

St. PETER'S UNIVERSITY

St. Peter's Institute of Higher Education and Research
(Declared under section 3 of UGC Act 1956)
Avadi, Chennai – 600 054.



PROGRAMME

M.E. (BUILDING TECHNOLOGY AND CONSTRUCTION MANAGEMENT)

(I TO IV SEMESTERS)

REGULATIONS AND SYLLABI

(REGULATIONS – 2013)

(Effective from the Academic Year 2013-'14)

M.E. (BUILDING TECHNOLOGY AND CONSTRUCTION MANAGEMENT)

(Regulations 2013)

(Effective from the Academic Year 2013-'14)

- 1. Eligibility:** Candidates who passed B.E. (Civil Engineering) of the university or any other equivalent examination thereto are eligible for admission to two year M.E. (Building Technology and Construction Management) programme.
- 2. Duration:** Two year comprising 4 semester. Each semester has a minimum 90 working days with a minimum of 5 hours a day. Candidates who have completed the duration of the programme of study are permitted to appear for the arrear (subjects) examinations, if any within two year after the duration of the programme.
- 3. Medium:** English is the medium of instruction and examination.
- 4. Weightage for internal and end assessment:** The weightage for continuous assessment (CA) and End assessment(EA) be 25:75 unless the ratio is specifically mentioned in the scheme of examinations.
- 5. Credit System:** Credit system be followed with 18 credits for each semester and each credit is equivalent to 25 hours of effective study provided in the time table.

6. Scheme of Examinations

I Semester

Code No.	Course Title	Credit (marks)	CA (marks)	EA (marks)	Total (marks)
Theory					
113BTPT01	Statistical Methods and Queuing Theory	3	25	75	100
113BTPT02	Modern Construction Materials	3	25	75	100
113BTPT03	Construction Contracts and Specifications	3	25	75	100
113BTPT04	Construction Equipment	3	25	75	100
113BTPT05	Green building Techniques	3	25	75	100
113BTPT06	Maintenance & Rehabilitation of Structures	3	25	75	100
Total		18	150	450	600

II Semester

Code No.	Course Title	Credit (marks)	CA (marks)	EA (marks)	Total (marks)
Theory					
213BTPT01	Construction Planning, Scheduling and Control	3	25	75	100
213BTPT02	Advanced Construction Techniques	2	25	75	100
213BTPT03	Computer Applications in Construction Engineering and Planning	3	25	75	100
213BTPT04	Construction Quality and Safety Management	2	25	75	100
213BTPE **	Elective I: Advanced Concrete Technology	3	25	75	100
213BTPE**	Elective II: Construction of Pavements	3	25	75	100
Practical					
213BTTP01	Construction Materials Testing and Software Laboratory	2	25	75	100
Total		18	175	525	700

III Semester

Code No.	Course Title	Credit (marks)	CA (marks)	EA (marks)	Total (marks)
Theory					
313BTPE**	Elective III :Construction Personnel Management	3	25	75	100
313BTPE**	Elective IV: Analysis and Design of Structural Systems	3	25	75	100
313BTPE**	Elective V: Construction Project Modeling and Simulation	3	25	75	100
Project					
313BTPE01	Project Work (Phase-1)	9	25	75	100
Total		18	100	300	400

IV SEMESTER

Code No.	Course Title	Credit (marks)	CA (marks)	EA (marks)	Total (marks)
Project					
413BTPE01	Project Work (Phase-I1)	18	25	75	100
Total		18	25	75	100

List of Electives for II Semester

Course Code	Course Name	Credit
213BTPE 01	Advanced Concrete Technology	3
213BTPE 02	Shoring, Scaffolding and Formwork	3
213BTPE 03	Construction of Pavements	3
213BTPE 04	Fracture Mechanics of Concrete	3
213BTPE 05	Building Services	3

List of Electives for III Semester

Course Code	Course Name	Credit
313BTPE 01	Quantitative Techniques in Management	3
313BTPE 02	Construction Personnel Management	3
313BTPE 03	Characterization of Construction Materials	3
313BTPE 04	Construction Finance and Economics	3
313BTPE 05	Analysis and Design of Structural Systems	3
313BTPE 06	CAD in Civil Engineering	3
313BTPE 07	Construction Project Modeling and Simulation	3

7. Passing Requirements: The minimum pass mark (raw score) be 50% in End Assessment (EA) and 50% in Continuous Assessment (CA) and End Assessment (EA) put together. No minimum mark (raw score) in Continuous Assessment (CA) be prescribed unless it is specifically mentioned in the scheme of Examination.

8. Grading System: Grading System on a 10 Point Scale be followed with 1 mark = 0.1 Grade point to successful candidates as given below.

CONVERSION TABLE

(1 mark = 0.1 Grade Point on a 10 Point Scale)

Range of Marks	Grade Point	Letter Grade	Classification
90 to 100	9.0 to 10.0	O	First Class
80 to 89	8.0 to 8.9	A	First Class
70 to 79	7.0 to 7.9	B	First Class
60 to 69	6.0 to 6.9	C	First Class
50 to 59	5.0 to 5.9	D	Second Class
0 to 49	0 to 4.9	F	Reappearance

Procedure for Calculation

Cumulative Grade Point Average (CGPA)	=	$\frac{\text{Sum of Weighted Grade Points}}{\text{Total Credits}}$
	=	$\frac{\sum (CA+EA) C}{\sum C}$
Where Weighted Grade Points in each Course	=	Grade Points (CA+EA) multiplied by Credits
	=	(CA+EA)C
Weighted Cumulative Percentage of Marks(WCPM)	=	CGPAx10

C- Credit,

CA-Continuous Assessment,

EA- End Assessment

9. Pattern of the Question Paper: The question paper for End Assessment will be set for three hours and for the maximum of 100 marks with following divisions and details.

Part A: 10 questions (with equal distribution to all units in the syllabus). Each question carries 2 marks.

Part B: 5 questions with either or type (with equal distribution to all units in the syllabus). Each question carries 16marks. The total marks scored by the candidates will be reduced to the maximum prescribed in the Regulations.

10. Effective Period of Operation for the Arrear Candidates : Two Year grace period is provided for the candidates to complete the arrear examination, if any.

