SYLLABUS

OF

M.E. CIVIL (Construction & Management.)

w.e.f.

2013
### University of Pune

**M.E. Civil Engg. (Construction & Management) 2013 Course**

Course Structure

University of Pune, Document on Rules and Regulation for P.G. Courses be referred for the detailed information.

1 Credit = 2 Modules = 15 Hrs.

**SEMESTER – I**

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>Teaching Scheme</th>
<th>Examination scheme</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>In Semester Assessment</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lect./ Pract.</td>
<td>Paper</td>
<td>TW</td>
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<tr>
<td>501 021</td>
<td>Applications of Statistical Methods in Construction</td>
<td>4</td>
<td>50</td>
<td>50</td>
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<tr>
<td>501 022</td>
<td>Management and Project Planning in Construction</td>
<td>4</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>501 023</td>
<td>Construction Technology</td>
<td>4</td>
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<tr>
<td>501 004</td>
<td>Research Methodology</td>
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<td>501 024</td>
<td>* Elective I</td>
<td>5</td>
<td>50</td>
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<tr>
<td>501 025</td>
<td>Lab Practice I</td>
<td>4</td>
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</table>

| Total | 25 | 250 | 250 | 50 | 50 | 600 | 25 |

* Elective I - Students should select the combination of technical and interdisciplinary courses in order to complete 5 credits from following list.

#### 501 024 - Elective I

<table>
<thead>
<tr>
<th>Code</th>
<th>2 Credits Course</th>
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<th>Code</th>
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<tbody>
<tr>
<td>501 024A</td>
<td>Cyber Security / Information security</td>
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<td>Economics &amp; Finance For Engineers</td>
<td>501024K</td>
<td>Mass communication, Photography and Videography</td>
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<tr>
<td>501 024 B</td>
<td>Sustainable Construction Materials</td>
<td>501 024 G</td>
<td>Foreign Language –I</td>
<td>501024L</td>
<td>Yoga and Meditation</td>
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<td>Subject</td>
<td>Teaching Scheme</td>
<td>Examination scheme</td>
<td>Credits</td>
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<tr>
<td>501 024 C</td>
<td>Disaster Management</td>
<td>501 024 H</td>
<td>Engineering Ethics</td>
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<tr>
<td>501 024 D</td>
<td>Retrofitting of Structures</td>
<td>501 024 I</td>
<td>Intellectual Property Rights</td>
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<td>501 024E</td>
<td>Construction Safety</td>
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**SEMESTER –II**

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<thead>
<tr>
<th>Code</th>
<th>Subject</th>
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<td>501 026</td>
<td>Construction Contracts Administration and Management</td>
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<td>501 027</td>
<td>Project Economics and Financial Management</td>
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<td>501 029</td>
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** Elective II - Students should select the combination of technical and interdisciplinary courses in order to complete 5 credits from following list.

501 029 - Elective II

<table>
<thead>
<tr>
<th>Code</th>
<th>2 Credits Course</th>
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<tbody>
<tr>
<td>501 029A</td>
<td>Human Rights</td>
<td>501 029 E</td>
<td>Foreign Language II</td>
<td>501 029I</td>
<td>Performing Arts</td>
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<tr>
<td>501 029C</td>
<td>Material Management</td>
<td>501 029G</td>
<td>Green Building Design and Construction</td>
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<tr>
<td>501 029D</td>
<td>Value Engineering</td>
<td>501 029H</td>
<td>Forensic Civil Engineering</td>
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SEMESTER –III

<table>
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<th>Subject</th>
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<th>Examination scheme</th>
<th>Credits</th>
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<td>Lect./Pract.</td>
<td>Paper</td>
<td>TW</td>
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<td>In Semester</td>
<td>End Semester</td>
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<td>601 032</td>
<td>Environment and energy for sustainable construction</td>
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<td>601 033</td>
<td>TQM in Construction</td>
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<td>601 034</td>
<td>Elective III</td>
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*** Elective III - Students should select the combination of technical and interdisciplinary courses in order to complete 5 credits from following list.

601 034 - Elective III

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<th>Code</th>
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<tr>
<td>601 034A</td>
<td>Advanced Construction Technology</td>
<td>601 034</td>
<td>Project Risk Analysis &amp; Mitigation Techniques</td>
<td>601 034H</td>
<td>Chess</td>
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<tr>
<td>601 034B</td>
<td>Infrastructure Development</td>
<td>601 034 F</td>
<td>Foreign Language</td>
<td>601 034I</td>
<td>Abacus</td>
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<td>601 034C</td>
<td>International Contracting</td>
<td>601 034G</td>
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<td>601 034D</td>
<td>Thrust Areas in Project Management</td>
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SEMESTER –IV

<table>
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<tr>
<th>Code</th>
<th>Subject</th>
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<td></td>
<td>Lect./Pract.</td>
<td>Paper</td>
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<tr>
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<td>In Semester Assessment</td>
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<td>Oral/Presentation</td>
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UNIVERSITY OF PUNE
M.E. (CIVIL) (CONSTRUCTION AND MANAGEMENT)
SEMESTER I

501 021- Application of Statistical Methods in Construction

Teaching Scheme:
Lectures : 4 Hrs./Week
Credits : 4

Examination Scheme:
Theory Paper : 100 Marks
In Semester Assessment: 50 marks
End Semester Assessment: 50 marks
Duration: 3 hrs.

Module - 1
Probability: Probability theory and its importance: Definition of probability, Rules of
Probability, The Baye’s theorem. Random variable. Probability distribution. Mean or
Expectation of Random variable. Properties of Mean of Expectation.

Module –2
Distributions: Theoretical probability Distributions: Binomial Distribution, Poisson
distribution. Normal Distribution, Exponential Distribution, Beta, Gamma.

Module - 3
Sampling: Sampling and sampling distribution: Probability samples, Non-probability
samples, sample Random sampling, Other sampling schemes, sampling distribution and
standard error, some Sampling and Quality control. Use of concepts of standard deviation,
coefficient of variance, range in quality control of concreting and similar such activities.

Module -4
Testing: Testing Hypothesis: Sampling of distribution – Test based on Normal Distribution,
students- t test, chisquare, K-S test for goodness of fit and distribution. Analysis of variance-
one way & two way classification.

Module – 5
Correlation Analysis: Correlation types, co-efficients. Bi-variate Frequency Distribution,
Scatter Diagram, Correlation Analysis.

Module – 6
Regression Analysis: Regression and Multivariate Analysis, Multiple Regression Analysis-
Non linear Regression. Use of regression analysis in resources management.

Module - 7
Simulation: Simulation – Types, case studies in construction using simulation
techniques, simulation software’s used. Griffi’s waiting line Method.

Module - 8
Applications: Use of mathematical models based on probabilistic and statistical methods,
simulation in risk identification, analysis and mitigation of project risks. EOQ in civil
engineering, Sensitivity analysis, ABC analysis.

Reference Books
8. Applied Statistics for Civil and Environmental Engineers by Kottegaoda.- Stratford Books

UNIVERSITY OF PUNE
M.E. (CIVIL) (CONSTRUCTION AND MANAGEMENT)
SEMESTER - I

501 022-Management and Project Planning in Construction

Teaching Scheme :
Lectures :4 Hrs./Week
Credits : 4

Examination Scheme:
Theory Paper : 100 Marks
In Semester Assessment : 50 marks
End Semester Assessment : 50 marks
Duration : 3 hrs.

Module - 1
Basics of Management: Modern scientific management, Management Functions, Management Styles.

Module - 2
Project Management: Basic forms of organization with emphasis on Project and matrix structures; project life cycle, planning for achieving time, cost, quality, project feasibility reports based on socio-techno-economic-environmental impact analysis, project clearance procedures and necessary documentation for major works like dams, multi-storied structures, ports, tunnels, Qualities, role and responsibilities of project Manager, Role of Project Management Consultants, Web based project management.

