standardized variables.

**L: 45 + T: 30 TOTAL: 75 HOURS**

**REFERENCES:**

1. Gupta.S.C., and Kapoor, V.K., “Fundamentals of Mathematical Statistics”, Sultan Chand and Sons, Eleventh Edition, 2002
2. J.E. Freund, Mathematical Statistical”, 5th Edition, Prentice Hall of India, 2001.
3. Jay L.Devore, “Probability and statistics for Engineering and the Sciences”, 5th Edition, Thomson and Duxbury, Singapore, 2002
4. Murray.R. SpiegelandLarry J.Stephens, “Schaum’sou Tlines- Statistics”, Third Edition, Tata McGraw-Hill, 2000
5. R.A.Johnson and C.B.Gupta, “Miller & Freund’s Probability and Statistics for Engineers”, Pearson Education, Asia, 7th Edition, 2007
6. Richard A.Johnson and Dean W.Wichern, “Applied Multivariate Statistical Analysis”, Pearson Education, Asia, 6th Edition, 2007

**Course Outcomes**

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

- select suitable materials for modern construction
- select composite materials used for manufacturing ultra high strength concrete
- utilize smart materials in advanced construction
- understand the properties of other than modern construction materials
- explain smart and intelligent materials

**UNIT – I CONCRETE AND METALS 9**

High Strength Concrete and High Performance Concrete – Applications- Properties of steel - New alloy steels - Aluminium and its products – applications.

**UNIT – II ALLOYS 9**

Other Alloys - Market forms - Uses - Light weight metals - Copper and Zinc alloys

**UNIT – III COMPOSITES 9**

Plastics -Reinforced Polymers - Fibre Reinforced Plastics - Cellular cores - Types of Polymer concrete composites - Properties of composites - Ferro-cement.

**UNIT – IV OTHER MATERIALS 9**

Applications - Water proofing compounds - Non-weathering materials – Flooring and facade Materials - Accelerating mixtures - Air entraining admixtures - Mineral admixtures –Super- plasticizers - Applications.

**BITUMEN:** Bitumen chemistry – Traditional properties – Susceptibility parameters – ageing of bitumen.

**UNIT – V SMART AND INTELLIGENT MATERIALS 9**

Brief outline and uses - Smart materials - Types of smart and intelligent materials - Usage in advanced construction - Smart structures - energy efficient building constructions.

**TOTAL: 45 HOURS**

**REFERENCE BOOKS**

1. Somayaji, Shan. "Civil Engineering Materials". - 2nd edition, Prentice Hall Inc, 2001
2. Siddique, Rafat. "Special Concretes". Ist edition, Galgotia Publications, New Delhi 2000.
3. Mamlouk, M.S. and Zaniewski, J.P. "Materials for Civil and Construction Engineers". Prentice Hall Inc., 1999.
4. Aitain."High Performance Concrete", ESPON Publications, Canada, 2003



**Course Outcomes**

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

- execute control over the scheduling, management and operating cost of equipments used in construction projects.
- study suitable type of equipment required for earth work.
- explain types of Dredging, Trenching, Tunneling, Drilling, Blasting
- select and recommend the equipment needed for material handling and concreting.
- discuss Concreting equipments - Batching ,Mixing Plant layout and RMC plant

**UNIT – I CONSTRUCTION EQUIPMENT AND MANAGEMENT 9**

Construction Equipment Management - Identification - Planning - Equipment Management in Projects - Maintenance Management - Replacement - Unit Operating Cost - Cost Control of Equipment -Depreciation Analysis - Safety Management.

**UNIT – II EQUIPMENTS FOR EARTH WORK 9**

Construction Equipments - Fundamentals of Earth Work Operations - Earth Moving Operations - Types of Earth Work Equipment - Tractors, Motor Graders, Scrapers, Front end Loaders, Earth Movers.

**UNIT – III OTHER CONSTRUCTION EQUIPMENT 9**

Equipment for Dredging, Trenching, Tunneling, Drilling, Blasting - Equipment for Compaction - Erection Equipment - Types of pumps used in Construction - Equipment for Dewatering and Grouting -Foundation and Pile Driving Equipment.

**UNIT – IV MATERIALS HANDLING EQUIPMENTS 9**

Equipment for Materials Handling - Forklifts and related equipment - Portable Material Bins -Conveyors - Hauling Equipment- Crushers - Feeders - Screening Equipment.

**UNIT – V CONCRETE PLANTS 9**

Concreting equipments - Batching and Mixing Plant layout - Equipment - Hauling, Pouring and Pumping Equipment – Transporters – RMC plant –equipments.

**TOTAL: 45 HOURS**

**REFERENCE BOOKS**

1. Sharma, S.C. "Construction Equipment and Management", Khanna Publishers, New Delhi,2006.
2. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C. "Construction Planning, Equipment andMethods", 5<sup>th</sup> edition, McGraw-Hill, Singapore, 2006.
3. Deodhar, S.V. "Construction Equipment and Job Planning", Khanna Publishers, New Delhi,1988.