Registrar

11.Syllabus

I Semester

113BTPT01 STATISTICAL METHODS AND QUEUEING THEORY

OBJECTIVE:

To study and understand the concepts of statistical methods and queuing theory and its applications

UNIT I CALCULAS OF VARIATION

Introduction – Euler’s equation – several dependent variables Lagrange’s equation of Dynamics – Integrals involving derivatives higher than the first – Problem with constraints – Direct methods and eigen value problems.

UNIT II MATRIX THEORY

Eigen values using QR transformations – generalized eigenvectors – canonical forms – singular value decomposition and applications – pseudo inverse – least square approximations.

UNIT III LINEAR PROGRAMMING PROBLEM

Graphical method – simplex method – Big M Technique – Integer programming.

UNIT IV DESIGN OF EXPERIMENTS

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

UNIT V QUEUEING MODELS

Poisson Process – Markovian queues – Single and Multi Server Models – Little’s formula Machine Interference Model – Steady State analysis – Self Service queue.

TOTAL (L: 45+T: 15): 60 PERIODS

REFERENCES:

1. Gupta, A.S, Calculus of variations with Applications, Prentice – Hall of India New Delhi, 1997.
2. Broson, R., Matrix operations, Schaum’s outline series, McGraw Hill, New York, 1989.
3. Taha H.A, “Operation Research – An Introduction”, Prentice Hall of India, 2001.
4. Walpole, R.E., Myer, R.H., Myer, S.L. and Ye, K., Probability and Statistics for Engineers and Scientists, 7th edition, Pearson Education, Delhi, 2002.
5. Vohra, N.D. “Quantitative Techniques in Management”, Tata McGraw – Hill Company Limited, 2007.
6. Gupta, S. C. and Kapoor, V. K., Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi, 2001.
7. Taha, H. A., Operations Research: An Introduction, Seventh Edition, Pearson Education Edition, Asia, New Delhi , 2002.

OBJECTIVE:

To study and understand the properties of recent materials used in construction.

UNIT I SPECIAL CONCRETES

Concretes, Behaviour of concretes - High Strength and High Performance Concrete – Fibre Reinforced Concrete, Self compacting concrete, Alternate Materials to concrete

UNIT II METALS

Steels - New Alloy Steels – Aluminum and its Products –Coatings to reinforcement – Applications.

UNIT III COMPOSITES

Plastics –Reinforced Polymers – FRP – Applications

UNIT IV OTHER MATERIALS

Water Proofing Compounds – Non-weathering Materials – Flooring and Facade Materials

UNIT V SMART AND INTELLIGENT MATERIALS

Smart and Intelligent Materials for intelligent buildings - Special features

REFERENCES:

1. Santhakumar.A.R., Concrete Technology, OxfordUniversity press, New Delhi.2007.
2. Mamlouk, M.S. and Zaniewski, J.P., Materials for Civil and Construction Engineers, Prentice Hall Inc., 1999.
3. Ashby, M.F. and Jones.D.R.H.H. "Engineering Materials 1: An introduction to Properties, applications and designs", Elsevier Publications, 2005.
4. Shan Somayaji, Civil Engineering Materials, Prentice Hall Inc., 2001
5. Aitkens , High Performance Concrete, McGraw Hill, 1999
6. Deucher, K.N, Korfiatis, G.P and Ezeldin, A.S, Materials for civil and Highway Engineers, Prentice Hall Inc., 1998.
7. Shetty M.S, Concrete Technology: Theory and Practice, S.Chand& Company Ltd., 2005.
8. ACI Report 440.2R-02, "Guide for the design and construction of externally bonded RP systems for strengthening concrete structures", American Concrete Institute, 2002.

113BTPT03 CONSTRUCTION CONTRACTS AND SPECIFICATIONS

OBJECTIVE:

To study and understand the contracts, arbitration and specifications.

UNIT I CONTRACTS AND DISPUTES

Comprehensive study of different types of contracts and their working - Problems in the operation of contracts - Claims and disputes

UNIT II CODES AND STANDARDS

Codes and Standards – Documents – Contract and construction programming – Inspection procedures - Processes and products – Total QA / QC programme and cost implication.

UNIT III ARBITRATION

Arbitration case studies - Professional practice ethics, duties and responsibilities;

UNIT IV MATERIALS

Selection of new materials - Influence of drawings, detailing, specification, standardization

UNIT V SPECIFICATIONS

Construction specifications - standard specifications, development, interpretation.

REFERENCES:

1. George J.Ritz , Total Construction Project Management - McGraw-Hill Inc,1994.
2. Chris Hendrickson and Tung Au, Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2000.
3. Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, Tata McGraw-Hill Publishing Company, New Delhi, 1998.
4. Choudhury, S , Project Management, Tata McGraw-Hill Publishing Company, New Delhi, 1988.
5. Andrew,D., Szilagg, Hand Book of Engineering Management, 1982.
6. James.A.,Adrain, Quantitative Methods in Construction Management, American Elsevier Publishing Co., Inc., 1973.
7. Oxley Rand Poslcit, Management Techniques applied to the Construction Industry, Granda Publishing Ltd., 1980.

OBJECTIVE:

To study and understand the various types of equipment and its applications in construction project

UNIT I CONSTRUCTION EQUIPMENT MANAGEMENT

Identification – Planning - Equipment Management in Projects - Maintenance Management – Replacement - Cost Control of Equipment - Depreciation Analysis – Safety Management

UNIT II EQUIPMENT FOR EARTHWORK

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

UNIT III OTHER CONSTRUCTION EQUIPMENTS

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

UNIT IV MATERIALS HANDLING EQUIPMENT

Forklifts and related equipment - Portable Material Bins – Conveyors - Hauling Equipment

UNIT V EQUIPMENT FOR PRODUCTION OF AGGREGATE AND CONCRETING

Crushers – Feeders - Screening Equipment - Handling Equipment - Batching and Mixing Equipment - Hauling, Pouring and Pumping Equipment – Transporters

REFERENCES:

1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., Construction Planning, Equipment and Methods, McGraw Hill, Singapore, 2006.
2. Sharma S.C. Construction Equipment and Management, Khanna Publishers, New Delhi, 1988.
3. Deodhar, S.V. Construction Equipment and Job Planning, Khanna Publishers, New Delhi, 1988.
4. Dr. Mahesh Varma, Construction Equipment and its planning and Application, Metropolitan Book Company, New Delhi. 1983.

