

# **Semester- II**

<b>SemesterII</b>		
<b>Course Code</b>	<b>Course Name</b>	<b>Credits</b>
<b>CEMC201</b>	<b>Project Economics and Financial Management</b>	<b>03</b>

<b>TeachingScheme</b>						
<b>ContactHours</b>			<b>CreditsAssigned</b>			
<b>Theory</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Theory</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Total</b>
<b>03</b>	--	--	<b>03</b>	--	--	<b>03</b>

<b>EvaluationScheme</b>								
<b>Theory</b>					<b>Term Work/Practical/Oral</b>			<b>Total</b>
<b>InternalAssessment</b>			<b>EndSemExam</b>	<b>Duration ofEnd SemExam</b>	<b>TW</b>	<b>PR</b>	<b>OR</b>	
<b>Test1</b>	<b>Test2</b>	<b>Average</b>						
<b>20</b>	<b>20</b>	<b>20</b>	<b>80</b>	<b>03 Hrs.</b>	---	---	---	<b>100</b>

<b>Objectives</b>
<ul style="list-style-type: none"> <li>• Understand the principles of economics and finance</li> <li>• Prepare financial statements, Perform ratio analysis and comment on the financial stability of the firm</li> <li>• Manage the working capital required on construction projects</li> <li>• Analyze the impact of exchange rate fluctuations on infrastructure projects</li> <li>• Employ capital budgeting methods to arrive at the best investment options</li> <li>• Learn from case studies of financial successes and failures</li> </ul>

<b>Detailed Syllabus</b>		
<b>Module</b>	<b>Sub Modules/Contents</b>	<b>Hrs</b>
<b>I</b>	<b>Principles of Economics</b> 1.1 Importance of the economic background to measurement, objectives of business firm. Factors bearing on size of firms. Motives to growth. Obstacles to growth of firms. 1.2 Accounting terminologies and recording process 1.3 The Companies Act, 1956 1.4 Preparation of balance sheet and Ratio Analysis. 1.5 Preparation of cash flow statement 1.6 Preparation of profit & loss account 1.7 Escrow Account for PPP Project.	<b>10</b>

<b>II</b>	<b>Capital</b> 2.1 Need of working capital 2.2 Numericals on Estimation of requirements of working capital 2.3 Numericals on Credit Management, Cash Management, Managing payments to suppliers and out standings. 2.4 Numerical on exchange rate fluctuations on international projects	<b>07</b>
<b>III</b>	<b>Economic Analysis</b> 3.1 Cost implication to different forms of construction 3.2 Maintenance and replacement lives of construction projects 3.3 Installation and running cost of services 3.4 Capital investment in project 3.5 Cost analysis by traders and by functional elements 3.6 Cost control during design and Construction, 3.7 Depreciation and its calculation by various methods 3.8 Various Appraisal Criteria Methods, viz, Payback period, ARR, NPV, B/C and IRR. Numericals on the same 3.9 Break-even analysis: numericals 3.10 Project portfolio management	<b>10</b>
<b>IV</b>	<b>Financial Planning</b> 4.1 Long term finance planning, Sources of finance, Stock, Borrowings, Debentures, Loan Capital, Public Deposit, Dividend Policies, Bonus Shares, Market value of shares, Reserves & surplus, Role of financing institutes in Construction, role of Lender's Engineer. 4.2 Venture Capital Financing- Indian Venture Capital scenario, SEBI regulations 4.3 Over and under capitalization with practical examples 4.4 World financial market 4.5 CIDC-ICRA grading of construction entities	<b>04</b>
<b>V</b>	<b>Budget</b> 5.1 Budgetary control system. Types of budgets, Procedure for master budgets. Budget manual 5.2 Numericals on preparation of production budget for a manufacturing company 5.3 Numericals on Preparation of cash budget 5.4 Numericals on Preparation of sales budget	<b>04</b>
<b>VI</b>	<b>Case Studies</b> 6.1 Konkan Railway Financial Appraisal or any Financial Appraisal of various sectors 6.2 Case studies for BOT, Dams, Mass Transit System, Infrastructure Projects Government Funded Projects with respect to a) Project Appraisal b) Raising of funds c) Cost to complete analysis	<b>04</b>

#### Course Outcomes

- Apply the basic principles of economics to construction entities
- Prepare financial statements
- Estimate the working capital required on a construction project

- Plan finance w.r.t. cash and credit required
- Perform capital budgeting and project portfolio analysis
- Appraise and criticize various Indian construction and infrastructure projects for their financial successes or failures.

**Assessment:**

**Internal:**

Assessment consists of two tests out of which; one should be compulsory class test and the other is either a class test or assignment on live problems or course project.

**End Semester Theory Examination:**

Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. **In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.**

1. Question paper will comprise of total six question
2. All question carries equal marks
3. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four question need to be solved.

**Recommended books:**

1. Construction project scheduling and control ----Mubarak, Wiley India.
2. Construction Management & PWD Accounts --- D Lal, S. K. Kataria& Sons
3. Construction Management and Accounts -- Singh H. Tata McGraw Hill, New Delhi
4. Construction Management: Planning and finance-- Cormican D. Construction press, London
5. Principles of Corporate Finance, Brealey R.A. Tata McGraw Hill, New Delhi
6. Engineering Economics—Kumar---Wiley,India.
7. Engineering Economy, Leland T. Blank. Anthony Tarquin. McGraw Hill
8. Engineering Economics, David Bedworth, Sabah Randhawa. McGraw Hill
9. Real Estate, Finance and investment, Bruggeman. Fishr, McGraw Hill
10. Foundations of Financial Management', Block Hirt. McGraw Hill
11. Case studies in finance, Burner, McGraw Hill
12. Cases in Finance , De Mello McGraw
13. The cost management toolbox ; A Managers guide to controlling costs and boosting profits. Oliver, Lianabel. Tata McGraw Hill
14. "Financial Management" – Indian Institute of Banking and Finance – Macmillan Publications.
15. Projects planning, Analysis Selection, Implementation and Review, Prasanna Chandra Tata McGraw Hill, New Delhi,
16. Fundamentals of Engineering Economics—Pravin Kumar, Wiley, India.
17. E. Sreedharan's presentation on January 16, 2001 as part of the Department of Administrative Reforms and Public Grievances, lecture series on "Ideas that have worked"

<b>SemesterII</b>		
<b>Course Code</b>	<b>Course Name</b>	<b>Credits</b>
<b>CEMC202</b>	<b>Infrastructure Development</b>	<b>03</b>

<b>TeachingScheme</b>						
<b>ContactHours</b>			<b>CreditsAssigned</b>			
<b>Theory</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Theory</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Total</b>
<b>03</b>		<b>--</b>	<b>03</b>			<b>03</b>

<b>EvaluationScheme</b>								
<b>Theory</b>					<b>Term Work/Practical/Oral</b>			<b>Total</b>
<b>InternalAssessment</b>			<b>EndSemExam</b>	<b>Duration ofEnd SemExam</b>	<b>TW</b>	<b>PR</b>	<b>OR</b>	
<b>Test1</b>	<b>Test2</b>	<b>Average</b>						
<b>20</b>	<b>20</b>	<b>20</b>	<b>80</b>	<b>03 Hrs.</b>				<b>100</b>

<b>Objectives</b>
<p>Students will be able to:</p> <ul style="list-style-type: none"> <li>• demonstrate the role of infrastructure in overall development of the nation.</li> <li>• gain knowledge of various sectors of infrastructure &amp; status of present progress.</li> <li>• get acquainted with the knowledge of funding &amp; managing infrastructure projects.</li> <li>• explain the concept of public private partnership &amp; its implementation in practice.</li> </ul>

<b>DetailedSyllabus</b>		
<b>Module</b>	<b>Sub-Modules/Contents</b>	<b>Hrs</b>
<b>I.</b>	<b>Development &amp; Construction Industry</b>	<b>08</b>
	1.1 Concept of Development, Measures of Development, Determinants of Development 1.2 Construction Industry: Global and Indian perspective 1.3 Characteristics, scope and features of construction Industry in India 1.4 Roles of various agencies involved in construction industry.	
<b>II.</b>	<b>Infrastructure in India</b>	<b>08</b>
	2.1 Classification of Infrastructure projects. 2.2 Role of infrastructure in development of country 2.3 Present status of various sectors of Infrastructure in India	
<b>III.</b>	<b>Economics of Infrastructure Projects</b>	<b>06</b>
	3.1 GDP & GNP 3.2 Sources of financing infrastructure projects 3.3 Role of Foreign Direct Investment (FDI) in Construction Industry	

IV	<b>Public Private Partnership</b>	05
	4.1 Definition of PPP, Principle, purpose & role of partnership 4.2 Various PPP models involved in construction industry 4.3 Role and functions of PMC in Infrastructure projects	
V.	<b>Issues related to Infrastructure Development</b>	06
	5.1 Environmental clearances for special as well as mega projects 5.2 Pre-requisites & documentation required for Infrastructure development 5.3 Role of Federation of Indian Chambers of Commerce & Industry (FICCI)	
VI.	<b>Delay and Failures in Infrastructure projects</b>	06
	6.1 Causes of delay in infrastructure projects. 6.2 Cost over-run and Time over run 6.3 Case study of TOR & COR	

<b>Course Outcomes</b>
<p>Students will be able to,</p> <ul style="list-style-type: none"> <li>• Explain the concept of development &amp; significance of Construction Industry.</li> <li>• Demonstrate the classification of infrastructure projects.</li> <li>• Illustrate the economy measurement indicators such as GDP &amp; GNP</li> <li>• Differentiate amongst various PPP models &amp; choose appropriate model for the particular execution</li> <li>• Identify various issues related to Infrastructure development</li> <li>• Explain various causes of Time Over run &amp; Cost Over run</li> </ul>
<p><b>Assessment:</b></p> <p><b>Internal:</b> Assessment consists of two tests out of which; one should be compulsory class test and the other is either a class test or assignment on live problems or course project.</p> <p><b>End Semester Theory Examination:</b> Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. <b>In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.</b></p> <ol style="list-style-type: none"> <li>1. Question paper will comprise of total six question</li> <li>2. All question carries equal marks</li> <li>3. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)</li> <li>4. Only Four question need to be solved</li> </ol>
<p><b>Recommended Books:</b></p> <ol style="list-style-type: none"> <li>1) India Infrastructure Report --- Rakesh Mohan</li> <li>2) Public Private Partnership - R.N.Joshi ( Vision Books)</li> <li>3) Indian Economy – Datt&amp;Sundharam (S.Chand publication)</li> <li>4) FDI in India --- NitiBhasin</li> <li>5) Infrastructure Development &amp; Financing in India --- N. Mani (New Century Publications)</li> <li>6) Infrastructure &amp; economic development ---Anu Kapil (Deep &amp;Deep Publications)</li> </ol>

SemesterII		
Course Code	Course Name	Credits
CEMPE2011	Program Elective 3: System Approach in Civil Engineering	03

TeachingScheme						
ContactHours			CreditsAssigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03		--	03			03

EvaluationScheme								
Theory					Term Work/Practical/Oral			Total
InternalAssessment			EndSemExam	Duration ofEndSemExam	TW	PR	OR	
Test1	Test2	Average						
20	20	20	80	03 Hrs.				100

Objectives
<ul style="list-style-type: none"> <li>To look at a practical problem through the perspective of Mathematics.</li> <li>To understand the various mathematical tools available at our hand.</li> <li>To analyze and apply the best suited mathematical model for getting feasible solution to our problem.</li> <li>To compare various mathematical model to decide upon the method giving optimum solution.</li> <li>To understand the similitude between mathematical models and real-life situations and identifying applications of Operation research on a continual basis.</li> <li>To apply Computer software and programming for solution of the mathematical models.</li> </ul>

Detailed Syllabus		
Module	Sub-Modules/ Contents	Hrs
I	<b>Introduction Systems Approach:</b>	15
	<b>Introduction Systems Approach:</b> Need of Systems Approach, Structure of the Mathematical Model, Limitations of Operations Research. <b>Linear Programming:</b> Difference between linear and non-linear programming, Linear Programming Problem (LPP), Primal-Dual Construction, Symmetric & Asymmetric Dual, Mathematical Formulation of LPP, Graphical method, Simplex Method.	

