M.E. CONSTRUCTION ENGINEERING AND MANAGEMENT

INSTITUTIONAL CORE COURSES

PICM001	STATISTICAL METHODS FOR ENGINEERS	L	T	P	C
		3	1	0	4

Course Objectives

- Perceive the concepts of Statistical methods and its applications in construction management.
- Simulate the existing data to predict future performance using random numbers.

Course Outcomes

CO1: Ability to analyze the sampling distributions and apply them in complex construction problems.
CO2: Ability to utilize the testing of hypothesis to measure the sampling involved in real life problems.
CO3: Ability to correlate and hence develop linear regression equation between various construction management problems.
CO4: Ability to examine the variance design principles in sampling.
CO5: Ability to apply SPSS tool to simulate construction relevant problems.

Sampling distributions – Point and interval estimates for population proportions, mean and variance – Maximum likelihood estimate method – Method of moments. testing of hypothesis -Tests based on Normal, t, χ^2 and F distributions for testing of means, variance and proportions – Analysis of r x c tables – Goodness of fit. Multiple and Partial Correlation – Method of Least Squares – Plane of Regression – Properties of Residuals Coefficient of multiple correlation – Coefficient of partial correlation – Multiple correlation with total and partial correlations – Regression and Partial correlations in terms of lower order co-efficient.

Design of experiments- Analysis of variance – One-way and two-way classifications – Completely randomized design Randomized block design – Latin square design. simulation Monte-Carlo simulation – Random numbers – Generation of random variables – Generation of selected discrete random variables – Generation of selected continuous random variables – Case studies in construction using simulation techniques – Excel/SPSS software used for simulation.

LECTURE: 45 PERIODS, TUTORIAL: 15 PERIODS, TOTAL: 60 PERIODS

References

1. R. A. Johnson and C. B. Gupta, Miller and Freund's Probability and Statistics for Engineers, Seventh Edition, Pearson Education, 2007.
2. Bilal M. Ayyub and Richard H. McCuen, Probability, Statistics and Reliability for Engineers and Scientists, Special Indian Edition, Chapman and Hall/CRC, 2010.
3. K. K. Chitkara, Construction Project Management planning, Scheduling and Controlling, Third Edition, McGraw Hill Education, 2014.
4. Jay. L. Devore, Probability and statistics for Engineering and the Sciences, Fifth Edition, Thomson and Duxbury, 2002.
5. J. E. Freund, Mathematical Statistics, Fifth Edition, Prentice Hall of India, 2001.

PROFESSIONAL CORE COURSES

		L	T	P	C
PCEC001	QUANTITATIVE METHODS IN CONSTRUCTION MANAGEMENT	3	0	0	3

Course Objectives

- The aim of this course is to enable the students to learn about quantitative methods in construction management.
- The syllabus comprises of transportation model, basic feasible solutions, PERT and CPM, quality control and optimization theory.

Course Outcomes

CO1: Ability to create and develop the quantitative techniques related to production and financial management in construction industries.
CO2: Ability to evaluate break- even point and develop the transportation and optimization models for cost analysis in various civil engineering projects.
CO3: Know the operations research and optimality analysis.
CO4: Know decision making under conditions of certainty, risk and uncertainty.
CO5: Understand managerial economics and game theory applications.

Introduction to Operations Research – Linear Programming – formulation – graphical solution –simplex solution -Duality and Post – Optimality Analysis- Transportation model- Optimization techniques- Integer programming- branch and bound techniques- transportation problems – least cost method – UV method – vogel's approximation method – North West corner cell method – work assignment problems.
Production management- Inventory Control - EOQ - Quantity Discounts - Safety Stock – Replacement Theory – PERT and CPM – Quality Control. Optimization theory- Decision Theory – Decision Rules – Decision making under conditions of certainty, risk and uncertainty – Utility Theory, Cost Concepts – Break-even analysis – Pricing Techniques – simulation models - Game theory Applications.

L = 45, TOTAL = 45PERIODS

References

1. Hamdy A.Taha, Operations Research: An Introduction, Prentice Hall, 2012.
2. Richard F. Fellows, Anita M. M. Liu - Research Methods for Construction, Wiley balckwell, 2015.
3. Paolo Brandimarte - Quantitative Methods: An Introduction for Business Management, Wiley balckwell, 2012.
4. Levin, R.I, Rubin, D.S., and Stinson J., Quantitative Approaches to Management, McGraw Hill College, 2003.
5. Frank Harrison, E., the Managerial Decision Making Process, Houghton Mifflin Co., Boston, 1999.

PCEC002	RECENT ADVANCES IN CONSTRUCTION MATERIALS	L	T	P	C
		3	0	0	3

Course Objectives

- This course will be focused on recent advances in building materials.
- Students will also be exposed to structural plastics and composites, metals and special alloys of steel, special concretes and green materials for sustainable development.

Course Outcomes

CO1: Ability to justify and choose the modern construction materials for constructional activities.
CO2: Ability to select and plan the smart, intelligent and green materials used for sustainable construction.
CO3: Ability to study about to advanced building materials.
CO4: Ability to know the characteristics of different alloys of steel.

Special Concretes - Light weight aggregate concrete -High Strength and High Performance Concrete – Fibre Reinforced Concrete, Self compacting concrete, Alternate Materials to concrete. Study of Advance Building Materials like, aluminum, glass, fabric, Construction chemicals –sealants, engineering grouts, mortars, admixtures and adhesives.

Metals And Special Alloys Of Steel - Water Jet Cut Stainless Steel, Mill Slab Steel, Tension Rods Assemblies And Cast Iron, Heat Treatment In Steels, Tendons. -Coatings-Adhesives-Structural Plastics And Composites- Polymer Membranes - Glazed Brick, Photo Catalytic Cement, Acid Etched Copper And Composite Fiber.

Water Proofing Compounds – Non-weathering Materials – Flooring and Facade Materials. Smart and Intelligent Materials for intelligent buildings - Special features- Green materials for sustainable development.

L = 45, TOTAL = 45PERIODS

References

1. Peter Domone, John Illston - Construction Materials: Their Nature and Behaviour, Fourth Edition, CRC Press, 2010.
2. Shin-Che Huang, Hervé Di Benedetto - Advances in Asphalt Materials: Road and Pavement Construction, Woodhead publishing, 2015.
3. David Doran, Bob Cather - Construction Materials Reference Book, Routledge; 2 edition, 2013.
4. Marco Casini - Smart Buildings: Advanced Materials and Nanotechnology to Improve Energy Efficiency and Environmental Performance, Woodhead Publishing2016.
5. Shetty M.S, Concrete Technology: Theory and Practice, S.Chand& Company Ltd., 2005.

PCEC003	CONSTRUCTION METHODS AND EQUIPMENTS	L	T	P	C
		3	0	0	3

Course Objectives

- This subject discusses in detail about different types of advanced construction methods.
- Students are expected to be familiarizing with advanced construction equipments and its safety measures and demolition techniques.

Course Outcomes

CO1: Ability to select and choose construction equipments for earthwork, material handling and miscellaneous purposes.

CO2: Ability to evaluate and choose advanced construction techniques for construction of special structures like off shore structures, domes and space decks.

CO3: Ability to understand the construction sequence of silos, chimneys and sky scrapers.

CO4: Ability to analyse the working of different equipments for each work.

Selection of equipment-factors effecting-relative advantages and disadvantages-technical and economic aspects. Equipment Management in Projects - Maintenance Management – Replacement - Cost Control of Equipment - Depreciation Analysis – Safety Management, Fundamentals of Earth Work Operations - Types of Earth Work Equipment. Equipment for Dredging, Trenching, Tunneling, Drilling, Blasting, Compaction, and Erection - Types of pumps used in Construction - Equipment for Dewatering and Grouting – Foundation and Pile Driving Equipment. Crushers – Feeders - Screening Equipment - Handling Equipment - Batching and Mixing Equipment - Pouring and Pumping Equipment.

Erection of lattice towers and rigging of transmission line structures – construction sequence in cooling towers, silos, chimney, sky scrapers, bow string bridges, cable stayed bridges – launching and pushing of box decks – Advanced construction techniques for offshore structures – construction sequence and methods in domes and prestress domes – support structure for heavy equipment and conveyor and machinery in heavy industries – erection of articulated structures, braced domes and space decks. Advanced techniques and sequence in demolition and dismantling.

L = 45, TOTAL = 45PERIODS

References

1. Clifford J. Schexnayder, Robert Peurifoy, Aviad Shapira, Robert Schmitt Construction Planning, Equipment, and Methods, McGraw-Hill Education; 8 edition 2010.
2. Kumar Neeraj Jha - Construction Project Management: Theory and Practice, Pearson; 1 edition, 2015.
3. Leonhard E. Bernold - Construction Equipment and Methods: Planning, Innovation, Safety, Wiley Blackwell, 2013.
4. Frank Harris, Ronald McCaffer - Modern Construction Management, Wiley Blackwell, 2013.
5. Sharma S.C. Construction Equipment and Management, Khanna Publishers, New Delhi, 2008.

