

Master of Technology - Construction Technology Management

Syllabus - First Semester

CONSTRUCTION ENGINEERING PRACTICES

Course Code: CME4101

CreditUnits: 04

Course Objective: to impart knowledge about the various construction engineering practices and help the students understand the various types of constructions such as RCC, Prestressed and pre fabricated. This will help in greater use of the modular technology in the day to day life.

Course Contents:

Module I:

Reinforced and prestressed concrete construction-Prefabricated structures.

Module II:

Production of ready mixed concrete-productivity analysis-Economics of formwork-Design of formwork and their reusability.

Module III:

Modular construction practices-fibonacci series, its handling and other reliable proportioning concepts.

Module IV:

Modular coordination-standardization-system building-advantages.

Module V:

Lamination and advantages of modular construction-concepts implementation procedures.

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---------------|---|----|-------|----|----|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books & References:

- Allen E, Iano, J, fundamentals of building construction material and method, John Wiley and sons, 2011.
- Cameron K. andres. ronald C. Smith, principals and practices of commercial construction, 8th edition, prentice hall, 2009.

CIVIL ENGINEERING MATERIALS

Course Code: CME4102

CreditUnits: 04

Course Objectives: The objective for this course are for the students to learn and characterize the engineering properties of cement-based materials and understanding the mixture design and engineering properties of special concretes such as high-performance concrete, self-consolidating concrete, fibre reinforced concrete, sprayed concrete, etc.

Course Contents:

Module I:

Light weight aggregate concrete - fiber reinforced concrete - High strength concrete.

Module II:

Changes in concrete with time, Corrosion of rebars in concrete- control measures.

Module III:

Different Industrial waste materials – their usage in concrete –study of properties.

Module IV:

Effects of temperature on Concrete- high temperature - Ferro-cement – advantages and properties and strength.

Module V:

Polymers - Fibre reinforced plastic in sandwich panels - Adhesives and sealants. Structural elastomeric bearings, Moisture barriers.

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|----------------------|----------|-----------|--------------|-----------|-----------|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books & References:

- Adam M. Neville, Properties of Concrete, 5th Edition, Longman Sc and Tech Publishers, 2011.
- Kumar Mehta. P. and Paulo J.M. Monteiro, Concrete Microstructure, Properties and Materials, McGraw Hill, 2006.

APPLIED NUMERICAL METHODS

Course Code: CME4103

CreditUnits: 03

Course Objective: The primary objective of this chapter is to provide you with a concrete idea of what numerical methods are and how they relate to engineering and scientific problems.

Course Contents:

Module I:

Solution of Algebraic and Transcendental Equation:-

Newton-Raphson method including method of complex roots, Graeffe's root square method (Computer based algorithm and programme for these methods)

Module II:

Interpolation and Approximation:-

Lagrange's and Newton-divided difference formula, Newton interpolation formula for finite differences, Gauss's forward and backward interpolation formulae, Bessel's and Laplace-Everett's formulae, Cubic spline, least squares approximation using Chebyshev polynomial.

Solution of partial differential equations of linear and non-linear nature with finite difference scheme and iteration techniques

Module III:

Solution of Linear Simultaneous Equations:-

Cholesky's (Crout's) method, Gauss-Seidel iteration and relaxation methods, Solution of Eigenvalue problems; Smallest, largest and intermediate Eigen values (Computer based algorithm and programme for these methods)

Module IV:

Numerical Differentiation and Integration:-

Numerical differentiation using difference operators, Simpson's 1/3 and 3/8 rules, Boole's rule, Weddle's rule.

Module V:

Solution of Differential Equations:-

Modified Euler's method, Runge-Kutta method of 2nd, 3rd and 4th orders, Predictor- Corrector method, Stability of Ordinary differential equation, Solution of Laplace's and Poisson's equations by Liebmann's method, Relaxation method.

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---------------|---|----|-------|----|----|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books & References:

- Numerical Method for Scientific and Engineering M.K. Jain, S.R.K. Iyenger and Wiley Eastern Ltd
- Numerical Methods for Engineers S.K. Gupta Wiley Eastern Ltd.
- Numerical Methods B.S. Grewal Khanna Publications
- Numerical Methods A.D. Booth Academic Press, NY
- An Introduction to Numerical Analysis K.E. Atkinson John Wiley & Sons, NY
- Introduction Methods of Numerical Analysis S.S. Sastry Prentice Hall of India
- Elementary Numerical Analysis S.D. Conte McGraw Hill

PRE-ENGINEERED CONSTRUCTION TECHNOLOGY

Course Code: CME4104

CreditUnits: 04

Course Objective: At the end of this course the student shall be able to appreciate modular construction, industrialised construction and shall be able to design some of the prefabricated elements and also have the knowledge of the construction methods using these elements.