	<p><b>Transportation Model:</b> Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions – Northwest corner rule, least cost method and Vogel’s approximation method. Optimality test: the stepping stone method and MODI method.</p> <p><b>Assignment Model:</b> Introduction, Mathematical Formulation of the Problem, Hungarian Method Algorithm, Processing of n Jobs Through Two Machines and m Machines, Graphical Method of Two Jobs m Machines Problem Routing Problem, Travelling Salesman Problem.</p>	
II	<p><b>Queuing Models &amp; Simulation</b></p> <p>Queuing systems and structures, single server and multi-server models, Poisson input, exponential service, constant rate service, finite and infinite population.</p> <p>Basic Concepts in Simulation, Methodology of Simulation, Introduction &amp; Application of Monte-Carlo Method; Advantages, Limitations &amp; Applications of Simulation.</p>	05
	<p><b>Introduction to Soft Computing</b></p> <p>Applications of Fuzzy logic, Artificial Neural Network, Neuro-fuzzy optimization, Genetic Algorithm, Genetic Programming, Particle Swarm Optimization, etc. in civil engineering.</p>	
IV	<p><b>Dynamic programming</b></p> <p>Characteristics of dynamic programming. Dynamic programming approach for Priority Management employment smoothening, capital budgeting, Stage Coach/Shortest Path, cargo loading and Reliability problems.</p>	05
	<p><b>Game Theory</b></p> <p>Competitive games, rectangular game, saddle point, minimax (maximin) method of optimal strategies, Value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point – mixed strategy for 2 X 2 games.</p>	
VI	<p><b>Integer Programming</b></p> <p>Types of Integer Programming Problems, Gomory’s cutting plane Algorithm, Branch &amp; Bound Technique. Introduction to Decomposition algorithms.</p>	04

<b>Course Outcomes</b>	
<ul style="list-style-type: none"> <li>• <b>Formulate</b> a mathematical model for a given complex problem.</li> <li>• <b>Solve</b> linear programming problems using various models.</li> <li>• <b>Apply</b> queuing model &amp; simulations for prediction of civil engineering system outcomes</li> <li>• <b>Use</b> soft computing for solving civil engineering problems</li> <li>• <b>Compare</b> various strategies using Game theory.</li> <li>• <b>Refine</b> the solution using integer programming.</li> </ul>	
<p><b>Assessment:</b>  <b>Internal:</b>            Assessment consists of two tests out of which; one should be compulsory class test and the other is either a class test or assignment on live problems or course project.</p>	

**End Semester Theory Examination:**

Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. **In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.**

1. Question paper will comprise of total six question
2. All question carries equal marks
3. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four question need to be solved.

**Recommended Books:**

- Taha, H.A. "Operations Research - An Introduction", Prentice Hall, (7th Edition), 2002.
- Ravindran, A, Phillips, D. T and Solberg, J. J. "Operations Research: Principles & Practice", John Willey and Sons, 2nd Edition, 2009.
- Hiller, F. S. and Liebermann, G. J. "Introduction to Operations Research", Tata McGraw Hill, 2002.
- Sharma S.D. "Operations Research", KedarNath Ram Nath-Meerut.
- KantiSwarup, P. K. Gupta and Man Mohan "Operations Research", Sultan Chand & Sons.

Semester II		
Course Code	Course Name	Credits
CEMPE2012	Program Elective 3: Building Services and Repairs	03

Teaching Scheme						
Contact Hours			Credits Assigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03	--	--	03	--	---	03

Evaluation Scheme								
Theory				Term Work/Practical/Oral			Total	
Internal Assessment			End Sem Exam	Duration of End Sem Exam	TW	PR		OR
Test1	Test2	Average						
20	20	20	80	03 Hrs.	--	--	--	100

Objectives
<ul style="list-style-type: none"> <li>• Electrical system and lighting systems in buildings</li> <li>• Water distribution and drainage systems, piped gas supply systems, fire-fighting installations,</li> <li>• Mechanical systems in buildings</li> <li>• Deterioration of concrete structures &amp; distress identification</li> <li>• Repair materials and techniques</li> <li>• Seismic retrofitting and maintenance of heritage structures</li> </ul>

Detailed Syllabus			
Module	Course Module / Contents		Hrs
I	<b>Electrical system and lighting systems in buildings</b>		07
	1.1	electrical systems in buildings, indoor and outdoor lighting systems, electrical layout plan, wiring system, Single and three phase supply, distribution boards, various electrical appliances, ISI specifications, electrical load calculation. Protective devices, Solar energy and panels	
	1.2	Principles of Illumination Design: Visual task, Modern theory of light & color: classification of lighting, artificial lights sources, Lighting for various buildings like offices, school, hospitals and house	
II	<b>Water Distribution and drainage systems, piped gas supply systems fire-fighting installations,</b>		08
	2.1	Water Distribution system: Material used, pipes & connections, Water meter, valves and storage tanks,	
	2.2	Drainage system: system of plumbing, house drainage plans Pipe and traps, Chambers- gradient and spacing, manholes, septic tanks, rain water	

		harvesting system.	
	2.3	piped gas supply systems, materials, connections, standards	
	2.4	Fire safety, fire-fighting systems	
III	<b>Mechanical systems in buildings</b>		06
	3.1	Motors, Generators, Pumps, HVAC Systems, capacity, components and working, maintenance.	
	3.2	Lifts, escalators, their components, working and maintenance.	
IV	<b>Deterioration of Concrete Structures &amp; Distress identification</b>		07
	4.1	Need for strengthening due to various reasons, Causes of distress in concrete structures - holistic models for deterioration of concrete.	
	4.2	Distress identification and testing methods, structural audit and different stages, field and laboratory testing.	
	4.3	Non-Destructive and Destructive Testing Methods: - Concrete strength assessment and tests, interpretation and evaluation of results,	
V	<b>Repair Materials and techniques</b>		06
	5.1	Selection of various repair materials and their essential parameters, identification of suitable repair strategy. machines/instruments required.	
	5.2	Rehabilitation and retrofitting methods, selection of repair methods. Jacketing methods,	
VI	<b>Seismic retrofitting and Maintenance of Heritage Structures</b>		05
	6.1	Effects of earthquakes and factors related to building damages due to earthquake, Methods of seismic retrofitting, restoration of buildings	
	6.2	Repair and rehabilitation of heritage structures	

<b>Course Outcomes</b>	
<p>On successful completion of the course, the learners will be able to:</p> <ul style="list-style-type: none"> <li>• Describe the electrical system and lighting systems in buildings</li> <li>• Explain water distribution and drainage systems, piped gas supply systems, fire-fighting systems.</li> <li>• Explain mechanical systems in buildings</li> <li>• Identify causes for deterioration of structures &amp; evaluate them</li> <li>• Explain repair materials and techniques</li> <li>• Describe seismic retrofitting and maintenance of heritage structures</li> </ul>	
<p><b>Assessment:</b></p> <p style="text-align: center;"><b>Internal:</b></p> <p>Assessment consists of two tests out of which; one should be compulsory class test and the other is either a class test or assignment on live problems or course project.</p> <p><b>End Semester Theory Examination:</b></p> <p>Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. <b>In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.</b></p> <ol style="list-style-type: none"> <li>1. Question paper will comprise of total six question</li> <li>2. All question carries equal marks</li> <li>3. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3</li> </ol>	

then part (b) will be from any module other than module 3)

4. Only Four question need to be solved

**Recommended Books:**

- David V. Chadderton, Building Services Engineering 6th 2012 edition, T&F India
- CPWD Handbook on Repair and Rehabilitation of RCC buildings, Govt of India Press, New Delhi
- Raikar, R.N., “Learning from failures - Deficiencies in Design, Construction and Service” R and D Centre (SDCPL), Raikar Bhavan, Bombay, 1987.
- Maintenance, Repair & Rehabilitation and Minor Works of Buildings, P.C.Varghese, PHI Publications
- Maintenance & Repairs of Buildings, P.K.Guha, New Central Book Agency
- Heating Ventilating and Air Conditioning Analysis and Design, Faye C. McQuiston and Jerald D. Parker, Wiley
- MEP systems & Repairs of Buildings: A.S. Radke, Published by Synergy Knowledgeware
- Bureau of Indian Standards, "Hand book of functional requirements of buildings, (SP-41 & SP-32)"
- Fire Safety in Building: V. K. Jain, New Age International Publication, Delhi
- Building maintenance guidebook / Buildings Department by HKSAR. Hong Kong: Building Dept.
- Building services: performance, diagnosis, maintenance, repair and the avoidance of defects by H.W. Harrison, P.M. Trotman., London: CRC.
- Guide to Concrete Repair and Protection, HB84-2006, A joint publication of Australia Concrete Repair Association, CSIRO and Standards Australia

SemesterII		
Course Code	Course Name	Credits
CEMPE2013	Program Elective 3: Thrust Areas in Project Management	03

TeachingScheme						
ContactHours			CreditsAssigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03	--	--	03	--	--	03

EvaluationScheme								
Theory					Term Work/Practical/Oral			Total
InternalAssessment			EndSemExam	Duration ofEnd SemExam	TW	PR	OR	
Test1	Test2	Average						
20	20	20	80	03 Hrs.	--	--	--	100

Objectives
<ul style="list-style-type: none"> <li>• Develop a thorough understanding of project pre-planning and importance of defining the scope of the project and setting benchmarks well in advance</li> <li>• Highlight the advantages of project partnering</li> <li>• Appraise the importance of SCM &amp; CCM in construction sector</li> <li>• Perform S.W.O.T analysis of construction entities</li> <li>• Apply lean construction techniques to construction projects</li> <li>• Appraise the leadership styles and motivations necessary on construction projects</li> </ul>

Detailed Syllabus		
Module	Sub modules / contents	Hrs
I	<b>Project pre-planning</b> 1.1 Project Influence cost diagram. Definition & selecting of pre-planning team design. 1.2 Defining project scope and setting benchmarks and documenting them well in advance 1.3 Evaluation of alternatives. Decision whether to invest in project or not. Problems on the same 1.4 Concept of PDRI— Project definition rating index. PDRI for residential and industrial buildings. Utility of PDRI with respect to benchmarking 1.5 Any case study on construction Project preplanning.	06
II	<b>Project partnering</b> 2.1 Definition; partnering as an effective risk sharing mechanism, partnering charter, partnering workshop. 2.2 Advantages of partnering; role in preventing construction disputes	04