PCEC004	PROJECT FORMULATION AND APPRAISAL	L	T	P	C
		3	0	0	3

Course Objective

- This course provides a basic understanding of capital investment and project financing.
- Students will be enriched with Feasibility study and its Reports, Time Value of Money, Indian and International Practice of Investment Appraisal, Features of BOT, BOLT, DBOT and BOOT model, Technology transfer and Foreign collaboration.

Course Outcomes

CO1: Ability to Formulate and generate the project and prepare reports for executing the work.
CO2: Ability to estimate the costing techniques and synthesize financial aspects of construction projects.
CO3: Ability to analyze private sector participation in infrastructure development projects and construct BOT, BOLT, DBOT and BOOT model.
CO4: Ability to assess various methods of project appraisal.

Capital investments - capital budgeting - Feasibility study - Feasibility Reports and its clearance, Preliminary analysis – market, technical, financial , economic and ecological - Project cash flow, Time Value of Money - Cost of Capital & Capital Budgeting Techniques – Project Appraisal -NPV – BCR – IRR – ARR – Urgency – Pay Back Period – Assessment of Various Methods – Indian Practice of Investment Appraisal – International Practice of Appraisal - Analysis of Risk.

Project financing-means of financing-financial institutions- key financial indicators. Private sector participation in Infrastructure Development Projects – Features of BOT model, BOLT model, BOOT model and DBOT model –Technology transfer and Foreign collaboration – Scope of technology transfer.

L = 45, TOTAL = 45 PERIODS

References

1. Prasanna Chandra, Projects – Planning, Analysis, Selection, Implementation Review, Tata McGraw Hill Publishing Company Ltd., Eighth Edition, New Delhi. 2014.
2. Kevin R. Callahan, Gary S. Stetz, Lynne M Project Management Accounting, with Website: Budgeting, Tracking, Wiley Blackwell, 2015.
3. Michael S. Dobson PMP, Deborah Singer- Project Risk and Cost Analysis, AMACOM Div American Mgmt Assn, 2011.
4. Derek Salkeld - Project Risk Analysis: Techniques for Forecasting Funding Requirements, Costs and timescales, Wiley-Blackwell, Oxford, 2013.
5. Joy P.K., Total Project Management - The Indian Context, New Delhi, Macmillan India Ltd., 2006.

PCEC005	ADVANCED CONSTRUCTION ENGINEERING LABORATORY	L	T	P	C
		0	0	2	2

Course Objective

- Students will be able to design concrete mix using BIS and ACI methods.
- Also they will perform non destructive testing and measuring the crack propagation.

Course Outcomes

CO1: Ability to design and develop the concrete mix proportions for different types of construction activities.
CO2: Ability to evaluate the fresh and hardened properties of special concrete and develop a detailed reports based on the findings.
CO3: Understand the Flow Characteristics of Self Compacting concrete.
CO4: Know the Effect of minerals and chemical admixtures in concrete at fresh and hardened state with relevance to workability, strength and durability.

List of Experiments

1. Concrete mix design by BIS and ACI as per relevant codes of practice (Comparative study).
2. Flow characteristics of Self compacting concrete.
3. Effects of minerals and chemical admixtures in concrete at fresh and hardened state with relevance to workability, strength and durability.
4. NDT on hardened concrete- UPV, Rebound hammer and core test.

L = 45, TOTAL = 45 PERIODS

PCEC006	HEALTH MONITORING OF STRUCTURES	L	T	P	C
		3	0	0	3

Course Objective

- This course exposes students to learn health monitoring of existing structures.
- The syllabus covers importance of maintenance, repair and rehabilitation, Quality assurance for concrete construction, methods of corrosion protection, Strengthening of structures, Dismantling of structures and Non destructive testing.

Course Outcomes

CO1: Ability to select and estimate the materials to strengthen the damaged structures.
CO2: Ability to select the non-destructive testing techniques and estimate the strength of different types of buildings.
CO3: Ability to classify different types of concrete.
CO4: Ability to understand Safety measures to be carried out during dismantling.

Maintenance, repair and rehabilitation, Deterioration of Structures -Distress in structures Causes and prevention. Mechanism of Damage –Types of Damages- Facets, importance of Maintenance various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration. Quality assurance for concrete construction concrete properties- strength, permeability, thermal properties and cracking. - Effects due to climate, temperature, chemicals, corrosion - design and construction errors - Effects of cover thickness and cracking.

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement and polymers coating for rebars loadings from concrete, mortar and dry pack, vacuum concrete, Gunite and Shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels and cathodic protection.

Mortar repair for cracks, shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels and cathodic protection. Repair of structures distressed due to earthquake – Strengthening using FRP- Strengthening and stabilization techniques for repair. Safety measures – Dismantling of structures – Safety in finishing works – NDT testing procedures - Engineered demolition techniques for structures.

L = 45, TOTAL = 45 PERIODS

Reference

1. Raikar, R.N., “Learning from failures - Deficiencies in Design, Construction and Service” - R&D Centre (SDCPL), Raikar Bhavan, Bombay, 2012.
2. Allen R.T and Edwards S.C, “Repair of Concrete Structures”, Blakie and Sons, UK, 2011.
3. Daniel Balageas, Claus-Peter Fritzen, Alfredo Güemes - Structural Health Monitoring, Wiley Blackwell, 2010.
4. Charles R. Farrar, Keith Worden - Structural Health Monitoring: A Machine Learning Perspective, Wiley Blackwell, 2012.
5. Santhakumar A.R., “Concrete Technology” Oxford University Press, Printed in India by Radha Press, New Delhi, 2007.

PCEC007	COMPUTER APPLICATIONS IN CONSTRUCTION ENGINEERING AND PLANNING	L	T	P	C
		3	0	0	3

Course Objective

- This course aims to provide a comprehensive introduction to computer applications in construction engineering and planning.
- Students will be introduced to system hardware , Languages , Data base management, Computer aided Cost Estimation, Linear, Dynamic and Integer Programming, Deterministic Inventory Models, Probabilistic Inventory Models, Basic concepts of Monte carlo simulation , Applications and limitations.

Course Outcomes

CO1: Ability to evaluate the sequences of construction process and estimate the cost of project using database software.
CO2: Ability to design and develop inventory model for an effective stock utilization in construction industries.
CO3: Ability to understand concepts of Monte carlo simulation.
CO4: Ability to develop an application with database software.

Introduction to system hardware – Languages – Data base management – Spread sheets – Applications - overview of IT Applications in Construction – Construction process – Computerization in Construction – Computer aided Cost Estimation – Developing application with database software.
Linear, Dynamic and Integer Programming - Branch and Bound Techniques – Application to Production Scheduling, Equipment Replacement, Material Transportation and Work Assignment Problems-software applications.

Deterministic Inventory Models - Probabilistic Inventory Models .PERT and CPM - Advanced planning and scheduling concepts – Computer applications – Case study. Basic concepts of Monte carlo simulation – Applications and limitations – Examples - Enterprises – Introduction to ERP systems.

L = 45, TOTAL = 45 PERIODS

References

1. Hsiang-Chuan Liu, Wen-Pei Sung, Wenli Yao - Computer, Intelligent Computing and Education Technology, CRC Press, 2013.
2. H. Wagter - Computer Integrated Construction, Elsevier Science, 2012.
3. Billy E.Gillet., Introduction to Operations Research – A Computer Oriented Algorithmic Approach, Mc Graw Hill, 2008.
4. Feigenbaum,L., Construction Scheduling with Primavera Project Planner, Prentice Hall Inc., 2002.
5. Ming Sun and Rob Howard, “Understanding I.T. in Construction, Spon Press, Taylor and Francis Group, 2004.

PCEC008	CONSTRUCTION REGULATIONS AND CONTROL	L	T	P	C
		3	0	0	3

Course Objective

- The course focused on the study of construction regulations and its control.
- This course also provide students the knowledge on Indian Contracts Act, Elements and types of contracts, Contract formation and interpretation, Potential contractual problems, Comparison of actions and laws, Powers and duties of arbitrator and types of laws.

Course Outcomes

CO1: Ability to select the elements of contracts and design a contract document for execution of construction works.

CO2: Ability to justify the legal requirements to solve contractual problems for managing construction contracts.

CO3: Understand the various processes involved in tenders.

CO4: Achieve awareness on arbitrations and powers and duty of an arbitrator.