Course Contents:

Module I:

Introduction, definition of pre-engineered builds, need of pre fabrication and pre engineering, advantages, applications, Pre Engineered Buildings Vs Conventional Steel Buildings.

Module II:

Design of Pre Engineered Buildings (PEB), design cycle, frame geometry, frame loading, design codes.

Module III:

Design criterion, dimensioning and detailing, design process, production.

Module IV:

Planning and control (PPC), maintenance. Design software and its uses in design of pre-engineered buildings.

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|----------------------|----------|-----------|--------------|-----------|-----------|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books & References:

- CBRI, Building materials and components, India, 1990.
- Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994.
- Koncz T., Manual of precast concrete construction, Vols. I, II and III, Bauverlag, GMBH, 1971.
- Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland BetorVerlag, 1978.

CONTRACT LAWS AND REGULATIONS

Course Code: CME4109

CreditUnits: 04

Course Objective: The current Program is designed such that the student will be able to understand the contract Laws, Acts, Tenders, Framing of documents, Types of contracts, Arbitration, Types of tenders, Law Enforcements, Laws related to land and revenue and Labour laws.

Course Contents:

Module I

Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability – Design of Contract Documents – International Contract Document – Standard Contract Document – Law of Torts

Module II

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

Module III

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

Module IV

Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties and their Influence on Construction Costs – Legal Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations

Module V

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 – Other Labour Laws

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|----------------------|----------|-----------|--------------|-----------|-----------|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Reference Books:

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

CONSTRUCTION ENGINEERING PRACTICES LAB

Course Code: CME4105

CreditUnits: 01

List of Experiments:-

1. Evaluation of properties of content, fine aggregates and coarse aggregates.
2. Mix design of ready mix concrete.
3. Production of ready mix concrete.
4. Evaluation of the various physical and strength properties of lamination, steel and timber.

Examination Scheme:

| IA | | | | EE | |
|----|----|----|---|----|----|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books & References:

- P.C. Aitcin, High-Performance Concrete, E & FN SPON, 1998.
- E. Bray and R. K. Stanley, Non Destructive Evaluation, CRC Press, 2002.

CIVIL ENGINEERING MATERIAL LAB

Course Code: CME4106

CreditUnits: 01

1. Evaluation of properties of content, fine aggregates and coarse aggregates.
2. Evaluation of properties of reinforcing steel, timber, building block and tile.
3. Variation of workability with time for different grades of concrete experimental observations.
4. Experimental observation on influence of following parameters on strength characteristics of concrete (Some of these parameters may be considered depending up on time)
 - i. Size, shape and grade of course aggregate.
 - ii. Grading of fine aggregate.
 - iii. Hand Mixing/ Machine Mixing.
 - iv. Aggregate- Cement Ratio.
 - v. Coarse aggregate- Fine aggregate Ratio.
 - vi. Size and shape of Test specimen.
 - vii. Admixtures.

Examination Scheme:

| IA | | | | EE | |
|----|----|----|---|----|----|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books & References:

- P.C. Aitcin, High-Performance Concrete, E & FN SPON, 1998.
- E. Bray and R. K. Stanley, Non Destructive Evaluation, CRC Press, 2002.

Syllabus - Second Semester

CONSTRUCTION METHODS & EQUIPMENT

Course Code: CME4201

CreditUnits: 04

Course Objective: to impart knowledge about the various construction equipments, their uses and application for a speedy construction work. This would help to use new and improved technology in construction and therefore be economically benefiting the builders and contractors.

Course Contents:

Module I:

Selection of equipment-factors effecting-relative advantages and disadvantages-technical and economic aspects.

Module II:

Construction engineering fundamentals-analysis of production outputs and costs

Module III:

Characteristics and performance of various equipment used in construction practices. Uses, advantages and disadvantages of various construction equipments.

Module IV:

Erection and material transport equipments- their performance advantages-pile driving-dewatering.

Module V:

Study of performance of equipment used for concrete construction including batching and mixing units-equipment used for tunneling.