	<p>2.3 Critical success factors for implementation</p> <p>2.4 Any case study on project partnering.</p>	
<b>III</b>	<p><b>S. W. O. T. analysis</b></p> <p>3.1 Practical Application of S.W.O.T Analysis in the Management of a Construction Project</p> <p>3.2 S.W.O.T. matrix- utility and advantage on strategic planning and management.</p> <p>3.3 S.W.O.T Analysis of Indian construction industry and infrastructure projects</p> <p>3.4 Any Case study on S.W.O.T analysis on construction project</p>	<b>04</b>
<b>IV</b>	<p><b>Supply Chain Management (SCM) &amp; Critical Chain Management (CCM)</b></p> <p>4.1 Concept of Supplier and customer in context of ISO</p> <p>4.2 Identifying the chain associated connecting various processes between the supplier and the customer in context of construction projects</p> <p>4.3 Management strategy for implementing S. S. C. M. in construction organizations and on construction projects</p> <p>4.4 Benefits of S. C. M</p> <p>4.5 Case Study on S.C.M in the construction sector</p> <p>4.6 Concept of critical chain in construction projects based on the theory of constraints.</p> <p>4.7 Developing critical chain plans for a single project and multiple projects.</p> <p>4.8 Measuring, monitoring and controlling the critical chain.</p> <p>4.9 Advantages of CCM.</p>	<b>06</b>
<b>V</b>	<p><b>Lean construction Techniques</b></p> <p>5.1 Lean Construction – concepts, development, objectives and practical applications</p> <p>5.2 Definitions - lean, value, waste, pull, flow</p> <p>5.3 Differences between LC and project management approaches</p> <p>5.4 Integrated Project Delivery (ILPD) &amp; Integrated Lean Project Delivery (ILPD)</p> <p>5.5 Last Planner System (LPS)</p> <p>5.6 Target Value Design (TVD)</p> <p>5.7 Building Information Modeling (BIM)</p> <p>5.8 5s, Six sigma and Visual Management</p> <p>5.9 Just in Time (JIT)</p> <p>5.10 Standardized work and continuous improvement</p> <p>5.11 Repetitive, look ahead and pull/push scheduling</p>	<b>10</b>

<b>VI</b>	<b>Leadership styles and motivation</b> 6.1 Qualities of a leader, difference between leader and manager 6.2 Maslow’s Hierarchy of Needs 6.3 Alderfer’s ERG Theory 6.4 McClelland’s Theory of Needs 6.5 Participatory leadership and factors affecting leadership 6.6 Various Leadership Styles 6.7 Emotional & Spiritual intelligence and their quotients 6.8 Transformational and Transactional leadership 6.9 Seven habits of highly effective people and the 8 <sup>th</sup> habit	<b>09</b>
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<b>Course Outcomes</b>	
<p>On successful completion of the course, the learners will be able to:</p> <ul style="list-style-type: none"> <li>• Appreciate the benefits of pre-project planning, scope definition and setting benchmarks, Perform design PDRI for particular projects</li> <li>• Highlight the advantages of project partnership</li> <li>• Perform SWOT analysis for a construction firm</li> <li>• Appraise the role of an efficient Supply Chain Management (SCM) &amp; Critical Chain Management (CCM) for the successful completion of infrastructure and construction projects</li> <li>• Apply lean construction techniques to construction processes</li> <li>• Demonstrate leadership styles and motivation techniques on construction projects</li> </ul>	
<p><b>Assessment:</b></p> <p style="text-align: center;"><b>Internal:</b></p> <p>Assessment consists of two tests out of which; one should be compulsory class test and the other is either a class test or assignment on live problems or course project.</p> <p><b>End Semester Theory Examination:</b></p> <p>Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. <b>In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.</b></p> <ol style="list-style-type: none"> <li>1. Question paper will comprise of total six question</li> <li>2. All question carries equal marks</li> <li>3. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)</li> <li>4. Only Four question need to be solved</li> </ol> <p><b><u>Recommended Books:</u></b></p> <ul style="list-style-type: none"> <li>• Pre-project planning handbook—published by Construction Industry Institute (CIT) USA. ASCE journal papers on project pre-planning to be used. ASCE journal papers.</li> <li>• Project Management—Financial evaluation with strategic planning, networking and control—Bhavesh Patel—2nd edition 2010, reprinted in 2011—Vikas publishing House Pvt. Ltd.</li> <li>• Scheduling Construction Projects—Principles and practices—Sandra Weber—Indian edition published in 2012—Pearson Publication.</li> </ul>	

- Construction Project management—Planning, Scheduling and controlling—K. K. Chitkara—Eight reprint 2004, Tata McGraw Hill Publishing Company Limited.
- Practical Application of SWOT Analysis in the Management of a Construction Project-IGOR N. MILOSEVIC; Leadership and Management in Engineering {Leadership Manage. Eng., 2010,
- <http://www.leanconstruction.org/>; Lean Construction Journals
- Lean Construction Management-The Toyota Way; Gao, Shang, Low, Sui Pheng
- Leadership and Motivation — Ralph Nader, Unit 11, ccb\_leadershipguide
- Funder, David Charles. The Personality Puzzle. W.W. Norton & Company. New York, 1977.
- Johns, Gary. Concordia University. “Theories of Work Motivation” “Leadership” Organizational Behaviour: Understanding and Managing Life at Work. Harper Collins College Publishers, 1996.
- Maslow, A. H. Motivation and Personality. Harper & Row. New York, 1970. Alderfer, C. P. “Existence, Relatedness and Growth: Human Needs in Organizational Settings”.
- McClelland, D. C. Human Motivation. Glenview, IL. Scott, Foresman, 1985. House, R. J. & Mitchell, T. R. “Path-Goal Theory of Leadership”. Journal of Contemporary Business. Autumn,
- Vroom, V. H. & Jago, A. G. “The New Leadership: Managing Participation in Organizations”. The 7 habits of highly effective people- Stephen R. Covey

SemesterII		
Course Code	Course Name	Credits
CEMPE2021	Program Elective 4: Remote Sensing and Geographical Information System	03

TeachingScheme						
ContactHours			CreditsAssigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03	--	--	03	--	--	03

EvaluationScheme								
Theory					Term Work/Practical/Oral			Total
InternalAssessment			EndSemExam	Duration ofEndSemExam	TW	PR	OR	
Test1	Test2	Average						
20	20	20	80	03 Hrs.	---	---	---	100

Objectives
<ul style="list-style-type: none"> <li>• Trigger academic excellence on par with international standards</li> <li>• Fetch attitudinal changes in students towards work and shape them as task completers for successful employable adults in geospatial technology.</li> <li>• Mould students as responsible citizens with knowledge, intellect, personal, social and cultural perception in solving geospatial problems.</li> <li>• Capacity building by training the students with practical knowledge and executable solutions to ever-growing Geo-spatial Problems and</li> <li>• Motivate the undergraduate students of all science and engineering disciplines to use Geo-information Technology for solving the problems relevant to their own disciplines</li> </ul>

Detailed Syllabus		
Module	Subject Module / Content	Hrs
I	Remote Sensing	07
	Physics of remote sensing, ideal remote sensing system orbital and sensor characteristics of major earth resource satellites, Electromagnetic spectrum – wavelength regions important to remote sensing, Atmospheric scattering, Atmospheric windows, Spectral signature concepts – typical spectral reflective characteristics of water, vegetation, and soil , Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors, Introduction to spatial resolution, spectral resolution, radiometric resolution, and temporal resolution,, Elements of remote sensing for visual interpretation	

	viz. tone, shape, size, pattern, texture, shadow, and association.	
<b>II</b>	<b>Digital Image Processing:</b>	<b>06</b>
	Digital / Satellite image, Image histogram, Introduction to image rectification, digital image processing, preprocessing and post-processing, Image registration, image enhancement, image transformations, Digital image classification (supervised & unsupervised). Digital elevation model (DEM) and its derivatives, triangular irregular network model (TIN), and other models & their applications	
<b>II</b>	<b>Geographical Information System (GIS)</b>	<b>07</b>
	Basic component, Objectives, Advantages, Basic components, and Functions of GIS. Spatial and non-spatial information, GIS data types - Vector and Raster data. Points, lines, and areas features. Manpower for GIS - Roles and responsibilities of Project Manager, Database Manager, digital map maker, system operator, and programmer Parameters for success and failure of GIS, GIS data types and data representation, data acquisition, geo-referencing of data, raster and vector data, attribute data models and its types, Digitizer and scanners. Commercially available GIS hardware and Software (Various open-source and closed-source)	
<b>III</b>	<b>Global Positioning System (G.P.S) and Global Navigation Satellite System (G.N.S.S.)</b>	<b>06</b>
	G.P.S. Segments: Spaces Segment, Control Segment, User Segment Features of G.P.S. Satellites. Absolute Positioning, Relative Positioning, differential G.P.S., Kinematics of G.P.S. G.P.S. Receivers: Navigational Receivers, Surveying Receivers, Geodetic Receivers. Introduction to GNSS and Types, IRNSS, GPS, GPS components, D Differential GPS, types of GPS tracking, Application of GNSS in surveying, Mapping and navigation	
<b>V</b>	<b>Remote Sensing and GIS Applications in Civil Infrastructure Management</b>	<b>07</b>
	Remote Sensing Applications in Disaster Management, Flood mapping, Drought assessment, Environmental monitoring, other Civil Engineering applications. GIS Applications in planning and database management in civil infrastructure, in Environmental & Water Resource Management., Underground infrastructure Management., Green infrastructure Management., in Transportation infrastructure management-Intelligent Transport System, Urban Transport Planning, Highway Alignment, Traffic Congestion analysis and Accident Studies, Road Network Planning.	
<b>VI</b>	<b>Case studies:</b>	<b>06</b>
	Application in land measurement work for land record department, Applications of land use and land cover pattern, Application in urban planning, Application in smart cities planning and development	

### **Course Outcomes**

On successful completion of the course, the learners will be able to:

- Explain remote sensing and spatial data from satellite imagery.
- Gain expertise of various digital image processing.
- Acquire knowledge of GIS and various GIS software packages
- Use GPS and GNSS for gathering geo-spatial data
- Apply Remote Sensing and GIS for solving civil engineering problems

#### **Assessment:**

##### **Internal:**

Assessment consists of two tests out of which; one should be a compulsory class test and the other is either a class test or assignment on live problems or course projects.

##### **End Semester Theory Examination:**

Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. In question, the paper weightage of each module will be proportional to the number of respective lecture hours as mentioned in the syllabus,

1. Question paper will comprise of total of six-question
2. All questions carry equal marks
3. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four questions need to be solved.

##### **Recommended books & Journals:**

1. Fundamentals of Remote Sensing, George Joseph and C Jeganathan , University Press.
2. Concepts and Techniques of Geographical Information System, Lo C.P.Yeung A K, Prentice India
3. Introduction to Geographical Information system, Kang-Tsung Chang, Tata McGraw Hill
4. international and National Journals on GIS and GPS
5. GIS A Management, Perspent-t Stan Aronoff, WDL Publisher.
6. Peter A Burrough Rachael A Mc Donnel, "Principles of GIS" (Oxford), 2000'
7. Christopher Jones, "GIS and Computer cartography" (Longman), 2000
8. Remote sensing and geographic Information System, AM, Chanra& S.K. Ghosh, Narosa Pub.
9. Concepts of Geographic Information System, C.P Yeung & Loe, PHI.
10. Introduction to Remote Sensing, Lillesand & keifer.
11. Global Positioning System, theory & practice, Hofmann and wellenhof, Springer India.