Indian Contracts Act – Elements and types of contracts– Features – Suitability -Design of contract documents – International contract document – Standard contract document – Law of torts. Prequalification – Bidding – Accepting – Evaluation of tender from technical, contractual and commercial points of view – Contract formation and interpretation – Potential contractual problems – World bank procedures and guidelines – Tamilnadu transparency in tenders act.

Comparison of actions and laws – Agreements – Subject matter – Violations – Appointment of arbitrators – Conditions of arbitration – Powers and duties of arbitrator – Rules of evidence – Enforcement of award – Costs. Insurance and bonding – Laws governing sale, purchase and use of urban and rural Land – Land revenue codes – types of tax laws –their influence on construction costs – Legal requirements for planning – Property law – Agency law – Local government laws for approval – Statutory regulations. Social security – Welfare legislation – Laws relating to wages, bonus and industrial disputes, labour administration – Insurance and safety regulations – Workmen's compensation act – Indian factory act – Tamilnadu factory act – Child labour act.

L = 45, TOTAL = 45 PERIODS

References

1. Brian Cooke, Peter Williams - Construction Planning, Programming and Control, Wiley Blackwell, 2013.
2. Roger ter Haar, Anna Laney, Marshall - Construction Insurance and UK Construction Contracts, 2016.
3. Pettang, Chrispin - Decision Support for Construction Cost Control in Developing Countries, IGI Global; 1 edition, 2016.
4. Edward Banyard Smith - Construction Law & Practice: Jurisdictional Comparisons, Wildy & Sons Ltd, 2012.
5. Jimmie Hinze, Construction Contracts, McGraw Hill, 2001.

PCEC009	VALUATION	L	T	P	C
		3	0	0	3

Course Objective

- This course is an overview about the valuation of the building.
- This course enables the students to determine the current worth of a construction project.

Course Outcomes

CO1: Ability to evaluate the value of the properties according to current market rate.
CO2: Ability to analyse different methods of depreciation .
CO3: Ability to choose the exact method for valuating the existing building.
CO4: Ability to analyse and compare the types of investment involved in the property.

Principals of valuation- Nature of value, fair market value and open market price, supply and Demand, property as an investment, percentage Yield of investments, Interest rates on Investment in land and buildings, valuation of like interests, property as an investment, Development of properties, Comparison with other types of Investment.

Rental value and net income- Economics and legal factors affecting Rent, Methods of Determination of Rental value, Effect of capital improvements on Rental value. Outgoings- Municipal and other Taxes, Repairs, Sinking funds, Insurances management. Nature and use of valuation tables.

Valuation Properties – Methods of valuation, Analysis of rental and sales, Direct comparison of capital value, valuation by reference to cost valuation by reference to profits. The residual or development method, Rental method of valuations land and building method, Modern developments, Method of costs of Building works, valuation of fully developed, Fully tenanted, partly & fully occupied properties, valuation of under developed properties, Properties Rental out or given on leave and license basis - Valuation of land – Situation, size, shape, Reversion to land value, Technical and physical conditions of lands, Methods of valuation of land, Problem of continuance of income reversion to land value, Encumbrance of land -Depreciation, Method of computing depreciation, Classification and life of buildings .

L = 45, TOTAL = 45 PERIODS

References

1. Prasanna Chandra Corporate Valuation: A Guide for Analysts - Managers and Investors Paperback, 2014 .
2. Aswath Damodaran Damodaran on Valuation: Security Analysis for Investment and Corporate Finance Study Guide (Wiley Professional Banking and Finance) 1994 .
3. Aswath Damodaran , Damodaran on Valuation: Security Analysis for Investment and Corporate Finance (Frontiers in Finance Series), 1994.
4. Aswath Damodaran, Damodaran on Valuation: Security Analysis for Investment and Corporate Finance (Book Disk and Study Guide Set): Textbook and Study Guide,1994.

PCEC010	ADVANCED COMPUTER TECHNIQUES LABORATORY	L	T	P	C
		0	0	2	2

Course Objective

- Students will be able to prepare a bid and prepare scheduling for small construction project using Primavera and MS project.

Course Outcomes

CO1: Ability to create and develop simulation models for project risk analysis
CO2: Ability to select and develop programs to solve civil engineering problems in the field of Construction management.
CO3: Understand the optimisation techniques and software problems.
CO4: Know the Deterministic and Probabilistic Inventory Models.
CO5: Understand concepts regarding estimation, planning, scheduling and accounting.

List of Experiments

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

L = 15, P = 30 TOTAL = 45 PERIODS

PROFESSIONAL ELECTIVE COURSES

PCEE001	SHORING, SCAFFOLDING AND FORMWORK	L	T	P	C
		3	0	0	3

Course Objective

- The aim of this course is enable the students to learn about shoring, scaffolding and formworks.
- Students are expected to be familiarizing with formworks for various structural elements and shell structures.

Course Outcomes

CO1: Ability to evaluate and choose appropriate shoring and scaffolding techniques for construction projects.

CO2: Ability to plan and design formworks for various elements such as slabs, beams, columns, walls, shells and tunnels.

CO3: Study the design aspects of formwork under various requirements.

CO4: Study the planning and erection aspects of form work for buildings.

Introduction - Forms for foundations, columns, beams walls etc., General objectives of formwork building - Planning for safety - Development of a Basic System - Key Areas of cost reduction - Planning examples. Overall Planning - Detailed planning - Standard units - Corner units - Pass units - Calculation of labour constants - Formwork hours - Labour Requirement - Overall programme - Detailed programme - Costing - Planning crane arrangements - Site layout plan - Transporting plant - Formwork beams - Scaffold frames - Framed panel formwork - Formwork accessories. Lumber - Types - Plywood - Types and grades - Reconstituted wood - Steel - Aluminum - Hardware and fasteners - Nails in Plywood - Allowable withdrawal load and lateral load.

Basic simplification - Beam formulae - Allowable stresses - Deflection, Bending - Lateral stability - Shear, Bearing - Design of Wall forms - Slab forms - Beam forms - Column forms . Simple wood stresses - Slenderness ratio - Form lining Design Tables for Wall formwork - Slab Formwork - Column Formwork - Slab props - Stacking Towers - Free standing and restrained - Rosett Shoring - Shoring Tower - Heavy Duty props.

Carpentry Shop and job mill - Forms for Footings - Slab form systems - Sky deck and Multiflex - Customized slab table - Standard Table module forms - Swivel head and uniportal head - Assembly sequence - Cycling with lifting fork - ACI - Design deficiencies - Permitted and gradual irregularities.

Hemispherical, Parabolic, Translational shells - Typical barrel vaults Folded plate roof details - Forms for Thin Shell roof slabs design considerations - Strength requirements -Tunnel forming components - Curb forms invert forms - Arch forms - Cut and cover construction - Bulk head method. Slip Forms - Functions of various components - Planning - Desirable characteristics of concrete - Common problems faced - Safety in slip forms special structures built with slip form Technique - Types of scaffolds - Putlog and independent scaffold -Single pole scaffolds - Truss suspended - Gantry and system scaffolds.

L = 45, TOTAL = 45 PERIODS

References

1. Kumar Neeraj Jha, Formwork for Concrete Structures, Tata McGraw-Hill Education, 2012.
2. Robert Ratay, Temporary Structures in Construction, McGraw-Hill Professional, Third Edition – 2012.
3. Garold (Gary) Oberlender, Robert Peurifo - Formwork for Concrete Structures, McGraw-Hill Education; 4 edition, 2011.
4. Murray Grant, Peter F. Pallett - Temporary Works: Principles of Design and Construction, ICE Publishing, 2012.
5. Robert L. Peurifoy and Garold D. Oberlender, Formwork for Concrete Structures, McGraw -Hill, 2002.

PCEE002	CONSTRUCTION ECONOMICS AND FINANCE	L	T	P	C
		3	0	0	3

Course Objective

- This course aims to provide understanding of economics and finance in construction.
- Students will be introduced to time value of money, series of payments, types of analysis, sources of finance, International financial management and financial statements.

Course Outcomes

CO1: Ability to justify and estimate the economic resources required to complete a typical construction project.
CO2: Ability to construct cash flow diagram for managing funds and accounts.
CO3: Know the economic resources required to complete a typical construction project .
CO4: Understand how to plan and control construction costs .

Time Value of Money –Cash Flow diagram –Nominal and effective interest-continuous interest. Single Payment Compound Amount Factor (P/F,F/P) –Uniform series of Payments (F/A,A/F,F/P,A/P)–Problem time zero (PTZ)-equation time zero (ETZ). Constant increment to periodic payments –Arithmetic Gradient (G), Geometric Gradient (C).