Module - 3
Project Scheduling: Construction Scheduling, Work break down structure, activity cost and time estimation in CPM, PERT, RPM (Repetitive Project Modeling) techniques. LOB technique, Mass haul diagrams. Precedence Network Analysis, software in Construction scheduling (MSP, primavera, Construction manager).

Module - 4
Project Controlling: Monitoring and Control, Crashing, Resource Leveling, Updating.

Module - 5

Module -6
Work Study: Definition, Objectives, basic procedure, method study and work measurement, work study applications in Civil Engineering.
Method study – Definition, Objective, Procedure for selecting the work, recording facts, symbols, flow process charts, multiple activity charts, string diagrams.
Work measurement – Time and motion studies, Concept of standard time and various allowances, time study, equipment performance rating. Activity sampling, time-lapse photography technique, Analytical production studies.
Module - 7
- Safety Engineering: Causes of Accidents on various sites, safety measures and safety policies to be adopted, determination of safety parameters, personal protective equipments. Workmen Compensation Act.

Module - 8
Administration of Incentive Schemes: Necessity, Merit rating, job evaluation, installation, modification and maintaining of incentive schemes based on implementation experience.

Reference books

2. Construction Project planning & Scheduling By Charles Patrick, Pearson, 2012
5. Modern construction management—Harris, Wiley India.
8. Work study – Currie.
12. Construction Management – Roy, Pilcher

UNIVERSITY OF PUNE
M.E. (CIVIL) (CONSTRUCTION AND MANAGEMENT) SEMESTER I

501 023 - Construction Technology

Teaching Scheme:
Lectures : 4 Hrs./Week
Credits : 4

Examination Scheme:
Theory Paper : 100 Marks
In Semester Assessment : 50 marks
End Semester Assessment : 50 marks
Duration : 3 hrs.

Module - 1

Module - 2
Under water construction: Problems encountered. Underwater drilling, blasting, Grouting methods in soft and hard soil including Jet grouting and Chemical grouting, Dewatering in shallow and deep excavations using different methods, Vacuum Dewatering and Well point system.
Module - 3

**Construction using Concrete Technology:** Concrete – Various methods of shuttering, Ready Mix Concrete, Pumped Concrete, Concrete mix design with various methods of concreting and also underwater concreting using tremie method, Concreting for under water Construction.

Module - 4

**Pile Construction:** Piling – Single pile and a group piles (Bored and Driven) during driving, Working loads and ultimate loads on driven and cast-in-situ piles, Piles in land and marine structures. Construction details of precast piles, pre stressed piles, steel piles and friction piles. Pile Capacity - Load test on piles initial and routine, failure and causes, Methods of pile driving by Vibration and Construction of micro piles, Diaphragm Walls.

Module - 5

**Coffer Dams:** Cofferdams – types, design and construction of single, double wall. Cofferdam. Sheet pile cofferdams, concrete wall movable cofferdam, land cofferdams, soldier construction method. Cofferdam wall by ICOS method.

Module - 6

**Caissons:** Types, box, pneumatic and open caissons, Well foundations, details, design and construction of caissons.

Module - 7


Module - 8

**Construction Equipment:** Construction Equipments – Understanding basics and functions of Equipment Earthmoving Machinery, Concreting Equipment, Material Handling Equipment and Transportation of Equipments.

Minimum 1 Case study be discussed /analyzed in each of the above topics.

**Reference Books:**
1. Construction Technology: Analysis, and Choice, 2ed, Bryan, Wiley India
3. Construction Equipment Planning and Applications – Dr. Mahesh Varma
4. Brochures Published by various agencies associated with construction.
5. Journals such as CE & CR, Construction world, International Construction.
UNIVERSITY OF PUNE  
M.E. (CIVIL) (CONSTRUCTION AND MANAGEMENT)  
SEMESTER I  

501 004 : RESEARCH METHODOLOGY 

<table>
<thead>
<tr>
<th>Teaching Scheme</th>
<th>Examination Scheme</th>
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<tbody>
<tr>
<td>Lectures: 4 hours/week</td>
<td>In semester Exam: 50 Marks</td>
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<td>Credits 4</td>
<td>End Sem. Exam. : 50 marks</td>
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<td>Duration of End Sem. Exam: 3Hrs</td>
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Module 1:  
**Introduction to Research**  
Meaning of research, types of research, process of research, Sources of research problem, Criteria / Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem, formulation of research hypotheses. Search for causation.

Module 2:  
**Developing a Research Proposal**  
Format of research proposal, Individual research proposal, Institutional research proposal, Significance, objectives, methodology, Funding for the proposal, Different funding agencies, Framework for the planning.

Module 3:  
**Literature survey**  
Definition of literature and literature survey, need of literature survey, sources of literature, elements and objectives of literature survey, styles of literature survey, and strategies of literature survey.

Module 4:  
**Data collection, Measuring, Sampling and Scaling**  
Classification of data, benefits and drawbacks of data, evaluation of data, qualitative methods of data collection, methods of qualitative research, Sampling, sample size, sampling strategy, attitude measurement and scaling, types of measurements, criteria of good measurements, classification of scales.

Module 5:  
**Preliminary data analysis**  
Testing of hypothesis - concepts and testing, analysis of variance techniques, introduction to non-parametric tests, Validity and reliability, Approaches to qualitative and quantitative data analysis.

Module 6:  
**Advanced data analysis techniques**  
Correlation and regression analysis, Introduction to factor analysis, discriminant analysis, cluster analysis, multidimensional scaling, Descriptive statistics, Inferential statistics, Multidimensional measurement and factor analysis.

Module 7:  
**Report writing**  
Need of effective documentation, importance of report writing, types of reports, report structure, report formulation, Plagiarism.

Module 8:  
**Presentation of research**  
Research briefing, presentation styles, impact of presentation, elements of effective presentation, Writing of research paper, presenting and publishing paper, Patent procedure.

**Reference Books:**
2. Research Methods for Business—Sekaran—Wiley, India
5. Research Methodology: An Introduction’ by Wayne Goddard and Stuart Melville
7. Research in Education---John Best and James Kahn,Prentice Hall of India Pvt.Ltd.

---For class room ppts---www.wileyeurope.com/college/sekan

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**UNIVERSITY OF PUNE**

**M.E. (CIVIL) (CONSTRUCTION AND MANAGEMENT)**

**SEMESTER I**

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**501 024 : ELECTIVE –I**

**Teaching Scheme**

- Lectures: 5 hours/week
- Credits 5

**Examination Scheme**

- End Sem. Exam.: 50 marks
- Duration of End Sem. Exam: 3 Hrs.

*Elective I - Select any combination having total of 5 credits from following technical / interdisciplinary courses*

**501 024 - Elective I**

<table>
<thead>
<tr>
<th>Code</th>
<th>2 Credits Course</th>
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<td>501 024 E</td>
<td>Construction Safety</td>
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</table>
Module 1:

Module 2:
Intelligent Property Issues in Cyber space: Domain names and related issues, Copyright in digital media, Patents in cyber world.

Rights of Neitizens and E-Governance: Privacy and freedom issues in cyber world, E-Governance, Cyber crimes and Cyber laws.

Module 3:


Module 4:

Access Control, Intrusion Detection and Server Management, Firewalls:
Overview of Identification and Authorization, Overview of IDS, Intrusion, Detection Systems and Intrusion Prevention Systems, User Management, Overview of Firewalls, Types of Firewalls, DMZ and firewall features


Reference Books:

4) Vakul Sharma, Information Technology Law and Practice, Delhi Law House, 3rd Edn, 2011
501 024 –B –Elective I- Sustainable Construction Materials (2Credits course)

Module 1:
Necessity and importance of sustainable construction materials. Material composition and properties, production, storage, distribution, testing, acceptance criteria, limitations of use, economic consideration, recent development related to the following materials to be studied.