SemesterII		
Course Code	Course Name	Credits
CEMPE2022	Program Elective 4: Advanced Construction Technology	03

TeachingScheme						
ContactHours			CreditsAssigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03	--	--	03	--	--	03

EvaluationScheme								
Theory					Term Work/Practical/Oral			Total
InternalAssessment			EndSemExam	Duration ofEnd SemExam	TW	PR	OR	
Test1	Test2	Average						
20	20	20	80	03 Hrs.	---	--	---	100

Objectives
<ul style="list-style-type: none"> <li>• To study and understand the latest construction techniques applied to engineering construction for sub structure.</li> <li>• To summarize the students about various techniques of super structure construction.</li> <li>• To give an experience in the implementation of new technology concepts which are applied in field of advanced construction in special structures.</li> <li>• Know the different methods of some advanced construction techniques and ground improvement techniques.</li> <li>• To present the new technology related to dredging system and its concepts related advanced construction technology.</li> <li>• To study different methods of Rehabilitation and strengthening in construction to successfully achieve the structural design.</li> </ul>

Detailed Syllabus		
Module	Course Module / Contents	Hrs
I	<b>Sub Structure Construction</b>	06
	1.1 Box jacking, Pipe jacking, Underwater drilling, blasting, and concreting. Underwater construction of diaphragm walls and basement	
	1.2 Driving well and caisson, sinking cofferdam, cable anchoring, and grouting. Driving diaphragm walls, sheet piles	
	1.3 Laying operations for built-up offshore system, Shoring for deep cutting, large reservoir construction, and well points. Dewatering for	

		underground open excavation.	
<b>II</b>	<b>Super Structure Construction for building</b>		06
	2.1	Vacuum dewatering of concrete flooring, Concrete paving technology	
	2.2	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 the slab, aerial transporting, Handling, and erecting lightweight components on tall structures	
<b>III</b>	<b>Construction of Special Structures</b>		06
	3.1	Erection of lattice towers - Rigging of transmission line structures, Construction sequence in cooling towers, Silos, chimneys, skyscrapers. Construction sequence and methods in domes, Support structure for heavy equipment and machinery in heavy industries, Erection of articulated structures and space decks.	
	3.2	Roof truss: erection problems Building / Industrial component, Equipment and tackles used for erecting these. Plate girder Launching a portion of bridge girder, large span lattice girder. Erection of chimney, Erection of overhead tank.	
<b>IV</b>	<b>Advancement in Construction techniques</b>		08
	4.1	Building construction techniques: Zero energy building, green building, pre-engineering building, Solar Paints, Building Integrated Photovoltaic (BIPV), Earthquake Resisting Controls-Isolation and Dissipation.	
	4.2	Coastal construction techniques: Sound Proofing walls, water-resistant roofs, high-performance doors and windows, air and moisture barriers.	
	4.3	Road construction techniques: 3D Printing, Road Printer, smart roads	
	4.4	Ground improvement techniques: Advanced piling techniques - Stone Column, Vibro Floatation, Grouting, Geotextile application, Micro Piles, and Soil Nailing. Vertical drains-Sand Drains, Pre-Fabricated Vertical Drains. Thermal Methods- soil heating and soil freezing.	
<b>V</b>	<b>Dredging</b>		06
	5.1	Dredging System, Mechanism, Hydraulic dredger in waves, dredging equipment, Water & Booster System, dredging in the navigation system, Agitation dredging system, silt dredging system, water injection system, Pneumatic dredging system, Amphibious & scrapper dredging system.	
	5.2	Advantages & Disadvantages of Various Dredging Systems, Production Cycle for Dredgers, Application, Capacity of dredgers, & its economical use, dredging economics	

<b>VI</b>	<b>Rehabilitation and Strengthening Techniques</b>		07
	6.1	Seismic retrofitting, strengthening of beams, strengthening of columns, strengthening of the slab, strengthening of a masonry wall, Protection methods of structures, Mud jacking and grouting for foundation, Micro piling and underpinning for strengthening floor and shallow profile, Subgrade waterproofing, Soil Stabilization techniques	
	6.2	Repair of steel structures, bridge, building, towers etc., monuments and historical structures. Prevention of water leakage in structures; Underwater repair; Durability of repairing material. Maintenance of underground railways.	

<b>Course Outcomes</b>
<p>On successful completion of the course, the learners will be able to:</p> <ul style="list-style-type: none"> <li>• Explain the procedure of construction techniques for sub structure of major civil engineering projects.</li> <li>• Gain knowledge of various stages of construction of super structure of major civil engineering projects.</li> <li>• Demonstrate the Implementation of new construction technology on engineering concepts which are applied in field Advanced construction technology in special structures.</li> <li>• Illustrate the different methods of advancement in construction techniques and ground improvement techniques.</li> <li>• Describe various dredging systems for major civil engineering projects.</li> <li>• Apply the theoretical and practical aspects of rehabilitation and strengthening techniques in civil engineering along with the design and management applications</li> </ul>
<p><b>Assessment:</b></p> <p><b>Internal:</b></p> <p>Assessment consists of two tests out of which; one should be a compulsory class test and the other is either a class test or assignment on live problems or course projects.</p> <p><b>End Semester Theory Examination:</b></p> <p>Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. In question, the paper weightage of each module will be proportional to the number of respective lecture hours as mentioned in the syllabus,</p> <ol style="list-style-type: none"> <li>1. Question paper will comprise of total of six-question</li> <li>2. All questions carry equal marks</li> <li>3. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)</li> <li>4. Only Four questions need to be solved.</li> </ol> <p><b>Recommended books &amp; Journals:</b></p> <ul style="list-style-type: none"> <li>•Construction Technology by Roy Chudley and Roger Greeno, Prentice Hall, 2005.</li> <li>•Dr. B.C. Punamia (2008); “Building Construction” Laxmi Publications (P) Ltd.ISBN13: 978-8131804285. 666p.</li> </ul>

- S. S. Bhavkatti (2012); “Building Construction” Vikas Publishing House Pvt Ltd. ISBN-13: 978-9325960794. 356p.
- Peter. H. Emmons, “Concrete repair and maintenance illustrated”, Galgotia Publications Pvt. Ltd., 2001.
- S. P. Arora and S. P. Bindra (2010); “Textbook of Building Construction”, Dhanpat Rai & Sons publication, ISBN-13: 978-8189928803. 688p
- Sushil Kumar (2010); “Building Construction” Standard Publishes-Distributors. ISBN-13: 978-8180141683. 796p.
- S.C. Rangwala, Building Construction, Charotar Publication Pvt Ltd. Anand
- Sankar, S.K. and Saraswati, S., Construction Technology, Oxford University Press, New Delhi, 2008.
- Construction Planning, Equipment and methods – Peurifoy-Tata McGraw Hill Publication
- Construction Equipment Planning and Applications – Dr. Mahesh Varma
- R. Chudley (revised by R. Greeno), Building Construction Handbook, Addison
- Wesley, Longman Group, England, 3rd ed.
- S.S. Ataev, Construction Technology, Mir Publishers, Moscow
- Robertwade Brown, "Practical foundation engineering hand book", McGraw Hill Publications

SemesterII		
Course Code	Course Name	Credits
CEMPE2023	Program Elective 4: Quality and Risk Management	03

TeachingScheme						
ContactHours			CreditsAssigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03	--	--	03	--	--	03

EvaluationScheme								
Theory					Term Work/Practical/Oral			Total
InternalAssessment			EndSemExam	Duration ofEndSemExam	TW	PR	OR	
Test1	Test2	Average						
20	20	20	80	03 Hrs.	--	--	--	100

Objectives
<ul style="list-style-type: none"> <li>• Study the concepts of Quality, Quality Management and Quality Audit in construction.</li> <li>• Gain knowledge of quality systems &amp; quality planning in construction industry.</li> <li>• Get acquainted with quality control concept for improving the quality of construction.</li> <li>• Understand the various issues associated with risk.</li> <li>• Learn techniques to identify and quantify risks</li> </ul>

Detailed Syllabus		
Module	Subject Module / Content	Hrs
<b>I</b>	<b>Quality Management</b>	<b>08</b>
	1.1 Introduction to Quality Management 1.2 objectives of Quality Management 1.3 Factor influencing construction quality. 1.4 Quality plan, Quality Management Guidelines & Quality circles 1.5 Concept of Quality Audit 1.6 Importance of Quality Control in Construction 1.7 Measure taken for Improving Quality of Construction 1.8 Challenges faced on Construction project due to Globalization	
<b>II</b>	<b>Quality Systems</b>	<b>06</b>

	<p>2.1 Introduction to Quality systems  2.2 ISO 9000 family of standards &amp; requirements.  2.3 Quality System Documents  2.4 Quality oriented training.  2.5 Bench-marking quality.  2.6 Design of Quality manuals</p>	
<b>III</b>	<b>Quality Assurance and Control</b>	<b>07</b>
	<p>3.1 Difference between Quality Control and Quality assurance.  3.2 Necessity of QA/QC.  3.3 Techniques and needs of QA/QC  3.4 Different aspects of quality.  3.5 Factors influencing construction quality.</p>	
<b>IV</b>	<b>Introduction to risk management</b>	<b>06</b>
	<p>4.1 Importance of risk, development of risk management system  4.2 Identifying risk events, cost of risk, types of risk and classification  4.3 Benefits of risk management, responsibilities of agencies involved in risk management  4.4 Risk management standards, decision making strategies effects of tax laws, government rulings, conflict resolution. money, time and technical risks  4.5 Risks in the context of global project teams  4.6 Problems related to natural disasters or unusual events like earthquakes, fires, accidents</p>	
<b>V</b>	<b>Risk Analysis Techniques</b>	<b>07</b>
	<p>5.1 Sensitivity analysis  5.2 Uncertainty, cost factors and benefit factors  5.3 Scenario analysis, scenario analysis simulation  5.4 Decision tree analysis, risk profile method, certainly equivalent method, risk adjusted discount rate method, certainty index method, 3 point estimated method  5.5 Use of risk prompts, use of risk assessment tables, details of RAMP process, utility of grading of construction entities for reliable risk assessment  5.6 Entrepreneurial risks, pure risks  5.7 Contract review and legal conflicts</p>	
<b>VI</b>	<b>Risk Mitigation</b>	<b>05</b>
	<p>6.1 Risk Mitigation methods such as by elimination, reducing, transferring, avoiding, absorbing or pooling  6.2 Residual risk, mitigation of unqualified risk</p>	

#### **Course Outcomes**

On successful completion of the course, the learners will be able to:

- Demonstrate Quality management guidelines
- Apply Quality Systems in construction Practices

- Describe the concept of Quality Control & Quality Manual
- Classify various types of risk applicable to Construction Projects
- Apply knowledge of Risk analysis techniques in mitigation process
- Implement appropriate method of Risk Mitigation in construction practices

**Assessment:**

**Internal:**

Assessment consists of two tests out of which; one should be a compulsory class test and the other is either a class test or assignment on live problems or course projects.

**End Semester Theory Examination:**

Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. In question, the paper weightage of each module will be proportional to the number of respective lecture hours as mentioned in the syllabus,

1. Question paper will comprise of total of six-question
2. All questions carry equal marks
3. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four questions need to be solved.