Comparing alternatives -Present worth Analysis, Annual Worth Analysis, Future Worth Analysis, Rate of Return Analysis (ROR) and Incremental Rate of Return (IROR) Analysis, Benefit/Cost Analysis, Break Even Analysis. Real Estate -Investment Property, Equipment Replace Analysis, Depreciation –Tax before and after depreciation –Value Added Tax (VAT) –Inflation.

Project Finance –Sources of finance -Long-term and short -term finance, Working Capital Management, Inventory valuation, Mortgage Financing -International financial management-foreign currency management - Management accounting, Financial accounting principles-basic concepts, financial statements –accounting ratios - funds flow statement –cash flow statement.

L = 45, TOTAL = 45 PERIODS

References

1. Danny Myers - Construction Economics: A New Approach, Routledge; 2 edition, 2013.
2. Gerard de Valence - Modern Construction Economics: Theory and Application, Taylor & Francis, 2010.
3. Collier C and GlaGola C, Engineering Economics & Cost Analysis, 3nd Edn. Addison Wesley Education Publishers.2010.
4. B. Drake - Construction Economics in the Single European Market, Routledge; 1 edition 2013.
5. Blank, L.T., and Tarquin,a.J, Engineering Economy,4th Edn. McGraw Hill Book Co., 2001.

PCEE003	INTERNATIONAL CONSTRUCTION BUSINESS	L	T	P	C
		3	0	0	3

Course Objective

- The aim of this course is to enable the students to learn about multinational trades and investements.
- Students are exposed to world economy, value systems on business.

Course Outcomes

CO1: Ability to justify and estimate the multinational investments in the construction Projects.

CO2: Ability to plan and select the different technology and policy implication for various countries.

CO3: Develop the ability to influence project design and to manage pre-construction activities.

CO4: Ability to understand the impact of management styles in selected countries.

International political system, economic system, multinationals, features of international trade & investment, national interest in international trade. International monetary system, balance of international payments, transfer of international payments, foreign exchange rates and their determination.

Developing countries in the world economy, international differences in technology, policy implications for host countries Cultural environment of international business -effect of culture, language, education, religion, value systems on business, impact on management styles in selected countries.

L= 45, TOTAL = 45 PERIODS

References

1. FIDIC documents.
2. Simon M.S. McGraw Hill (2015);" Construction Contracts & Claims", New York. ISBN: 9780070574335. 278 p.
3. Unified Contract Documents by CIDC.
4. Reboert Matays and Mathews (2015);" Dispute Review Board Manual", ISBN-13: 978-0070410602.
5. K.N.Vaid (1991);" International Construction Contracting", NICMAR Publication 2014. ISBN: 9788185448169.

PCEE004	MANAGEMENT OF HOUSING PROJECTS	L	T	P	C
		3	0	0	3

Course Objective

- This course provide a general review about housing projects.
- Students will also be exposed to quality, affordable and associated services of housing to the people .

Course Outcomes

CO1: Ability to justify and choose the modern construction materials and technology for construction activities .

CO2: Ability to plan and develop various facilities such as water supply ,waste disposals, lifts, HVAC systems.

CO3: Ability to understand the role of various agencies for housing and urban planning.

CO4: Ability to understand about new developments in construction methods and technology.

Need and importance of housing, role of various state and national level agencies, local bodies etc., rural and urban housing, systems approach to housing and urban planning. New developments: materials, construction techniques, low cost housing, mass housing, industrialized housing, appropriate technology.

Planning, Pre-execution phase, project phase and post-execution phase management of building services water supply, waste disposal, lifts, HVAC systems. Maintenance of buildings need and importance, organization and management .

L= 45, TOTAL = 45 PERIODS

References:

1. National Association of Home Builders - Residential Construction Performance Guidelines, Fifth Edition, Contractor Reference 2016.
2. David Marchman and Tulio Sulbaran - Scheduling for Home Builders with Microsoft® Project, 3rd Edition 2012.
3. Leon Rogers - Basic Construction Management:Fifth The Superintendent's Job 2009.
4. Kent Shepard - obsite PhraseBook English-Spanish 2002.
5. K.N.Vaid - Managing Technical Organisations And Professionals July 2003.

PCEE005	INDUSTRIAL RELATIONS AND HUMAN RESOURCE MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objective

- This course will focus on industrial relations and human resource management.
- Students will also exposed to human resource management functions and objectives, demand analysis, Line and staff relationship, career development.

Course Outcomes

CO1: Ability to evaluate and choose industrial relation policies to avoid the industrial conflicts and disputes.

CO2: Ability to evaluate and formulate the key issues related to administering the human elements such as motivation, compensation, appraisal, career planning, diversity, ethics, and training.

CO3: Ability to understand about functionalities of human resource management.

CO4: Ability to forecast demands of a project both qualitative and quantitative.

Human resource management functions and objectives, professionalization of human resource management in India; human resource management in changing scenario of business; new directions in human resource management - structure and role of Human Resource management -Human resource inventory; human resource manager; organization and functions; human resources management development - organizational strategy - steps in human resource planning, forecasts – demand analysis; quantitative and qualitative aspects of human resource planning; job analysis and job description, recruitment and selection - Staffing; career planning; succession planning- Line and staff relationship, organization of human resource department, styles, communication – human resource productivity, moral and motivation, creating conducive work environment.

Identification of training needs – qualitative and quantitative; training curriculum planning; training facilities and equipments; advanced training; designing training programmes; employee counselling; executive development programmes; evaluation of training and development programmes; career planning and career development; promotion, transfer and demotion.

Constituents of industrial relations, dimension of industrial relation at work, successful industrial relations programme, Anatomy of Industrial Relations -Genesis of industrial conflicts, industrial unrest, Industrial disputes - Industrial Relations Policy - Government policies through 5 year plans, industrial policy revolution, National Commission on Labour and Industrial Relations Policy. Causes, disputes by States and industrial units; prevention; settlement methods – under the law, tripartite bodies, work committee, conciliation, labour court, tribunal and national tribunal- Collective Bargaining - Concept, main features, principles, contents and coverage; process of negotiation, participative management - Dispute Settlement Mechanism - Conciliation, role of conciliator, duties and responsibilities - voluntary and compulsory; arbitration – references, procedure.

L = 45, TOTAL = 45 PERIODS

References

1. R.S. Dwivedi , Managing Human Resources Galgotia Publishing Co., New Delhi, 20142.
2. John Storey - New Perspectives on Human Resource Management (Routledge Revivals), 2014.
3. Terry L. Leap, Personnel/Human Resource Management, MacMilan Publishing Company, New York, 2012.
4. Chris Rowley - Human Resource Management in the Asia-Pacific Region: Convergence Revisited, Routledge, 2010.
5. Dale Yoder, Personnel Management and Industrial Relations, PHI, New Delhi, 2000.

PCEE006	CONSTRUCTION PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objective

- This course provides a general overview of construction project management at site .
- Students will also be enriched with Project life cycle, design of work break down systems, value engineering, equipment and material management.

Course Outcomes

CO1: Ability to evaluate and choose various management techniques for successful completion of construction projects.

CO2: Ability to design work break down systems for effective labour and material Management.

CO3: Understand construction control processes.

CO4: Ability to frame work break down structure for proper execution of the project.

Concept of a Project – Characteristic features – Project Life cycle – Phases –Project Management – tools and techniques for project management – role of project managers. Development of project plan and objectives – programming – scheduling – project organization – organization and project team – role of communication in project management – controlling systems.

Working systems – Characteristics – class of systems – design of systems – work break down system (WBS) – project execution plan – project procedure manual –sub systems of project management- monitoring of projects networks– monitoring contracts.

Project direction – direction during production stage – value engineering review – stages –directives – project coordination – procedure – interface management – project control –scope for progress control – overall project progress control – stages – methods. Basic concept – Labour requirements – Labour productivity – site productivity – Equipment Management – Material management- procurement organization – procurement planning – functions of material management – inventory control.

L = 45, TOTAL = 45 PERIODS

References

1. Prasanna Chandra, “Project Planning,Analysis, Selection,Implementation and review”, Tata Mcgraw Hill ,2010.
2. J. F. McCarthy - Construction Project Management: A Managerial Approach, Pareto; 1 edition, 2010.
3. Mr Dennis Lock - Project Management in Construction, Gower Publishing Ltd; 9th revised edition, 2012.
4. M. Hajdu - Network Scheduling Techniques for Construction Project Management, Springer US, 2013.
5. Chris Hendrickson and Tung Au, Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2000.

PCEE007	PROJECT PLANNING AND CONTROL	L	T	P	C
		3	0	0	3

Course Objective

- This course provides a general overview about the project planning.
- The syllabus covers the project organization of the projects, time estimation, CPM, PERT.

Course Outcomes

CO1: Ability to evaluate and choose the project planning and control activities in the construction projects.
CO2: Ability to develop a network techniques in the construction.
CO3: Ability to create estimation of a project.
CO4: Ability to formulate scheduling of a construction project.