Module 2:
Various construction chemicals/admixtures, Fly ash and its use in concrete, Silica fume concrete, Self compacting concrete, Fiber Reinforced plastics and concrete, Light weight concrete

Module 3:
Crumb modified bitumen Rubber, Glenium Concrete, Materials used in nuclear-containment structures.

Module 4:
High performance concrete, Nano technology in cement concrete, Ferrocement

Reference Books:
1. Concrete Technology by Neville
2. Construction Materials, Methods & Techniques(3e) by William P Spence, Yesdee Publication 2012, Pvt. Ltd., Chennai, India
4. Concrete Technology by M.S.Shetty, S.Chand Publ.
6. New Building Materials and Construction World magazine
7. Ferrocement Construction Manual-Dr. D.B.Divekar-1030, Shivaji Nagar, Model Colony, Pune
8. Civil Engineering and Construction Review magazine
9. Engineering Materials –Dr. S.V.Deodhar

501 024 –C-Elective I - Disaster Management (2Credits course)

Module 1:
Disasters – Natures and extent of disasters, natural calamities such as earthquake, floods, drought volcanoes, forest, coasts hazards, landslides etc. Manmade disasters such as chemical and industrial hazards, nuclear hazards, fire hazards etc. Disaster Management – Financing relief expenditure, legal aspects, rescue operations. Casual management, risk management.

Module 2:
Emergency Management program – Administrative setup and organization. Hazard analysis, training of personnel, information management, emergency facilities and equipment necessary public awareness creation, preparation and execution of the emergency management program.

Module 3:
Various organizations registered with Government and NGO’s working for disaster relief- Challenges faced by organizations. Methods of assessment of impact of disasters such as photogrammetric methods, media survey, ground data collection.
Module 4:
International adopted practices for disaster mitigation. Rules and regulations, Monitoring aspects of disaster mitigations programs.

Reference Books:
1. An Introduction to Disaster Management – Natural Disasters and Man Made Hazards, S.Vaidyanathan, Ikon Books
2. Construction Engineering and Management – Seetharaman, Umesh Publ.
3. NICMAR Publications
4. Different sites on internet on disaster management
5. Project Management – K Nagarajan – New Age International Ltd.

501 024 – D-Elective I - Retrofitting of Structures (2 Credits course)

Module 1:
Importance of rehabilitation repairs and retrofitting as a part of construction engineering. Difference between the term. Rehabilitation studies of buildings, underground construction, bridges, streets and highways, sewage treatment plants – masonry work, R.C.C. works, steel structures- types of distress.

Module 2:
Numerical condition surveys for foundation, structural and functional deterioration, design criteria, materials and technology. Predictive performance models, evaluating alternatives based on technical, commercial, management, financial feasibilities, data collection and database management, maintenance of rehabilitated structures. Procedure adopted by BIFR (Board of Industrial and Financial Reconstruction).

Module 3:
Earthquake damages of buildings, their retrofitting, restoration, effects of earthquakes, response of buildings to earthquake motion, factors related to building damages due to earthquake, methods of seismic retrofitting, restoration of buildings.

Module 4:
New Construction materials, processes and techniques used for repairs, rehabilitation and retrofitting- Construction chemicals based on nanotechnology, construction points based on nanotechnology, various types of fibre wrappings etc.

Reference Books:
1. Technology of Building Repairs, Raikar R N
2. The Bombay Building Repairs & Reconstruction Board Act 1969, Govt. of Maharashtra
3. Maintenance & Repairs of Buildings, P.K.Guha
5. Construction, Maintenance & Restoration and Rehabilitation of Highway Bridges, K.S.Rakshit
Module 1:
Construction Safety Management – Role of various parties, duties and responsibilities of top management, site managers, supervisors etc. role of safety officers, responsibilities of general employees, safety committee, safety training, incentives and monitoring. Writing safety manuals, preparing safety checklists and inspection reports.

Module 2:
Safety in construction operations – Safety of accidents on various construction sites such as buildings, dams, tunnels, bridges, roads, etc. safety at various stages of construction. Prevention of accidents. Safety measures. Safety in use of construction equipment e.g. vehicles, cranes, hoists and lifts etc. safety of scaffolding and working platforms. Safety while using electrical appliances. Explosives used.

Module 3:
Various safety equipment and gear used on site. First aid on site, Safety awareness program. Labor laws, legal requirement and cost aspects of accidents on site, Incentive for safety practices.

Module 4:
Study of safety policies, methods, equipment, training provided on any ISO approved construction Company, safety in office, working on sites of high rise construction, deep excavation

Reference Books
4. ISI for safety in Construction – Bureau of Indian Standards.

501 024 -F  Elective –I - Economics and Finance for Engineers (1Credit Course)

Module 1:

Module 2:

Reference
1. As specified by the instructor
Module 1:
Introduction: Glimpse of France, life of French people (Culture, food, etc.), French alphabets, accent, etc., Unit zero of the Text Book (Grammar, Vocabulary, and Lesson), Exercise of Unit zero of Text Book & workbook

Module 2:
French Lessons: Brief revision, Unit-1 of the Text Book (Grammar, vocabulary), Unit-1, Lesson 1 of the Text Book, Exercise of Unit-1, Lesson 1 of the Text book & workbook

Reference
2. Jumelage-I workbook by Roopa Luktuke

Module 1:
Introduction: Meaning & scope of Ethics in general & for engineers in particular, Moral obligations and rules in engineering, Categories of moral, Work Culture, Corporate, local & global issues, Rights & responsibilities of Engineers, Conflicts in the profession, Mental Stresses & Emotional Intelligence

Module 2:
Code of Ethics for Engineers: First principles of Engineering Ethics & Ethical terminology, Social Values, Character, considerations for general Individuals, Engineers & the Society, Recommendations of the Professional bodies (Code of Conduct), Introduction to Copyright, IPR (Intellectual Property Right), Plagiarism & Legal issues

Reference

Module 1:
Introduction to Intellectual Property Rights

International Scenario
International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Module 2
Patent Rights

Recent Developments in IPR
Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies

Reference Books
3 Robert P. Merges, Peter S. Menell, Mark A. Lemley “Intellectual Property in New”,
**Elective –I (K) Mass communication, Photography and Videography**  
**(Audit Course—No Credits)**

**Module 1: Mass Communication - Theories & methods**

**Module 2: Photography and Videography**
Camera Basics, Still Photography, Lenses, Exposure, Composition, Colour. Shot Angle, Camera Movement, Light techniques and final printing.
Videography Basics – Video camera –types, mounting. Sound Basics, Film Sound appreciation, Sound Track analysis, Editing Basics, Fragmentation Juxtaposition: Frame, Shot, Sequence, Scene Time, Pace, Rhythm. Learning basic editing software and primary editing on available/given materials.

**Books**
5. Holman, Tomlinson, Sound for film and television, Focal Press
7. Talbot-Smith, Michael, Sound engineering explained, Focal Press
8. Talbot-Smith, Michael, Sound assistance, Focal Press
10. Truebitt, Rudy and David, Trubitt, Live sound for musicians,
11. Hal Leonard Nathan, Julian, Back to basic audio,
12. Newnes Yewdall, Lewis, David, Practical art of motion picture sound, Focal Press

**501 024 –L-Elective II - Yoga and Meditation**  
**(Audit course--Non Credit course)**

**Module1**

**Yoga:** Sukshma (subtle) yoga techniques, Difference between physical exercises and yogasans, Impact of yogasans on human body, benefits of yogasans, Patanjali yoga sutras, Technique of different yogasans like, Trikonasan, Ardhachandrasan, Padmasan, Akarnadhanurasan, Ardhamatsendrasan, Vajrasan, Pachhimottanasan, Bhujangasan, Shalbhasan, Dhanurasan, Naukasans, Makrasan, Pawanmuktasans, Halasan, Sarvangasan, Shavasan, Suryanamaskar( Sun Salutation), Yoga and Food.
Module 2  
**Meditation:** Breathing Technique, Pranayam, Benefits of Pranayam, Precautions for Pranayam, Kumbhak, Bandhi (Locks), Chakras, Mudra, Technique of Pranayam, Anulom-Vilom Pranayam, Ujjayi Pranayam, Bhramari Pranayam, Bhastrika Pranayam, Agnisar Pranayam, Kapalbhati Pranayam, Meditation (Dhyan).