**Recommended books & Journals:**

- James, J.O' Brian, Construction Inspection Handbook – Quality Assurance and Quality Control, Van Nostrand, New York, 1989.
- Mantri Handook- A to Z of Construction- Mantri Publication.
- Kwaku, A., Tena, Jose, M. Guevara, Fundamentals of Construction Management and Organisation, Reston Publishing Co., Inc., Virginia, 1985.
- Juran Frank, J.M. and Gryna, F.M. Quality Planning and Analysis, Tata McGraw Hill, 1993
- Hutchins.G, ISO 9000, Viva Books, New Delhi, 2000
- John L. Ashford, The Management of Quality in Construction, E &F.N.Spon, New York, 1989
- Kit Sadgrove, Complete guide to business risk management, Gower Publishing Ltd
- Hans Buhlmann, Mathematical Methods in Risk Theory, Springer Verlag
- Christopher Marrison, Fundamentals of risk measurements, Tata McGraw Hill
- Seetharaman, Construction Engineering and Management, Umesh Publications

MECE&M Semester II		
Course Code	Course Name	Credits
CEMIE 2021	Institute Level Elective: Project Management	03

#### Teaching Scheme

Contact Hours			Credits Assigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03	--	--	03	--	--	03

#### Evaluation Scheme

Theory					Termwork/Practical/Oral			Total Marks
Internal Assessment			End Sem Exam	Duration of End Sem Exam	TW	PR	OR	
Test 1	Test 2	Average						
20	20	20	80	03 Hrs.	--	--	--	100

#### Objectives:

- To familiarize the students with the use of a structured methodology/approach for each and every unique project undertaken, including utilizing project management concepts, tools and techniques.
- To appraise the students with the project management life cycle and make them knowledgeable about the various phases from project initiation through closure.

Module	Detailed Contents	Hrs
<b>I</b>	<b>Project Management Foundation:</b> Definition of a project, Project Vs Operations, Necessity of project management, Triple constraints, Project life cycles (typical & atypical) Project phases and stage gate process. Role of project manager. Negotiations and resolving conflicts. Project management in various organization structures. PM knowledge areas as per Project Management Institute (PMI).	<b>5</b>
<b>II</b>	<b>Initiating Projects:</b> How to get a project started, Selecting project strategically, Project selection models (Numeric/Scoring Models and Non-numeric models), Project portfolio process, Project sponsor and creating charter; Project proposal. Effective project team, Stages of team development & growth (forming, storming, norming & performing), team dynamics.	<b>6</b>
<b>III</b>	<b>Project Planning and Scheduling:</b> Work Breakdown Structure (WBS) and linear responsibility chart, Interface Co-ordination and concurrent engineering, Project cost estimation and budgeting, Top down and bottom up budgeting, Networking and Scheduling techniques. PERT, CPM, GANTT chart. Introduction to Project Management Information System (PMIS).	<b>8</b>
<b>IV</b>	<b>Planning Projects:</b> Crashing project time, Resource loading and leveling, Goldratt's critical chain,	<b>6</b>

	Project Stakeholders and Communication plan. Risk Management in projects: Risk management planning, Risk identification and risk register. Qualitative and quantitative risk assessment, Probability and impact matrix. Risk response strategies for positive and negative risks	
V	<p><b>5.1 Executing Projects:</b> Planning, monitoring and controlling cycle. Information needs and reporting, engaging with all stakeholders of the projects. Team management, communication and project meetings.</p> <p><b>5.2 Monitoring and Controlling Projects:</b> Earned Value Management techniques for measuring value of work completed; Using miles tones for measurement; change requests and scope creep. Project audit.</p> <p><b>5.3 Project Contracting</b> Project procurement management, contracting and outsourcing,</p>	8
VI	<p><b>6.1 Project Leadership and Ethics:</b> Introduction to project leadership, ethics in projects. Multicultural and virtual projects.</p> <p><b>6.2 Closing the Project:</b> Customer acceptance; Reasons of project termination, Various types of project terminations (Extinction, Addition, Integration, Starvation), Process of project termination, completing a final report; doing a lessons learned analysis; acknowledging successes and failures; Project management templates and other resources; Managing without authority; Areas of further study.</p>	6

### Outcomes

Students will be able to :

- Apply selection criteria and select an appropriate project from different options.
- Write work break down structure for a project and develop a schedule based on it.
- Identify opportunities and threats to the project and decide an approach to deal with them strategically.
- Use Earned value technique and determine & predict status of the project.
- Capture lessons learned during project phases and document them for future reference

#### Assessment:

##### Internal:

Assessment consists of two tests out of which; one should be compulsory class test and the other is either a class test or assignment on live problems or course project.

##### End Semester Theory Examination:

Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. **In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.**

1. Question paper will comprise of total six questions
2. All questions carry equal marks
3. Questions will be mixed in nature (for example, supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four questions need to be solved.

**References:**

1. JackMeredith&SamuelMantel, ProjectManagement: Amanagerialapproach,WileyIndia, 7<sup>th</sup>Ed.
2. A Guide to the Project Management Body of Knowledge (PMBOK<sup>®</sup> Guide), 5<sup>th</sup> Ed, ProjectManagementInstitutePA, USA
3. GidoClements,ProjectManagement,CengageLearning.
4. Gopalan,ProjectManagement,,WileyIndia
5. Dennis Lock,ProjectManagement,GowerPublishingEngland,9<sup>th</sup>Ed.

MECE&M Semester II		
Course Code	Course Name	Credits
CEMIE 2022	Institute Level Elective: Finance Management	03

**Teaching Scheme**

Contact Hours			Credits Assigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03	--	--	03	--	--	03

**Evaluation Scheme**

Theory					Termwork/Practical/Oral			Total Marks
Internal Assessment			End Sem Exam	Duration of End Sem Exam	TW	PR	OR	
Test1	Test2	Average						
20	20	20	80	03 Hrs.	--	--	--	100

**Objectives:**

- Overview of Indian financial system, instruments and market
- Basic concepts of value of money, returns and risks, corporate finance, working capital and its management
- Knowledge about sources of finance, capital structure, dividend policy

Module	Detailed Contents	Hrs
<b>I</b>	<p><b>Overview of Indian Financial System:</b> Characteristics, Components and Functions of Financial System.</p> <p><b>Financial Instruments:</b> Meaning, Characteristics and Classification of Basic Financial Instruments—Equity Shares, Preference Shares, Bonds-Debentures, Certificates of Deposit, and Treasury Bills.</p> <p><b>Financial Markets:</b> Meaning, Characteristics and Classification of Financial Markets—Capital Market, Money Market and Foreign Currency Market</p> <p><b>Financial Institutions:</b> Meaning, Characteristics and Classification of Financial Institutions—Commercial Banks, Investment-Merchant Banks and Stock Exchanges</p>	<b>06</b>
<b>II</b>	<p><b>Concepts of Returns and Risks:</b> Measurement of Historical Returns and Expected Returns of a Single Security and a Two-security Portfolio; Measurement of Historical Risk and Expected Risk of a Single Security and a Two-security Portfolio.</p> <p><b>Time Value of Money:</b> Future Value of a Lump Sum, Ordinary Annuity, and Annuity Due; Present Value of a Lump Sum, Ordinary Annuity, and Annuity Due; Continuous Compounding and Continuous Discounting.</p>	<b>06</b>
<b>III</b>	<p><b>Overview of Corporate Finance:</b> Objectives of Corporate Finance; Functions of Corporate Finance—Investment Decision, Financing Decision, and Dividend Decision.</p> <p><b>Financial Ratio Analysis:</b> Overview of Financial Statements—Balance Sheet, Profit and Loss Account, and Cash Flow Statement; Purpose of Financial Ratio</p>	<b>09</b>

	Analysis; Liquidity Ratios; Efficiency or Activity Ratios; Profitability Ratios; Capital Structure Ratios; Stock Market Ratios; Limitations of Ratio Analysis.	
<b>IV</b>	<p><b>Capital Budgeting:</b> Meaning and Importance of Capital Budgeting; Inputs for Capital Budgeting Decisions; Investment Appraisal Criterion—Accounting Rate of Return, Payback Period, Discounted Payback Period, Net Present Value (NPV), Profitability Index, Internal Rate of Return (IRR), and Modified Internal Rate of Return (MIRR)</p> <p><b>Working Capital Management:</b> Concepts of Meaning Working Capital; Importance of Working Capital Management; Factors Affecting an Entity's Working Capital Needs; Estimation of Working Capital Requirements; Management of Inventories; Management of Receivables; and Management of Cash and Marketable Securities.</p>	<b>10</b>
<b>V</b>	<p><b>Sources of Finance:</b> Long Term Sources—Equity, Debt, and Hybrids; Mezzanine Finance; Sources of Short Term Finance—Trade Credit, Bank Finance, Commercial Paper; Project Finance.</p> <p><b>Capital Structure:</b> Factors Affecting an Entity's Capital Structure; Overview of Capital Structure Theories and Approaches—Net Income Approach, Net Operating Income Approach; Traditional Approach, and Modigliani-Miller Approach. Relation between Capital Structure and Corporate Value; Concept of Optimal Capital Structure</p>	<b>05</b>
<b>VI</b>	<p><b>Dividend Policy:</b> Meaning and Importance of Dividend Policy; Factors Affecting an Entity's Dividend Decision; Overview of Dividend Policy Theories and Approaches—Gordon's Approach, Walter's Approach, and Modigliani-Miller Approach</p>	<b>03</b>

### Outcomes

Students will be able to...

- Understand Indian finance system and corporate finance
- Take investment, finance as well as dividend decisions

#### Assessment:

##### Internal:

Assessment consists of two tests out of which; one should be compulsory class test and the other is either a class test or assignment on live problems or course project.

#### End Semester Theory Examination:

Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. **In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.**

1. Question paper will comprise of total six questions
2. All questions carry equal marks
3. Questions will be mixed in nature (for example, supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four questions need to be solved.

**References:**

1. Fundamentals of Financial Management, 13<sup>th</sup> Edition (2015) by Eugene F. Brigham and Joel F. Houston; Publisher: Cengage Publications, New Delhi.
2. Analysis for Financial Management, 10<sup>th</sup> Edition (2013) by Robert C. Higgins; Publishers: McGraw Hill Education, New Delhi.
3. Indian Financial System, 9<sup>th</sup> Edition (2015) by M. Y. Khan; Publisher: McGraw Hill Education, New Delhi.