Function of Project Planning –Inter dependency relationship, Generation and screening of project ideas, project rating index, Characterization of the market, demand forecasting, market planning. Financial Analysis - Estimation of cost of project and means of financing, estimates of sales and production, cost of production, working capital requirement and its financing, estimates of working results.

Forms of project organization, project planning, project control, human aspects of project management, prerequisites for successful project implementation. Project review and administrative aspects- Initial review, performance evaluation, abandonment analysis, administrative aspects of capital budgeting, evaluating the capital budgeting system of an organization. Network techniques for project management, development of project network, time estimation, determination of critical path, scheduling when resources are limit, PERTand CPM models.

L= 45, TOTAL= 45 PERIODS

References:

1. Prasanna Chandra, Project Planning: Analysis, Selection, Implementation and Review, Tata Mc Graw Hill 2014.
2. Narendra Singh, Project Management and Control, HPH, 2009.
3. John M. Nicholas and Herman Steyn, Project Management for Business and Technology: Principles and Practice, Prentice Hall India 3rd Edition , 2015.
4. Clifford F. Gray & Eric W. Larson, Project Management: The Managerial Process, Tata Mc Graw Hill 5th Edition , 2016.
5. Harold Kerzner, 'Project Management, A systems approach to Planning, Scheduling & controlling', Wiley India (P) Ltd., 11th Edition, 2016.

PCEE008	VALUE ENGINEERING	L	T	P	C
		3	0	0	3

Course Objective

- This course aims to provide understanding the concept of value engineering in the construction projects.
- Students will be introduced to factors of value such as aesthetic,ergonomics,technical and value analysis**.**

Course Outcomes

CO1: Ability to select the elements and factor of value in construction activities.
CO2: Ability to evaluate the value analysis, time value of money and rate of return in the construction.
CO3: Ability to prioritize the functionality important for the customer which will improve the worth of the product.
CO4: Ability to eliminate unwanted functionality to reduce the overall cost.

Meaning of value, basic and secondary functions ,factors contributing to value such as aesthetic, ergonomics, 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.

Life cycle costing- forecasting of capital as well as operating and maintenance costs, time value, present worth analysis, discounted cash flow methods, rate of return analysis, sensitivity analysis.

L= 45, TOTAL = 45 PERIODS

Reference:

1.Lean thinking: Banish Waste and create wealth in your corporation, James P.Womack,Daniel T.Jones, Simon & Schuster ,(2010).
2. Cooper ,R.and Slagmulder,R. Target hosting and value engineering (2007).
3. “Value Engineering – Concepts, Techniques and applications by anil kumar Mukhopadhyaya”(2012).
4. “ Value Engineering Mastermind – Form Concept to value engineering certificate by Anil Kumar Mukhopadhyaya”(2010).
5. “ Value Optimisation for project and performance management by Robert B.Stewart, CVS Life, FSAVE,PMP” .

PCEE009	MANAGEMENT OF QUALITY AND SAFETY IN CONSTRUCTION	L	T	P	C
		3	0	0	3

Course Objective

- This course aims to teach students on how to manage quality and safety in construction.
- The syllabus covers Types of organizations, Quality circle, Codes and Standards, Total QA / QC programme, failure mode analysis, Bid preparation, Natural causes and speed of Construction, Value engineering and value analysis.

Course Outcomes

CO1: Ability to evaluate and choose the quality control aspects in planning, management and improvement techniques for effective construction activities.

CO2: Ability to develop the concepts of quality assurance and control techniques in construction.

CO3: To learn how to measure quality costs of construction processes.

CO4: To understand the importance of safety management in construction and the reduction of accidents on construction sites.

CO5: To understand the relationship between safety investment and the financial, social and pain & suffering costs of construction accidents.

Types of organizations-Inspection. control and enforcement –Quality Management Systems and method - Responsibilities and authorities In quality assurances and quality Control- Architects, engineers, contractors, and special consultants, Quality circle. Quality policy -Objectives and methods In Construction Industry –Consumers satisfaction, Economics-Time of Completion -Statistical tolerance -Taguchi's concept of quality -Codes and Standards -Documents -Contract and construction programming -Inspection procedures -Processes and products - Total QA / QC programme and cost implication.

Objectives -Regularity agent, owner, design, contract and construction oriented objectives, methods - Techniques and needs of QA/QC –Different aspects of quality - Appraisals, Factors Influencing construction quality. Critical, major failure aspects and failure mode analysis -Stability methods and tools, optimum design – Reliability testing, coefficient and prediction -Selection of new materials -Influence of drawings detailing, specification, and standardization -Bid preparation- Reliability Based Design. Construction activity, environmental safety. Social and environmental factors- Natural causes and speeds of Construction -Life cycle costing-Reliability and Probabilistic methods-Value engineering and value analysis.

L = 45, TOTAL = 45 PERIODS

References

1. Abdul Razzak Rumane - Quality Management in Construction Projects, CRC Press, 2016.
2. Patrick X. W. Zou, Riza Yosia Sunindijo - Strategic Safety Management in Construction and Engineering, Wiley Blackwell, 2015.
3. S. Keoki Sears, Glenn A. Sears, Richard H. Clough, Jerald L. Rounds, Robert O. Segner - Construction Project Management, Wiley; 6 edition, 2015.
4. Paul Watson, Tim Howarth - Construction Quality Management: Principles and Practice, Routledge, 2012.
5. Juran Frank, J.M. and Gryna, F.M. “Quality Planning and Analysis”, Tata McGraw Hill 2002.

PCEE010	ENERGY CONSERVATION TECHNIQUES IN BUILDING CONSTRUCTION	L	T	P	C
		3	0	0	3

Course Objective

- Students will be exposed to energy efficient buildings to conserve energy .
- This course emphasis the understanding of Fundamentals of energy, resource conservation, energy efficient building design, Energy management of electrical equipments and air conditioning systems.

Course Outcomes

CO1: Ability to evaluate and plan the various components which makes the building energy efficient such as lighting, space conditioning and heat control.

CO2: Ability to design energy efficient buildings which balances all aspects of energy, lighting, space conditioning and ventilation by providing a mix of passive solar design strategies.

CO3: To Study about the key design elements for energy efficient buildings.

CO4: Ability to know about airborne emissions and waste management.

Fundamentals of energy-Energy Production Systems -Heating. Ventilating and Air. conditioning -Solar Energy and Conservation -Energy Economic Analysis -Energy conservation and audits -Domestic energy consumption – savings- challenges –primary energy use In buildings -Residential. Commercial -Institutional and public Buildings.

Energy and resource conservation. Design of green buildings –Evaluation tools for building energy -Embodied and operating energy .Peak demand- Comfort and indoor air quality -Visual and acoustical quality -Land, water and materials –Airborne emissions and waste management.

Natural building design consideration. Energy efficient design strategies - advanced building Technologies. Smart buildings – Economics and cost analysis Energy in building design- Energy efficient and environment friendly building .

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 systems- Air conditioning systems- Applications- .Facility operation and maintenance- Facility modifications- Energy recovery dehumidifier- Waste heat recovery. Steam plants and distribution systems- Improvement of boiler efficiencies- Frequency of blow down -Steam leakage-steam Flash and condensation.

L = 45, TOTAL = 45 PERIODS

References

1. Paul Tymkow, Savvas Tassou, Maria Kolokotroni, Hussam Jouhara - Building Services Design for Energy Efficient Buildings, Routledge, 2013.
2. Ursula Eicker - Energy Efficient Buildings with Solar and Geothermal Resources, Wiley Blackwell, 2014.
3. Javad Khazaii - Energy-Efficient HVAC Design: An Essential Guide for Sustainable Building, Springer; 2014 edition, 2014.
4. Moncef Krarti - Energy Audit of Building Systems: An Engineering Approach, CRC Press, Second Edition, 2016.
5. Cook. J Award –"Winning passive Solar Design", Mc-Graw Hill-2004.

PCEE011	REMOTE SENSING AND GIS FOR URBAN PLANNING AND MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objective

- This course provides a basic understanding of remote sensing and GIS for urban planning and management.
- The topics discussed are Remote sensing for detection of urban features, land use/land cover mapping, population estimation from remote sensing, Mapping transportation network, traffic and parking studies and intelligent transportation systems.

Course Outcomes

CO1: Ability to evaluate and compile the satellite images for different applications in civil engineering projects using remote sensing principles.

CO2: Ability to assess and compile data using GIS for natural resource management and construction management.

CO3: To study the various types of data, data analysis methods and data quality requirements.

CO4: To study the means of getting suitable data output and to use the data output for construction management using GIS tools.