**References Books:**  
1. *Light on Yoga:* by B.K.S. Iyengar, Harper Collins Publishers India  
3. *Yoga for Dummies* by Georg Feuerstein and Larry Payne, Wiley India publishing  
5. *Meditation - Science and Practice* by N. C. Panda, D. K. Printworld Publisher  
6. *YogPravesh* by Vishwas VMandlik, Yogchaitanya Prakashan  
7. *Asanand YogVigyan,* Bhartiya Yog Sansthan, Delhi  
8. *Pranayam Vigyan,* Bhartiya Yog Sansthan, Delhi  

**Reference Web Sites:**  
7. [http://www.yogaVision.net](http://www.yogaVision.net)  
8. [http://www.swamij.com](http://www.swamij.com)

**UNIVERSITY OF PUNE**  
**M.E. (CIVIL) (CONSTRUCTION AND MANAGEMENT)**  
**SEMESTER I**  

**501 025 Lab Practice – I**  

<table>
<thead>
<tr>
<th>Teaching Scheme</th>
<th>Examination Scheme</th>
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</thead>
<tbody>
<tr>
<td>Pract. 4 hrs./week</td>
<td>Oral : 50 Marks,</td>
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<tr>
<td></td>
<td>TW : 50 Marks</td>
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<td>Credits 4</td>
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</table>

----Term work should consist of any 6 assignments out of the first 8 .  
----Assignments 9, 10 are compulsory.  

1. Assignment on use of means of dispersion in quality control.  
2. Assignment on formulation of linear regression equation between a dependant variable and independent variable, applicable in construction.  
3. Working out total number of construction equipment necessary to complete a particular quality of item work in a particular time and determining its direct cost per MODULE-for construction equipment working in a group.
4. Assignment on showing the schematic of a pumped concrete layout and determining the total length of the pipe-line required, considering dependent factors.

5. Assignment on developing a precedence network, calculation of floats and project crashing.

6. Assignment on work study

7, 8. Any 2 assignments on Elective I

9. Site Visits Minimum Two site visits to study construction techniques and use of major construction equipment associated with ongoing major construction works. Visit Report to be submitted

10. Assignment on using MS Excel / MS Project software. Use of Priema Vera is recommended.

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UNIVERSITY OF PUNE

M. E. (CIVIL) CONSTRUCTION AND MANAGEMENT

SEMESTER-II

501 026-Construction Contracts Administration and Management

Teaching Scheme:
Lectures :4 Hrs./Week
Credits : 4

Examination Scheme:
Theory Paper : 100 Marks
In Semester Assessment : 50 marks
End Semester Assessment : 50 marks
Duration : 3 hrs.

Module 1
Construction Contracts :

a) Standard forms of contracts, methods of inviting tenders, pre-bid meetings, pre-qualification system, scrutiny of tenders and comparative statement.

b) Contract formation, conditions of contracts, contracts with various stakeholders on a major construction projects, contract pricing by the client, project management consultants and the contractor, contract performance, contract correspondence and contract closure.

Module 2
Construction Claims:
Extra items and causes of claims. Types of construction claims, documentation. settlement of claims, extension of time.

Module 3
Dispute Resolution:
Causes of disputes and importance of role of various stakeholders in prevention of disputes, Alternate Dispute Resolution methods- mediation, conciliation, arbitration and Dispute Resolution Boards.

Module 4
Contract Conditions:

b) ICE conditions-Introduction, FIDIC conditions- evolution of FIDIC document, types based on whether design is of employer or contractor, Design & Build contract, EPC contract, short forms of contract- Colour Code. Various conditions of Red Book.
Module 5
**Indian Contract Act (1872)**: a) Definition of the contract as per the ACT. Valid, Voidable, Void contracts, Objectives of the act.

b) Clauses 1 to 75- Contract formation, contract performance, valid excuses for non-performance, Breach of contract, effects of breach- understanding the clauses and applying them to situations/scenarios on construction projects. Importance of the Workmen’s Compensation Act on construction projects.

Module 6
**Arbitration**: Indian Arbitration And Conciliation Act 1996

Module 7
**Conciliation**: Conciliation and its provisions in the Act, Conduct of conciliation and arbitral proceedings, grounds for challenge. Arbitral award and its enforcement. Procedure of appeal against the awards.

Module 8
**Injunctions and Bailment**

a) Injunctions- Types, temporary, perpetual, mandatory.

b) Indemnity & Guarantee- difference between the two; Contracts of Guarantee & Indemnity. Consideration for Guarantee, Surety’s liability, discharge of surety. Bailment- Nature of transaction, delivery of bailee.

Reference Books:
UNIVERSITY OF PUNE
M.E. (CIVIL) (CONSTRUCTION AND MANAGEMENT)
SEMESTER II

501 027- Project Economics & Financial Management

Teaching Scheme:
Lectures : 43 Hrs./Week
Credits : 4

Examination Scheme:
Theory Paper : 100 Marks
In Semester Assessment : 50 marks
End Semester Assessment : 50 marks
Duration : 3 hrs.

Module

Module 2
Capital: Analysis of need for working capital, Estimation of requirements of working capital, Credit Management, Cash Management, Managing payments to suppliers and outstanding.

Module 3
Economic Analysis: Cost implication to different forms of construction and maintenance and replacement lives of material, Installation and running cost of services, Capital investment in project, Cost analysis by traders and by functional element, Cost planning techniques, Cost control during design and Construction, Depreciation, Various Appraisal Criteria Methods. Break-even analysis, Cash flow analysis, Risk Analysis and Management Practice, Role of Lender’s Engineer.

Module 4

Module 5

Module 6

Module 7
Construction Accounts: Accounting process, preparation of profit and loss account and balance sheet as per the companies Act, 1956, preparation of contract accounts for each project, methods of recording and reporting site accounts between project office and head office, Ratio Analysis. Escrow Account for PPP Project.

Module 8
Case Studies: Case studies for 1)BOT 2) Dams 3) Mass Transit System 4) Infrastructure Projects 5) Government Funded Projects with respect to a) Project Appraisal b) Raising of funds c) Cost to complete analysis.
Reference Books
1. Construction project scheduling and control ----Mubarak, Wiley India.

UNIVERSITY OF PUNE
M.E. (CIVIL) (CONSTRUCTION AND MANAGEMENT)
SEMESTER II
501 028 -Operations Research

Teaching Scheme :
Lectures :4 Hrs./Week
Credits : 4

Examination Scheme:
Theory Paper : 100 Marks
In Semester Assessment : 50 marks
End Semester Assessment : 50 marks
Duration : 3 hrs.

SECTION-I

Module - 1
Use of Operations Research in Civil Engineering and Managerial Decision making process. Introduction to Optimization Techniques and their application in Engineering Planning, Design and Construction. Various models; Objective function and constraints, convex and concave functions, regions and sets.

Module - 2
Linear programming: Formulation of Linear optimization models, Civil engineering applications. Simplex method, special cases in simplex method, Method of Big M, Two phase method, duality, sensitivity analysis.

Module - 3
Module - 4
(a) Dynamic programming: Multi stage decision processes, Principle of optimality, Recursive equation, Application of D.P.
(b) Decision theory.