MECE&MSemesterII		
Course Code	Course Name	Credits
CEMIE 2023	InstitutelevelElective: EntrepreneurshipDevelopmentand Management	03

#### TeachingScheme

ContactHours			CreditsAssigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03	--	--	03	--	--	03

#### EvaluationScheme

Theory				Termwork/Practical/Oral			TotalMarks	
InternalAssessment			End SemExam	Durationof EndSemExam	TW	PR		OR
Test1	Test2	Average						
20	20	20	80	03Hrs.	--	--	--	100

#### Objectives:

- Toacquaintwithentrepreneurship andmanagementofbusiness
- Understand Indianenvironmentforentrepreneurship
- Ideaof EDP,MSME

Module	DetailedContents	Hrs
<b>I</b>	<b>OverviewOfEntrepreneurship:</b> Definitions,RolesandFunctions/ValuesofEntrepreneurship,HistoryofEntrepreneurshipDevelopment,RoleofEntrepreneurshipintheNationalEcconomy,FunctionsofanEntrepreneur,EntrepreneurshipandForms of Business Ownership RoleofMoneyandCapitalMarketsinEntrepreneurialDevelopment:Contributionof GovernmentAgenciesin SourcinginformationforEntrepreneurship	<b>04</b>
<b>II</b>	<b>Business Plans And Importance Of Capital To Entrepreneurship:</b> Preliminary andMarketingPlans,ManagementandPersonnel,Start-upCostsandFinancingaswellasProjectedFinancialStatements,LegalSection,Insurance,SuppliersandRisks,Assumptions and Conclusion, Capital and its Importance to the Entrepreneur <b>EntrepreneurshipAndBusinessDevelopment:</b> Starting aNewBusiness,Buying anExistingBusiness,NewProductDevelopment,BusinessGrowthandtheEntrepreneur LawanditsRelevancetoBusinessOperations	<b>09</b>
<b>III</b>	Women's Entrepreneurship Development, Social entrepreneurship-role and need, EDPcell,roleofsustainabilityandsustainabledevelopmentforSMEs,casestudies, exercises	<b>05</b>
<b>IV</b>	<b>IndianEnvironmentforEntrepreneurship:</b> key regulationsandlegalaspects,MSMED Act 2006 andits implications, schemesand policies of the Ministry ofMSME, role and responsibilities of various government organisations, departments,banksetc.,RoleofStategovernmentsintermsofinfrastructuredevelopmentsand supportetc.,Publicprivatepartnerships,NationalSkilldevelopmentMission,Credit	<b>08</b>

	Guarantee Fund, PMEGP, discussions, group exercises etc	
<b>V</b>	<b>Effective Management of Business:</b> Issues and problems faced by micro and small enterprises and effective management of M and S enterprises (risk management, credit availability, technology innovation, supply chain management, linkage with large industries), exercises, e-Marketing	<b>08</b>
<b>VI</b>	<b>Achieving Success In The Small Business:</b> Stages of the small business lifecycle, four types of firm-level growth strategies, Options – harvesting or closing small business Critical Success factors of small business	<b>05</b>

#### **Outcomes:**

Students will be able to...

- Understand the concept of business plan and ownerships
- Interpret key regulations and legal aspects of entrepreneurship in India
- Understand government policies for entrepreneurs

#### **Assessment**

##### **Internal:**

Assessment consists of two tests out of which, one should be compulsory class test and the other is either a class test or assignment on live problems or course project.

##### **End Semester Theory Examination:**

Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. **In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.**

1. Question paper will comprise of total six questions
2. All questions carry equal marks
3. Questions will be mixed in nature (for example, suppose Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only four questions need to be solved.

##### **References:**

1. Poornima Charantimath, Entrepreneurship development-Small Business Enterprise, Pearson
2. Education Robert D Hisrich, Michael P Peters, Dean A Shepherd, Entrepreneurship, latest edition, The McGraw Hill Company
3. Dr TN Chhabra, Entrepreneurship Development, Sun India Publications, New Delhi
4. Dr CN Prasad, Small and Medium Enterprises in Global Perspective, New Century Publications, New Delhi
5. Vasant Desai, Entrepreneurial development and management, Himalaya Publishing House
6. Maddhurima Lall, Shikha Sahai, Entrepreneurship, Excel Books
7. Rashmi Bansal, STAY hungry STAY foolish, CIIE, IIM Ahmedabad
8. Law and Practice relating to Micro, Small and Medium Enterprises, Taxmann Publication Ltd.
9. Kurakto, Entrepreneurship-Principles and Practices, Thomson Publication
10. Laghu Udyog Samachar
11. www.msme.gov.in
12. www.dcmesme.gov.in
13. www.msme training.gov.in

MECE&M SemesterII		
Course Code	Course Name	Credits
CEMIE 2024	Institutelevel Elective: HumanResourceManagement	03

#### TeachingScheme

ContactHours			CreditsAssigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03	--	--	03	--	--	03

#### EvaluationScheme

Theory					Termwork/Practical/Oral			Total Marks
InternalAssessment			EndSem Exam	Durationof End SemExam	TW	PR	OR	
Test1	Test2	Average						
20	20	20	80	03Hrs.	--	--	--	100

#### Objectives:

- To introduce the students with basic concepts, techniques and practices of the human resource management.
- To provide opportunity of learning Human resource management (HRM) processes, related with the functions, and challenges in the emerging perspective of today's organizations.
- To familiarize the students about the latest developments, trends & different aspects of HRM.
- To acquaint the student with the importance of inter-personal & inter-group behavioral skills in an organizational setting required for future stable engineers, leaders and

Module	DetailedContents	Hrs
I	<b>Introduction to HR</b> Human Resource Management- Concept, Scope and Importance, Interdisciplinary Approach Relationship with other Sciences, Competencies of HR Manager, HRM functions. Human resource development (HRD): changing role of HRM – Human resource Planning, Technological change, Restructuring and rightsizing, Empowerment, TQM, Managing ethical issues.	5
II	<b>Organizational Behavior (OB)</b> Introduction to OB Origin, Nature and Scope of Organizational Behavior, Relevance to Organizational Effectiveness and Contemporary issues Personality: Meaning and Determinants of Personality, Personality development, Personality Types, Assessment of Personality Traits for Increasing Self Awareness Perception: Attitude and Value, Effect of perception on Individual Decision-making, Attitude and Behavior. Motivation: Theories of Motivation and their Applications for Behavioral Change (Maslow, Herzberg, McGregor); Group Behavior and Group Dynamics: Work groups formal and informal groups and stages of group development. Team Effectiveness: High performing teams, Team Roles, cross functional and self-directed team. Case study	7
III	<b>Organizational Structure &amp; Design</b> Structure, size, technology, Environment of organization; Organizational Roles &	6

	<p>conflicts: Concept of roles; role dynamics; role conflicts and stress.</p> <p>Leadership: Concepts and skills of leadership, Leadership and managerial roles, Leadership styles and contemporary issues in leadership.</p> <p>Power and Politics: Sources and uses of power; Politics at workplace, Tactics and strategies.</p>	
IV	<p><b>Human Resource Planning</b>  Recruitment and Selection process, Job-enrichment, Empowerment - Job-Satisfaction, employee morale.  Performance Appraisal Systems: Traditional &amp; modern methods, Performance Counseling, Career Planning.  Training &amp; Development: Identification of Training Needs, Training Methods</p>	5
V	<p><b>Emerging Trends in HR</b>  Organizational development; Business Process Re-engineering (BPR), BPR as a tool for organizational development, managing processes &amp; transformation in HR. Organizational Change, Culture, Environment  Cross Cultural Leadership and Decision Making: Cross Cultural Communication and diversity at work, causes of diversity, managing diversity with special reference to handicapped, women and ageing people, intracompany cultural difference in employee motivation.</p>	6
VI	<p><b>HR &amp; MIS</b>  Need, purpose, objective and role of information system in HR, Applications in HRD in various industries (e.g. manufacturing R&amp;D, Public Transport, Hospitals, Hotels and service industries)  <b>Strategic HRM</b>  Role of Strategic HRM in the modern business world, Concept of Strategy, Strategic Management Process, Approaches to Strategic Decision Making; Strategic Intent – Corporate Mission, Vision, Objectives and Goals  <b>Labor Laws &amp; Industrial Relations</b>  Evolution of IR, IR issues in organizations, Overview of Labor Laws in India; Industrial Disputes Act, Trade Unions Act, Shops and Establishments Act</p>	10

#### **Contribution to Outcomes:**

Students will be able to:

- Understand the concepts, aspects, techniques and practices of human resource management.
- Understand the Human Resource Management (HRM) processes, functions, changes and challenges in today's emerging organizational perspective.
- Gain knowledge about the latest developments and trends in HRM.
- Apply the knowledge of behavioral skills learnt and integrate it within interpersonal and intergroup environment emerging as future stable engineers and managers.

#### **Assessment:**

##### **Internal:**

Assessment consists of two tests out of which; one should be compulsory class test and the other is either a class test or assignment on live problems or course project.

**EndSemesterTheoryExamination:**

Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in questionpapers of end semester examination. **In question paper weightage of each module will be proportional tonumberofrespectivelecturehours asmentionin thesyllabus.**

1. Questionpaperwillcompriseoftotalsixquestion
2. Allquestion carryequalmarks
3. Questionswillbemixedinnature(forexamplesupposedQ.2haspart(a)frommodule3thenpart (b)will bef from anymodule other than module3)
4. OnlyFour questionneedto besolved.

**References:**

1. StephenRobbins,OrganizationalBehavior,16<sup>th</sup> Ed,2013
2. VS P Rao, Human ResourceManagement, 3<sup>rd</sup> Ed, 2010, Excelpublishing
3. Aswathapa,Humanresourcemanagement:Text&cases,6<sup>th</sup> edition, 2011
4. C. B.MamoriaandSVGankar,Dynamics ofIndustrialRelationsinIndia,15<sup>th</sup>Ed, 2015,HimalayaPublishing,15<sup>th</sup>edition, 2015
5. P.SubbaRao,EssentialsofHumanResourcemanagementandIndustrialrelations,5<sup>th</sup>Ed,2013,Himalaya Publishing
6. LaurieMullins,Management&OrganizationalBehavior, LatestEd,2016,PearsonPublications

MECE&M Semester II		
Course Code	Course Name	Credits
CEMIE 2025	Institute level Elective: Professional Ethics and CSR	03

#### Teaching Scheme

Contact Hours			Credits Assigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03	--	--	03	--	--	03

#### Evaluation Scheme

Theory				Termwork/Practical/Oral			Total Marks	
Internal Assessment			End Sem Exam	Duration of End Sem Exam	TW	PR		OR
Test1	Test2	Avg						
20	20	20	80	03Hrs.	--	--	--	100

#### Objectives:

- To understand professional ethics in business
- To recognize corporate social responsibility

Module	Detailed Contents	Hrs
01	<b>Professional Ethics and Business:</b> The Nature of Business Ethics; Ethical Issues in Business; Moral Responsibility and Blame; Utilitarianism: Weighing Social Costs and Benefits; Rights and Duties of Business	04
02	<b>Professional Ethics in the Marketplace:</b> Perfect Competition; Monopoly Competition; Oligopolistic Competition; Oligopolies and Public Policy <b>Professional Ethics and the Environment:</b> Dimensions of Pollution and Resource Depletion; Ethics of Pollution Control; Ethics of Conserving Depletable Resources	08
03	<b>Professional Ethics of Consumer Protection:</b> Markets and Consumer Protection; Contract View of Business Firm's Duties to Consumers; Due Care Theory; Advertising Ethics; Consumer Privacy <b>Professional Ethics of Job Discrimination:</b> Nature of Job Discrimination; Extent of Discrimination; Reservation of Jobs.	06
04	<b>Introduction to Corporate Social Responsibility:</b> Potential Business Benefits—Triple bottom line, Human resources, Risk management, Supplier relations; Criticisms and concerns—Nature of business; Motives; Misdirection. Trajectory of Corporate Social Responsibility in India	05
05	<b>Corporate Social Responsibility:</b> Articulation of Gandhian Trusteeship Corporate Social Responsibility and Small and Medium Enterprises (SMEs) in India, Corporate Social Responsibility and Public-Private Partnership (PPP)	08

06	<b>Corporate Social Responsibility in Globalizing India:</b> Corporate Social Responsibility Voluntary Guidelines, 2009 issued by the Ministry of Corporate Affairs, Government of India, Legal Aspects of Corporate Social Responsibility—Companies Act, 2013.	08
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### Contribution to outcomes

Students will be able to...