GIS – Definition – Components of GIS -Maps – Definition – Types of Maps – Characteristics of Maps – Map Projections — Hardware, Software and Organizational Context – GIS software-Data Types – Spatial and Non-Spatial – Spatial Data – Points, Lines and areas– Non-spatial data – Nominal, Ordinal, Interval and Ratio – Digitizer – Scanner – Editing and Cleaning – Geo reference data.

Raster and Vector Data Structure – Raster data storage – Run length, Chain and Block Coding – Vector Data Storage – Topology – Topological Models – Arc Node Structure – Surface Data – DEM – Grid DEM and TIN structure- Applications of DEM Reclassification – Measurement – Buffering – Overlaying – SQL for Queries – Neighborhood and zonal operations – Data Quality – Components of data quality - Sources of errors in GIS – Meta data Output – Maps, Graphs, Charts, Plots , Reports – Printers – Plotters – Fields of application – Natural Resource Management, construction management- Parcel based, AM/FM applications examples – Case study.

L = 45, TOTAL = 45 PERIODS

References

1. Paul Longley,Michael Batty,spatial Analysis: Modeling in a GIS Environment Wiley,2008.
2. Allan Brimicombe GIS, environmental modeling and engineering, CRC Press,2010
3. Yuji Murayama, Rajesh Bahadur Thapa, Spatial Analysis and Modeling in Geographical Transformation Process: GIS, Springer, 2011.
4. Juliana Maantay, John Ziegler, John pickles,GIS for the Urban environment, Esri press 2006.
5. Michael F. Goodchild,Louis T.Steyaert,BardelyO.Parks,Carol Johnston,David Maidment, Michael crane,SandiGlendinning,GIS and Environmental modeling: Progress and Research issues(Handover) by, Publisher; Wiley; 1 edition, 2010.

PCEE012	INTEGRATED PROJECT INFORMATION MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objective

- This course is an overview of integrated project information system.
- The syllabus comprises of Information systems, Structured methodologies, Project management information system, Coding techniques, Defection of error, Validating, software quality assurance and Software life cycle models.

Course Outcomes

CO1: Ability to develop business models for integrated project life cycle in construction industries.

CO2: Ability to evaluate and test the coding techniques in validating cost benefit analysis for value and risk assessments.

CO3: Develop a research proposal for a project implement and evaluate a small project in your field of study.

CO4: Manage all aspects of your project (and could include site analysis, concept development, budget, fabrication and documentation).

Information systems – Establishing the framework – Business models – Information system architecture – Evolution of information systems. Modern information system – System development life cycle – Structured methodologies – Designing computer based methods, procedures, control – Designing structured programs.

Integrated construction management information system – Project management information system – Functional areas, finance, marketing, production, personnel – Levels, DSS, EIS, ES – Comparison, concepts and knowledge representation– Managing international information system. Control – Testing security – Coding techniques – Defection of error – Validating – Cost benefit analysis – Assessing the value and risk of information system.

Software engineering qualities – Design, production , service, software specification, software metrics, software quality assurance – Systems methodology – Objectives – Time and logic, knowledge and human dimension – Software life cycle models – Verification and validation.

L = 45, TOTAL = 45 PERIODS

References

1. Ralph H Sprague and Huge J Waston, Decision Support for Managers, Prentice Hall, 2013.
2. D.P. Goyal Management Information Systems: Managerial Perspectives, Vikas Publishing, 4th Edition 2014.
3. Kenneth C. Laudon, Jane Price Laudon Information resources management, Pearson, 2012.
4. Gordon B. Davis, Management Information System: Conceptual Foundations, Structure and Development, McGraw Hill, 2010.
5. Joyce J Elam, Case Series for Management Information Systems, Simon and Schuster, Custom Publishing, 2011.

PCEE013	FORENSIC ENGINEERING AND RETROFITTING OF STRUCTURES	L	T	P	C
		3	0	0	3

Course Objective

- This course will be focused on retrofitting of structures.
- Students will also be exposed to durability and deterioration of concrete, destructive and non- destructive techniques and Refurbishment and Protection Techniques.

Course Outcomes

CO1: Ability to analyze, select and estimate the materials to strengthen the repaired structures.

CO2: Ability to select the non-destructive testing techniques to estimate the properties of material, elements without causing damage in a building.

CO3: Ability to maintain existing urban infrastructure to be sustainable, healthy and resilient for the benefit of society and the environment.

CO4: Ability to develop capability in problem identification, diagnosis and treatment of whole-of-life performance of the structure.

Durability and Deterioration of concrete-Plastic Shrinkage - Plastic Settlement - Drying Shrinkage - Thermal Movement - Freez and Thaw -Weathering - Carbonation - Sulphate Action - Alkali-Aggregate Reaction - Acids - Crazing - Honey Combing - Popouts - Creep - Abrasion - Erosion and Cavitation - Fire - Sub-grade Movement - Formwork Movement - Premature Removal of Forms / Shores - Rebar Corrosion -Poor Design Details - Errors in Design.

Investigation and Diagnosis- General Considerations - Observation - Questioning - Field and Laboratory Testing – Destructive Testing - Non-Destructive Testing - Rebound Hammer - Ultrasonic Pulse Velocity - Pachometer -Semi-Destructive Testing - Probe Test - Pull-Out Test - Pull-Off Test - Break-Off Test - Core Test - Half-Cell Potential Measurements - Resistivity Measurements - Dust Sampling – Carbonation Depth Testing - Tests for determining cement content, chloride content and sulphate content.-Repair Materials- Patching Materials - Resurfacing Materials - Sealing Materials - Water-Proofing Materials - Admixtures - Substrate Preparation.

Refurbishment and Protection Techniques- Routing and Sealing - Stitching - External Stressing - Resin Injection - Grouting - Blanketing - Overlays - Sprayed Concrete - Prepacked Concrete – Dry packing - Jacketing - Plate Bonding - Protective Coatings - Autogenous Healing - Vacuum Impregnation - Chloride Extraction - Realkalization of Concrete - Cathodic Protection.

L = 45, TOTAL = 45 PERIODS

References

1. Peter H.Emmons, Concrete Repair and Maintenance, Galgotia Publishers, 2010.
2. S.Champion, Failure and Repair of Concrete Structures, John Wiley & Sons, 2011.
3. Ted Kay, Assessment and Renovation of Concrete Structures, Longman Scientific & Technical, 2012.
4. R.T.L.Allen and S.C.Edwards, the Repair of Concrete Structures, Blackie & Son Ltd.V.K.,2010.
5. Sidney M.Johnson, Deterioration, Maintenance and Repair of Concrete Structures, McGraw-Hill Book Company,2013.

PCEE014	INTERNATIONAL CONTRACTING	L	T	P	C
		3	0	0	3

Course Objective

- This course will be focused on international contracting.
- The students will also be exposed to international financing agencies and types of international project systems in the construction**.**

Course Outcomes

CO1: Ability to select and develop the international contracting and various conditions of contracting.

CO2: Ability to analyze the international participation in infrastructure development projects and construct BOT, BOOT, BOR and BTO model.

CO3: Ability to understand the rules and regulations in various funding projects.

CO4: Ability to understand about the contractual procedures.

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. Study and application of various conditions of contract under the FIDIC document development of regulatory framework. Project exports from India.

International financing-Various institutions such as WB, IMF, ADB etc. and their role, rules – regulations in funding various projects, forming alliance, bilateral and multilateral funding, trade practices etc. International Projects – Types of BOT systems such as BOT, BOOT, BOO, DBO,BOR, BLT, BRT, BTO & DBGO, MOOT, ROO, ROT, BOLT – Contractual procedures, special features, methods of handling.

L= 45, TOTAL= 45 PERIODS

References:

1. FIDIC documents.
2. Simon M.S. McGraw Hill (2015);" Construction Contracts & Claims", New York. ISBN: 9780070574335. 278 p.
3. Unified Contract Documents by CIDC.
4. Reboert Matays and Mathews (2015);" Dispute Review Board Manual", ISBN-13: 978-0070410602.
5. K.N.Vaid (1991);" International Construction Contracting", NICMAR Publication. ISBN: 9788185448169.

PCEE015	TECHNOLOGY AND MANAGEMENT OF HIGH RISE AND SPECIAL BUILDINGS	L	T	P	C
		3	0	0	3

Course Objective

- This course highlights the need for high rise buildings.
- The syllabus comprises of various aspects of high rise and special buildings, construction, technologies, materials, safety and quality.

Course Outcomes

CO1: Ability to select and choose various types of buildings for construction.
CO2: Ability to evaluate and choose various construction technology for construction of special structures.
CO3: Ability to understand various machine foundations.
CO4: Ability to understand about earthquake resistant construction.