Module - 5
Non-Linear programming: Single variable unconstrained optimization – Local & Global optima, Uni-modal Function- Sequential Search Techniques: Dichotomous, Fibonacci, Golden Section methods.

Module - 6
Multivariable optimization without constraints-The gradient vector and Hessian Matrix, Gradient techniques, steepest ascent/decent technique, Newton’s Method.
Multivariable optimization with equality constraints-Lagrange Multiplier Technique.

Module - 7
(a) Queuing Theory, Simulation.
(b) Sequencing model – n jobs through 2, 3 and M machines.

Module - 8
(a) Economic Analysis, mathematics of finance, benefit cost analysis.
(b) Replacement models.

Reference Books
1. Operations Research by Hamdy A.Taha
3. Engineering Optimization—Methods and Applications—Ravindran, Wiely
5. Quantitative Techniques in Management by N.D. Vohra
6. Principles of Construction Management by R. Pilcher
7. Operations Management by E.S. Buffa
10. Operation Research – Hira and Gupta, S.Chand
**Elective II** - Students should select the combination of technical and interdisciplinary courses in order to complete 5 credits from following list.

<table>
<thead>
<tr>
<th>Code</th>
<th>2 Credits Course</th>
<th>Code</th>
<th>1 Credit Course</th>
<th>Code</th>
<th>Audit Course (No Credit Course)</th>
</tr>
</thead>
<tbody>
<tr>
<td>501 029C</td>
<td>Material Management</td>
<td>501 029G</td>
<td>Green Building Design and Construction</td>
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<td></td>
</tr>
<tr>
<td>501 029D</td>
<td>Value Engineering</td>
<td>501 029H</td>
<td>Forensic Civil Engineering</td>
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</tbody>
</table>

**501 029 -A -Elective II Human Rights (2 Credits course)**

**Module 1:**

**Human Rights – Concept, Development, Evolution**
- Philosophical, Sociological and Political debates
- Benchmarks of Human Rights Movement.
**Human Rights and the Indian Constitution**
- Constitutional framework
- Fundamental Rights & Duties
- Directive Principles of State Policy
- Welfare State & Welfare Schemes

**Module 2:**

**Human Rights & State Mechanisms**
- Police & Human Rights
- Judiciary & Human Rights
- Prisons & Human Rights
- National and State Human Rights Commissions
Module 3:

**Human Rights of the Different Sections** and contemporary issues
- Unorganized Sector,
- Right to Environment, particularly Industrial sectors of Civil Engineering and Mechanical Engineering.
- Globalization and Human Rights
- Right to Development,

Module 4:

**Citizens’ Role and Civil Society**
- Social Movements and Non-Governmental Organizations
- Public Interest Litigation

- Role of Non Government organizations in implementation of Human rights.
- Right to Information

**Human Rights and the international scene** – Primary Information with reference to Engineering Industry. (2 hrs)
- UN Documents
- International Mechanisms (UN & Regional)
- International Criminal Court.

References:

1. Study material on UNESCO, UNICEF website
3. Introduction to International Humanitarian Law by Curtis F. J. Doebbler - CD Publishing

Internal assessment:

i) Assignments based on topics from syllabus and case studies as applicable to relevant discipline of Engineering.

ii) Power point and oral presentation based on of selected topic from syllabus.

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**501 029-B-Elective II  Human Resource Management  (2 Credits course)**

Module - 1

**Introduction:** Need of HRD in the context of globalization, various HRD parameters viz. performance appraisal, potential appraisal, training rewards and recognition etc. Elements of the ICDP i.e. integrated construction development paradigm, key elements of HRD such as basic literacy, functional skills, supervisory skills, entrepreneurship skills. Personal Management – Concept of Personal Management, Role and Function of Personal Manager, Necessity of Personal Management.

Module - 2

**Training:** – Training of multi-skilled workforce, quality, productivity and employee relations in construction, training of engineers related to issues such as management capabilities, formation
of joint ventures, privatization and BOT type of systems. CIDC – IGNOU Training programs.

**Module – 3**

**HRD department and HRM:** Structure of department, personal office at head office and project site, personal selection, placement, training, transfer, promotion, retirement, health, welfare, working conditions, relation with other departments, workers participation in management, distinct processes associated with human resource management viz. sourcing, outsourcing, de-centering, flexi working, multi-skilling issues related with subcontracting.

**Module – 4**

**Manpower calculations:** Techniques of manpower planning, Estimation of manpower for company project, Manpower estimation at various stages, considering Risk due to Lead – time. Remuneration – Remuneration of personal, Job evaluation, performance appraisal, merit – rating, various methods of deciding the Remuneration.

**Reference Books**

1. Human Resource Management by Biswajeet Pattanayak
2. Managing Human Resources by Bohlander & Snell

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**501 029—C- Elective II --Materials Management (2 Credits course)**

**Module – 1**

**Importance of Materials Management:** Importance of material management and its role in construction industry-scope, objectives and functions, Integrated approach to materials management, Role of materials manager.

**Module - 2**

**Codification and procurement:** Classification and Codification of materials of construction. ABC analysis-Procedure and its use, Standardization in materials and their management, Procurement, identification of sources of procurement, vendor analysis. Vendor analysis concept of (MRP) Material requirement planning, planning, purchase procedure, legal aspects.

**Module - 3**

**Inventory and Stores Management:**

(a) Inventory Management – Inventory Control techniques. EOQ, Advantages and limitation of use of EOQ, Periodic ordering, order point control, safety stock, stock outs, application of AC analysis in inventory control, concept of (JIT)- Just in time management, Indices used for assessment of effectiveness of inventory management.

(b) Stores Management : Receipt and inspection, care and safety in handling, loss on storage, wastage, Bulk purchasing, site layout and site organization, scheduling of men, materials and equipment.

**Module –4**


Use of (MMS) – Materials Management Systems in materials planning, procurement, inventory, control, cost control etc.
Reference Books
1. Purchasing and Inventory Control- by K. S. Menon, Wheeler Publication.

501 029—D- Elective II Value Engineering and valuation (2 Credits course)
Module – 1
Value Analysis
Value : Meaning of value, basic and secondary functions, factor contributing to value such as aesthetic, ergonomic, technical, economic : identifying reasons or unnecessary costs :
Value Analysis : 10 Commandments of value analysis; value analysis team; principles of value analysis, elements of a job plan viz. orientation, Information, presentation. Implementation, follow
up action, benefits of value analysis, various applications; assessing effectiveness of value analysis.
Module – 2
Life cycle costing:Life cycle costing – Forecasting of Capital as well as operating & maintenance costs, time value, present worth analysis, DCF methods, ROR analysis, sensitivity analysis. Different methods of performing value engineering.
Module - 3
Valuation:Types of value, purposes of valuation factors affecting value. Different methods of valuation for different types of assets such as land and building, horticulture, historical places.
Module – 4

Reference Books
1. Value Engineering: Analysis And Methodology By Del Younke
5. Estimating, Costing Specifications & valuation in Civil EngineeringBy: M.Chakraborty Published By: Author.
7. Estimating and Costing By: Rangwala Published By: Charotar Publishing House,

501 029—E-Elective II-- Foreign Language –II French-II (1 Credit course)
Module 1
French Grammar and Vocabulary: Unit-1, Lesson 2 of the Text Book (Grammar & Vocabulary), Unit-1, Lesson 1 of the Text Book, Exercise of Unit-1, Lesson 2 of the Text Book & workbook.
Module 2
Advance Vocabulary, Writing & Speaking: Unit-1, Lesson 3 of the Text Book (Grammar & Vocabulary), Unit-1, Lesson 3 of the Text Book, Exercise of Unit-1, Lesson 3 of the Text Book & workbook, Revision & speaking practice.
Reference
2. Jumelage-I workbook by Roopa Luktuke

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501 029—F—Elective II Building Services and Maintenance
(1 Credit course)

Module 1
Integrated design: factors affecting selection of services/systems, Provision of space in the
building to accommodate building services, Structural integrity of building services equipment.
Sound and vibration attenuation features, Provisions for safe operation and maintenance,

Building services engineering system for intelligent buildings: Introduction to information
transmission systems, communication and protection system, call systems, public address
system and Building automation/management systems.