**Course Outcomes**

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

- study the project formulation
- understand the project costing of construction projects
- discuss project appraisal
- explain project finance
- illustrate private sector participation.

**UNIT I PROJECT FORMULATION 9**

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.

**UNIT II PROJECT COSTING 9**

Project Cash Flows – Time Value of Money – Cost of Capital.

**UNIT III PROJECT APPRAISAL 9**

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.

**UNIT IV PROJECT FINANCING 9**

Project Financing – Means of Finance – Financial Institutions – Special Schemes – Key Financial Indicators - Ratios.

**UNIT V PRIVATE SECTOR PARTICIPATION 9**

Private sector participation in Infrastructure Development Projects - BOT, BOLT, BOOT - Technology Transfer and Foreign Collaboration - Scope of Technology Transfer.

**TOTAL: 45 HOURS**

**REFERENCES:**

1. Barcus, S.W. and Wilkinson.J.W., Hand Book of Management Consulting Services, McGraw Hill, New York, 1986.
2. Joy P.K., Total Project Management - The Indian Context, New Delhi, Macmillan India Ltd., 1992
3. Prasanna Chandra, Projects – Planning, Analysis, Selection, Implementation Review, McGraw Hill Publishing Company Ltd., New Delhi. 2006.
4. United Nations Industrial Development Organisation (UNIDO) Manual for the Preparation of Industrial Feasibility Studies, (IDBI Reproduction) Bombay, 1987.

# **P15CEM105 CONSTRUCTION PLANNING, SCHEDULING AND CONTROL 3 0 0 3**

## **Course Outcomes**

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

- Study construction planning
- discuss construction schedules
- Calculate Monte Carlo Schedule Simulation and Crashing and Time/Cost Tradeoffs
- illustrate cost control, monitoring and accounting
- know Computerized Organization and Centralized Database Management Systems

### **UNIT I CONSTRUCTION PLANNING 9**

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.

### **UNIT II SCHEDULING PROCEDURES AND TECHNIQUES - I 9**

Construction Schedules – Critical Path Method – Scheduling Calculations – Float – Presenting Project Schedules – Scheduling for Activity-on-Arrow and with Leads, Lags, and Windows – Scheduling with Resource Constraints and Precedences – Use of Advanced Scheduling Techniques

### **UNIT III SCHEDULING PROCEDURES AND TECHNIQUES – II 9**

Scheduling with Uncertain Durations – Calculations for Monte Carlo Schedule Simulation – Crashing and Time/Cost Tradeoffs – Improving the Scheduling Process.

### **UNIT IV COST CONTROL, MONITORING AND ACCOUNTING 9**

The Cost Control Problem – The 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.

### **UNIT V ORGANIZATION AND USE OF PROJECT INFORMATION 9**

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.

**TOTAL : 45 HOURS**

## REFERENCES

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, 1998.
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, 1986.

## Course Outcomes

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

- discuss micro structure concrete and dimensional stability
- prepare a mix design for the various mix proportions
- enumerate the properties of ingredients used in concretes
- explain the different types of special concrete and their applications in construction.
- explain different types of non destructive testing methods.

### Unit I Concrete 9

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.

### Unit II Proportioning concrete mixtures 9

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.

### Unit III Durability of concrete 9

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 behavior.

### Unit IV Special types of concrete 9

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.

### Unit V Non destructive methods 9

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.

**TOTAL : 45 HOURS**

#### REFERENCES:

1. P.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, 2006.
3. Gupta.B.L., Amit Gupta, “Concrete Technology, Jain Book Agency, 2010.
4. Neville, A.M., Properties of Concrete, Prentice Hall, 1995, London.
5. Santhakumar.A.R. ;”Concrete Technology”,Oxford University Press,2007.
6. Shetty M.S., Concrete Technology, S.Chand and Company Ltd. Delhi, 2003

**Course Outcomes**

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

- test the concrete mixes designed as per IS, ACI and BS methods.
- know various tests on hardened concrete.
- Demonstrate Permeability tests on hardened concrete

**LIST OF EXPERIMENTS**

1. Mix design of concrete as per IS, ACI & BS methods for high performance concrete.
2. Flow Characteristics of Self Compacting concrete.
3. Effect of minerals and chemical admixtures in concrete at fresh and hardened state with relevance to workability, strength and durability.
4. NDT on hardened concrete - UPV, Rebound hammer and core test.
5. Permeability tests on hardened concrete – Demonstration

