University of Pune

Syllabus of

Master of Engineering-Civil (M.E. Civil)

With Specialization in

Construction Management

2013-2014

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

Course Structure

SEMESTER –I

Code	Subject	Teaching Scheme	Examination scheme					Credits
		Lect./ Pract.	Paper		TW	Oral/Presentation	Total	
			In Semester Assessment	End Semester Assessment				
501101	Applications of Statistical Methods in Construction subject 1	4	50	50	--	--	100	4
501102	Management and Project Planning in Construction Sub	4	50	50	--	--	100	4
501103	Construction Technology	4	50	50	--	--	100	4
501104	Research Methodology Treatment	4	50	50	--	--	100	4
501105	* Elective I	5	50	50	--	--	100	5
501106	Lab Practice I	4			50	50	100	4
	Total	**25**	**250**	**250**	**50**	**50**	**600**	**25**

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

Technical courses-

a. Sustainable Construction Materials – 2 Credits.
b. Disaster Management – 2 Credits.
c. Retrofitting of Structures – 2 credits.
d. Construction Safety – 2 Credits

Non Technical courses –

e. Mass communication, Photography and Videography - 1 Credit
f. Cyber Security - 1 Credit

STRUCTURE FOR M. E. 2013 COURSE

SEMESTER –II

Code	Subject	Teaching Scheme	Examination scheme					Credits
		Lect./ Pract.	Paper		TW	Oral/Presentation	Total	
			In Semester Assessment	End Semester Assessment				
501107	Construction Contracts Administration and Management	4	50	50	--	--	100	4
501108	Project Economics and Financial Management	4	50	50	--	--	100	4
501109	Operation Research	4	50	50	--	--	100	4
501110	** Elective II	5	50	50	--	--	100	5
501111	Lab Practice II	4	--	--	50	50	100	4
501112	Seminar I	4	--	--	50	50	100	4
	Total	**25**	**200**	**200**	**100**	**100**	**600**	**25**

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

Technical courses

a. Human Resource Development – 2 Credits.
b. Material Management – 2 Credits.
c. Value Engineering – 2 credits.
d. Project Risk Analysis & Mitigation Techniques – 2 Credits

Non Technical courses –

e. Global Languages - 1 Credit
f. Performing Arts - 1 Credit

STRUCTURE FOR M. E. 2013 COURSE

SEMESTER –III

Code	Subject	Teaching Scheme	Examination scheme					Credits
		Lect./ Pract.	Paper		TW	Oral/Presentation	Total	
			In Semester Assessment	End Semester Assessment				
501113	Environment and energy for sustainable construction	4	50	50	--	--	100	4
501114	TQM in Construction	4	50	50	--	--	100	4
501115	*** Elective III	5	100	-	--	--	100	5
501116	Seminar II	4	--	--	50	50	100	4
501117	Project Stage I	8	--	--	50	50	100	8
	Total	**25**	**250**	**200**	**100**	**100**	**500**	**25**

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

Technical courses

a. Advanced Construction Technology– 2 Credits.
b. Infrastructure Development – 2 Credits.
c. International Contracting – 2 credits.
d. Thrust Areas in Project Management – 2 Credits

Non Technical courses

e. Human Rights - 1 Credit
f. Principle Centered Leadership - 1 Credit

STRUCTURE FOR M. E. 2013 COURSE

SEMESTER –IV

Code	Subject	Teaching Scheme	Examination scheme					Credits
		Lect./ Pract.	Paper		TW	Oral/Presentation	Total	
			In Semester Assessment	End Semester Assessment				
501118	Seminar III	5	--	50	50	100	100	
501119	Project Work Stage II	20	--	150	50	200	100	25
	Total	**25**	**200**	**200**	**100**	**300**	**500**	**25**

Lab Practice I & II

The laboratory work will be based on completion of assignments / practicals confined to the course of that semester.

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SEMESTER I

Mathematics – Application of Statistical Methods in Construction (501101)

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: 2 hrs.

MODULE - I - Probability [7 hrs.]
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 –II - Distributions [8 hrs]
Theoretical probability Distributions: Binomial Distribution, Poisson distribution. Normal Distribution, Exponential Distribution, Beta, Gamma.

MODULE - III - Sampling [8 hrs.]
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 - IV - Testing [7 hrs.]
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 - V Correlation Analysis [7 hrs.]
Correlation types, co-efficients. Bi-variate Frequency Distribution, Scatter Diagram, Correlation Analysis.

MODULE – VI - Regression Analysis [8 hrs]
Regression and Multivariate Analysis, Multiple Regression Analysis-Non linear Regression. Use of regression analysis in resources management.

MODULE - VII - Simulation [8 hrs.]
Simulation – Types, case studies in construction using simulation techniques, simulation software's used. Griffi's waiting line Method.

MODULE - VIII - Applications [7 hrs.]
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

1. Probability and Statistics for Engineers –Miller, Freund-Hall, Prentice India Ltd. 2009
2. Applied Mathematics for Engineers and Physiscists-pipes and Harvill. McGraw Hill

International Edition, 1970
3. Sampling techniques-Cochran, Wiley Series, 2008.
4. Statistics-Concepts and Controversies-David S. Moore-Freeman Company, New York.
5. Reliability Principles and practices-Calabro-McGraw Hill Book Company, 1963
6. Shrivastava, Shenoy & Sharma, Quantitative Techniques for Managerial Decisions, Wiley, 1989.
7. Applied Statistics for Civil and Environmental Engineers by Kottegoda.- Stratford Books

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SEMESTER - I

Management and Project Planning In Construction (501102)

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 : 2 hrs.