113BTPT05 GREEN BUILDING TECHNIQUES

OBJECTIVE:

To study and understand the various types of energy efficient buildings and equipment and its applications in construction project

UNIT I INTRODUCTION

Fundamentals of energy- Energy Consumption Systems-Heating, Ventilating and Air-conditioning –Domestic energy consumption – savings - challenges – primary energy use in Residential – Commercial – Institutional and public buildings – Legal requirements for conservation of fuel and power in buildings.

UNIT II ENVIRONMENTAL

Environmental factors: Thermal performances of buildings - Evaluation tools for building energy Comfort factors - Indoor Air quality – Visual and acoustical quality – Land, water and materials and measurements; Climatic design.

UNIT III DESIGN

Daylight design of general lighting schemes; Energy management and lighting; acoustical design of auditoria and noise control in buildings; Solar Control and shading devices, Louvre design; ventilation; introduction to lighting; units of light, colour, lamps, luminaries,

UNIT IV SERVICES

Energy in building design – Energy efficient and environment friendly building – Thermal phenomena – thermal comfort – Indoor Air quality – Climate, sun and Solar radiation, - Psychometrics – passive heating and cooling systems - Energy Analysis – Active HVAC systems - Preliminary Investigation – Goals and policies – Energy audit – Types of Energy audit – Analysis of results – Energy flow diagram – Energy consumption / Unit Production – Identification of wastage- Priority of conservative measures – Maintenance of energy management programme

UNIT V 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 systems – Air conditioning systems – Applications – Facility operation and maintenance – Facility modifications – Energy recovery dehumidifier – Waster heat recovery – Steam plants and distribution systems – Improvement of boiler efficiency – Frequency of blow down – Steam leakage – steam Flash and condense return.

REFERENCES:

1. Moore F., Environmental Control system McGraw Hill, Inc. 1994.
2. Brown, GZ, Sun, Wind and light: Architectural design strategies, John Wiley & Sons, 1985.
3. Cook, J, Award – Winning passive Solar Design, McGraw Hill, 1984.
4. J.R. Waters, Energy conservation in Buildings: A Guide to part L of the Building Regulations, Blackwell Publishing, 2003.

113BTPT06 MAINTENANCE AND REHABILITATION OF STRUCTURES

OBJECTIVE:

To study the damages, repair and rehabilitation of structures.

UNIT I MAINTENANCE AND REPAIR STRATEGIES

Maintenance, repair and rehabilitation, Facets of Maintenance, importance of Maintenance various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

UNIT II SERVICEABILITY AND DURABILITY OF CONCRETE

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

UNIT III MATERIALS AND TECHNIQUES FOR REPAIR

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, Guniting and Shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels and cathodic protection.

UNIT IV REPAIRS TO STRUCTURES

Repair of structures distressed due to earthquake – Strengthening using FRP- Strengthening and stabilization techniques for repair.

UNIT V DEMOLITION OF STRUCTURES

Engineered demolition techniques for structures - case studies

REFERENCES:

1. Denison Campbell, Allen and Harold Roper, "Concrete Structures, Materials, Maintenance and Repair", Longman Scientific and Technical UK, 1991.
2. Allen R.T and Edwards S.C, "Repair of Concrete Structures", Blakie and Sons, UK, 1987.
3. Raikar, R.N., "Learning from failures - Deficiencies in Design, Construction and Service" - R&D Centre (SDCPL), RaikarBhavan, Bombay, 1987.
4. Santhakumar A.R., "Concrete Technology" OxfordUniversity Press, Printed in India by Radha Press, New Delhi, 2007.
5. Peter H.Emmons, "Concrete Repair and Maintenance Illustrated", Galgotia Publications pvt. Ltd., 2001.

II Semester

213BTPT01 CONSTRUCTION PLANNING, SCHEDULING AND CONTROL

OBJECTIVE:

To study and understand the concept of scheduling and the techniques necessary for construction project

UNIT – I CONSTRUCTION PLANNING

Basic Concepts in the Development of Construction Plans - Choice of Technology and Construction Method - Defining Work Tasks - Defining Precedence Relationships among Activities - Estimating Activity Durations - Estimating Resource Requirements for Work Activities - Coding Systems

UNIT – II SCHEDULING PROCEDURES AND TECHNIQUES

Construction Schedules - Critical Path Method – Scheduling Calculations - Float - Presenting Project Schedules - Scheduling for Activity-on-Node and with Leads, Lags, and Windows - Scheduling with Resource Constraints and Precedences - Use of Advanced Scheduling Techniques - Scheduling with Uncertain Durations - Calculations for Monte Carlo Schedule Simulation - Crashing and Time/Cost Tradeoffs - Improving the Scheduling Process.

UNIT – III COST CONTROL, MONITORING AND ACCOUNTING

The Cost Control Problem - The Project Budget - Forecasting for Activity Cost Control - Financial Accounting Systems and Cost Accounts - Control of Project Cash Flows - Schedule Control - Schedule and Budget Updates - Relating Cost and Schedule Information.

UNIT – IV QUALITY CONTROL AND SAFETY DURING CONSTRUCTION

Quality and Safety Concerns in Construction - Organizing for Quality and Safety - Work and Material Specifications - Total Quality Control - Quality Control by Statistical Methods - Statistical Quality Control with Sampling by Attributes - Statistical Quality Control with Sampling by Variables - Safety

UNIT – V ORGANIZATION AND USE OF PROJECT INFORMATION

Types of Project Information - Accuracy and Use of Information - Computerized Organization and Use of Information - Organizing Information in Databases - Relational Model of Databases - Other Conceptual Models of Databases - Centralized Database Management Systems - Databases and Applications Programs - Information Transfer and Flow.

REFERENCES:

1. Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, Tata McGraw-Hill Publishing Company, New Delhi, 1998.
2. Calin M. Popescu, ChotchaiCharoenngam, Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications, Wiley, New York, 1995.
3. Chris Hendrickson and Tung Au, Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2000.
4. Willis, E. M., Scheduling Construction Projects, John Wiley & Sons, 1986.
5. Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985.

213BTPT02 ADVANCED CONSTRUCTION TECHNIQUES

OBJECTIVE:

To study and understand the latest construction techniques applied to engineering Construction

UNIT I SUB STRUCTURE CONSTRUCTION

Box jacking - pipe jacking - Under water construction of diaphragm walls and basement - Tunneling techniques - piling techniques - driving well and caisson - sinking cofferdam - cable anchoring and grouting - driving diaphragm walls, sheet piles - laying operations for built up offshore system - shoring for deep cutting - large reservoir construction - well points - dewatering and stand by plant equipment for underground open excavation.