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---------------|---|----|-------|----|----|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books & References:

- Peurifoy,R.L., Ledbetter.W.B and schexnayder,C,construction planning and equipment methods, 5th Edition, McGraw Hill, Singapore,1995.
- Sharma S.C.. Construction equipment and management, khannapublishers,newdelhi, 2011.

CONSTRUCTION QUALITY & SAFETY MANAGEMENT

Course Code: CME4202

CreditUnits: 04

Course Objective: It will help the students to understand the importance of quality in construction industry and the aspects of completing the projects on time. This will also impart knowledge about the safety measures required during construction work and the management of the same.

Course Contents:

Module I:

Quality policy in construction industry-Consumer satisfaction- Ergonomics-Time of completion, Statistical tolerance.

Module II:

Taguchi's concept of quality-contract and construction programming-inspection procedures.

Module III:

Quality assurance/Quality control programme and cost implication.

Module IV:

Different aspects of quality-appraisals-failure mode analysis-stability methods and tools-Influence of drawings-detailing.

Module V:

Specifications-standardization-Bid preparation-construction activity-Environmental safety-social and environmental factors.

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---------------|---|----|-------|----|----|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books & References:

- Clarkson H.Oglesby,productivity improvement in construction, Mcgraw Hill,2000.
- James,J.O Brain, construction inspection handbook-quality assurance and quality control, Van Nostrand, newyork,1989.
- Juran frank, J.M.andgryana,F.M.quality planning and analysis ,tata McGraw Hill,1982.
- Kwaku A., Tenah and joseM.Guevera, fundamental of cinstruction management and organization PHI 1995.

RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING

Course Code: CME4210

CreditUnits: 02

Course Objectives:

The course will enhance scientific, technical and research writing skills and impart knowledge about various stages of research process, statistical analysis, statistical tests and their applications in statistical decision making.

Course Contents:

Module I: Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.

Module II: Population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, large and small samples, primary and secondary data, data processing and analysis. Sample surveys and questionnaire designing, scaling techniques.

Module III: Dependent and independent variables, univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: null hypothesis and alternate hypothesis, errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation, coefficient of determination.

Module IV: Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing, bibliography and footnotes. Making presentation-use of visual aids and PPTs. Publication of research papers, citations,. Intellectual property rights and copy rights, plagiarism, patents and patent laws, commercialization and ethical issues.

Examination Scheme:

| Attendance | Assignment/Library consultation / Thesis writing | Class test | Final Exam | Total |
|------------|--|------------|------------|-------|
| 5 | 15 | 10 | 70 | 100 |

Text Books:

- Blake, G. and Bly, R.W. 1993, The Elements of Technical Writing. MacMillan, New York
- Booth, V. 1981. Writing a Scientific Paper and Speaking at Scientific Meetings. The Biochemical Society, London
- Chawla, D and Sondhi, N. 2016, Research Methodology- Concepts and Cases. Vikas Publishing House Pvt Ltd. New Delhi
- Kothari, C.R. 2008. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi.

Reference Books:

- Geode, Millian J. & Paul K. Hatl, Methods in Research, McGraw Hills, New Delhi.
- Montgomery, Douglas C. (2007), 5th Ed. Design and Analysis of Experiments, Wiley India.
- Panneerselvam, R. 2009. Research Methodology, PHI Learning Pvt. Ltd., New Delhi-110001
- Ranjit Kumar 2009. Research Methodology- A step-by-step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd. Patpargang, Delhi- 110092

BUILDING SERVICES & MAINTENANCE MANAGEMENT

Course Code: CME4203

CreditUnits: 04

Course Objective: To impart knowledge about the various components of the urban planning, the services related to the buildings such as MEP, lifts, escalators, fire protections, etc., prefabrication systems in residential buildings. It will also help the students to understand the building maintenance and its management.

Course Contents:

Module I:

Components of urban forms and their planning. Concepts of neighborhood unit. Street system and layout in a neighborhood. Functional planning of buildings, optimization of space: Spatial Synthesis graphical techniques, heuristic procedures, formulation of linear and non-linear optimization problem. Space requirements and relationships for typical buildings, like residential offices, hospitals, etc.

Module II:

Standard fire, fire list, fire resistance, classification of buildings, means of escape, alarms, etc. Lightning protection of buildings, Engineering services in a building as a systems. Lifts, escalators, cold and hot water systems, waster water systems, and electrical systems.

Module III:

Prefabrication systems in residential buildings: Planning and modules and sizes of components in prefabrication, Earthquake resistant structures - Air-conditioning and heating - Acoustics and Sound insulation.