MODULE—I Basics of Management [6 hrs.]
Modern scientific management, Management Functions, Management Styles.

MODULE –II - Project Management [9 hrs.]
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—III : Project Scheduling [9 hrs.]
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—IV: Project Controlling [6 hrs.]
Monitoring and Control, Crashing, Resource Leveling, Updating.

MODULE—V - Construction Management [6 hrs.]
Site mobilization – demobilization aspects, various Resources management based on funds availability. Co-coordinating, communicating & reporting techniques. Application of MIS to construction. Training of Construction Managers.

MODULE—VI - Work Study [9 hrs.]
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—VII - Safety Engineering [8 hrs.]
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—VIII - Administration of Incentive Schemes [7 hrs]

Necessity, Merit rating, job evaluation, installation, modification and maintaining of incentive schemes based on implementation experience.

Minimum 2 case studies covering the above contents.

Reference books

1. Modern construction management--.Harris, Wiley India**.**

2.Construction Management and Planning by Sengupta and Guha-Tata McGraw Hill publication.

3.Project Management – K Nagrajan – New age International Ltd.

4.Work study – Currie.

5.Professional Construction Management Barrie-Paulson-McGraw Hill Institute Edition.

6.Project Management – Ahuja H.N. – John Wiely, New York.

7.Construction Project Management Planning, Scheduling and Controlling-Tata McGraw Hill, New Delhi

8.Construction Management – Roy, Pilcher

9.Construction Management – O'Brien.

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SEMESTER I

CONSTRUCTION TECHNOLOGY (501103)

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 : 2 hrs.

MODULE—I- Underground Construction [7 hrs.]

Underground and Underwater Construction – Tunnel-Shaft sinking, Micro Tunneling, Tunnel driving in hard and soft strata, bedding of conduits.

MODULE—II - Under water construction [8 hrs.]

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—III – Construction using Concrete Technology [7 hrs.]

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—IV – Pile Construction [8 hrs.]

a) 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.
b) 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—V - Coffer Dams [8 hrs.]

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—VI -Caissons [7 hrs.]

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

MODULE –VII - Equipment Management [7 hrs.]

Equipment Management, Costing, Optimum utilization and Equipment selection, depreciation, interest on capital, Manpower, Spare parts etc, Documentation, Log-Books, History Books, Periodical MIS Report.

MODULE—VIII - Construction Equipment [8 hrs.]

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

Minimum 1 Case study in each topic covered above.

Reference Books:

1Construction Technology: Analysis,and Choice, 2ed,Bryan, Wiley India

2. Construction Planning, Equipment and methods – Peurifoy-Tata McGraw Hill Publication
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.
5. Document Reports of actual major works executed.
6. Construction Technology by Roy Chudley and Roger Greeno, Prentice Hall, 2005.

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SEMESTER I
RESEARCH METHODOLOGY (501104)

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 : 2 hrs.

Module 1: Research Problem & (10 hrs.)
Meaning of research problem, Sources of research problem, Criteria / Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem.

Module 2: Basic Instrumentation (10 hrs.)
Instrumentation schemes, Static and dynamic characteristics of instruments used in experimental set up, Performance under flow or motion conditions, Data collection using a digital computer system, Linear scaling for receiver and fidelity of instrument, Role of DSP if collected data contains noise.

Module 3: Applied statistics (10 hrs.)
Regression analysis, Parameter estimation, Multivariate statistics, Principal component analysis, Moments and response curve methods, State vector machines and uncertainty analysis.

Module 4: Modelling and prediction of performance (10 hrs.)
Setting up a computing model to predict performance of experimental system, Multiscale modelling and verifying performance of process system, Nonlinear analysis of system and asymptotic analysis, Verifying if assumptions hold true for a given apparatus setup, Plotting family of performance curves to study trends and tendencies, Sensitivity theory and applications.

Module 5: Developing a Research Proposal (10 hrs.)
Format of research proposal, Individual research proposal, Institutional proposal Proposal of a student – a presentation and assessment by a review committee consisting of Guide and external expert only. Other faculty members may attend and give suggestions relevant to topic of research.

Module: **Computer Applications (10 hrs.)**

a)Computer applications for matrix operations, solution of ordinary and partial differential equations.
b)Computer applications for solution of transcendental equation, regression analysis and numerical integration.

Reference Books:
1. 'Research methodology: an introduction for science & engineering students', by Stuart Melville and Wayne Goddard
2. 'Research Methodology: An Introduction' by Wayne Goddard and Stuart Melville
3. 'Research Methodology: A Step by Step Guide for Beginners', by Ranjit Kumar, 2nd Edition
4. 'Research Methodology: Methods and Trends', by Dr. C. R. Kothari

5. ‘Operational Research’ by Dr. S.D. Sharma, Kedar Nath Ram Nath & co
6. Software Engineering by Pressman

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SEMESTER I
(Elective I) 501105

Teaching Scheme :
Lectures :5 Hrs./Week

Examination Scheme:
Theory Paper : 100 Marks
Credits : 5
In Semester Assessment : 50 marks
End Semester Assessment : 50 marks
Duration : 2 hrs.