- Understand rights and duties of business
- Distinguish different aspects of corporate social responsibility
- Demonstrate professional ethics
- Understand legal aspects of corporate social responsibility

### Assessment:

#### Internal:

Assessment consists of two tests out of which; one should be compulsory class test and the other is either a class test or assignment on live problems or course project.

#### End Semester Theory Examination:

Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. **In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.**

1. Question paper will comprise of total six questions
2. All questions carry equal marks
3. Questions will be mixed in nature (for example, supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only four questions need to be solved.

#### References:

1. Business Ethics: Texts and Cases from the Indian Perspective (2013) by Ananda Das Gupta; Publisher: Springer.
2. Corporate Social Responsibility: Readings and Cases in a Global Context (2007) by Andrew Crane, Dirk Matten, Laura Spence; Publisher: Routledge.
3. Business Ethics: Concepts and Cases, 7th Edition (2011) by Manuel G. Velasquez; Publisher: Pearson, New Delhi.
4. Corporate Social Responsibility in India (2015) by Bidyut Chakrabarty, Routledge, New Delhi.

MECE&M Semester II		
Course Code	Course Name	Credits
CEMIE 2026	Institute level Elective: Research Methodology	03

#### Teaching Scheme

Contact Hours			Credits Assigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03	--	--	03	--	--	03

#### Evaluation Scheme

Theory					Termwork/Practical/Oral			Total Marks
Internal Assessment			End Sem Exam	Duration of End Sem Exam	TW	PR	OR	
Test1	Test2	Average						
20	20	20	80	03Hrs.	--	--	--	100

#### Objectives:

- To understand Research and Research Process
- To acquaint students with identifying problems for research and develop research strategies
- To familiarize students with the techniques of data collection, analysis of data and interpretation

Module	Detailed Contents	Hrs
01	<b>Introduction and Basic Research Concepts</b> 1.1 Research– Definition; Concept of Construct, Postulate, Proposition, Thesis, Hypothesis, Law, Principle. Research methods vs Methodology 1.2 Need of Research in Business and Social Sciences 1.3 Objectives of Research 1.4 Issues and Problems in Research 1.5 Characteristics of Research: Systematic, Valid, Verifiable, Empirical and Critical	09
02	<b>Types of Research</b> 2.1. Basic Research 2.2. Applied Research 2.3. Descriptive Research 2.4. Analytical Research 2.5. Empirical Research 2.6 Qualitative and Quantitative Approaches	07
03	<b>Research Design and Sample Design</b> 3.1 Research Design– Meaning, Types and Significance 3.2 Sample Design– Meaning and Significance Essential of a good sampling Stages in Sample Design Sampling methods/techniques Sampling Errors	07
04	<b>Research Methodology</b> 4.1 Meaning of Research Methodology 4.2. Stages in Scientific Research Process:	08

	<b>a. Identification and Selection of Research Problem</b> <b>b. Formulation of Research Problem</b> <b>c. Review of Literature</b> <b>d. Formulation of Hypothesis</b> <b>e. Formulation of research Design</b> <b>f. Sample Design</b> <b>g. Data Collection</b> <b>h. Data Analysis</b> <b>i. Hypothesis testing and Interpretation of Data</b> <b>j. Preparation of Research Report</b>	
<b>05</b>	<b>Formulating Research Problem</b> <b>5.1 Considerations: Relevance, Interest, Data Availability, Choice of data, Analysis of data, Generalization and Interpretation of analysis</b>	<b>04</b>
<b>06</b>	<b>Outcome of Research</b> <b>6.1 Preparation of the report on conclusion reached</b> <b>6.2 Validity Testing &amp; Ethical Issues</b> <b>6.3 Suggestions and Recommendation</b>	<b>04</b>

### Outcomes

Students will be able to:

- Prepare a preliminary research design for projects in their subject matter areas
- Accurately collect, analyze and report data
- Present complex data or situations clearly
- Review and analyze research findings

### **Assessment:**

#### **Internal:**

Assessment consists of two tests out of which; one should be compulsory class test and the other is either a class test or at least 6 assignments on complete syllabus or course project.

#### **End Semester Theory Examination:**

Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. **In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.**

1. Question paper will comprise of total six questions
2. All questions carry equal marks
3. Questions will be mixed in nature (for example, supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only four questions need to be solved.

#### **References:**

1. Dawson, Catherine, 2002, Practical Research Methods, New Delhi, UBS Publishers Distributors.
2. Kothari, C.R., 1985, Research Methodology- Methods and Techniques, New Delhi, Wiley Eastern Limited.
3. Kumar, Ranjit, 2005, Research Methodology- A Step-by-Step Guide for Beginners, (2<sup>nd</sup> ed), Singapore, Pearson Education

MECE&M Semester II		
Course Code	Course Name	Credits
CEMIE 2027	Institute level Elective: IPR & Patenting	03

#### Teaching Scheme

Contact Hours			Credits Assigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03	--	--	03	--	--	03

#### Evaluation Scheme

Theory			Termwork/Practical/Oral				Total Marks	
Internal Assessment			End Sem Exam	Duration of End Sem Exam	TW	PR		OR
Test 1	Test 2	Average						
20	20	20	80	03 Hrs.	--	--	--	100

#### Objectives:

- To understand intellectual property rights protection system
- To promote the knowledge of Intellectual Property Laws of India as well as International treaty procedures
- To get acquainted with Patent search and patent filing procedure and applications

Module	Detailed Contents	Hr
01	<b>Introduction to Intellectual Property Rights (IPR):</b> Meaning of IPR, Different category of IPR instruments - Patents, Trademarks, Copyrights, Industrial Designs, Plant variety protection, Geographical indications, Transfer of technology etc. <b>Importance of IPR in Modern Global Economic Environment:</b> Theories of IPR, Philosophical aspects of IPR laws, Need for IPR, IPR as an instrument of development	05
02	<b>Enforcement of Intellectual Property Rights:</b> Introduction, Magnitude of problem, Factors that create and sustain counterfeiting/piracy, International agreements, International organizations (e.g. WIPO, WTO) active in IPR enforcement <b>Indian Scenario of IPR:</b> Introduction, History of IPR in India, Overview of IP laws in India, Indian IPR, Administrative Machinery, Major international treaties signed by India, Procedure for submitting patent and Enforcement of IPR at national level etc.	07
03	<b>Emerging Issues in IPR:</b> Challenges for IP in digital economy, e-commerce, human genome, biodiversity and traditional knowledge etc.	05
04	<b>Basics of Patents:</b> Definition of Patents, Conditions of patentability, Patentable and non-patentable inventions, Types of patent applications (e.g. Patent of addition etc), Process Patent and Product Patent, Precautions while patenting, Patent specification	07

	Patentclaims,Disclosuresandnon-disclosures,Patentrightsandinfringement, Methodofgetting apatent	
<b>05</b>	<b>PatentRules:</b> Indianpatentact,Europeanscenario,USscenario,Australia scenario,Japanscenario,Chinesescenario,Multilateral treatieswhereIndiaisamember(T RIPS agreement, Paris convention etc.)	08
<b>06</b>	<b>Procedure for Filing a Patent (National and International):</b> Legislation andSalient Features, Patent Search, Drafting and Filing Patent Applications, Processingof patent, Patent Litigation, Patent Publication etc, Time frame and cost, PatentLicensing,PatentInfringement <b>Patentdatabases:</b> Importantwebsites,Searchinginternationaldatabases	07

#### **Outcomes:**

Studentswillbeable to...

- understand IntellectualPropertyassets
- assistindividuals andorganizationsin capacitybuilding
- workfor development,promotion,protection,compliance,andenforcementofIntellectualPropertyandPatent

#### **Assessment:**

##### **Internal:**

Assessmentconsistsoftwotestsoutofwhich,oneshouldbecompulsoryclasstestandtheotheriseitheraclasstest or at least 6 assignment on completesyllabus or courseproject.

##### **EndSemesterTheoryExamination:**

Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in questionpapers of end semester examination. **In question paper weightage of each module will be proportional tonumberofrespectivecturehours asmentionin thesyllabus.**

1. Questionpaperwillcompriseoftotalsixquestion
2. Allquestion carryequalmarks
3. Questionswillbemixedinnature(forexamplesupposedQ.2haspart(a)frommodule3thenpart (b)will bef from anymodule other than module3)
4. OnlyFourquestion needtobe solved.

#### **ReferenceBooks:**

1. RajkumarS.Adukia,2007,AHandbookonLawsRelatingtoIntellectualPropertyRightsinIndia,TheInstitu teof Chartered Accountants ofIndia
2. KeaylaBK,Patentsystemandrelatedissuesataglance,PublishedbyNationalWorkingGrouponPatentLaw s
3. TSengupta,2011,IntellectualPropertyLawinIndia,KluwerLawInternational
4. TzenWongandGrahamDutfield,2010,IntellectualPropertyandHumanDevelopment:CurrentTrendsand FutureScenario, CambridgeUniversityPress
5. Cornish,WilliamRodolph&Llewelyn,David.2010,IntellectualProperty:Patents,Copyrights,TradeMar ks and AlliedRight, 7<sup>th</sup>Edition,Sweet &Maxwell
6. LousHarns,2012,TheenforcementofIntellactualPropertyRights:ACaseBook,3<sup>rd</sup>Edition,WIPO
7. PrabhuddhaGanguli,2012,IntellectualPropertyRights,1stEdition,TMH
8. RRadhaKrishnan &SBalasubramanian,2012,IntellectualPropertyRights,1stEdition,ExcelBooks

9. MAshokKumarandmohdIqbalAli,2-11,IntellectualPropertyRights,2ndEdition,SerialPublications
10. KompalBansalandPraishitBansal,2012,FundamentalsofIPRforEngineers,1stEdition,BSPublications
11. EntrepreneurshipDevelopmentandIPRUnit,BITSPilani,2007,AManualonIntellectualPropertyRights,
12. Mathew Y Maa, 2009, Fundamentals of Patenting and Licensing for Scientists and Engineers, WorldScientificPublishingCompany
13. NSRathore,SMMathur,PritiMathur,AnshulRathi,IPR:Drafting,InterpretationofPatentSpecificationsand Claims, NewIndia PublishingAgency
14. VivienIrish,2005,IntellectualPropertyRightsforEngineers,IET
15. HowardB Rockman,2004,IntellectualPropertyLawfor Engineersandscientists,Wiley-IEEEPress

MECE&M SemesterII		
Course Code	Course Name	Credits
CEMIE 2028	Institutelevel Elective: Digital Business Management	03

#### Teaching Scheme

Contact Hours			Credits Assigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03	--	--	03	--	--	03

#### Evaluation Scheme

Theory					Termwork/Practical/Oral			Total Marks
Internal Assessment			End Sem Exam	Duration of End Sem Exam	TW	PR	OR	
Test 1	Test 2	Average						
20	20	20	80	03 Hrs.	--	--	--	100

#### Objectives:

- To familiarize with digital business concept
- To acquaint with E-commerce
- To give insights into E-business and its strategies