**TOTAL: 60 HOURS**

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<b>Theory</b>						
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2	P15CEM202	Contract Laws and Regulations	3	0	0	3
3	P15CEM203	Quantitative Techniques in Management	3	0	0	3
4	P15CEM501	<b>Elective - Quality Control and Assurance in Construction</b>	3	0	0	3
	P15CEM511	<b>Elective - Environmental Impact Assessment of Civil Engineering Projects</b>				
5	P15CEM512	<b>Elective- Project Safety Management</b>	3	0	0	3
6	P15CEM604	<b>Open Elective - Total Quality Management</b>	3	0	0	3
<b>Practical</b>						
7	P15CEM204	Advanced Computing Techniques Laboratory	0	0	4	2
<b>Total Credits</b>						<b>20</b>

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

**COURSE OUTCOMES:**

Upon completion of this course the student will be able to,

- **CO1** Explain the various methods in substructure construction.
- **CO2** Apply the different techniques in super structure construction for buildings.
- **CO3** Explain the different special structures.
- **CO4** Determine the various techniques for rehabilitation and strengthening of buildings and demolition techniques.
- **CO5** Discuss the demolition techniques and the safety precautions of it.

**UNIT I SUB STRUCTURE CONSTRUCTION 9**

Box jacking - Pipe jacking - Under water construction of diaphragm walls and basement - Tunneling techniques - Piling techniques - Driving well and caisson - sinking cofferdam - cable anchoring and grouting - Driving diaphragm walls, Sheet piles - Laying operations for built up offshore system - Shoring for deep cutting - Large reservoir construction - well points - Dewatering for underground open excavation.

**UNIT II SUPER STRUCTURE CONSTRUCTION FOR BUILDINGS 9**

Vacuum dewatering of concrete flooring – Concrete paving technology – Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections – Erection techniques of tall structures, Large span structures – launching techniques for heavy decks – in-situ prestressing in high rise structures, Post tensioning of slab- aerial transporting – Handling and erecting lightweight components on tall structures.

**UNIT III CONSTRUCTION OF SPECIAL STRUCTURES 9**

Erection of lattice towers - Rigging of transmission line structures – Construction sequence in cooling towers, Silos, chimney, sky scrapers - Bow string bridges, Cable stayed bridges – Launching and pushing of box decks – Construction of jetties and break water structures – Construction sequence and methods in domes – Support structure for heavy equipment and machinery in heavy industries – Erection of articulated structures and space decks.

**UNIT IV REHABILITATION AND STRENGTHENING TECHNIQUES 9**

Seismic retrofitting - Strengthening of beams - Strengthening of columns - Strengthening of slab - Strengthening of masonry wall, Protection methods of structures, Mud jacking and grouting for foundation – Micro piling and underpinning for strengthening floor and shallow profile - Sub grade water proofing, Soil Stabilization techniques.

**UNIT V DEMOLITION 9**

Demolition Techniques, Demolition by Machines, Demolition by Explosives, Advanced techniques using Robotic Machines, Demolition Sequence, Dismantling Techniques, Safety precaution in Demolition and Dismantling- recycle, reuse of demolition wastes.

**TOTAL: 45 HOURS**



**REFERENCES:**

1. Jerry Irvine, Advanced Construction Techniques, CA Rocketr, 1984
2. Patrick Powers. J., Construction Dewatering: New Methods and Applications, John Wiley & Sons, 1992.
3. Peter.H.Emmons, "Concrete repair and maintenance illustrated", Galgotia Publications Pvt. Ltd., 2001.Press, 2008.
4. Robertwade Brown, Practical foundation engineering hand book, McGraw Hill Publications, 1995.
5. Sankar, S.K. and Saraswati, S., Construction Technology, Oxford University Press, New Delhi, 2008.

**COURSE OUTCOMES:**

Upon completion of this course the student will be able to,

- **CO1** Prepare contract schedules, notice inviting tender and contract documents.
- **CO2** Understand laws of construction contract.
- **CO3** Implement dispute resolution.
- **CO4** Prepare contract management plan as per standards.
- **CO5** Discuss labour regulations

**UNIT I CONSTRUCTION CONTRACTS 9**

Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability – Design of Contract Documents – International Contract Document – Standard Contract Document – Law of Torts.

**UNIT II TENDERS 9**

Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines – Tamilnadu Transparency in Tenders Act.

**UNIT III ARBITRATION 9**

Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs.

**UNIT IV LEGAL REQUIREMENTS 9**

Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties and their Influence on Construction Costs – Legal Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations.

**UNIT V LABOUR REGULATIONS 9**

Social Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes, Labour Administration – Insurance and Safety Regulations – Workmen's Compensation Act – Indian Factory Act – Tamilnadu Factory Act – Child Labour Act - Other Labour Laws.

**TOTAL : 45 HOURS**

**REFERENCES:**

1. Gajaria G.T., Laws Relating to Building and Engineering Contracts in India,
2. Jimmie Hinze, Construction Contracts, McGraw Hill, 2001.
3. Joseph T. Bockrath, Contracts and the Legal Environment for Engineers and Architects, McGraw Hill, 2000.
4. Kwaku, A., Tenah, P.E. Jose M.Guevara, P.E., Fundamentals of Construction Management and Organisation, Printice Hall, 1985.M.M.Tripathi Private Ltd., Bombay, 1982.
5. Patil. B.S, Civil Engineering Contracts and Estimates, Universities Press (India) Private Limited, 2006.