Characteristics of building types; Residential, Commercial, hospital, industrial, institutional, green and intelligent building; Construction technology; Sub-structure, super structure, services, facade, formworks; Industrial structures – technology, execution and erection, per engineered buildings, selection of technologies for different building elements.
Cost effective construction, technology, materials, and economics; Special construction technologies; Deep foundations in high rise, top down construction, use of automation and robotics; Special industrial structures; Machine foundation – types, construction, technology for block type machine foundations; Basements; Waterproofing; Earthquake resistant construction.

L= 45, TOTAL = 45 PERIODS

Reference:

1. Tony, B. Construction technology and choice. Wiley – Blackwell, UK 2017.
2.Chew, L., Michael , Construction technology for tall buildings. World scientific, Singapore 2012.
3.Chudley, R., Greeno, R. Advanced construction technology. Pearson Education, UK 2014.
4.Craighead, H., High rise security and fire life safety. Butterworth – Heinemann, Amsterdam 2012.
5. Brian, C., Construction Practice. Wiley- Black Well, UK ,2011.

PCEE016	MANAGEMENT OF UNDERGROUND CONSTRUCTION AND MARINE STRUCTURES	L	T	P	C
		3	0	0	3

Course Objective

- This course familiarize the students about know-how of the underground excavation, use of explosives and various construction technologies adopted in marine structures.
- This course helps the students to know about risks involved and remedial measures to overcome those risks in underground construction.

Course Outcomes

CO1: Ability to analyze and select the various blasting techniques.
CO2: Ability to select the various types of materials and equipments for underground construction.
CO3: Ability to understand about the safety measures to be taken for underground works.
CO4: Ability to understand the stages of offshore structure.

Site investigation; Ground and rock characterization, rock composition and ground types, rock mass classification, geological studies; Drilling and blasting; Drilling, pneumatic breakers, explosives, blasting, safety precautions, drilling patterns, explosive load charging; Tunneling technology – mechanized, shield, micro, special methods; Hazards and safety.

Seafloor and marine soils; Geotechnical aspects, ecological and societal impact of marine construction; Materials and fabrication; Steel structures for marine environment, structural concrete, hybrid steel concrete structures; Offshore construction equipments; Crane barges, derrick barges, drilling vessels; Underwater construction; Stages of offshore structure construction, facilities and methods in fabrication.

L= 45, TOTAL = 45 PERIODS

Reference:

1. Ou, C. “Deep excavtion theory and practice”. Taylor & Francis, London 2016.
2.Gerwick, B. “Construction of marine and offshore structures”. CRC Press, Boca Raton, 2007.
3.Indian Road Congress. (1989). “Behaviour of concrete under sea water and in marine environment. IRC”, New Delhi.
4.Nichols, H., Day, D. Moving the earth – “The workbook of excavation”. McGraw-hill, New York, 2010.
5. 2016Beer, G. “Technology innovation in underground construction”. CRC Press, The Netherlands , 2010.
6.Turner, J. “Excavation systems planning, design and safety”. McGRaw-hill, New York 2009.

PCEE017	PREFABRICATED STRUCTURES	L	T	P	C
		3	0	0	3

Course Objectives

- This course focused on recent advances in building construction.
- Students gain knowledge on modular construction, industrialised construction and design of prefabricated elements and construction methods.

Course Outcomes

CO1: Ability to illustrate the standardization and disuniting of structures

CO2: Ability to apply the concept of wall panels ,slabs, columns during erection of prefabricated buildings

CO3: Ability to analyze the behavior of structural components to examine their importance in progressive collapse

CO4: Ability to evaluate the efficiency of materials used for designing various sections.

Need for prefabrication–principles–materials–modular coordination– standarization –systems production–transportation–erection. prefabricated components - behaviour of structural components–large panel constructions–construction of roof and floor slabs–wall panels–columns–shear walls - design principles .

Disuniting of structures-design of cross section based on efficiency of material used–problems in design because of joint flexibility–allowance for joint deformation, joint in structural members -joints for different structural connections–dimensions and detailing–design of expansion joints design for abnormal loads - progressive collapse–code provisions–equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc.,-importance of avoidance of progressive collapse.

L = 45, TOTAL = 45PERIODS

References

1.CBRI, Building materials and components, India, 2010.

2.Gerostiza C.Z., Hendrikson C. and Rehat D.R.,"Knowledge based process planning for construction and manufacturing", Academic Press Inc., 2014.

3.Koncz T.,"Manual of precast concrete construction", Vol.I, II and III, Bauverlag, GMBH,2016.

4."Structural design manual", Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 2009.

PCEE018	MANAGEMENT OF PUBLIC PRIVATE PARTNERSHIP PROJECTS	L	T	P	C
		3	0	0	3

Course Objective

- This course will be focusing on emerging models of public-private partnerships.
- Students will also be exposed for financing models and risk management in Public Private Partnership projects.

Course Outcomes

CO1: Ability to select and develop various contracting and financial models of the project.

CO2: Ability to evaluate the types of financing models and develop management principles to reduce failure in PPP's.

CO3: Ability to identify the risks involved in PPPs.

CO4: Ability of structuring PPP projects to suit various sectors of infrastructure development.

Background of public-private partnerships (PPPs) – economic environment and changes, economic and other reasons and compulsions for privatization; Private sector participation; Different forms of PPPs – contracting models (service contracts, maintenance contracts and management contracts); Financing models (PFI, SPV and other structures).

Government and multilateral agency guidelines, implementation principles; Enabling framework and model concessionaire agreements; Role of partners; Structuring PPP projects to suit various sectors of infrastructure development, engineering and development projects; Risk management in PPPs; Financing methodologies; Legal and contracting framework of PPPs; Process management; Drivers of success/failure of PPPs; Case studies.

L= 45, TOTAL = 45 PERIODS

Reference:

1.Akintoye, A., Beck, M. PPP – Managing risks and opportunities. John Wiley & Sons, New York 2013.

2.Akintoye, A., Beck, M. Policy, finance and management for public private partnership. Blackwell, UK 2009.

3.Joshi, P. Laws relating to infrastructure projects. LexisNexis Butterworths, New Delhi 2013 .

4.Nair, P., Kumar, D. Public private partnership in infrastructure issues and perspectives. ICFAI University Press, Hyderabad 2009.

5.Ramesh, G., Nagadevara, V., Naik, G, Suraj, A. Public private partnerships. Routledge, New Delhi 2012.

6.Sharma, Y. public private partnership in infrastructure. Vitasta Publishing, New Delhi 2012.

PCEE019	GREEN CONSTRUCTION MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objective

- This course exposes the students with recent innovative technologies that reduces environmental foot print and improves sustainability in construction projects.
- This course helps the students to create zero carbon city.

Course Outcomes

CO1: Ability to justify and choose the various building technologies for green building construction.
CO2: Ability to select and plan for green and sustainable materials used for construction.
CO3: Ability to compare and contrast conventional construction materials and methods with green building.
CO4: Ability to increase sustainability in construction projects.

Green buildings; Green house effect; Global warming; Green architecture; Passive solar design; Green building materials (product selection criteria and sustainable materials); Building technologies, water management and waste management; Future of green building; Renewable energies, LID system for storm water management, rainwater management.

Climatic change; Life change analysis, Kyoto protocol, industrial economy and sustainability; Green building movement; Green movement in India (IGBC, TERI, GRIHA), global green movement, (LEED in US, BREEAM in UK, BEAM in Hong kong, GBCA (green star) in Australia), carbon credits and trading, concept of zero carbon- city.

L= 45, TOTAL = 45 PERIODS

Reference:

1.Charles, J. Sustainable construction – Green building design and delivery. John Wiley & Sons, Canada 2010.
2.Dominique G. and Nicolas, F. Sustainable architecture and urbanism – Concepts, technologies, examples. Birkhauser, Switzerland 2010.
3.Energy and resources Institute Catalad'Energia, Asia Urbs Programme.. Sustainable building design manual – policy and regulatory mechanisms. TERI Press, New Delhi 2009.
4.Spicegel, R., Meadows, D .Green building materials- A guide to product selection and specification. John Wiley & Sons, New Jersey 2012.

PCEE020	PROJECT RISK MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objective

- This course is an overview of risk management of a project.
- The syllabus comprises Importance and types of Risk , Identifying risk events, determination of Net Present Value, Sensitivity analysis, scenario analysis simulation and risk mitigation through various policies.

Course Outcomes

CO1: Ability to evaluate and develop analytical and integrative thinking in understanding and implementing the risk management pratices.

CO2: Ability to evaluate different types of risk and develop risk management principles to reduce construction loss.

CO3: Ability to demonstrate knowledge of the range of financial and financial related risks facing organizations.

CO4: Ability to understand reputational and operational risk and how to manage it.

General – Importance and types of Risk, 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.

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. 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.

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.