Module 2
The concepts and importance of energy conservation and energy efficiency for environmental
protection, environmental protection and maintenance of building services systems, selection of
environmentally friendly products and materials used in building services systems.

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

Reference books
   Society,Gen A.K.Vaidya Marg, Goregaon (E),Mumbai-65
2. Building Maintenance Management, 2ed,---Chanter, Wiley India

(1 Credit course)

Module 1
Principles of Sustainability, Energy Conservation and Water Conservation
Introduction to Course, Sustainability, Major Environmental Challenges, Global Warming,
Introduction to Green Buildings; LEED, Sustainable Urban Development.
Building energy system strategies, Energy Conservation in Buildings, HVAC Systems, Energy
and Atmosphere - LEED Credits, eQuest Energy Simulations, Conducting an Energy Audit,
Fossil Fuels vs. Renewable Energy.
Water Conservation in Buildings, Storm Water Harvesting and Management, Water cycle
strategies.
Module 2

**Green Materials and Green building codes**
Green Construction Materials, Materials and Resources - LEED Credits, Building Deconstruction, C&D Recycling, Indoor Environmental Quality – Basic, IEQ - LEED Credits, Building Commissioning, Materials selection strategies

**Reference Books** --
3. Energy Conservation Building Code (ECBC)

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**501 029- H--Elective II -- Forensic Civil Engineering** (1 Credit course)

**Module 1**
Introduction to forensic engineering, Forensic investigations-tools and techniques, Failures-types, causes and mechanisms, Monitoring and instrumentation, Mitigation of failure.

**Module 2**
Professional practice and ethics, Legal issues, Repairs and remediation, Risk and risk assessment, Assessment of damage, Case studies.

**References**
Proceedings, Conference on Forensic Civil Engineering, Association of Consulting Civil Engineers(I), August, 2013

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**501 029—I-Elective II -- Performing Arts – Music and Dance** (Audit course--Non Credit course)

**Module 1:**
**Indian Music**
Experiencing ethos and bliss by listening to performances of various reputed artists.
Experiencing oneness with nature and the super power by performing individually or in a group.

**Module 2:**
**Indian Classical Dance**
Types – Kathak, Bharatnatyam, Kuchipudi, Odiss etc. Importance of “Abhinaya” (acting) in dance. Role of “Taala” and “Laya” in dance. Various dance form. Various gharanas in traditional dance types Fusion with other dance styles. Experiencing the Indian cultural power through individual and group performances.

**Books/Audio CD**
5. Anup Rag Vilas by Pt. Kumar Gandharava, Bandishes composed and sung by author mostly available on cassettes Swarganga Foundation.
7. Introduction to Bharata’s Natyashasatra by Adya Rangacharya, Munshiram Manoharlal publication.
8. Art of Dancing classing and folk dance by priyabala Shah, Parimal publication

501 029 – J -Elective II -- Principle Centered Leadership
(Audit course--Non Credit course)

Module 1 :
Motivation, Leadership and Competency
   a) Motivation:--
   b) Competency Mapping:-

Module 2 :
Entrepreneurship and strategic Management

   b) Strategic Management:

Reference Books
1. Seven habits of highly effective people—Stephen Covey—Franklin Covey Publications
2. Living the seven habits Stephen Covey—Franklin Covey Publications
3. 8th Habit – from effectiveness to greatness Stephen Covey—Franklin Covey Publications
5. Human Resources Management & Human Relations, V P Michael, Himalaya
7. Construction project Management, integrated approach—Feedings First Indian Reprint 2011—Yesdee publications
8. Cases in Strategic Management, Amita Mital, Tata Mcgraw Hill
UNIVERSITY OF PUNE
M.E. (CIVIL) (CONSTRUCTION AND MANAGEMENT)
SEMESTER II

501 030 Lab Practice II

Teaching Scheme
Pract. 4 hrs./week

Examination Scheme
Oral : 50 Marks,
TW :: 50 Marks
Credits 4

Term work should consist of any 6 assignments out of the first 8, assignments 9 and 10 are compulsory.

1. Assignment on study on a tender/contract document on Civil Engineering Work.
2. Assignment on preparation of comparative statement for an item rate contract.
3. Assignment on project cash flow statement and its evaluation using at least 2 methods.
5. Assignment on use of linear programming
6. Assignment on use of Transportation Model.
7,8. Any 2 assignments on Elective-II
9. 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.
10. Assignment on any one software used - An estimation and tendering software /primavera software / ERP software. Students are required to operate the software; The demonstration of software is not expected.
Term work should consist of spiral bound report on any technical topic of interest associated with the post graduate course and should be submitted in a standard format having the following contents.

i. Introduction
ii. Literature Survey
iii. Theoretical contents
iv. Field Applications, case studies
v. Relevance to the present national and global scenario of construction industry
vi. Strengths and weaknesses of the particular area of seminar
vii. R & D in the particular area
viii. Benefit cost studies – feasibility studies
ix. Vendors associated
x. Conclusions
xi. References

Students should prepare a power point presentation to be delivered in 15 minutes and should be able to answer questions asked in remaining five minutes.

Wherever possible, the topic for the seminar-I may be decided on the dissertation work to be done in semester III & IV.
UNIVERSITY OF PUNE  
M. E. (CIVIL) CONSTRUCTION AND MANAGEMENT  

SEMESTER - III  

601 032-Environment & Energy for Sustainable Construction  

Teaching Scheme :  
Lectures : 4 Hrs./Week  

Examination Scheme:  
Theory Paper : 100 Marks  
Credits : 4  
In Semester Assessment: 50 marks  
End Semester Assessment: 50 marks  
Duration: 3 hrs.  

Module –1  
Environment and its impact:  
Concept of Environment & Environmental Impact Factors & area of consideration for Mega Projects such as Airports, Highways, Power Projects, Water Related Projects. 3E’s Environmental Economics, Ethics & Ecology of sustainable development.  

Measurement of Environmental & Socio Economic Impact & Other concepts: Natural/Physical Environmental Impacts, Social Impacts, Economic Impacts Concept of Significance Effect, Commitments of resources.  

Module –2  
Socio Economic Impacts: Physical, Social, Aesthetic and Economic Environment, Type of Socio economic Impacts, Outline of basic steps in performing the socio economic assessment, Fiscal Impacts Analysis  

Module –3  
Environment and pollution Control Laws:  

Module-4  
Moduleed nations Framework Convention on Climate change (UNFCC), Protocol, Conference of Parties (COP), Clean Development Mechanism (CDM), Prototype Carbon Funds (PCF), Carbon credits and its trading, Benefits to developing countries  

Module –5  
Energy Efficient Projects & Financing of energy Efficiency Projects:  
Energy efficient Projects, Evaluation of energy efficient projects, Various ways of financing Energy efficient projects, Role of Financial Institutions and corporate banks, Deferred Payment Financing , Types of energy Performance Contracts, Energy Services Companies (ESCOs), and their role, Emphasis on ESCOs  

Module -6  

Module –7  
Systems-Preliminary investigation- goals and policies –energy audit-types of wastage-priority of conservative measures- maintenance of energy program.