UNIT II SUPER STRUCTURE CONSTRUCTION FOR BUILDINGS

Vacuum dewatering of concrete flooring – concrete paving technology – techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections – launching techniques – suspended form work – erection techniques of tall structures, large span structures – launching techniques for heavy decks – insituprestressing in high rise structures, aerial transporting handling erecting lightweight components on tall structures.

UNIT III CONSTRUCTION OF SPECIAL STRUCTURES

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.

UNIT IV REHABILITATION TECHNIQUES

Mud jacking grout through slab foundation - micropiling for strengthening floor and shallow profile - pipeline laying - protecting sheet piles, screw anchors - sub grade water proofing, underpinning, crack stabilization techniques.

UNIT V DEMOLITION

Advanced techniques and sequence in demolition and dismantling.

REFERENCES:

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

213BTPT03 - COMPUTER APPLICATIONS IN CONSTRUCTION ENGINEERING AND PLANNING

OBJECTIVE:

To study and understand the hardware and software requirements of computer, programming and scheduling techniques applied to construction engineering

UNIT I INTRODUCTION

Introduction to System Hardware – Languages – Feasibility study and analysis – procurement, training, implementation and system management – procedural language - developing application with spread sheet - developing application with files and database software.

UNIT II OPTIMIZATION TECHNIQUES

Linear, Dynamic and Integer Programming - Branch and Bound Techniques – Application to Production Scheduling, Equipment Replacement, Material Transportation and Work Assignment Problems – Software applications

UNIT III INVENTORY MODELS

Deterministic and Probabilistic Inventory Models - Software applications.

UNIT IV SCHEDULING APPLICATION

PERT and CPM - Advanced planning and scheduling concepts – Computer applications – case study.

UNIT V OTHER PROBLEMS

Estimating – project planning and scheduling- accounting and cost engineering – Enterprises – Introduction to ERP systems - operations simulation

REFERENCES:

1. Billy E.Gillet., Introduction to Operations Research – A Computer Oriented Algorithmic Approach, Tata McGraw Hill, 1990
2. Paulson, B.R., Computer Applications in Construction, McGraw Hill, 1995
3. Feigenbaum,L., Construction Scheduling with Primavera Project Planner Prentice Hall Inc., 2002
4. Ming Sun and Rob Howard, "Understanding I.T. in Construction, Spon Press, Taylor and Francis Group, London and New York, 2004.

213BTPT04 - CONSTRUCTION QUALITY AND SAFETY MANAGEMENT

OBJECTIVE:

To study total quality management concepts, safety laws and audits applied to construction engineering

UNIT I INTRODUCTION

Total quality management concepts - ISO9000 - QA/QC systems and organizations, Quality Audits – Problem solving techniques

UNIT II QUALITY CONTROL

Statistical Quality Control; Quality Function Deployment; Material Quality Assurance; Specifications and Tolerances

UNIT III SAFETY ISSUES

Safety issues - Injury accidents and their causes - Safety program components - Role of workers, Supervisors

UNIT IV SAFETY MANAGEMENT

Managers and Owners - Safety Procedures for various construction operations - Safety audits and Safety laws

UNIT V OTHER SAFETY MEASURES

Ability of systems to protect fire – Preventive systems – fire escape system design – Planning for pollution free construction environmental – Hazard free Construction execution.

REFERENCES:

1. James, J.O' Brian, Construction Inspection Handbook – Quality Assurance and Quality Control, Van Nostrand, New York, 1989.
2. Kwaku, A., Tena, Jose, M. Guevara, Fundamentals of Construction Management and Organisation, Reston Publishing Co., Inc., Virginia, 1985.
3. Juran Frank, J.M. and Gryna, F.M. Quality Planning and Analysis, Tata McGraw Hill, 1993
4. Hutchins.G, ISO 9000, Viva Books, New Delhi, 2000
5. Clarkson H. Oglesby, Productivity Improvement in Construction, McGraw-Hill, 1989.
6. John L. Ashford, The Management of Quality in Construction, E &F.N.Spon, New York, 1989.
7. Steven McCabe, Quality Improvement Techniques in Construction, Addison Wesley Longman Ltd, England. 1998.

213BTTP01 CONSTRUCTION MATERIALS TESTING AND SOFTWARE LABORATORY

(A) CONSTRUCTION MATERIALS TESTING

OBJECTIVE:

- This course provides a thorough knowledge of material selection through the material testing based on specification.

LIST OF EXPERIMENTS

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

LIST OF EQUIPMENTS REQUIREMENTS:

1. Concrete making equipments.
2. Equipments for self- compacting concrete.
3. Workability and slump equipments for HPC & SCC.
4. Equipments for compression testing with very high precision with automated graph
5. NDT equipments - UPV, rebound hammer, core cutting machine (electrically operated)
6. Permeability apparatus
7. Oven (Range 0 to 600 degree C)

(B) SOFTWARE LABORATORY

OBJECTIVE:

- This course gives an exposure to students in utilizing the sophisticated Spread sheets programs, Estimation Software and other package programs

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.

LIST OF EQUIPMENTS / SOFTWARES / TOOLS REQUIREMENTS

1. MS OFFICE
2. QE PRO
3. MS OFFICE SUIT
4. PRIMAVERA POWER USER
5. PRIMAVERA CONTRACTOR STANDARD
6. PERT MASTER
7. PRIMAVERA MONTE CARLO SIMULATION
8. PRIMAVERA EXPEDITION

Electives for II Semester

213BTPE01 ADVANCED CONCRETE TECHNOLOGIES

OBJECTIVE:

To study the properties of concrete and to know the state of the art developments in concrete

UNIT I CONCRETE INGREDIENTS

Composition of OPC – Manufacture – Modified Portland Cements – Hydration Process of Portland Cements – Structure of Hydrated Cement Pastes

Mineral Admixtures – Slags – Pozzolanas and Fillers – Chemical Admixtures – Solutes – Retarders – Air Entraining Agents – Water Proofing Compounds – Plasticizers and Super Plasticizers

Aggregates – Properties and testing of fine and course aggregates – combining of aggregates – Substitute material for aggregates – recent advancements.