Module	Detailed content	Hrs
1	<b>Introduction to Digital Business-</b> Introduction, Background and current status, E-market places, structures, mechanisms, economics and impacts Difference between physical economy and digital economy, <b>Drivers of digital business-</b> Big Data & Analytics, Mobile, Cloud Computing, Social media, BYOD, and Internet of Things (digitally intelligent machines/services) Opportunities and Challenges in Digital Business,	09
2	<b>Overview of E-Commerce</b> <b>E-Commerce-</b> Meaning, Retailing in e-commerce-products and services, consumer behavior, market research and advertisement B2B-E-commerce-selling and buying in private e-markets, public B2B exchanges and support services, e-supply chains, Collaborative Commerce, Intra business EC and Corporate portals Other E-C models and applications, innovative EC System-From E-government and learning to C2C, mobile commerce and pervasive computing EC Strategy and Implementation-EC strategy and global EC, Economics and Justification of EC, Using Affiliate marketing to promote your e-commerce business, Launching a successful online business and EC project, Legal, Ethics and Societal impacts of EC	06
3	<b>Digital Business Support services:</b> ERP as e-business backbone, knowledge Top Apps, Information and referral system <b>Application Development:</b> Building Digital business Applications and Infrastructure	06
4	<b>Managing E-Business-</b> Managing Knowledge, Management skills for e-business, Managing Risks in e-business Security Threats to e-business- Security Overview, Electronic Commerce Threats, Encryption, Cryptography, Public Key and Private Key Cryptography, Digital	06

	Signatures, Digital Certificates, Security Protocol over Public Networks: HTTP, SSL, Firewall as Security Control, Public Key Infrastructure (PKI) for Security, Prominent Cryptographic Applications	
5	<b>E-Business Strategy</b> -E-business Strategic formulation-Analysis of Company's Internal and external environment, Selection of strategy, E-business strategy into Action, challenges and E-Transition (Process of Digital Transformation)	04
6	<b>Materializing business: From Ideo to Realization</b> -Business plan preparation Case Studies and presentations	08

#### Outcomes:

Students will be able to:

- Identify drivers of digital business
- Illustrate various approaches and techniques for E-business and management
- Prepare E-business plan

#### Assessment:

##### Internal:

Assessment consists of two tests out of which; one should be compulsory class test and the other is either a class test or at least 6 assignment on complete syllabus or course project.

#### End Semester Theory Examination:

Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. **In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.**

1. Question paper will comprise of total six questions
2. All questions carry equal marks
3. Questions will be mixed in nature (for example, supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only four questions need to be solved.

#### References:

1. A textbook on E-commerce, Er Arunrajan Mishra, Dr W K Sarwade, Neha Publishers & Distributors, 2011
2. E-commerce from vision to fulfilment, Elias M. Awad, PHI-Restricted, 2002
3. Digital Business and E-Commerce Management, 6<sup>th</sup> Ed, Dave Chaffey, Pearson, August 2014
4. Introduction to E-business-Management and Strategy, Colin Combe, ELSVIER, 2006
5. Digital Business Concepts and Strategy, Eloise Coupey, 2<sup>nd</sup> Edition, Pearson
6. Trend and Challenges in Digital Business Innovation, Vincenzo Morabito, Springer
7. Digital Business Discourse Erika Darics, April 2015, Palgrave Macmillan
8. E-Governance- Challenges and Opportunities in: Proceedings in 2<sup>nd</sup> International Conference theory and practice of Electronic Governance
9. Perspectives the Digital Enterprise—A framework for Transformation, TCS consulting journal Vol.5
10. Measuring Digital Economy-A new perspective-DOI: [10.1787/9789264221796-en](https://doi.org/10.1787/9789264221796-en) OECD Publishing

MECE&M Semester II		
Course Code	Course Name	Credits
ILOC2029	Institute level Elective: Environmental Management	03

#### Teaching Scheme

Contact Hours			Credits Assigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03	--	--	03	--	--	03

#### Evaluation Scheme

Theory					Termwork/Practical/Oral			Total Marks
Internal Assessment			End Sem Exam	Duration of End Sem Exam	TW	PR	OR	
Test 1	Test 2	Average						
20	20	20	80	03 Hrs.	--	--	--	100

#### Objectives:

- Understand and identify environmental issues relevant to India and global concerns
- Learn concepts of ecology
- Familiarize environment related legislations

Module	Detailed Contents	Hrs
I	Introduction and Definition of Environment: Significance of Environment Management for contemporary managers, Career opportunities. Environmental issues relevant to India, Sustainable Development, The Energy scenario.	10
II	Global Environmental concerns : Global Warming, Acid Rain, Ozone Depletion, Hazardous Wastes, Endangered life-species, Loss of Biodiversity, Industrial/Man-made disasters, Atomic/Biomedical hazards, etc.	06
III	Concepts of Ecology: Ecosystems and interdependence between living organisms, habitats, limiting factors, carrying capacity, food chain, etc.	05
IV	Scope of Environment Management, Role & functions of Government as a planning and regulating agency. Environment Quality Management and Corporate Environmental Responsibility	10
V	Total Quality Environmental Management, ISO-14000, EMS certification.	05
VI	General overview of major legislations like Environment Protection Act, Air (P & CP) Act, Water (P & CP) Act, Wildlife Protection Act, Forest Act, Factories Act, etc.	03

#### Contribution to Outcomes

Students will be able to...

- Understand the concept of environmental management
- Understand ecosystem and interdependence, food chain etc.
- Understand and interpret environment related legislations

### **Assessment:**

#### **Internal:**

Assessment consists of two tests out of which; one should be compulsory class test and the other is either a class test or assignment on live problems or course project.

#### **End Semester Theory Examination:**

Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. **In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.**

1. Question paper will comprise of total six questions
2. All questions carry equal marks
3. Questions will be mixed in nature (for example, if Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only four questions need to be solved.

#### **References:**

1. Environmental Management: Principles and Practice, C.J. Barrow, Routledge Publishers London, 1999
2. A Handbook of Environmental Management Edited by Jon C. Lovett and David G. Ockwell, Edward Elgar Publishing
3. Environmental Management, T. V. Ramachandra and Vijay Kulkarni, TERI Press
4. Indian Standard Environmental Management Systems— Requirements With Guidance For Use, Bureau Of Indian Standards, February 2005
5. Environmental Management: An Indian Perspective, S.N. Chary and Vinod Vyasulu, Macmillan India, 2000
6. Introduction to Environmental Management, Mary K. Theodore and Louise Theodore, CRC Press
7. Environment and Ecology, Majid Hussain, 3<sup>rd</sup> Ed. Access Publishing, 2015

SemesterII		
Course Code	Course Name	Credits
CEML201	Program Lab-II	01

TeachingScheme						
ContactHours			CreditsAssigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
--	2	--	--	1	--	01

EvaluationScheme								
Theory					Term Work/Practical/Oral			Total
InternalAssessment			EndSemExam	Duration ofEnd SemExam	TW	PR	OR	
Test1	Test2	Average						
--	--	---	---	---	25	--	25	50

Objectives
<ul style="list-style-type: none"> <li>• Apply spreadsheet (excel or other) tools to simplify complex civil engineering problems</li> <li>• Prepare site visit reports</li> <li>• Administer incentive schemes and devise training programs for construction managers</li> <li>• Valuate civil engineering structure</li> <li>• Read tender notices/contract documents and extract information from it</li> <li>• Formulate the conditions of contract for a particular project</li> <li>• Write technical papers in reputed journals</li> <li>• Summarizes technical articles</li> </ul>

Module	Description	Hrs
I	Minimum two site visits to study the feasibility aspects, tendering procedures, accounting systems, funds raising and other financial management aspects, billing procedures etc. associated with on-going major construction work-visit report to be submitted	16
II	Use of spread sheet and data base application software for performing various functions of civil engineers as mentioned below is to be demonstrated <ul style="list-style-type: none"> <li>• Quantity Estimation</li> <li>• Rate Analysis</li> <li>• Bid preparation</li> <li>• Material and supplier information</li> <li>• Employee / equipment information etc.</li> </ul>	04
III	Collection and study of tender notices, tender documents of contract document associated with Civil Engineering works. Exercise on contract document associated with Civil Engineering works.	02
IV	Exercise on Valuation: Valuation of land and building using various methods report to be submitted on prescribed format	02
V	Preparation of training program for site engineers based on competency mapping and training needs assessment	02
VI	Summarizing two articles related to construction engineering and	02

	management from reputed technical journals	
<b>VII</b>	One Assignment related to each subject	-

### **Contribution to Outcomes**

Students will be able to:

- Write effective project reports highlighting the pros & cons of the technologies envisaged for the project
- Apply spreadsheet (excel or other) tools to simplify complex civil engineering problems
- Administer incentive schemes based on the contribution of employee to previous projects and bridging gaps by devising training programs for construction managers by identifying their competency gaps
- Perform Valuation using various methods and arrive at actual present value of a civil engineering structure
- Read tender notices/contract documents and extract information from it and formulate the conditions of contract for a particular project
- Summarize technical articles and write technical papers in reputed journals

SemesterII		
Course Code	Course Name	Credits
CEMSBL201	Skill Based Lab-II	02

TeachingScheme						
ContactHours			CreditsAssigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
--	4	--	--	2	--	02

EvaluationScheme								
Theory					Term Work/Practical/Oral			Total
InternalAssessment			EndSemExam	Duration ofEndSemExam	TW	PR	OR	
Test1	Test2	Average						
--	--	--	--	--	50	--	50	100

Students will be able to:

- Understand the Concept Computerized Project management
- Study the Various Project management Software used in Construction Project
- Study Planning and managing database of Construction Project using Software

Module	Description	Hrs
<b>I</b>	<b>Computerized Project Management:</b> Introduction to Concepts of Advanced Construction Management using Softwares. Application and Case studies.	<b>03</b>
<b>II</b>	<b>Project management using MS-Project Software: Real Estate Project</b> Residential or Commercial building Project etc.	<b>06</b>
<b>III</b>	<b>Advanced Project Management using Primavera Software:</b> Infrastructure Projects (Hi-Rise Structure/Transportation Infrastructure/Hydropower Project etc.)	<b>10</b>
<b>IV</b>	<b>GIS Software for Project Management (Gram++, Arc GIS, Q-GIS etc.):</b> Applications of GIS software in Construction Database Management & Mapping.	<b>10</b>
<b>V</b>	<b>Building Information Modeling (BIM-Software) REVIT, TEKLA etc.:</b> Building information Modeling (BIM) & Revit Software in Construction Project.	<b>10</b>

**Term Work:** At least one Project Assignment must be prepared with the help of mentionedsoftwares to Submit for Term work

#### Contribution to Outcomes

On successful completion of the course, the learners will be able to:

- Explain Concept of Computerized Project management.
- Apply Project management Software (MS-Project) for Planning of Building Projects.
- Apply Advanced Project management Software (Primavera) for Planning of Infrastructure Projects.
- Execute the Planning and managing database of Construction Project using GIS Software.
- Illustrate the Principles of Building information Modeling (BIM) Software in Construction Project.

### **Recommended Books & Journal**

- 1) Computerized Project Management Manual
- 2) MS-Project Software & Manual
- 3) Primavera Software & Manual
- 4) BIM & REVIT Software & manual
- 5) Arc GIS, Q-GIS, Gramm++ Software & Manual
- 6) Open Source Project Management Software