Module IV:

Building Maintenance: Scheduled and contingency maintenance planning. M.I.S. for building maintenance. Maintenance standards. Economic maintenance decisions.

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---------------|---|----|-------|----|----|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books & References:

- R. G. Hopkinson and J. D. Kay , The Lighting of buildings ,Faber and Faber, London, 1969
- Hand book for Building Engineers in Metric systems, NBC, New Delhi, 1968
- Philips Lighting in Architecture Designs, McGraw Hill, New York, 1964
- Time saver Standards for Architecture Design Data , Callendar JH ,McGraw Hill, 1974
- William H. Severns and Julian R. Fellows, Air conditioning and refrigeration ,John Wily and sons.
- Arora and Bindra, Building Construction, Dhanpat Rai, 2012.
- Hand Book of Housing Statistics, NBO, 2003.
- National Building Code of India, Bureau of Indian Standards, 2005.

SYSTEMS DESIGN AND VALUE ANALYSIS

Course Code: CME4204

CreditUnits: 04

Course Objective: to impart knowledge about the system design procedure and the value savings during the construction. This will help the students in management of various resources.

Course Contents:

Module I:

Analysis synthesis, Appraisal, System design procedure, objectives and constraints, application to buildings.

Module II:

Introduction, Value analysis, function analysis.

Module III:

Job plan. Value savings during construction. Value management.

Module IV:

Case studies in Value engineering.

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---------------|---|----|-------|----|----|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books & References:

- Keith F. Potts, "Construction Cost Management: Learning from Case Studies", Taylor & Francis, 2007.
- HojjatAdeli, AsimKarim, AsimSalimulKarim, "Construction Scheduling, Cost Optimization andManagement", Taylor & Francis, 2001.
- K. K. Chitkara, "Construction Project Management: Planning, Scheduling and Controlling", TataMcGraw-Hill Education, 2002.
- Panagiota E. Paraoulaki, "Value Engineering and Its Application to the Construction Industry",
- Massachusetts Institute of Technology, Department of Civil and Environmental Engineering, 2000.
- Alphonse J. Dell'Isola, "Value engineering: practical applications --for design, construction, maintenance& operations", R. S. Means Company, 1997.

STRUCTURAL OPTIMIZATION

Course Code: CME4205

CreditUnits: 04

Course Objective: Design, *construction* and maintenance of engineering systems involve decision making both at the managerial and at the technological level. With the increasing availability of computational power, *optimization* is becoming an important concept in the structures as well. This course gives the overview of the optimization techniques that can be applied in structures.

Course Contents:

Module I:

Definition - Objective Function; Constraints - Equality and inequality - Linear and non-linear, Side, Non-negativity, Behaviour and other constraints -Formulation of different types of structural optimization problems; Optimality criteria based structural optimizations;

Module II:

Computation of derivatives of response quantities w.r.t. design variables; Classical optimization

Module III:

Lagrange multiplier technique and Kuhn-Tucker conditions

Module IV:

Solution of NLP by direct methods and by series of unconstrained optimization problems and by series of linear programming problems.

Module V:

Structural Application- Methods for optimal design of structural elements, continuous beams and single storied frames using plastic theory - Minimum weight design for trussmembers - Fully stressed design - Optimization principles to design of R.C. structures such as multistorey buildings, water tanks and bridges

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---------------|---|----|-------|----|----|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books & References:

- S.S. Rao, Optimization, Theory and Applications, 2nd Edition, Wiley Eastern Ltd., New Delhi, 1991.
- J.S. Arora, Introduction to Optimum Design, McGraw-Hill Book Company, New York, 1989.
- A.J. Morris (Editor), Foundations of Structural Optimization - A Unified Approach; John Wiley and Sons, Chichester, 1982.
- Uri Krish, "Optimum Structural Design", McGraw Hill Book Co. 1981
- Spunt, "Optimization in Structural Design", Civil Engineering and Engineering Mechanics Services, Prentice-Hall, New Jersey 1971.
- Iyengar.N.G.R and Gupta.S.K, "Structural Design Optimisation", Affiliated East West Press Ltd, New Delhi, 1997

CONSTRUCTION PLANNING AND MANAGEMENT

Course Code: CME4206

CreditUnits: 04

Course Objective: To impart knowledge about the construction planning, scheduling, controlling and management. It will also help the students to learn the various tools of project planning and management software.