UNIT II SPECIAL CONCRETES

Fibre Reinforced Concrete – Self Compacting Concrete – Polymer Concrete – High performance concrete – Sulphur concrete.

UNIT – II CONCRETE MIX DESIGN

Mix Proportioning – Mixes incorporating Fly ash, Silica fume, GGBS – Mixes for High Performance Concrete – High strength concrete – variations in concrete strength.

UNIT IV MECHANICAL PROPERTIES OF CONCRETE

Interfacial Transition Zone – Fracture Strength – Compressive strength – Tensile strength - Impact strength - Bond strength.

UNIT V DURABILITY OF CONCRETE

Factors affecting durability – Chemical Attack – Permeability – chloride penetration – water absorption – creep – Shrinkage.

REFERENCES:

1. Santhakumar.A.R., Concrete Technology, OxfordUniversity press, New Delhi. 2007.
2. Gambhir.M.L., Concrete Technology – Tata McGraw Hill Book Co. Ltd.,Delhi, 2004.
3. Neville, A.M., Properties of Concrete, Longman, 1995.
4. MethaP.K.andMontreio P.J.M., Concrete Structure Properties and Materials, Prentice Hall, 1998.
5. Gupta.B.L. and Amit Gupta, Concrete Technology, Standard Publishers Distributer, New Delhi, 2004.

213BTPE02 SHORING, SCAFFOLDING AND FORMWORK

OBJECTIVE:

To study and understand the various types of scaffolding, formworks, shoring methods and techniques.

UNIT I PLANNING AND SITE EQUIPMENT & PLANT FOR FORM WORK

At Tender stage – Development of basic system – Planning for maximum reuse – Economical form construction – Planning examples – Crane size, effective scheduling estimate – Recheck plan details – Detailing the forms. Overall Planning – detail planning – Standard units – Corner units – Schedule for column formwork – Formwork elements – Planning Crane arrangements – Site layout plan – Transporting plant – Formwork beams – Formwork ties – Wales and ties – scaffold frames from accessories – Vertical transport table form work.

UNIT II FORM MATERIALS

Lumber – Types – Finish – Sheathing boards working stresses – Repetitive member stress – Plywood – Types and grades – Textured surfaces and strength – Reconstituted wood – Steel – Aluminum Form lining materials – Hardware and fasteners – Nails in Plywood
Concrete density – Height of discharge – Temperature – Rates of Placing – Consistency of concrete – Live loads and wind pressure – Vibration Hydrostatic pressure and pressure distribution – Examples – Vertical loads – Uplift on shores – Adjustment for non standard conditions.

UNIT III DESIGN OF FORMS AND SHORES

Basic simplification – Beam formulas – Allowable stresses – Deflection bending lateral stability – Shear, Bearing – Examples in wall forms – Slab forms – Beam forms – Ties, Anchors and Hangers – Column forms – Examples in each.

Simple wood stresses – Slenderness ratio – Allowable load – Tubular steel shores patented shores – Site Preparation, Size and spacing – Steel Tower Frames – Safety practices – Horizontal shores shoring for multistoried – More concentrated shore loads T- heads – Tow Tier wood shores – Ellis shores – Dayton sure grip and Baker Roofs shores – Safeway Symons shores – Beaver – advance shores Dead shore – Raking and Flying shores.

UNIT IV FORMWORK FOR BUILDINGS

Location of job mill – Storage – Equipment – Footings – Wall footings – Column footings Sloped footing forms – Curb and gutter forms – Wall forms – Prefabricated panel systems – Giant forms curved wall forms – Column heads – Beam or girder forms – Beam pockets – Suspended forms – Concrete joint construction – Flying system forms. Causes of failures – Inadequate shoring inadequate bracing of members – improper vibration – Premature stripping – Errors in design – Failure to follow codes – How formwork affects concrete quality – ACI – Case studies – Finish of exposed concrete design deficiencies – Safety factors – Prevention of rotation – Stripping sequence – Advantages of reshoring.

UNIT V FORMS FOR DOMES AND TUNNELS, SLIP FORMS AND SAFETY PRACTICES FOR SCAFFOLDS

Hemispherical, Parabolic, Translational typical barrel vaults, Hyperbolic Folded plates – Shell form design considerations loads – Inserts, Anchors bolts – Building the forms- Placing concrete – Form removed – Strength requirements – Tunnel forming components – Curb forms invert forms – Arch forms – Concrete placement methods – Cut and cover construction – Tolerances – Form construction – Shafts.
Slip Forms - Principles – Types – advantages – Functions of various components – Planning – Desirable characteristics of concrete – Common problems faced – Safety in slip forms special structures built with slip form Technique – Codal provisions – Types of scaffolds – Putlog and independent scaffold – Single pole scaffolds – Fixing ties – Spacing of ties plan – bracing – knots – safety net – General safety requirements – precautions against particular hazards – Truss suspended – Gantry and system scaffolds.

REFERENCES:

1. Robert L. Peurifoy and Garold D. Oberlender, Formwork For Concrete Structures, McGraw – Hill, 1996.
2. Hurd, M.K., Formwork for Concrete, Special Publication No.4, American Concrete Institute, Detroit, 1996
3. Michael P. Hurst, Construction Press, London&New York, 2003
4. Austin, C.K., Formwork for Concrete, Cleaver – Hume Press Ltd., London, 1996.

213BTPE03 CONSTRUCTION OF PAVEMENTS

OBJECTIVE:

To study the properties of flexible and rigid pavement

UNIT I ROAD MAKING MATERIALS FOR FLEXIBLE AND RIGID PAVEMENTS

Classification, testing and applications of road making aggregates – Road binders – Bitumen - Cement

UNIT II PROPERTIES OF BITUMINOUS MIXTURES

Resistance of bituminous mixtures to permanent deformation – Flexibility and brittleness - Common mechanical tests – Permeability characteristics – Weathering of bituminous road surfacing – Adhesion of bituminous binders to road aggregates – Effect of aggregate size in bituminous courses – Temperature susceptibility of bituminous courses – Design of bituminous mixes.

UNIT III PROPERTIES OF PAVEMENT QUALITY CONCRETE MIXURES AND CONSTRUCTION PRACTICE

Properties of fresh and hardened concrete – laboratory tests – Design of concrete mixes for Pavement Quality Concrete.

Construction of various layers in rigid and flexible pavements – Quality assurance during construction – sampling and analysis.