Technical courses

a. Sustainable Construction Materials – 2 Credits.
b. Disaster Management – 2 Credits.
c. Retrofitting of Structures – 2 credits.
d. Construction Safety – 2 Credits

Non Technical courses

e. Mass communication, Photography and Videography - 1 Credit
f. Cyber Security - 1 Credit

a. Sustainable Construction Materials - 2 Credits

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 1: **[8 hrs..]**

a) Various construction chemicals/admixtures.
b) Fly ash and its use in concrete
c) Silica fume concrete

MODULE 2: **[7 hrs..]**

a) Self compacting concrete
b) Fiber Reinforced plastics and concrete
c) Light weight concrete

MODULE 3: **[8 hrs..]**

a) Crumb modified bitumen Rubber
b) Glenium Concrete
c) Materials used in nuclear-containment structures

MODULE 4: **[7 hrs..]**

a) High performance concrete
b) Nano technology in cement concrete
c) 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
3. Concrete Structure properties & Materials by Mehta P.K & Mantreio P.J.M, Prentice hall.
4. Concrete Technology by M.S.Shetty, S.Chand Publ.
5. Building Materials by M L Gambhir, Neha Jamwal, Tata McGraw Hill Publ. Edition 2011
6. New Building Materials and Construction World magazine
7. Civil Engineering and Construction Review magazine
8. Engineering Materials R.K.Rajput, S.Chand & Co. Publ. Ed.2007

b. Disaster Management – (2 Credits)

MODULE – I **[8 hrs.]**

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 – II **[7 hrs.]**

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 - III **[8 hrs.]**

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 – IV **[7 hrs.]**

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.
6. Disaster Management Handbook by Jack Pinkowski – CRC Press (Taylor and Francis group)

c. Repairs, Rehabilitation, Retrofitting of Structures - (2 Credits)

MODULE – I **[7 hrs.]**

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 – II **[8 hrs.]**

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 – III **[8 hrs.]**

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 – IV **[7 hrs.]**

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
4. Concrete Structures Protection Repair and Rehabilitation, R.Dodge Woodson, Elsevier Publ.
5. Construction, Maintenance & Restoration and Rehabilitation of Highway Bridges, K.S.Rakshit
6. Retrofitting of Concrete Structures by Externally Bonded FRP's – CEB – FIP, Technical report, Bulleting 35

d. **Construction Safety (2 Credits)**

MODULE – I **[7 hrs.]**

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 – II **[8 hrs.]**

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 – III **[7 hrs.]**

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 – IV **[8 hrs.]**

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

1. Construction safety manual published by National Safety Commission of India.
2. Safety Management in Construction Industry – A manual for project managers. NICMAR Mumbai.
3. Construction Safety Handbook – Davies V.S.Thomasin K, Thomas Telford, London.
4. ISI for safety in Construction – Bureau of Indian Standrads.
5. “Safety management” –Girimaldi and Simonds, AITBS, New Delhi.

Non Technical Subjects

e. Mass communication, Photography and Videography (1 Credit) (7 hrs.)

Module 1 :Mass Communication - Theories & methods

Concepts and Theories, Communication concepts, Process and Function, Interpersonal & Intra personal, Group behavior, need for Mass Communication. Relevance of Communication Theories to Practice, Models of Communication, Impact and Effect of Communication Old and new media, Communication Techniques, - Feedback and Evaluation of Communication Effect, Interview and Questionnaires- Method of Data Analysis, use of Information Technology, various methods of mass communication like seminars, conferences, print and digital media, internet, CDs, DVD, movies, U-tube, video conferencing.

Module 2 : Photography and Videography (8 hrs.)

Camera Basics, Still Photography, Lenses, Exposure, Compositionm, 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

1. Richard Dimbleby and Graeme Burton, 1995, More than words: An introduction
f. to communication, London: Routledge.
g. Melvin L. DeFleur and Everette E. Dennis, 1991, Understanding mass
h. communication, New Delhi: Goyal Saab.
i. Marshall McLuhan, 1964, Understanding Media, New York: McGraw –Hill
j. Wilbur Schramm, 1964, Mass media and national development, the role of
k. information in developing countries, Stanford: Stanford University Press.
l. Holman, Tomlinson, Sound for film and television, Focal Press
m. McCormick, Tim and Rumsey, Francis, Sound and recording: An introduction,
n. Focal Press
o. Talbot-Smith, Michael, Sound engineering explained, Focal Press
p. Talbot-Smith, Michael, Sound assistance, Focal Press
q. Altman, Rick, ed., Sound theory sound practice, Routledge
r. Talbot-Smith, Michael, Sound engineer's pocket book, Focal Press
s. Truebitt, Rudy and David, Trubitt, Live sound for musicians, Hal Leonard
t. Nathan, Julian, Back to basic audio, Newnes
u. Yewdall, Lewis, David, Practical art of motion picture sound, Focal Press
v. Leider, N., Colby, Digital audio workstation, McGraw-Hill

f. Cyber Security – (1 Credit)

Module 1:

Basic Concepts of Technology and Law: Basics of Information Technology, Basics of Indian Legal System, Information Technology Act 2000 (Amended), Relevant Amendments in all other laws

E-Contract: The essence of digital contracts, Law of Contract, Construction of E-contracts, Issues of security, Employment contracts, Consultant Agreements and Digital signature

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

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

Module 2:

Information Security Fundamentals: Background, Importance, Statistics, National and International Scenario, Goals of security, Confidentiality, Privacy, Integrity, Non-repudiation, Availability.

Essentials of computer security - Sources of security threats – Intruders, Viruses, Worms and related threats - Threat identification - Threat analysis - Vulnerability identification and Assessment. Security Investigation Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

Security Policies and Management: Security Policy Design, Designing Security Procedures, Risk Assessment Techniques, Security standards, Security Models.