Course Contents:

Module I:

Project Planning and Scheduling - Processes of project planning, scheduling - progress control – project planning and scheduling techniques - Network Scheduling Techniques - Use of computer based models.

Module II:

Principles of Project management - Resource Management and Inventory - Implementation of Project Planning Management.

Module III:

Analysis and design of planning and control system - Disputes and Claims Management

Module IV:

Use of computer based project management tools

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---------------|---|----|-------|----|----|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books & References:

- Callahan, M. T., Quackenbush, D. G., and Rowings, J. E., Construction Project Scheduling, McGrawHill, New York, 1992.
- Cleland, D. I. and Ireland, L. R., Project Management: Strategic Design and Implementation, 4th Edition, McGraw Hill, New York, 2002.

RELIABILITY ANALYSIS IN CONSTRUCTION MANAGEMENT

Course Code: CME4207

CreditUnits: 04

Course Objective: This course will help the students to understand and learn the probability theories, the resistance distribution parameters and the reliability methods which can be put to use in construction engineering and management.

Course Contents:

Module I:

Probability Theory: Mutually exclusive events, set theory, sample points and sample space, laws of probability, total probability theorem, Baye's rule, random variables-discrete and continuous, jointly distributed discrete variables, marginal distribution, conditional distribution, jointly distribution continuous variables, functions of random variables, moments and expectations, common probability distribution normal. Lognormal, Gamma and Beta distribution, external distribution.

Module II:

Resistance Distribution and Parameters: Statistics of properties of concrete and steel, Statistics of strength of bricks and mortar, Characterization of variables, allowable stresses based on specified reliability. Monte Carlo Study of Reliability: Monte Carlo Method Inverse transformation technique. Application to columns beams and frames.

Module III:

Reliability Methods: Basic variables and failure surface, first order second moment methods, Hasofer and Lind's method, Non-normal distributions; determination of reliability index B of structural elements.

Module IV:

Reliability Based Design: Determination of partial safety checking formats. Development of reliability based criteria, optimal safety factors, and calibration of IS 456 and IS 800.

Module V:

Reliability of Structural Systems: System reliability, modeling of structural systems, bounds on system reliability, automatic generation of a mechanism, generation of dominant mechanism, reliability analysis of R.C.C. and steel frames.

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---------------|---|----|-------|----|----|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books & References:

- Ranganathan, R. (1990) 'Reliability Analysis and Design of Structures' Tata McGraw Hill Delhi.
- Rao, S.S. 'Reliability based Design' Tata McGraw Hill Delhi.
- Ghosh. D.I. (1989) 'A Primer of Reliability Theory', John Wiley, New York.
- Lewis, E.E. (1987) 'Introduction to Reliability Engineering' John Wiley, New York.

SUSTAINABLE CONSTRUCTIONS

Course Code: CME4208

CreditUnits: 04

Course Objectives: Depletion of the earth's natural resources, soaring energy costs, pollution of vital water and food sources, and irreversible environmental degradation and climate change are serious challenges facing the human civilization. This course is designed to enable students in using engineering principles in developing innovative strategies to positively influence the human life, the planet's environment, and the productivity of engineering infrastructure.

Course Contents:

Module I:

Principles of sustainability: Introduction to Course, Definition of sustainability, Major Environmental Challenges, Global Warming, Introduction to Green Buildings; LEED, Sustainable Urban Development, Sustainable Sites - LEED Credits.

Module II:

Energy Conservation in Buildings, HVAC Systems, Energy and Atmosphere - LEED Credits, Fossil Fuels vs. Renewable Energy.

Module III:

Water Conservation in Buildings, Storm Water Harvesting and Management.

Module IV:

Green Construction Materials, Materials and Resources - LEED Credits, Building Deconstruction, C&D Recycling, Indoor Environmental Quality – Basic, Building Commissioning, Economics of Green Buildings, LCC/LCA

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---------------|---|----|-------|----|----|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books & References:

- C.J. Kibert (2008) "Sustainable Construction: Green Building Design and Delivery", 2nd Ed., John Wiley, Hoboken, New Jersey
- G.T. Miller Jr. (2004) "Living in the Environment: Principles, Connections, and Solutions", 14th Ed., Brooks Cole, Pacific Grove, California.

Syllabus - Third Semester

CONSTRUCTION ECONOMICS AND FINANCE

Course Code: CME4301

CreditUnits: 04

Course Objectives: This course will make students learn and understand the concepts of finance and economics in the construction.