Module –8


Reference Books:
7. Financing Energy Efficiency: Forging The Link
9. Public Procurement Of Energy Efficiency Services Lessons From International Experience by Jas Singh, Dilip R. Limaye, Brian Henderson, And Xiaoyu Shi

UNIVERSITY OF PUNE
M.E. (CIVIL) (CONSTRUCTION AND MANAGEMENT)
601 033 TQM in Construction

Teaching Scheme :
Lectures :4 Hrs./Week

Examination Scheme:
Theory Paper : 100 Marks
Credits : 4
In Semester Assessment: 50 marks
End Semester Assessment: 50 marks
Duration: 3 hrs.

Module –1

Concept of Quality:
Definition of quality as given by Deming, Juran, Crosby, difference between Quality control, Quality Assurance (QA/QC). Total quality control (TQC) and Total Quality Management (TQM), Need for TQM in construction industry.
Organization necessary for implementation of quality, Quality manual-Contents, data required, preparation, responsibility matrix, monitoring for quality- PDCA Cycle. Quality aspects in every phase in the life cycle of Construction project.
Module-2

Quality Control tools and statistical quality Control:

(A) Histogram, Pareto diagram, Fishbone diagram. Quality control chart-Testing required for quality control of construction material used in RCC Work- destructive and Non destructive Test (NDT)

(B) Statistical Quality Control- Necessity, Benchmarking, Application of dispersion methods in quality control of construction activity.

Module –3

Training and development of Human Resources:
Training needs assessment, technical and managerial competencies necessary for achieving quality, preparation for training. Training on Project Rework Reduction Tool (PRRT) software- training for preparation of checklist necessary for RCC work, for commonly used formats.

Module –4

Development of quality circles, quality inspection team, inspection reports, monitoring and control, 360° feedback for quality.

Module –5

Study of ISO 9004- Quality System Standards.
Eight Principles of ISO-Basic meaning, applying these principles for an effective quality process in the organization. Management support and commitment necessary for achieving implementation for quality system standards.

Module –6

Achieving TQM on Construction Projects:
Advantages, barriers, principles, steps in implementation, seven types of construction defects. Determining cost of poor quality including hidden cost.
Quality functions deployment (QFD). Importance of third party quality audits. CIDC-CQRA quality rating systems, customers satisfaction surveys, Non Conformity reports (NCR), remedial strategy for reducing NCR’s.

Module –7

Six Sigma:
Definition of six sigma, evolution – Historical aspects, probability distribution Six sigma ratings, Six sigma training, six sigma as an effective tool in TQM.

Module –8

Application of Six Sigma tool to:

(i) RCC Work in building
(ii) DLC and PQC layers in road construction.
(iii) Assessment of overall construction process from concept to completion of a construction project.

Reference Books

1. International Standards Organization – ISO 9001 and ISO 9004
4. Probability and Statistics for Engineers – Miller, Freund-Hall, Prentice India Ltd.
*** Elective III - Students should select the combination of technical and interdisciplinary courses in order to complete 5 credits from following list.

601 034 -- Elective III

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601 034 – A - Elective III Advanced Construction Technology (2 Credits course)

Module 1
Construction of power generating structures – Atomic Power stations, Thermal power stations, Windmills, Transmission towers, Chimneys (single and multi-flue), cooling towers - Natural draft cooling towers (NDCT) & Induced draft cooling tower (IDCT), Ash handling system, Containment Structure, Electro Static Precipitator (ESP), Case study of Kaiga atomic power station, Madras atomic power station.

Module 2
Bridges, Steel Bridges, Arch Bridges, Cantilever Bridges Segmental construction & Box Girders. Construction of special type of bridges such as cable stayed bridge, suspension and Pre-stressed bridge, construction of foundation and Super structure. Off shore structure such as Beacons, Oil drilling Platforms. Dredging equipment and techniques for construction of Channels and Islands.

Module 3
Construction of Metro Railway - Underground and over ground structures, different methods and techniques of construction. Problems and solutions – during maintenance and up-keep of structures. Fire, Ventilation, Dewatering- power supply, Subsidence, Vibration etc.

Module 4
High rise buildings – Construction methods and techniques using in-situ concrete, Precast Concrete & Structural Steel, finished concrete, tunnel form, fire Fighting, Safety. Innovative methods of construction – Slip form technology, Jump form technology, Dry wall technology, Plastering Machines.
Reference Books:
3. Construction Equipment Planning and Applications – Dr. Mahesh Varma
4. Manuals, brochures, publications from construction companies, firms etc.
5. Reports of actual works executed.
6. NICMAR Publications on Construction Engineering.

601 034—B--Elective III -- Infrastructure Development (2 Credits course)

Module—1
Construction Industry:
Nature, characteristics, size and structure. Role of infrastructure development in employment generation and improving of the National economy. Various Agencies associated with infrastructure development in India as regards various sectors.

Module—2
Status of Infrastructure in India:
Road sector, Port, Railway, communication, water supply and drainage, Power sector, oil and gas industry, Health and educational services. Infrastructure Development, Indian budget and its relation with Infrastructure development projects in India. Various programs related with Infrastructure development in rural and urban sector.
Public Private Partnership (PPP) in Infrastructure, Draft Concession Agreement for PPP projects, Escrow Agreement.

Module—3
Issues related to infrastructure development – pre – requisites necessary to ensure success for switching over from public sector management to private sector management, issues in developing, funding and managing infrastructure projects, role, responsibility of project management consultants. FDI in Infrastructure development, Problem areas and solutions.

Module – 4

Reference Books
2. India Infrastructure Report – Rakesh Mohan
3. Infrastructure Today - Magazine
4. Document of five year plans, published by Govt. of India.
6. Infrastructure Development in India by Rajarshi Majumder Rawat Publications – 2010
8. Indian Highways – Journals
601 034- C- Elective III - International Contracting (2 Credits course)

Module – 1
International contracting – meaning, scope, nature, present status of the International construction market, role of Asia-Pacific region countries in the present construction development. Impact of WTO/GATS on the Indian Construction Sector as regards domestic market and export sector. Selection of personnel to suit socio-economic-environmental culture in other countries, suitable organizational structure.

Module – 2
Study and application of various conditions of contract under the FIDIC document. Development of regulatory framework. Project exports from India. International financing: Various institution such as WB, IMF, ADB. African bank etc. and their role, rules – regulations in funding various projects, forming alliance, bilateral and multilateral funding, trade practices etc.

Module – 3
International Projects – Types of BOT systems such as BOT, BOOT, BOO, DBO, BOR, BLT, BRT, BTO & DBFOT, MOOT, ROO, ROT, BOLT – Contractual procedures, special features, methods of handling.

Module – 4
Disputes Resolving – International Courts, formation of DRB’s (Dispute resolving boards) functioning and experiences in India and abroad, Advantages of DRB’s UNICTRAL Proceedings for International Arbitration. Institutionalized Arbitration, CIDC – SIAC Arbitration. CASE studies of any 2 major project executed/functioning under International contracting.

Reference Books:
1. A Short Course in International Contracts: Drafting the International Sales by By Karla C. Shippe: world trade press
2. FIDIC documents
Module—1
Project Pre-planning and Partnering
a) Project preplanning:-
   Project Influence cost diagram. Need for project preplanning in the context of time and cost overruns, reduction in economic benefits. Definition selecting pre-planning team and evaluation of alternatives. Decision whether to invest in project design Concept of PDRI—Project definition rating index. PDRT for residential and industrial buildings. Utility of PDRI with respect to benchmarking. Any case study on Project pre—planning.
b) Project partnering:-
   Delimitation, partnering as an effective risk sharing mechanism, partnering charter, partnering workshop. Advantages of partnering role in preventing construction disputes, risk management and QM. C Critical success factors for implementation Any case study on project partnering.
Module-2
S. W. O. T. analysis and S. C. M
a)S. W. O. T
b) S. C. M.
   Supply Chain Management. Concept of Supplier and customer in context of ISO. Identifying the chain associated connecting various processes between the supplier and the customer in context of construction project. Management strategy for implementing S. S. C. M. in construction organizations and on construction projects. Benefits of S. C. M.
Module-3
Critical Chain Management (CCM) and Fast Track Construction
Critical Chain Management (CCM):--
   Concept of critical chain in construction projects based on the theory of constraints. Developing critical chain plans for a single project and multiple projects. Measuring, monitoring and controlling the critical chain. Advantages of CCM.
Fast Track Construction:--
Module--4
Earned Value Analysis and Project Reporting
Earned Value Analysis:--
   Definition of earned value. Importance of Earned value analysis. Concepts of cost variance, schedule variance, cost performance index and schedule performance index methods of determining earned value viz. Ratio method, repetitive type work package method, Complex construction work package method, start or finish method. Accounting practices for determining the earned value.