UNIT IV MACHINERIES

Road making machineries – Road formation, bituminous constructions - Road surface evaluation

UNIT V LATEST ADVANCEMENTS

Methods to improve bitumen quality – Rheological and chemical additives – Polymer modified bitumen – Super pave concepts – Recycling of bituminous courses – Smart materials for cement concrete pavement – Use of admixtures and fibres.

REFERENCES:

1. Mix Design Methods for Asphalt Concrete and other Hot mix types MS 2, Sixth Edition, The Asphalt Institute, 1997.
2. Edwin J. Barth, Asphalt Science and Technology, Gordon and Breach Science Publishers, New York, 1984.
3. Bituminous materials in road construction, The English Language Book Society and Her Majesty's Stationery Office, 1966.

213BTPE04 FRACTURE MECHANICS OF CONCRETE

OBJECTIVE:

To study the various types of fracture mechanics of concrete, its process and behaviour.

UNIT I INTRODUCTION

Linear Elastic fracture mechanics: Overview of fracture mechanics, fracture at atomic level, stress concentration factor.

UNIT II ENERGY THEORY

Griffith's Energy Theory, Energy release rate, SIF, Effect of finite size, Instability and R-curve, crack-tip plasticity, CTOD, J-integral.

UNIT III FRACTURE MECHANICS

Fracture mechanics of concrete: Why fracture mechanics of concrete? Non-linear fracture models

UNIT IV FRACTURE ENERGY

RILEM Fracture energy, softening of concrete, fracture process zone

UNIT V FRACTURE BEHAVIOUR

Fracture size effect, Interface fracture, Fracture behaviour of HSC and HPC.

REFERENCES:

1. Surendra P. Shah, Stuart E. Swartz, Chengsheng Ouyang, Fracture Mechanics of Concrete: Applications of Fracture Mechanics to Concrete, Rock and Other Quasi-Brittle Materials, Wiley-Interscience; 1 edition (September 1995).
2. George C., A. DiTommaso, Fracture mechanics of concrete: Structural application and numerical calculation, MartinusNijhoff Publishers, DORDRECHT / BOSTON / LANCASTER, 1985.
3. Nordie seminar held at Division of Building Materials, FRACTURE MECHANICS OF CONCRETE, November 6, 1986
4. J. M. Emery, J. D. Hochhalter & A. R. Ingraffea, Computational Fracture Mechanics of Concrete Structures: A Retrospective through Multiple Lenses

213BTPE05 BUILDING SERVICES

OBJECTIVE:

To study the various aspects of building including sanitary, HVAC, Automation and intelligent buildings.

UNIT I INTRODUCTION

Man-Made Environment, General principles of site selection, Site Plan, Planning Regulations and By-laws, Principles of Planning and orientation of buildings.

UNIT II PLUMBING AND DRAINAGE

Importance of building services in multi-storey buildings, Systems of Plumbing, Planning and Pipe sizing for water supply, sewage disposal and storm water drainage.

UNIT III DAMP PREVENTION AND FIRE PROTECTION

Causes and Effects of Dampness, Techniques and methods of Damp prevention, Materials used for Damp proofing, Damp proofing treatment in buildings. Termite Proofing methods. Important considerations in Fire Protection, Properties of Fire-resisting materials, Fire-resistant construction, General measures of Fire Safety in Buildings.

UNIT IV NOISE AND ACOUSTICS

Effects and Types of Noise, Transmission of Noise, Sound insulation versus sound absorption, maximum acceptable noise levels, means of noise control and sound insulation, Principles of Acoustics, Acoustical Defects, Acoustical materials for buildings.

UNIT V HVAC AND OTHER SERVICES

Heat insulating materials and methods of heat insulation. Necessity and functional requirements of a Ventilation system. Purpose and classification of Air Conditioning of Buildings, Principles of comfort AC, Systems of Air Conditioning. Lighting design, Elevators and escalators, Electrical distribution, Fire safety and security services, Building automation, intelligent buildings.

REFERENCES:

1. S.P. Arora, S.P. Bindra, Building Construction, Dhanpat Rai Publications (P) Ltd., New Delhi, 2007.
2. S.C. Rangwala, K.S. Rangwala, P.S. Rangwala, Building Construction, Charotar Publishing House, Anand, 2007.
3. Levin, R.I, Rubin, D.S., and Stinson J., Quantitative Approaches to Management, McGraw Hill Book Co., 1988.

313BTPE01 QUANTITATIVE TECHNIQUES IN MANAGEMENT

OBJECTIVE:

To study the various quantitative methods applied to the elements of management

UNIT I OPERATIONS RESEARCH

Introduction to Operations Research - Linear Programming – Graphical and Simplex Methods, Duality and Post – Optimality Analysis – Transportation and Assignment Problems

UNIT II PRODUCTION MANAGEMENT

Inventory Control - EOQ - Quantity Discounts - Safety Stock – Replacement Theory – PERT and CPM – Simulation Models – Quality Control

UNIT III FINANCIAL MANAGEMENT

Working Capital Management – Compound Interest and Present Value methods – Discounted Cash Flow Techniques – Capital Budgeting

UNIT IV DECISION THEORY

Decision Theory – Decision Rules – Decision making under conditions of certainty, risk and uncertainty – Decision trees – Utility Theory

UNIT V MANAGERIAL ECONOMICS

Cost Concepts – Break-even analysis – Pricing Techniques – Game theory Applications

REFERENCES:

4. Vohra, N.D., Quantitative Techniques in Management, Tata McGraw-Hill Company Ltd, New Delhi, 1990.
5. Schroeder, R.G, Operations Management, McGraw Hill, USA, 1982.
6. Levin, R.I, Rubin,D.S., and Stinson J., Quantitative Approaches to Management, McGraw Hill Book Co., 1988.
7. Frank Harrison, E., The Managerial Decision Making Process, Houghton Mifflin Co., Boston, 1975.
8. Hamdy A.Taha, Operations Research: An Introduction, Prentice Hall, 2002.