Reference Books:

1) Bakshi P M and Sri R K, Cyber and E-commerce Laws, Bharat Publishing House, 1st Edn, 2002
2) Syed shakil Ahmed, Rajiv Raheja, A handbook on Information technology: Cyber law and E-Commerce, Capital Law House, 2004
3) Rodney D Ryder, Business Process Outsourcing, Date Protection and Information Security, Wadhwa & Co., 1st Edn, 2001
4) Vakul Sharma, Information Technology Law and Practice, Delhi Law House, 3rd Edn, 2011
5) Lipton, K., Cyberspace Law Cases and Materials, 2nd edition. Aspen Publishers. NY: New York, 2006
6) Michael E Whitman and Herbert J Mattord, Principles of Information Security, Vikas Publishing House, New Delhi, 2003
7) Micki Krause, Harold F. Tipton, Handbook of Information Security Management, Vol 1-3 CRC Press LLC, 2004.
8) Michael E Whitman and Herbert J Mattord, Principles of Information Security, Vikas Publishing House, New Delhi, 2003

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SEMESTER I

Lab Practice – I (501106)

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, and 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 dependant 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 or MS Project software.

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SEMESTER-II

Construction Contracts Administration and Management (501107)

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 : 2 hrs.

MODULE—1 - Construction Contracts [9 hrs.]

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 [6 hrs.]
Extra items and causes of claims. Types of construction claims, documentation. settlement of claims, extension of time.

MODULE - 3 Dispute Resolution [7 hrs.]
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 [8 hrs.]
a) General condition and Particular conditions, conditions of Ministry of Statistics and Program Implementation- Government Of India. Model forms of contract. Role of Planning Commission.
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) [9 hrs.]
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 [6 hrs.]
Indian Arbitration And Conciliation Act 1996
Difference between 1940 Act and 1996 Act. Extent of application of 1996 Act. Objectives, general provisions. Composition of the arbitral tribunal, jurisdiction of arbitral tribunal, duties, power of arbitrators.

MODULE—7 - Conciliation **[6 hrs.]**

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 **[9 hrs.]**

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:

1) Civil Engineering Contracts and Estimates - B. S. Patil – Universities Press- 2006 Edition, reprinted in 2009.
2) The Indian Contract Act (9 of 1872), 1872- Bare Act- 2006 edition, Professional Book Publishers.
3) The Arbitration and Conciliation Act,(1996), 1996 (26 of 1996)- 2006 Edition, Professional Book Publisher.
4) Law of contract Part I and Part II, Dr. R.K. Bangia- 2005 Edition, Allahabad Law Agency.
5) Arbitration, Conciliation and Alternative Dispute Resolution Systems- Dr. S.R. Myneni- 2004 Edition, reprinted in 2005- Asia Law House Publishers.
6) The Workmen's Compensation Act, 1923 (8 of 1923) Bare Act- 2005- Professional Book Publishers.
7) Standard General Conditions for Domestic Contracts- 2001 Edition- Published by Ministry Of Statistics and Program Implementation, Government of India.
8) FIDIC Document (1999).
9) Dispute Resolution Board foundation manual-www.drbf.org.

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

Project Economics & Financial Management (501108)

Teaching Scheme :
Lectures :43 Hrs./Week

Examination Scheme:
Theory Paper : 100 Marks
Credits : 4
In Semester Assessment : 50 marks
End Semester Assessment : 50 marks
Duration : 2 hrs.

MODULE -1- Principles of Economics [7 hrs]

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, Study of present economy.

MODULE – 2 - Capital [8 hrs]

Analysis of need for working capital, Estimation of requirements of working capital, Credit Management, Cash Management, Managing payments to suppliers and out standings.

MODULE - 3 - Economic Analysis [8 hrs]

Cost implication to different forms of construction and maintenance 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 -Financial Planning [7 hrs]

Long term finance planning, Stock, Borrowings, Debentures, Loan Capital, Public Deposit, Dividend Policies, Bonus Shares, Market value of shares, Reserves. Over and under capitalization, Introduction to Micro financing.

MODULE-5 – Budget [6 hrs.]

Budgetary control system. Types of budgets, Procedure for master budgets. Budget manual.

MODULE – 6 – Corporate Sector [9 hrs]

Corporate tax planning, Public policies on ICRA grading of exchange, World financial market, Role of financing institutes in Construction, CIDC-IRA grading of construction entities, Venture Capital Financing- Indian Venture Capital scenario, SEBI regulation.

MODULE -7 - Construction Accounts [7 hrs]

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 [8 hrs]

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**.**

2. Projects planning, Analysis Selection, Implementation and Review, Prasanna Chandra Tata McGraw Hill, New Delhi, 2005
3. "Construction Management and Accounts", Singh H. Tata McGraw Hill, New Delhi, 1988
4. 'Construction Management: "Planning and finance", Cormican D. Construction press, London, Feb 2002.
5. "Principles of Corporate Finance", Brealey R.A. Tata McGraw Hill, New Delhi, 2003.
6. 'Engineering Economy', Leland T. Blank. Anthony Tarquin. McGraw Hill, 2008.
7. 'Engineering Economics', David Bedworth, Sabah Randhawa. McGraw Hill, 1996.
8. 'Real Estate, Finance and investment', Bruggeman. Fishr, McGraw Hill, 2010.
9. 'Foundations of Financial Management', Block Hirt. McGraw Hill, 2009.
10. 'Case studies in finance', Burner, McGraw Hill, 2009.
11. 'Cases in Finance', DeMello McGraw, 2003.
12. The cost management toolbox ; A Managers guide to controlling costs and boosting profits.' Oliver, Lianabel. Tata McGraw Hill, 1999.
13. "Financial Management" – Indian Institute of Banking and Finance – Macmillan Publications.