**COURSE OUTCOMES:**

Upon completion of this course the student will be able to,

- **CO1** Describe about operations method and analyze using the various methods of operational research.
- **CO2** Determine production management methodologies and study the types under it.
- **CO3** Interpret the various financial management methods and the various cash flow techniques
- **CO4** Discuss about the concepts of decision theory.
- **CO5** Explain the concepts of managerial economics and game theory applications. .

<b>UNIT I</b>	<b>OPERATIONS RESEARCH</b>	<b>9</b>
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Introduction to Operations Research - Linear Programming – Graphical and Simplex Methods, Duality and Post – Optimality Analysis – Transportation and Assignment Problems.

<b>UNIT II</b>	<b>PRODUCTION MANAGEMENT</b>	<b>9</b>
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Inventory Control - EOQ - Quantity Discounts - Safety Stock – Replacement Theory – PERT and CPM – Simulation Models – Quality Control

<b>UNIT III</b>	<b>FINANCIAL MANAGEMENT</b>	<b>9</b>
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Working Capital Management – Compound Interest and Present Value methods – Discounted Cash Flow Techniques – Capital Budgeting.

<b>UNIT IV</b>	<b>DECISION THEORY</b>	<b>9</b>
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Decision Theory – Decision Rules – Decision making under conditions of certainty, risk and uncertainty – Decision trees – Utility Theory.

<b>UNIT V</b>	<b>MANAGERIAL ECONOMICS</b>	<b>9</b>
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Cost Concepts – Break-even analysis – Pricing Techniques – Game theory Applications

**TOTAL: 45 HOURS**

**REFERENCES:**

1. Frank Harrison, E., The Managerial Decision Making Process, Houghton Mifflin Co., Boston, 1999.
2. HamdyA.Taha, Operations Research: An Introduction, Prentice Hall, 2010.
3. Levin, R.I, Rubin,D.S., and Stinson J., Quantitative Approaches to Management, McGraw Hill College, 1993.
4. S.L.Tang, IrtishadU.Ahmad, Syed M.Ahmed, Ming Lu, Quantitative Technique for Decision making in Construction, Hongkong University Press, HKU, 2004.
5. Schroeder, R.G, Operations Management, McGraw Hill, 2009.Vohra, Nd., Quantitative Techniques in Management, Third Edition, Tata McGraw-Hill Company Ltd, 2007.

**P15CEM501 QUALITY CONTROL AND ASSURANCE IN CONSTRUCTION L T P C 3 0 0 3**  
**COURSE OUTCOME**

Upon completion of this course the student will be able to,

- **CO1** Explain important of quality management with respect to standard guidelines.
- **CO2** Elaborate about needs of getting ISO 9000 certificate and related documents.
- **CO3** State that Taguchi's concept of quality in QC/QA.
- **CO4** Describe various types of techniques and different aspects of QC/QA.
- **CO5** Illustrate about bid preparation , selection of material and Value engineering.

**UNIT I QUALITY MANAGEMENT 9**

Introduction – Definitions and objectives – Factors influencing construction quality – Responsibilities and authority – Quality plan – Quality Management Guidelines – Quality circles.

**UNIT II QUALITY SYSTEMS 9**

Introduction - Quality system standard – ISO 9000 family of standards – Requirements – Preparing Quality System Documents – Quality related training – Implementing a Quality system – Third party Certification.

**UNIT III QUALITY PLANNING 9**

Quality Policy, Objectives and methods in Construction industry - Consumers satisfaction, Ergonomics - 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 / QC programme and cost implication.

**UNIT IV QUALITY ASSURANCE AND CONTROL 9**

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 – Critical, major failure aspects and failure mode analysis, – Stability methods and tools, optimum design – Reliability testing, reliability coefficient and reliability prediction.

**UNIT V QUALITY IMPROVEMENT TECHNIQUES 9**

Selection of new materials – Influence of drawings, detailing, specification, standardization – Bid preparation – Construction activity, environmental safety, social and environmental factors –

Natural causes and speed of construction – Life cycle costing – Value engineering and value analysis.

**TOTAL: 45 HOURS**

**REFERENCES:**

1. Hutchins.G, ISO 9000: A Comprehensive Guide to Registration, Audit Guidelines and Successful Certification, Viva Books Pvt. Ltd., 1994.
2. James, J.O' Brian, Construction Inspection Handbook – Total Quality Management, Van Nostrand, 1997
3. John L. Ashford, The Management of Quality in Construction, E & F.N.Spon, 1989.
4. Juran Frank, J.M. and Gryna, F.M. Quality Planning and Analysis, McGraw Hill, 2001
5. Kwaku.A., Tena, Jose, M. Guevara, Fundamentals of Construction Management and Organisation, Reston Publishing Co., Inc., 1985.6. Steven McCabe, Quality Improvement Techniques in Construction, Addison Wesley Longman Ltd, 1998.