313BTPE02 CONSTRUCTION PERSONNEL MANAGEMENT

OBJECTIVE:

To study the productivity assessment and improvement techniques qualities of leadership in successful completion of construction project

UNIT I INTRODUCTION

Labour Productivity - Factors Affecting Job-Site Productivity - Labour Relations in Construction - Problems in Collective Bargaining

Historical Perspective -

UNIT II ORGANISING TECHNIQUES

Modern trends - Strategic Planning - Effects of Project Risks on Organization - Organization of Project Participants - Traditional Designer-Constructor Sequence - Professional Construction Management - Owner-Builder Operation - Turnkey Operation - Leadership and Motivation for the Project Team

UNIT III PRODUCTIVITY ASSESSMENT

Sources of lost time - productivity assessment tools such as productivity measurement system - work sampling - foreman delay survey

UNIT - IV PRODUCTIVITY IMPROVEMENT

Productivity improvement tools such as crew balance charts, process diagrams.

UNIT V LEADERSHIP

Basic theories of motivation, leadership, communication and team behaviour adapted and applied to construction management; case studies.

REFERENCES:

1. Chris Hendrickson and Tung Au, Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2000.
2. Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, Tata McGraw-Hill Publishing Company, New Delhi, 1998.
3. Frederick E. Gould, Construction Project Management, Wentworth Institute of Technology, Vary E. Joyce, Massachusetts Institute of Technology, 2000.
4. Choudhury, S , Project Management, Tata McGraw-Hill Publishing Company, New Delhi, 1988.
5. George J.Ritz , Total Construction Project Management - McGraw-Hill Inc, 1994.

313BTPE03 CHARACTERIZATION OF CONSTRUCTION MATERIALS

OBJECTIVE:

To study characterization of materials concrete, steel and asphalt using various techniques

UNIT I INTRODUCTION

Characterization, using; Macroscopic and microscopic techniques (visual examination, optical and scanningelectron microscopy),

UNIT II CHEMICAL CHARACTERIZATION

Chemical and mineralogical analysis techniques (X-ray and neutron diffraction, spectroscopic techniques), and non-destructive techniques.

UNIT III MATERIAL BEHAVIOUR CHARACTERIZATION

Characterization of material behaviour: Rheology and viscoelasticity, constitutive relationships, fracture and fatigue, failure mechanisms and degradation processes.

UNIT IV WASTE CHARACTERIZATION STUDIES

Defining C&D Debris, Construction debris –Residential and Non-residential, Demolition debris - Residential and Non-residential, Renovation debris - Residential and Non-residential.

UNIT V MANAGEMENT OF C & D DEBRIS

Landfilling, Recovery of C&D debris for recycling, Deconstruction, Asphalt and concrete recycling, Waste wood recycling, Metals recycling, Asphalt shingles, Drywall (Sheetrock, Gypsum), Estimated recovery rate

REFERENCES:

1. Amanda Simpson, Jeremiah Vieregge, Jeffrey Schirer, Nanomechanical Characterization of Construction Materials, Hysitron, Inc.
2. Ikari, T., Fukasawa, R., Terahertz characterization of construction materials for remote gas, sensing, Infrared, Millimeter, and Terahertz Waves, 2009. IRMMW-THz 2009. 34th International Conference on 21-25 Sept. 2009.
3. Thygesen, LG, Hansen, KK, Improved Suction Technique for the Characterization of Construction Materials, Journal of ASTM International (JAI), Volume 4, Issue 1 (January 2007).
4. Zhanping Youa, Julian Mills-Bealea, Justin M. Foleya, Samit Royb, Gregory M. Odegardc, Qingli Daia, c, Shu Wei Goha, Nanoclay-modified asphalt materials: Preparation and characterization, Construction and Building Materials, Volume 25, Issue 2, February 2011, Pages 1072–1078.
5. Lai, Wai-lok Wallace, Characterization of porous construction materials using electromagnetic radar wave, The Hong Kong Polytechnic University, 2006.
6. Franklin Associates, Prairie Village, KS, CHARACTERIZATION OF BUILDING-RELATED CONSTRUCTION AND DEMOLITION DEBRIS IN THE UNITED STATES, TechLaw, Inc., June 1998.

313BTPE04 CONSTRUCTION FINANCE AND ECONOMICS

OBJECTIVE:

To study the role and methods of economics and finance concepts applied to construction business.

UNIT I ECONOMICS

Role of Civil Engineering in Industrial Development – Advances in Civil Engineering - Engineering Economics – Support Matters of Economy related to Engineering – Market demand and supply – Choice of Technology – Quality Audit in economic law of returns governing production.

UNIT II CONSTRUCTION ECONOMICS

Construction development in Housing, transport energy and other infrastructures – Economics of ecology, environment, energy resources – Local material selection – Form and functional designs – Construction workers – Urban Problems – Poverty – Migration – Unemployment – Pollution.

UNIT III FINANCING

The need for financial management - Types of financing – Financing instruments- short term borrowing – Long term borrowing – Leasing – Equity financing – Internal generation of funds – External commercial borrowings – Assistance from government budgeting support and international finance corporations – Analysis of financial statements – Balance Sheet - Profit and Loss account – Cash flow and Fund flow analysis – Ratio analysis – Investment and financing decision – Financial Control - centralized management.

UNIT IV ACCOUNTING METHOD

General Overview – Cash basis of a accounting – Accrual basis of accounting – Percentage completion method – Completed contract method – Accounting for tax reporting purposes and financial reporting purposes – Accounting Standards

UNIT V LENDING TO CONTRACTORS

Loans to Contractors – Interim construction financing – Security and risk aspects.

REFERENCES:

1. Prasanna Chandra, Project Selection, Planning, Analysis, Implementation and Review, Tata McGraw Hill Publishing Company, 1995.
2. Halpin, D.W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985.
3. Warner Z Hirsch, Urban Economics, Macmillan, New York, 1993.
4. Kwaku A, Tenah and Jose M.Guevara, Fundamental of Construction Management and Organisation, Prentice – Hall of India, 1995.
5. Madura, J and Veit, E.T., Introduction to Financial Management, West Publishing Co., St. Paul, 1988.

313BTPE05 ANALYSIS AND DESIGN OF STRUCTURAL SYSTEMS

OBJECTIVE:

To study the various conceptual analysis and design of structural systems

UNIT I INTRODUCTION TALL BUILDING SYSTEMS

Introduction, Generalized classification and behavior of structural systems, Structural subsystems and structural elements, materials for structural systems, Floor Systems -Concrete Floor Systems -Steel Floor Systems.

UNIT II ANALYSIS OF STRUCTURAL SYSTEMS

Preliminary analysis and analytical modeling of structural systems, basic design Principles of structural components/skeleton, Initial Selection of Structural System - Optimization of Various Structural Systems, concepts of structural safety.