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

SEMESTER II
OPERATION RESEARCH **(501109)**

Teaching Scheme :
Lectures :43 Hrs./Week

Examination Scheme:
Theory Paper : 100 Marks
Credits : 4
In Semester Assessment : 50 marks
End Semester Assessment : 50 marks
Duration : 2 hrs.

SECTION-I

MODULE - 1 **[8 hrs.]**

(a) 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
(b) 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 **[7 hrs.]**
(a) Transportation Model and its variants, Assignment Model and its variants.
(b) Games Theory.

MODULE - 4 **[8 hrs.]**
(a) Dynamic programming:
Multi stage decision processes, Principle of optimality, Recursive equation, Application of D.P.
(b) Decision theory.

MODULE- 5 **[7 hrs.]**
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 **[8 hrs.]**
(a) Queuing Theory, Simulation.
(b) Sequencing model – n jobs through 2, 3 and M machines.

MODULE - 8 **[7 hrs.]**
(a) Economic Analysis, mathematics of finance, benefit cost analysis.
(b) Replacement models.

Reference Books
1. Operations Research by Hamdy A.Taha
2. Engineering Optimization by S.S.Rao

3. Operations Research by J.K.Sharma
4. Quantitative Techniques in Management by N.D.Vohra
5. Principles of Construction Management by R.Pilcher
6. Operations Management by E.S.Buffa
7. Principles of Operations Management by H.M.Wangner

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

(Elective II) (501110)

Teaching Scheme :
Lectures :5 Hrs./Week

Examination Scheme:
Theory Paper : 100 Marks
Credits : 5
In Semester Assessment : 100 marks

Technical courses

Human Resource Development – 2 Credits.

a. Material Management – 2 Credits.
b. Value Engineering – 2 credits.
c. Project Risk Analysis & Mitigation Techniques – 2 Credits

Non Technical courses

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d. Global Languages - 1 Credit
e. Performing Arts - 1 Credit

a. Human Resource Management (2 Credits)

MODULE - 1 Introduction: [8 hrs.]

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: – [7 hrs.]

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 [8 hrs.]

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 [7 hrs.]

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
3. Personnel Management' by Monappa A. – Tata McGraw Hill,new delhi.1997
4. Harvard Business Review, "Appraising Perfoprmance Appraisal," Tata McGraw Hill.
5. Nair,MRR, "Excellence through Human Resource D evelopment", Tata McGraw Hill.
6. Rao T , "HRD in the New Economic Environment", Tata McGraw Hill.
7. Pareck , "HRD in the New Millenium", Tata McGraw Hill.
8. Singh, "Selected Reading in HRD" Tata McGraw Hill.

b. Materials Management (2 Credits)

MODULE – 1 Importance of Materials Management [6 hrs.]
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 [9 hrs.]
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 [8 hrs.]

(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.

(a) 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 Quality Control and use of MMS **[7 hrs.]**
Quality Control – Conventional methods of quality control of Construction materials.
Statistical method of quality control, sampling techniques quality control in process. Quality management and its economics.

(a) 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.
2. Materials Management, P.Gopalkrishnan, Prentice Hall
3. Handbook of materials management, P.Gopalkrishnan, Sundershan, Prentice Hall.
4. Inventory Management, L.C.Jhamb, Everest Publ.

c. Value Engineering and valuation (2 Credits)

MODULE – 1 - Value Analysis [8 hrs.]

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 [7 hrs.]

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 [9 hrs.]

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 Valuation Report [6 hrs.]

Valuation Report, contents, standard formats, Case study of any one Report.

Reference Books

1. Value Engineering: Analysis And Methodology By Del Younke
2. Industrial Engg. & Mgt., O.P.Khanna, Dhanpat Rai Publ.
3. Industrial Organization & Engg. Economics, T.R.Banga, S.C.Sharma, Khanna Publ.
4. Estimating and Costing in Civil Engineering: Theory and Practice B.N Dutta Published S. Dutta & Company, Lucknow.
5. Estimating, Costing Specifications & valuation in Civil EngineeringBy: M.Chakraborty Published By: Author.
6. Estimating and Costing By: G.S.Birdie
7. Estimating and Costing By: Rangwala Published By: Charotar Publishing House,
8. Practical Information for Quantity Surveyors, Property valuers, Architects Engineers and Builders, P.T.Joglekar, Pune Vidyarthi Griha Prakashan, 2008 reprint.

d. Project Risk Analysis And Mitigation Techniques (2 Credits)

MODULE – 1 - Risk analysis (9.hrs.)

General – Importance of Risk, types of risks, quantifiable and un-quantified risks. Micro, market, project level risk analysis approach. Risk analysis and Management for projects (RAMP) – Identifying risk events. Probability distribution. Stages in Investment, life-cycle; determination of NPV and its standard deviation for perfectly co-related, moderately co-related and un-correlated cash flows.

MODULE – 2 -Dealing with uncertainties 6 (hrs.)

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 –3 6 (hrs.)

Use of risk prompts, use of Risk Assessment tables, details of RAMP process, utility of Grading of construction entities for reliable risk assessment. Risk Mitigation – by elimination, reducing, transferring, avoiding, absorbing or pooling. Residual
risk, mitigation of un-quantified risk.

MODULE – 4 6 (hrs.)