Project Reporting
Reporting requirements of particular specifications. Use of project management software’s in reporting. Study of sample project reports.

Reference Books
1. Pre-project planning handbook—published by Construction Industry Institute (CIT) USA. ASCE journal papers on project pre-planning to be used. ASCE journal papers on project partnering to be used.

601 034-E-Elective III Project Risk Analysis and Mitigation Techniques
(1 Credits course)

Module – 1 - Risk analysis

Dealing with uncertainties
Sensitivity analysis, scenario analysis simulation, decision tree analysis, risk profile method, certainly equivalent method; risk adjusted discount rate method, certainty index method, 3 point estimated method.

Module – 2
Coverage of risk through CIDC’s MOU with the Actuarial Society of India through risk premium such as (BIP) – Bidding Indemnity Policy (DIMO) – Delay in meeting obligation by client policy, (SOC) – Settlement of claims policy (LOP)- Loss of profit policy (TI). Transit Insurance policy (LOPCE) Loss of performance of construction equipment policy.

Reference Books
2. Industrial Engineering And Management Of Manufacturing Systems.- Dr.Surendra Kumar Satya Prakashan
3. RAMP Handbook By Institution Of Civil Engineers And The Faculty And Institute Of Actuariesthomas Telford Publishing, London.
7. Construction Management Practice, Dr.V.K.Raina, Shroff Publ.
601 034—F-Elective III French-III
(1 Credit course)

Module 1:
French Grammar and Vocabulary: Unit-1, Lesson 4 of the Text Book (Grammar & Vocabulary), Unit-1, Lesson 4 of the Text Book, Revision & speaking practice

Module 2:
Advance Vocabulary, Writing & Speaking, Exercise of Unit-1, Lesson 4 of the Text Book & workbook, Practicing Simple conversation in French, Revision & practice of conversation (Simple questions & answers)

Reference: Jumelage-I Text Book by Manjiri Khandekar & Roopa Luktuke
Jumelage-I workbook by Roopa Luktuke

601 034—G--Elective III - Safety Practices in Construction
(1 Credit course)

Module 1:
Introduction to Construction Safety And Safety Technology—Introduction to construction safety; historical background and current perspective; Government's policy in industrial safety; safety & health legislation in India, Construction Sites (Safety) Regulations; Codes of practice; Potential hazards/risks associated with construction sites and high risk activities such as the use of hoist, Working at height and working in confined space. Safety in typical civil structures – Dams-bridges-water Tanks-Retaining walls-Critical factors for failure-Regular Inspection and monitoring. Safety in Erection and closing operation - Construction materials –Specifications – suitability – Limitations – Merits and demerits – Steel structures –Concrete structure. Workplace ergonomics including display screen equipment and manual handling, personal protective equipment, first aid and emergency preparedness, fire safety, electrical hazards.

Module 2:
Construction Safety Management and Accident Prevention
Safety training; safety policy; safety committees; safety inspection; safety audit; reporting accidents and dangerous occurrences.Accident Prevention: Principles of accident prevention; job safety analysis; fault tree analysis; accident management

References
Module 1
Introduction of chess game, What is chess board, the place of chess board, Chess pieces position & its moves, The concept of attacking, The concept check with different pieces, Mate/Checkmate, Castling, Pawn Promotion, Notation, Stalemate, Pointing

Module 2
End game, attacking a piece, Opening principles, Piece exchange, Pin, Defining the draws in Chess

Reference: As specified by the instructor

Module 1
Introduction of Abacus, addition & subtraction with help of small friends, big friends & big family, Concept of visualization, Multiplication & Division

Module 2
Additional & Subtraction with decimal concept, Determine cube root & square root

Reference: As specified by the instructor
UNIVERSITY OF PUNE
M.E. (CIVIL) (CONSTRUCTION AND MANAGEMENT)
SEMESTER III

601 035 Seminar – II

Teaching Scheme
Pract. 4 hrs./week

Examination Scheme
Oral : 50 Marks,
TW : 50 Marks
Credits 4

Term work should consist of ---
I) Spiral bound report preferably, printed on both the sides of paper on the topic of
dissertation work and should be submitted in a standard format having the following
contents.
i) A report on training undergone on a construction project site/organization/for a period
of minimum 15 days, including the data collection necessary for the project work.
ii) A report on the topic of dissertation, containing the following:
   a) Literature review and problem statement formulation.
   b) Research Methodology and proposed schedule of completion of project work.
      Students should prepare a power point presentation to be delivered in 15 minutes and
      should be able to answer questions asked in remaining five minutes.

II) Spiral bound report preferably, printed on both the sides of paper on vocational training
of 2 weeks
UNIVERSITY OF PUNE
M.E. (CIVIL) (CONSTRUCTION AND MANAGEMENT)
SEMESTER III
601 036  Project Stage I

Teaching Scheme  Examination Scheme
Pract. 8 hr./week  Oral: 50 Marks,
Credits 8  TW ; 50 marks

The project work will start in semester III, and should preferably be a live problem in the industry or macro-issue having a bearing on performance of the construction industry and should involve scientific research, design, collection, and analysis of data, determining solutions and must preferably bring out the individuals contribution.

The dissertation stage I report should be presented in a standard format, in a spiral bound hard copy, preferably printed on both the sides of paper, containing the following contents.

i. Introduction including objectives, limitations of study.
ii. Literature Survey, background to the research.
iii. Problem statement and methodology of work
iv. Theoretical contents associated with topic of research
v. Field Applications, case studies
vi. Data collection from field/organizations or details of experimental work/analytical work
vii. Part analysis / inferences
viii. Details of remaining work to be completed during the project work stage II
ix. References

Students should prepare a power point presentation to be delivered in 25 minutes and should be able to answer questions asked in remaining five minutes.(It is preferred that at least one paper on the research area be presented in a conference or published in a referred journal.)
UNIVERSITY OF PUNE
M.E. (CIVIL) (CONSTRUCTION AND MANAGEMENT)
SEMESTER IV

601 034 Seminar – III

Teaching Scheme
Pract. 5 hrs./week

Examination Scheme
End Semester Assessment : 50 marks
TW :: 50 Marks
Oral / Presentation-100 marks
Credits : -5

Term work should consist of a spiral bound report on the topic of dissertation work, preferably typed on both the sides of pages and should be submitted in a standard format.
Seminar III will be assessed based on the requirements of completion of project work for the project stage II.
Students should prepare a power point presentation to be delivered in 15 minutes and should be able to answer questions asked in remaining five minutes.

UNIVERSITY OF PUNE
M.E. (CIVIL) (CONSTRUCTION AND MANAGEMENT)
SEMESTER IV

601 038 Project Work Stage II

Teaching Scheme
Pract. 20 hrs./week

Examination Scheme
Oral/Presentation : 50 Marks
TW : 150 Marks
Credits : - 20

The final dissertation should be submitted in black bound hard copy as well as a soft copy on CD.

(The due weightage will be given for the paper(s) on topic of project presented in a conferences or published in referred journals.)

The Term Work of Dissertation of semester IV should be assessed jointly by the pair of internal and external examiners, along with oral examination of the same.