UNIT III PRELIMINARY DESIGN AND OPTIMIZATION

Design process and conceptual design, Structural requirements, design loads for buildings and structures, Optimum Structural Systems – Design Issues - Height to Width Ratios - Span Dimension of Girders

UNIT IV FRAMED SYSTEMS

Classification of framed systems - Vertical Framing Systems, Lateral Resisting Frame Systems - Moment Resisting Frames - Braced Frames - Shear Walls, Framed Tube Systems, Member Sizes of Frame - Floor Framing Design - Shear Lag Effects.

UNIT V NEW STRUCTURAL SYSTEMS

Classification of New Structural Systems - Mega-structures - Cellular Structures - Bridged Structures, Comparison of Systems Efficiency.

References:

1. MahjoubElneimeiri, Structural Systems for Tall Buildings, Fall 2009 - Lecture 1, http://www.rds.com.vn/uploads/ARCH489_Fall2009_Lecture1%20-%20aug%2025.pdf
2. Mir M. Ali and Kyoung Sun Moon, Structural Developments in Tall Buildings: Current Trends and Future Prospects, Architectural Science Review, Volume 50.3, pp 205-223
3. J. Ger, F. Cheng, Seismic Design Aids for Nonlinear Pushover Analysis of Reinforced Concrete, Steel Bridges, CRC Press, London, 2012.
4. Toshiyuki Tanaka, Masashi Yamamoto, Takeshi Katayama, Recent Applications of Structural Control Systems to High-Rise Buildings Earthquake Engineering and Engineering Seismology, Vol. 4, No. 1.
5. Baker, W.F., 1992 Structural Engineering International, Published by IABSE, May 1992, "Energy-Based Design of Lateral Systems", pp. 99-102.
6. Baker, W.F., Novak, L.C., Sinn, R.C. and Viise, J.R., ASCE Structures Congress 2000, "Structural Optimization of 2000' Tall 7 South Dearborn Building".
7. Abdelrazaq, A.K., Sinn, R.C., ASCE Structures Congress 2000, "Robustness and Redundancy Design for Tall Buildings".
8. Taranath, B.S., 1998, 2nd Edition, Steel, Concrete, & Composite Design of Tall Buildings.
9. Smith, B.S., Coull, A., 1991, 1st Edition, Tall Building Structures: Analysis and Design
10. Naoki NIWA¹, Seiji AKIYAMA², Satoru NAGAI³, Kazunari MAKIBE⁴ and Akio TOMITA⁵ RESEARCH ON ADVANCED STRUCTURAL FRAMING SYSTEM FOR HIGH-RISE OFFICE BUILDINGS 13th World Conference on Earthquake Engineering Vancouver, B.C., Canada, August 1-6, 2004

313BTPE06 CAD IN CIVIL ENGINEERING

OBJECTIVE:

To study the various concepts of Computer Aided Design

UNIT I INTRODUCTION TO CAD

Concepts of Computer Aided Design - Role of Computers in engineering process. Introduction to Hardware and Software Systems for Computer Aided Engineering.

UNIT II SOFTWARE TOOLS FOR CAD

Software Tools for CAD: Programming paradigms - Object Oriented Programming - Introduction to C++ Computer modelling of engineering systems - Data Structures - pointers, arrays, structures and classes, Programming techniques for computer modelling of civil engineering problems.

UNIT III COMPUTER GRAPHICS

Computer Graphics - Basic principles, Transformations, Segmentation, Interactive graphics, Drafting - AutoCAD, Graphical User Interfaces - Windows. Graphics standards - Graphics Programming.

UNIT - IV DATABASE MANAGEMENT

Database Management System - Database models - Concepts of RDBMS - Engineering Database Management systems - Concepts of Database Programming. Artificial Intelligence and Expert Systems - Knowledge Representation - Rules, Frames and Semantic networks - Inference Strategies.

UNIT V MODELS

Process models - prototypes in Civil Engineering. Development of CAE systems for different civil engineering applications such as in Building Technology and Construction Management, Geotechnical Engineering, Hydraulics and Water Resources Engineering, Structural Engineering, Transportation Engineering and Environmental Engineering.

REFERENCES:

1. Billy E. Gillet., Introduction to Operations Research – A Computer Oriented Algorithmic Approach, Tata McGraw Hill, 1990
2. Paulson, B.R., Computer Applications in Construction, McGraw Hill, 1995
3. Feigenbaum, L., Construction Scheduling with Primavera Project Planner Prentice Hall Inc., 2002
4. Ming Sun and Rob Howard, "Understanding I.T. in Construction, Spon Press, Taylor and Francis Group, London and New York, 2004.

313BTPE07 CONSTRUCTION PROJECT MODELING AND SIMULATION

OBJECTIVE:

To study the various concepts of construction modeling and simulation

UNIT I INTRODUCTION

Introduction to systems approach - Typical construction systems - Mathematical models. Fundamentals of simulation - Monte Carlo method - Analog and digital simulation - Continuous and discrete models - Simulation languages - Introduction to Computer Simulation Applications in Construction Engineering.

UNIT II INTRODUCTION TO MODELLING

Steps in the modeling & problem solving process - types of models - various approaches to modeling and optimization – computer software to develop types of models covered.

UNIT III MATHEMATICAL CONCEPTS OF SIMULATION

Probability concepts - Random numbers - Pseudo random generators - Arrival patterns - Service time distributions, Queue discipline – Manual simulation of simple queuing system - Creating and moving transactions - Queues and facilities - Event scheduling - Internal logic of GPSS processor - Program control statements.

UNIT IV PROJECT APPLICATIONS

Priority - Preemption - Functions – Parameters and save values – Standard numerical attributes - Collection of statistics - Report preparation, Applications of GPSS - Simple queuing problems - Inventory problems - Simulation of ports - Railway platforms and level crossings - Traffic signals - Analysis of simulation results.

UNIT V VALIDATION

Model validation - Replication of random conditions - Time series analysis

REFERENCES:

1. Gordon, G., *System Simulation*, Prentice-Hall of India, 1992
2. GPSS/PC, *User Manual*, Minuteman Software, USA, 1985
3. 3-D Construction Modeling (Small, Simple and Sustainable Construction Books), <http://insitebuilders.wordpress.com/2013/03/14/hands-on-construction-101-introduction/>
4. <http://insitebuilders.wordpress.com/page/2/>

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