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

1. Project Risk Analysis and Management Guide by John Bartlett APM Publishing Limited, 2004 2nd edition

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.
4. Construction Engineering and Management – Seetharaman.
5. Projects Planning analysis selection implementation and Review – Prasanna Chandra.
6. Construction Project Management, K. K. Chitkara, Tata McGraw Hill Publ.
7. Construction Management Practice, Dr.V.K.Raina, Shroff Publ.
8. Projects, Prasanna Chandra, Tata McGraw Hill Publ.
9. Project Management, K.Nagarajan, New Age International
10. www.cidc.in

e. English … credit 1

Module 1 Speaking & Listening skills (7 hrs)

- Informal conversation (e.g. planning a vacation, describing daily schedule, describing a personality, etc.)
- Formal conversation - listening to grievances, describing working of a machine, etc.
  (Guidelines to teacher: acquaint students to active listening, barriers to listening & how to overcome them
  Grammatical aspects covered: Future and present tense
  Functions: suggestions, descriptions, advice, complaints, responding to grievances, etc.)

Module 2 : Reading and Writing skills (8 hrs.)

Reading Skills

- Comparative reading – formal and informal pieces
  (Informal pieces – fiction, cartoon strips, advertisements)
  (Formal strips – news papers, company reports, minutes of meeting, circulars, etc.
  (Guidelines to teachers: discuss effective reading skills, barriers & types of reading)

- **Writing skills**
  - Office drafting – memo, circulars, notices, letters, their formats etc
  - Report writing – progress report, accident report, performance report, investigation report, visit report
  - Technical report writing – formats for seminar / project reports
  - Business correspondence
    - Email etiquettes
    - Letter of enquiry, order, complaint
    - Resume, job application, joining letter
    - Appreciation letter, resignation

OR

e. Other foreign language (German / French / Spanish / Japanese) …….with 1 credit each

- Alphabets – writing, reading and pronunciation
- Conversation – 50 sentences (commonly used in formal and informal communication, e.g. greetings, appreciations, regret, festivals)
- Technical words – 50 minimum (e.g. roads, bridges, equipments, concrete, etc.)
- Manners and etiquettes

f. Performing Arts – Music and Dance (Credit 1)

Module 1 : Indian Music (8 hrs.)

Vocal, Instrumental, Sur, Laya, Tal. Ragas and their classification based on time and "Raasa-Nirmitee". Seasons and Ragas. Various "Bandishes" and "Gharanas" or styles. Light Indian Music-different types. 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 (7 hrs.)

Types –Kathak, Bharatnatyam, Kuchipudi, Odissy 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.

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Books/Audio CD

1. Hindustani Sangeet Paddhati by Pt.Vishnu Narayan Bhatkhande publ. Swarganga Foundation.
2. Jivi Jivai (Golden Voice Golden Years) Pt.Jasraj, Publ. Bandishes with notations composed by the author.
3. Pranav Bharati, by Pt.Ompraksh Thakur, publ. Swarganga foundation.
4. Rasa Gunjan by Pt.Birju Maharaj, Publ. Swarganag foundation
5. Anup Rag Vilas by Pt.Kumar Gandharava, Bandishes composed and sung by author mostly available on cassettes Swarganga Foundation.
6. The dance Orissi – Mohan Khokar published by (2010) Abhinav Publications, New Delhi
7. Introduction to Bharata's Natyashastra by Adya Rangacharya, Munshiram Manoharlal publication.
8. Art of Dancing classing and folk dance by priyabala Shah, Parimal publication
9. Tantra Mantra Yantra in Dance: An Exposition of Kathaka, by Ranjana Shrivastava, D.K.Prinword Pvt. Ltd.,

Lab Practice II (501111)

Teaching Scheme	Examination Scheme
Pract. 4 hrs../week	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.
4. Assignment on preparation of a balance sheet for any construction organization.
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.

Seminar – I **(501112)**

Teaching Scheme	Examination Scheme
Pract. 4 hrs../week	Oral : 50 Marks,
	TW :: 50 Marks
	Credits 4

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

Environment & Energy for Sustainable Construction (501113)

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: 2 hrs.

MODULE – I **[10 hrs.]**

Environment and its impact:

a) 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.

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

MODULE – II **[10 hrs.]**

Scio 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 – III **[10 hrs.]**

Environment and pollution Control Laws:

a) Rules and regulations & Laws governing Energy ,Conservation in India & developed Nations – Energy Conservation Act 2001,Revisions and present state of implementation standardization & Labeling ,Electricity Act 2003 ,Revisions and present status of implementation
b) 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 – IV **[10 hrs.]**

Energy Efficient Projects & Financing of energy Efficiency Projects :

a) 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

b) Clean Development Mechanism Benefits for Energy Conservation Projects, Methodology & Procedure: What is CDM? Methodology & Procedures for CDM, Eligibility, Criteria, UNFCCC, Role of UNFCCC & Government of India.

MODULE – V **[10 hrs.]**

Energy Efficient Services: Energy building design-Energy efficient and environmental friendly building-Thermal phenomena-Thermal comfort-Indoor air quality-climate, sun and solar radiation-

Psychometrics-passive heating and air cooling systems- Energy analysis-active HVAC Systems-Preliminary investigation- goals and policies –energy audit-types of wastage-priority of conservative measures- maintenance of energy program.