**COURSE OUTCOMES**

Upon completion of this course, the student will be able to

- **CO1** State the Environmental impact Assessment for infrastructure Concepts
- **CO2** Explain the Advantages and applicability of different EIA methods
- **CO3** Predict and Assess the impact on various natural resources
- **CO4** Estimate the Environmental Management Plan
- **CO5** Prepare a report on different case studies for various engineering projects

**UNIT I Introduction 9**

Impact of development projects under Civil Engineering on environment - Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) – EIA capability and limitations – Legal provisions on EIA

**UNIT II Methodologies 9**

Methods of EIA –Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives – Case studies

**UNIT III Prediction and Assessment 9**

Assessment of Impact on land, water and air, noise, social, cultural flora and fauna; Mathematical models; public participation – Rapid EIA

**UNIT IV Environmental Management Plan 9**

Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected People – ISO 14000

**UNIT V Case Studies 9**

EIA for infrastructure projects – Bridges – Stadium – Highways – Dams – multi-storey Buildings – Water Supply and Drainage Projects

**Total : 45 HOURS**

**REFERENCES**

1. Canter, R. L., “Environmental Impact Assessment”, McGraw-Hill Inc., New Delhi, 1996
2. Shukla, S.K. and Srivastava, P.R., “Concepts in Environmental Impact Analysis”, Common Wealth Publishers, New Delhi, 1992
3. John G. Rau and David C Hooten (Ed)., “Environmental Impact Analysis Handbook”, McGraw-Hill Book Company, 1990
4. “Environmental Assessment Source book”, Vol. I, II & III. The World Bank, Washington, D.C., 1991
5. Judith Petts, “Handbook of Environmental Impact Assessment Vol. I & II”, Blackwell Science, 1999

**COURSE OUTCOMES:**

Upon completion of this course the student will be able to,

- **CO1** Study the various causes of accidents in construction sites
- **CO2** Understand the concepts of safety and requirements in construction projects
- **CO3** Understand the contractual obligations and design for safety
- **CO4** Know the importance of safety programmes
- **CO5** Discuss various roles of designer in ensuring safety

**UNIT I CONSTRUCTION ACCIDENTS 9**

Accidents and their Causes – Human Factors in Construction Safety – Costs of Construction Injuries – Occupational and Safety Hazard Assessment – Legal Implications

**UNIT II SAFETY PROGRAMMES 9**

Problem Areas in Construction Safety – Elements of an Effective Safety Programme – Job-Site Safety Assessment – Safety Meetings – Safety Incentives.

**UNIT III CONTRACTUAL OBLIGATIONS 9**

Safety in Construction Contracts – Substance Abuse – Safety Record Keeping

**UNIT IV DESIGNING FOR SAFETY 9**

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.

**UNIT V OWNERS AND DESIGNERS OUTLOOK 9**

Owner's responsibility for safety – Owner preparedness – Role of designer in ensuring safety – Safety clause in design document.

**TOTAL: 45 HOURS**

**REFERENCE:**

1. Jimmy W. Hinze, Construction Safety, Prentice Hall Inc., 1997.
2. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, Construction Safety and Health Management, Prentice Hall Inc., 2001.
3. Tamilnadu Factory Act, Department of Inspectorate of factories, Tamil Nadu. Health Management, Prentice Hall Inc., 2001.

**COURSE OUTCOMES**

Upon completion of this course, the student will be able to

- **CO1** Expose the importance and benefits of Total Quality Management
- **CO2** Discuss about the various process control tools
- **CO3** Discuss about Total Quality Management implementation
- **CO4** Explain about various tools to enhance quality
- **CO5** Discuss about cost of failures

<b>Unit -I</b>	<b>Introduction to Quality</b>	<b>9</b>
Defining Quality - Quality as a Management framework - Quality & Competitive advantage - Three levels of Quality - Quality Philosophies - Deming Philosophy - Juran Philosophy - Crossby Philosophy - Comparison of Quality Philosophies - Other Quality Philosophers - A.V. Feigenbaum - Kaoru Ishikawa - Genichi Taguchi		
	<b>Quality Systems</b>	<b>9</b>
<b>Unit -II</b>		
Quality Management Systems - ISO 9000:2000 - Six Sigma		
<b>Unit -III</b>	<b>Total Quality Management</b>	<b>9</b>
Evolution of TQM - Definition of TQM - TQM Framework - Stages in TQM Implementation - TQM Roadmap		
<b>Unit -IV</b>	<b>Quality Tools</b>	<b>9</b>
Deming Wheel - Zero Defect Concept – Benchmarking - Seven QC Tools – FMEA - Poka Yoke - Five S - Quality Circle - Quality Function Deployment - Taguchi's Robust Design - Total Productive Maintenance - Force Field analysis - Tree & Matrix Diagram		
<b>Unit -V</b>	<b>Cost of Quality</b>	<b>9</b>
Classification of failure cost - Juran's Model of optimum quality costs - Analysis of External & Internal Failure costs		