L = 45, TOTAL = 45 PERIODS

References

1. RAMP Handbook By Institution Of Civil Engineers And The Faculty And Institute Of Actuariesthomas Telford Publishing, London,2012.
2. Yuri Raydugin - Project Risk Management: Essential Methods for Project Teams and Decision Makers, Wiley Blackwell, 2013.
3. Professor Elaine Harris Strategic Project Risk Appraisal and Management, Gower; Pap/Ele edition, 2012.
4. Peter Edwards, Paul Bowen Risk - Management in Project Organisations, a Butterworth-Heinemann Title, 2010.
5. John Bartlett, Project Risk Analysis and Management Guide, APM Publishing Limited, 2004.

GENERIC ELECTIVE COURSES

PCGE001	COMPUTER SIMULATION MODELING AND ANALYTICAL TOOLS FOR PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objective

- This course provides a general overview of computer simulation modeling and analytical tools for project management.
- Students will also be enriched with introduction to systems engineering, Basic Simulation Modeling, comparison of simulation packages and advanced analytical tools.

Course Outcomes

CO1: Ability to analyze, select and estimate the optimization techniques for solving problems related to construction industries.
CO2: Ability to create and develop a simulation model for estimating various productivities related to on site problems during construction phase.
CO3: Ability to study about analytical tools .
CO4: Ability to generate Genetic algorithm.

Introduction to Systems Engineering, System development phases and cycles system development life cycle approach-Basic Simulation Modeling, System model & Simulation, continuous & discrete, simulation of an inventory system, Single server, simulation of simple systems.

Introduction to Simulation Softwares, comparison of simulation packages with programming languages, classification of simulation software. Analytical Tools: Simple Additive Weighting Method (SAW), Weighted Product Method (WPM), Analytical Hierarchy Process (AHP),TOPSIS, Modified TOPSIS, Compromise Ranking Method (VIKOR), Graph Theory and Matrix Approach, Introduction to Genetic Algorithm (GA), Simulated Annealing and Particle Swarm Optimisation.

L = 45, TOTAL = 45 PERIODS

References

1. Bernard P. Zeigler, Hessam S. Sarjoughian Guide to Modeling and Simulation of Systems of Systems, Academic Press 2011.
2. Averill M. Law and W. David Kelton , Simulation modeling and analysis –Fourth edition, McGraw-Hill 2014.
3. R.V. Rao, Decision Making in the Manufacturing Environment using Graph Theory and Fuzzy Multiple Attribute Decision Making, Spinger -Verlage London Limited, 2012.
4. Roger W. McHaney Computer Simulation: A Practical Perspective, Academic Press, 1991.
5. Francis Neelamkavil, Computer Simulation and modeling, Wiley Publication, 2011.

PCGE002	DISASTER MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objective

- This course aims to provide a comprehensive introduction to overview of disaster management and disaster management cycle.
- Students will be introduced to disaster mitigation, disaster risk reduction, response and recovery and disaster planning.

Course Outcomes

CO1: Ability to develop the key concepts of hazardous emergency management.
CO2: Adopt the disaster management strategies.
CO3: Students will be exposed to the natural and manmade disasters.
CO4: Ability to develop the mitigate methods for various disasters.

Objectives-Overview of Disaster Management – Distinguishing between an emergency and a Disaster situation. Disaster Management Cycle – Phase I: Mitigation, and strategies; hazard Identification and vulnerability analysis. Disaster Mitigation and Infrastructure, impact of disasters on development programmes, vulnerabilities caused by development, developing a draft country-level disaster and development policy.

Phase II: Preparedness, Disaster Risk Reduction(DRR), Emergency Operation Plan (EOP), Mainstreaming Child Protection and Gender in Emergency Planning, Assessment, Phases III and IV: Response and recovery, Response aims, Response Activities, Modern and traditional responses to disasters, Disaster Recovery, and Plan , Disasters as opportunities for development initiatives Disaster Planning-Disaster Response Personnel and duties, Community Mitigation Goals, Pre-Disaster Mitigation Plan, Personnel Training, Volunteer Assistance, School-based Programmes, Hazardous Materials, Ways of storing and safely handling hazardous materials, Coping with Exposure to Hazardous Materials.

L = 45, TOTAL = 45 PERIODS

References

1. Ayaz,. “Disaster Management: Through the New Millennium”, Anmol Publications. (2009).
2. Dave, P. K.. “Emergency Medical Services and Disaster Management: A Holistic Approach”, New Delhi: Jaypee Brothers Medical Publishers (P) Ltd., 2009.
3. Narayan, B. “Disaster Management”, New Delhi: A.P.H. Publishing Corporation ,2009.
4. Kumar, N.. “Disaster Management”. New Delhi: Alfa Publications. ,2009.
6. Ghosh, G. K., “Disaster Management”, New Delhi: A.P.H Publishing Corporation. ,2008.

PCGE 003	MANAGEMENT PRINCIPLES AND RISK ANALYSIS	L	T	P	C
		3	0	0	3

Course Objective

- This course provides overview of risk management principles.
- The syllabus comprises of principles, risk identification, ranking, reducing and transfer of risk through various policies.

Course Outcomes

CO1: Ability to evaluate different types of risk and develop risk reduction techniques to reduce construction loss.

CO2: Ability to evaluate and develop integrative thinking in understanding the risk management principles.

CO3: Ability to generate life cycle for risk management.

CO4: Ability to assess the factors affecting insurance for financing.

Definitions - The Development of Risk Management - Principles of Risk Management -The hazard and risk – knowledge of the contents the reasons for managing risk in the public and private sectors – Risk estimation – types of risk and classifications – benefits of having a risk management programme responsibilities of those involved in the risk management - Outline the elements of the various risk management standards, Risk Management Documentation - Risk Culture - Risk Identification - – life cycle risk management – multi dimensional analysis – risk ranking – event incident scenario – uncertainties and consequences – risk estimation – assessment – quantitative techniques –human factors – decision making under uncertainity.

Risk Reduction - Transfer and Sharing of Risk - Elimination and Retention of Risk -Entrepreneurial risks - Pure risks - Internal risks Retaining insurable risks – Insurance -Self-insurance - Contractual Transfer of Risk – Captives - Responsibilities of those involved in Risk Transfer -- Factors Affecting Insurance as a Financing Tool - How the Internal Audit Function Works - Control Systems - Auditing Risk Management- Setting up an Internal Audit Function.

L= 45, TOTAL = 45 PERIODS

References:

1. Ian Cameron , Raghu Raman Process Systems Risk Management Elsevier Academic Press (2005)
2. Sadgrove, Kit, Complete guide to business risk management, Jaico Publication(1997)
3. Marrison, Chris, Fundamentals of risk measurements, Tata Nc Graw Hill, Delhi,(2002)
4. Hans Buhlimann, Mathematical Methods in Risk Theory, Springer – Verlang Berlin Heidelberg (1970).

PCGE004	BUILDING ACOUSTICS AND NOISE CONTROL	L	T	P	C
		3	0	0	3

Course Objective

- This course provides a general overview of building acoustics and noise control.
- Students will also be enrich their knowledge with necessary information and methods for providing acoustic comfort building.

Course Outcomes

CO1: Ability to evaluate and choose various noise controlling techniques.
CO2: Ability to design different structures for comfort acoustic building.
CO3: Ability to analyse different types of noise.
CO4: Ability to evaluate indoor and outdoor noise levels.

Sound waves, Frequency, Intensity, Wave length, Measurement of sound decibel scale speech and music frequencies , human ear characteristics - Tone Structure Outdoor noise levels - acceptable indoor noise levels- IS codes –sono meter, determinate of density of a given building material, absorption co-efficient and measurements, choice of absorption material, resonance, reverberation, echo, exercises involving reverberation time and absorption co-efficient.

Types of noises, transmission of noise, transmission loss, noise control and sound insulation, remedial measures and legislation. Walls/partitions, floors/ceilings, windows/doors, insulating fittings and gadgets machine mounting and insulation of machinery. Site selection, shape, volume, treatment for interior surfaces-basic principles in designing open air theatres, cinemas, broadcasting studios, concert halls, class rooms, lecture halls and theatres for acoustics.

L= 45, TOTAL = 45 PERIODS

References:

1. Dr.V.Narasimhan, “An introduction to Building Physics”,Kabeer printing works,chennai-5, 2012.
2 .D.J.Groomet, “Noise ,Building and People”, Pergumon Press, 2010.
3 .Thomas D.North wood, “Architecture acoustics”, dowden, Hutchinson and Ross Inc., 2007.
4 .B.J.Smith ,R.J.Peters, Stephanie Owen, “Acoustics and Noise Control”, Longman Group Ltd – New york ,USA, 2012.
5 .http:www.sounddesigns.net