MODULE – VI **[10 hrs.]**

Energy Management: Energy management of electrical equipment – Improvement of power factor-management of maximum demand-Energy savings in Pumps-Fans-Compressed air Systems-energy savings in lighting system-air conditioning system-Applications-Facility operation and maintenance-facility modifications – energy recovery dehumidifier- water heat recovery –steam plants and distribution systems- improvement of boiler efficiency- frequency of blow down – steam leakage-Steam flash and condense return.

Reference Books:

1. Environmental Monitoring and Characterization by Artiola CBS Publishers 2006.
2. Environmental Engineering, 4 E by Weiner CBS Publishers 2010.
3. Socioeconomic and Environmental Impacts of Biofuels, by Alexandros Gasparatos and per Stromberg, October 2012.
4. Environmental and Pollution Laws in India by Justice T. S. Doabia, I. P. S. Doabia and M. S, S. Doabia, Second Edition 2010,
5. Environmental Impact Assessment and Audit by Larry W. Canter Environmental, Tata McGraw Hill.
6. Environmental Pollution and Control, 4th Edition, J. Jeffrey Peirce, P Aarne Vesilind And Ruth Weiner, Nov 1997
7. Financing Energy Efficiency: Forging The Link
8. Between Financing And Project Implementation, By Silvia Rezessy And Paolo Bertoldi, Institute Of Energy European Commission, May 2010
9. Public Procurement Of Energy Efficiency Services Lessons From International Experience by Jas Singh, Dilip R. Limaye, Brian Henderson, And Xiaoyu Shi
10. Energy Management Handbook By Steve Doty And Wayne C. Turner, 8th Edition
11. Energy Conservation Act 2001, Electricity Act 2003

UNIVERSITY OF PUNE

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

TQM in Construction (501114)

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: 2 hrs.

MODULE 1: Concept of Quality: [10 hrs.]

(A) 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.

(B) 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: [10 hrs]

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

MODULE 3: Training and development of Human Resources: [10 hrs]

(A) 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.

(B) Development of quality circles, quality inspection team, inspection reports, monitoring and control, 360' feedback for quality.

MODULE 4: Study of ISO 9004- Quality System Standards. [10 hrs]

(A) Purpose of ISO Standards. Difference between ISO 9001 and ISO 9004.Certification process for ISO 9001. Certification bodies involved.

(B) 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 5: Achieving TQM on Construction Projects: [10 hrs]

(A) Advantages, barriers, principles, steps in implementation, seven types of construction defects. Determining cost of poor quality including hidden cost.

(B) 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 6: Six Sigma: [10 hrs]

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

(B) 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
2. Mantri Handbook – A to Z of Construction – Mantri Publications
3. Juran's Quality Handbook – Joseph M. Juran, A. Blanton. Godfrey – Mcgraw Hill International Edition (1998)
4. Probability and Statistics for Engineers – Miller, Freund-Hall, Prentice India Ltd.
5. Quality Control and Total Quality Management, P.L.Jain, Tata Mcgraw Hill Publ.

UNIVERSITY OF PUNE
M. E. (CIVIL) CONSTRUCTION AND MANAGEMENT
SEMESTER-III
Elective –III (501115)

Teaching Scheme :
Lectures :5 Hrs./Week

Examination Scheme:
Theory Paper : 100 Marks
Credits : 5
In Semester Assessment : 50 marks
End Semester Assessment:50

Technical courses-

a. Advanced Construction Technology– 2 Credits.
b. Infrastructure Development – 2 Credits.
c. International Contracting – 2 credits.
d. Thrust Areas in Project Management – 2 Credits

Non Technical courses–

e. Human Rights - 1 Credit
f. Principle Centered Leadership - 1 Credit

a. Advanced Construction Technology (2 Credits)

MODULE 1 **[7 hrs.]**

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 **[8 hrs.]**

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 **[7 hrs.]**

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 **[8 hrs.]**

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 :

1. Construction Technology by Roy Chudley and Roger Greeno, Prentice Hall, 2005.
2. Construction Planning, Equipment and methods – Peurifoy-Tata McGraw Hill Publication
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.

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b. Infrastructure Development

MODULE—1 **[6 hrs.]**

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 **[9 hrs.]**

Status of Infrastructure in India:

In 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 **[6 hrs.]**

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 **[9 hrs.]**

Provisions made for Infrastructure Development in the 12^{th} and 13^{th} five year plans of the planning commission Government of India. Formation of the Indian Infrastructure Development Corporation. SPV's for Infra projects.

JNNURM - Jawaharlal Nehru National Urban Renewal Mission, PMGSY – Pradhan Mantri Gram Sadak Yojana, RGGVY - Rajiv Gandhi Grameen Vidyutikaran Yojana, Ports Connectivity Projects, Indira Gandhi International Air Port project, Indo – US Nuclear Deal, Nuclear Power Projects in India

Reference Books

1. India Infrastructure Report – Rakesh Mohan
2. Infrastructure Today - Magazine
3. Document of five year plans, published by Govt. of India.
4. Public Private Partnership in Infrastructure by R. N. Joshi Vision Publications – 2010.
5. Infrastructure Development in India by Rajarshi Majumder Rawat Publications – 2010
6. Journal of the 'Indian Roads' Congress.
7. Indian Highways – Journals

c. International Contracting (501111 c)

MODULE – I (7 hrs.)

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 – II (8 hrs.)

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 – III (6 hrs.)

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 – IV (9 hrs.)