**Total: 45 hours**

**TEXT BOOKS**

1. Srinivasa Gupta, Valarmathi, Total Quality Management, II Edition, Tata Mc.Graw Hill
2. Janaki Raman, Gopal, Total Quality Management, II Edition, PHI

**REFERENCES**

1. James R.Evans William M.Lindsay The Management and control of Quality Thomson Learning 2005
2. Subbraj Ramasamy Total Quality Management Tata McGraw Hill 2005
3. P.N Mukherjee Total Quality Management Prentice Hall 2006 Adrian Wilkinson , Tom Redman, Ed Snape andn Mick Marching ton Managing with Total Quality Management: Theory and Practice Palgrave Macmillan 2006
4. Kanishka Bedi Quality Management Oxford University Press 2006
5. Hubert K.Rampersad Managing Total Quality Tata McGraw Hill 2005
6. Sid Kemp,PMP Quality Management Demystified Tata McGraw Hill 2006

**COURSE OUTCOMES:**

Upon completion of this course the student will be able to,

- **CO1** Prepare quantity takeoff and delivery of bid for construction projects.
- **CO2** Plan equipment information using Excel software for construction project.
- **CO3** Prepare track project report using Primavera software.
- **CO4** Plan scheduling and track construction projects using MS office.
- **CO5** Analyze the risk factors in projects and prepare simulation models.

**LIST OF EXPERIMENTS**

1. Quantity takeoff, Preparation and delivery of the bid or proposal of an engineering construction project.
2. Design of a simple equipment information system for a construction project.
3. Scheduling of a small construction project using Primavera scheduling systems including reports and tracking.
4. Scheduling of a small construction project using tools like MS project scheduling systems including reports and tracking.
5. Simulation models for project risk analysis.

**TOTAL: 60 HOURS**



**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for ME III Semester under Regulations 2015**  
**Civil Engineering**  
**Branch: Construction Engineering and Management**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
<b>Theory</b>						
1	P15CEM504	<b>Elective</b> – Energy Efficient Building	3	0	0	3
2	P15CEM506	<b>Elective</b> – Construction Personnel Management	3	0	0	3
3	P15CEM607	<b>Open Elective</b> - Human Resource Management	3	0	0	3
<b>Practical</b>						
4	P15CEM301	Practical Training	0	0	0	1
5	P15CEM302	Technical Seminar	0	0	4	2
6	P15CEM303	Project Work Phase – I	0	0	12	6
<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, Third Semester ME CEM Students and Staff, COE

**COURSE OUTCOMES**

Upon completion of this course the student will be able to,

**CO1** Discuss various components of energy efficient building

**CO2** Explain passive solar heating and cooling

**CO3** Study electric Lighting control for day lighted buildings

**CO4** Demonstrate heat control and ventilation

**CO5** Discuss design for climatic zones

**UNIT I INTRODUCTION 9**

Climate adapted and climate rejecting buildings – Heat Transfer – Measuring Conduction – Thermal Storage – Measurement of Radiation – The Green house Effect – Convection – Measuring latent and sensible heat – Psychrometry Chart – Thermal Comfort – Microclimate, Site Planning and Development – Temperature – Humidity – Wind – Optimum Site Locations – Sun Path Diagrams – Sun Protection – Types of Shading Devices – Design responses to energy conservation strategies.

**UNIT II PASSIVE SOLAR HEATING AND COOLING 9**

General Principles of passive Solar Heating – Key Design Elements – Sunspace – Direct gain – Trombe Walls, Water Walls – Convective Air loops – Concepts – Case Studies – General Principles of Passive Cooling – Ventilation – Principles – Case studies – Courtyards – Roof Ponds – Cool Pools – Predicting ventilation in buildings – Window Ventilation Calculations – Room Organization Strategies for Cross and Stack Ventilation – Radiation – Evaporation and dehumidification – Wind Catchers – Mass Effect – Zoning – Load Control – Air Filtration and odor removal.

**UNIT III DAYLIGHTING AND ELECTRICAL LIGHTING 9**

Materials, components and details – Insulation – Optical materials – Radiant Barriers – Glazing materials – Glazing Spectral Response – Day lighting – Sources and concepts – Building Design Strategies – Case Studies – Daylight apertures – Light Shelves – Codal requirements – Day lighting design – Electric Lighting – Light Distribution – Electric Lighting control for day lighted buildings – Switching controls – Coefficient of utilization – Electric Task Lighting – Electric Light Zones – Power Adjustment Factors.