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
3. Construction Contracts & Claims – Simon M.S. McGraw Hill, New York
4. Unified Contract Documents by Ministry of Statistics and program implementation, Government of India.
5. Dispute Review Board Manual by Robert Matyas and Mathews.
6. International Construction Contracting – K.N.Vaid-NICMAR Publication

d. Thrust Areas in Project Management (501112)

MODULE—I **[8 hrs.]**
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—II **[7 hrs.]**

S. W. O. T. analysis and S. C. M
a) S. W. O. T:-
Strengths, Weaknesses, opportModuleies, threats analysis. Conduct S. W. O. T. for individual construction organization, Indian Construction industry. Advantages, S. W. O. T. matrix utility of S. W. O. T. matrix on strategic planning and management.

b) S. C. M.:--
Supply Chain Management. Concept of Supplier and customer in context of ISO. Indentifying 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—III **[7 hrs.]**
Critical Chain Management (CCM) and Fast Track Construction

a) 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.

b) Fast Track Construction:--
diagrammatic representation of the concept of the fast track construction. Advantage, suitability of fast track construction. Form of contract suitable for fast track projects. Concept of guaranteed maximum pricing (GMP). Any one case study on fast track constriction.

MODULE—IV **[8 hrs.]**
Earned Value Analysis and Project Reporting

a) 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.

b) Project Reporting:--

Guidelines for report preparation, various stakeholders of projects associated with reporting. Scheduling program default report content, report Sorting, selection criteria, interpretation. 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.
2. Project Management—Financial evaluation with strategic planning, networking and control—Bhavesh Patel—2nd edition 2010, reprinted in 2011—Vikas publishing House Pvt. Ltd.
3. Scheduling Construction Projects—Principles and practices—Sandra Weber—Indian edition published in 2012—Pearson Publication.
4. Construction Project management—Planning, Scheduling and controlling—K. K. Chitkara—Eight reprint 2004, Tata McGraw Hill Publishing Company Limited.

Non Technical Subjects

e. Human Rights (2 Credits)

Module 1. a: Human Rights – Concept, Development, Evolution (7 hrs.)
- Philosophical, Sociological and Political debates
- Benchmarks of Human Rights Movement.

Module 1. b: 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 (8 hrs.)
- 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 (7 hrs.)
- Unorganized Sector ,
- Right to Environment, particularly Industrial sectors of Civil Engineering and Mechanical Engineering .

-Globalization and Human Rights
- Right to Development,

Module 4. a: Citizens' Role and Civil Society (8 hrs.)
- Social Movements and Non-Governmental Organizations
- Public Interest Litigation

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

Module 4. b: Human Rights and the international scene –Primary Information with reference to Engineering Industry.(2 hrs)
- UN Documents
- International Mechanisms (UN & Regional)
- International Criminal Court

* student can select any two module from the four modules for the one credit course.

Referances:

1.Study material on UNESCO,UNICEF web site

2.HUMAN RIGHTS IN INDIA A MAPPING,Usha Ramanathan: free download from http://www.ielrc.org/content/w0103.pdf

3.**Introduction to International Humanitarian Law by Curtis F. J. Doebbler - CD Publishing , 2005 .**

4.**Freedom of Information,**by **Toby Mendel - UNESCO , 2008**

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.

f. Principle Centered Leadership (1 Credit)

Module 1 : Motivation, Leadership and Competency (8 hrs.)

a) Motivation:--

Necessity, types, means of providing extrinsic motivation. Leadership. Qualities of a leader. Types of Leadership viz. Lassez Fairre, transactional, transformational. Principle centered leadership based on Stephen Covey habits.

b) Competency Mapping:-

Definition of competency. Generic, functional and Strategic Competencies. Importance of developing competencies. Identification of competency gaps at managerial cadre level through benchmarking requirements based on role, mapping and assessment. Training and Developmental programs for competency gap closure.

Module 2 ; Entrepreneurship and strategic Management (7 hrs.)

a) Entrepreneurship: - Qualities of an entrepreneur. Business ideas generation methods—creative imagination, brainstorming, newspaper exercise activity. Ideas evaluation based on John Mullion's 7 point test concept of a B—plan.

b) Strategic Management: --

Necessity in the context of global challenges. Objectives of strategic management. Forecasting abilities and methods. Developing organizations for the achievement of strategic objectives. Dealing with uncertainties.

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
4. Human Resource Development In The Building Industry, Vinita Shah, published by NICMAR
5. Human Resources Management & Human Relations , V P Michael , Himalaya
6. Human Resource Management Biswajeet Pattanayak published by Prentice Hall
7. Construction project Management, integrated approach—Feedings First Indian Reprint 2011—Yesdee publications
8. Cases in Strategic Management, Amita Mital published by Tata Mcgraw Hill

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

Seminar – II **(501116)**

Teaching Scheme	Examination Scheme
Pract. 4 hrs../week	Oral : 50 Marks,
	TW :: 50 Marks
	Credits 4

Term work should consist of spiral bound report 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 45 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.

UNIVERSITY OF PUNE

M.E. (CIVIL) (CONSTRUCTION AND MANAGEMENT)
SEMESTER III
Project Stage I (501117)

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

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 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

Seminar – III **(501118)**

Teaching Scheme
Pract. 5 hrs../week

Examination Scheme
End Semester Assessment : 50,
TW :: 50 Marks
Credits : -

Term work should consist of a spiral bound report on the topic of dissertation work 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. Pre Dissertation submission acceptance or not

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

Project work Stage II (501119)

Teaching Scheme	Examination Scheme
	Oral/Presentation : 200
Pract. 20 hrs../week	End Semester Assessment : 150,
	TW :: 50 Marks
	Credits : - 25

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

(It is preferred that at least two papers on the research area be 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.