**UNIT IV HEAT CONTROL AND VENTILATION 9**

Hourly Solar radiation – Heat insulation – Terminology – Requirements – Heat transmission through building sections – Thermal performance of Building sections – Orientation of buildings – Building characteristics for various climates – Thermal Design of buildings – Influence of Design Parameters – Mechanical controls – Examples. Ventilation – Requirements – Minimum standards for ventilation – Ventilation Design – Energy Conservation in Ventilating systems – Design for Natural Ventilation – Calculation of probable indoor wind speed.

**UNIT V DESIGN FOR CLIMATIC ZONES 9**

Energy efficiency – An Overview of Design Concepts and Architectural Interventions – Embodied Energy – Low Embodied Energy Materials – Passive Downdraft Evaporative Cooling – Design of Energy Efficient Buildings for Various Zones – Cold and cloudy – Cold and sunny – Composite – Hot and dry – Moderate – Warm and humid – Case studies of residences, office buildings and other buildings in each zones – Commonly used software packages in energy efficient building analysis and design - Energy Audit – Certification.

**TOTAL : 45 HOURS**

**REFERENCES:**

1. Brown, G.Z. and DeKay, M., Sun, Wind and Light - Architectural Design Strategies, John Wiley and Sons Inc, 2001
2. Energy Conservation Building Code, Bureau of Energy Efficiency, New Delhi,2007.
3. Handbook on Functional Requirements of Buildings Part 1 to 4 SP : 41 ( S and T) 1995
4. Majumdar, M (Ed), Energy - Efficient Buildings in India, Tata Energy Research Institute, Ministry of Non Conventional Energy Sources, 2002.
5. Moore, F., Environmental Control System, McGraw Hill Inc. 2002.
6. Tyagi, A.K. (Ed). Handbook on Energy Audits and Management Tata Energy Research Institute, 2000.

**COURSE OUTCOMES**

Upon completion of this course the student will be able to,

**CO1** Discuss man power planning

**CO2** Explain organisation, placement and training

**CO3** Study human relations and organisational behaviour

**CO4** Demonstrate welfare measures

**CO5** Discuss management and development methods

**UNIT I MANPOWER PLANNING**

**9**

Manpower Planning process , Organising, Staffing, directing, and controlling – Estimation, manpower requirement – Factors influencing supply and demand of human resources – Role of HR manager – Personnel Principles.

**UNIT II ORGANISATION**

**9**

Requirement of Organisation – Organisation structure – Organisation Hierarchical charts – Staffing Plan - Development and Operation of human resources - Managerial Staffing – Recruitment – Selection strategies – Placement and Training.

**UNIT III HUMAN RELATIONS AND ORGANISATIONAL BEHAVIOUR**

**9**

Basic individual psychology – Approaches to job design and job redesign – Self managing work teams – Intergroup – Conflict in organizations – Leadership-Engineer as Manager – al aspects of decision making – Significance of human relation and organizational – Individual in organization – Motivation – Personality and creativity – Group dynamics, Team working – Communication and negotiation skills.

**UNIT IV WELFARE MEASURES**

**9**

Compensation – Safety and health – GPF – EPF – Group Insurance – Housing - Pension – Laws related to welfare measures.

**UNIT V MANAGEMENT AND DEVELOPMENT METHODS**

**9**

Wages and Salary, Employee benefits, Employee appraisal and assessment – Employee services – Safety and Health Management – Special Human resource problems – Productivity in human resources – Innovative approach to designing and managing organization – Managing New Technologies – Total Quality Management – Concept of quality of work life – Levels of change in the organizational Development – Requirements of organizational Development – System design and methods for automation and management of operations – Developing policies, practices and establishing process pattern – Competency upgradation and their assessment – New methods of training and development – Performance Management.

**TOTAL: 45 HOURS**

**REFERENCES**

1. Carleton Counter II and Jill Justice Coutler, The Complete Standard Handbook of Construction Personnel Management, Prentice-Hall, Inc., 1989.
2. Charles D Pringle, Justin GooderiLongenecter, Management, CE Merril Publishing Co. 1981.
3. Dwivedi R.S, Human Relations and OrganisationalBehaviour, Macmillian India Ltd., 2005.
4. Josy.J. Familiaro, Handbook of Human Resources Administration, McGraw-Hill International Edition, 1987.
5. Memoria,C.B., Personnel Management, Himalaya Publishing Co., 1997.

Semester	3	Type	Generic Core
Course Code	<b>P15CEM607</b>	Open Elective	NA
Course Title	<b>HUMAN RESOURCE MANAGEMANT</b>	L:T:P:C	3:0:0:3

**Course Outcomes :** Upon completion of this course the student will be able to,

6. Understand and identify the fundamental of Human Resource Management
7. Understand the process of recruitment and selection
8. Discuss the training and development methods in organizations.
9. Find out effective performance appraisal programs and to design an effective compensation structure for a give context
10. Understand the emerging trends in Human Resource Management

Unit	Syllabus Contents	Number of Sessions
1	<p><b>Introduction and Human Resource Planning</b>  Human Resource Management – Evolution, Nature, Scope, Function, Objectives, Importance, Model, and Challenges – Human Resource Manager – Difference between Personnel Management and Human Resource Management  Other relate topics : Concept of Strategic HRM, Concept of International HRM Job Analysis : Process – Methods of collecting job related data’s, Design of job description and specification.</p>	9
2	<p><b>Recruitment and Selection</b>  JOB Design – Factors affecting job Design – Contemporary issues in job design-Human Resource Planning – Process – Recruitment and Selection – Nature and purpose – Sources of Recruitment - Factors influencing Recruitment – Recruitment Process – Evaluation – Nature and Process of Selection – Employee Mobility – Induction, Placement, Promotion, Transfer, Separation, Layoff.</p>	9
3	<p><b>Training and Development</b>  Training Vs Development – Need – Approaches – Types of Training – Training methods – Designing of Training Programs and implementation – Methods of Evaluation of Training programs – Employee development – Training Vs Development – Designing and implementing employee development programs.</p>	9
4	<p><b>Performance and Compensation Management</b>  Objectives – Challenges – Performance Appraisal Process – Methods of Appraisal – Compensation – Components of Indian pay structure, Incentives and Benefits – Job Evaluation: Concept, Job Evaluation Methods – Employee Retention – Need – Retention techniques.</p>	10
5	<p><b>Current Trends In HRM</b>  Competency Mapping – Human Resource Accounting – Quality Work Life- Knowledge Management – Learning Organization – Outsourcing of HRM Processes – HRIS – HR Analytics</p>	8
<b>Total No. of Sessions</b>		<b>45</b>

## Learning Resources:

- |   |                  |   |
|---|------------------|---|
| 1 | Text Books       | <ol style="list-style-type: none"><li>1. Gary Dessler, Human Resource Management, 12<sup>th</sup> edition, Pearson Education , 2011</li><li>2. VSP Rao, Human Resource Management – Text and Cases, 3ed edition, Excel Books, 2010</li></ol>  |
| 2 | Reference Books  | <ol style="list-style-type: none"><li>1. David A.Decenzo, SephenP.Robbins, Fundamentals of Human Resource Management, 10<sup>th</sup>edition,Wiley Publication</li><li>2. John M.Ivancevich, Human Resource Management, 10<sup>th</sup> edition Mc.Graw Hill 2012</li><li>3. Uday Kumar Haldar, Juthika Sarkar. Human Resource Management. Oxford Publication , 2012</li><li>4. Scott, Snell, George, Bohlander, Human Resource Management – A South Asian Perspective, Cengage Learning</li><li>5. Subbarao, Personnel Human Resource Management, Himalaya Publishing House, 2010</li><li>6. Klerman, Human Resource Management, Biztantra, 2008</li></ol>   |
| 3 | Web Site / Links | <ol style="list-style-type: none"><li>1. <a href="http://nipm.in">http://nipm.in</a></li><li>2. <a href="http://www.shrmindia.org">http://www.shrmindia.org</a></li><li>3. <a href="http://www.nhrde.sc">http://www.nhrde.sc</a></li><li>4. <a href="http://www.thehrclub.net">http://www.thehrclub.net</a></li><li>5. <a href="http://www.humanresources.org/website/c/">http://www.humanresources.org/website/c/</a></li><li>6. <a href="http://www.nationalhrd.org">http://www.nationalhrd.org</a></li><li>7. <a href="http://www.shrm.org">www.shrm.org</a></li><li>8. <a href="http://www.citehr.com">www.citehr.com</a></li><li>9. <a href="http://www.nationalhrd.org">www.nationalhrd.org</a></li><li>10. <a href="http://www.shrmindia.org">www.shrmindia.org</a></li><li>11. <a href="http://www.peoplematters.com/homepage.aspx">http://www.peoplematters.com/homepage.aspx</a></li><li>12. <a href="http://www.hrmguide.net">www.hrmguide.net</a></li></ol> |

**COURSE OUTCOMES**

Upon completion of this course the student will be able 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.
- Develop skills in facing and solving the problems experiencing in the field.

**SYLLABUS:**

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.

**COURSE OUTCOMES**

Upon completion of this course the student will be able to,

- work on a specific technical topic in Construction Engineering and Management in order to acquire the skills of oral presentation.
- acquire technical writing abilities for seminars and conferences.

**SYLLABUS**

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.

**TOTAL: 30 HOURS**



**COURSE OUTCOMES**

Upon completion of this course the student will be able to,

- identify a specific problem for the current need of the society and collecting information related to the same through detailed review of literature.
- develop the methodology to solve the identified problem.
- train the students in preparing project reports and to face reviews and viva-voce examination.

**SYLLABUS**

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: 180 HOURS**

**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for ME IV Semester under Regulations 2015**  
**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>Practical</b>						
1	P15CEM401	Project Work Phase – II	0	0	24	12
<b>Total Credits</b>						<b>12</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, Fourth Semester ME CEM Students and Staff, COE