Course Contents:

Module I:

Construction accounting, Income statement. Depreciation and amortization.

Module II:

Engineering economics, Time value of money, discounted cash flow, NPV, ROR, PI, Bases of comparison, Incremental rate of return, Benefit-cost analysis, Replacement analysis, Break even analysis.

Module III:

Risks and uncertainties and management decision in capital budgeting.

Module IV:

Taxation and inflation. Work pricing, cost elements of contract, bidding and award, revision due to unforeseen causes, escalation.

Module V:

Turnkey activities, Project appraisal and project yield. Working capital management, financial plan and multiple source of finance. International finance, Budgeting and budgetary control, Performance budgeting. appraisal through financial statements, Practical problems and case studies.

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---------------|---|----|-------|----|----|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books & References:

- Eugene F. Brigham, Michael C. Ehrhardt, "Financial Management Theory and Practice", Cengage Learning, 2010
- Simon A. Burtonshaw-Gunn, "Risk and Financial Management in Construction", Gower Publishing, Ltd., 2009
- Warner Z, Hirsch, Urban Economics, Macmillan, New York, 1993
- Danny myers, Construction economics: A new approach, Taylor and francis publisher, 2004.
- Ofori, G, the construction industry aspects of its economics and management, Singapore university press, 1990.

SUMMER INTERNSHIP EVALUATION

Course Code: CME4335

CreditUnits: 06

Guidelines:

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives:

- **Each student will be allotted a supervisor** for proper guidance.
- **Student will first submit synopsis in the format given by coordinator/supervisor.**
- Student will maintain a file (**Internship File/Project Report**). **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of file.** The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. Report Layout: The report should contain the following components

Front Page

Table of Content

Acknowledgement

Student Certificate

Company Profile (optional)

Introduction

Main Body

References / Bibliography

The File will include *five sections* in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.

2. **Declaration by the Students**--This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.

3. **Certificate**--This is page number (ii). The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).

4. **Acknowledgements**--This is page number (iii). Keep this brief and avoid using informal language. This page must be signed by the candidate.

5. **Abstract and Keywords**--This is page number (iv). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.

The keywords (maximum 6) are a hint that what is contained in the report.

7. **Contents**--This is page number (v). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.

8. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.

9. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

10. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE INTERNSHIP FILE

Continuous Internal Assessment

40 Marks

Final Assessment

60 Marks

Continuous Internal Assessment consists of topic relevance, progress report and synopsis marks. Final Assessment includes viva, presentation and report marks.

Examination Scheme:

| Components | V | S | R | PR | FP |
|---------------|----|----|----|----|----|
| Weightage (%) | 20 | 20 | 20 | 20 | 20 |

V – Viva, S – Synopsis, FP – Final Presentation, R – Report, PR-Progress Report

PROJECT-DISSERTATION-I

Course Code: CME4337

CreditUnits: 05

GUIDELINES FOR DISSERTATION

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTATION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

➤ Report Layout

The report should contain the following components:

➤ Title or Cover Page

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ Acknowledgements (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➤ Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➤ Table of Contents

Titles and subtitles are to correspond exactly with those in the text.

➤ Introduction

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ Materials and Methods

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➤ Results and Discussion

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in “point” form.

➤ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➤ **Future prospects**

➤ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE DISSERTATION FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following *assessment objectives*:

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information

Control Quality

Draw Conclusions

Examination Scheme:

Dissertation 50

Viva Voce 50

Total 100

ata, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between ‘dissertation topic’ and ‘dissertation title’. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author’s name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)

- Next is the ‘acknowledgements’.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:

Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

| | |
|--|-----|
| Continuous Evaluation: (Based on Abstract, Regularity, Adherence to initial plan, Records etc.) | 40% |
| Final Evaluation: Based on, Contents & Layout of the Report, | 60% |
| Conceptual Framework, | 05 |
| Objectives & Methodology and | 05 |
| Implications & Conclusions | 10 |
| Viva & Presentation | 20 |

HIGHWAY CONSTRUCTION AND MAINTENANCE

Course Code: CME4302

CreditUnits: 04

Course Objective: To impart knowledge about the various construction processes in highway engineering that may be broadly studied under embankment construction, Bituminous Constructions, Concrete road construction and hill road constructions. Also the maintenance of all of them is of prime importance because once constructed they should be maintained for proper and smooth traffic movement.

Course Contents:

Module I:

Embankment Construction: Formation cutting in Soil and hard rock, Preparation of Subgrade, Ground improvement, Retaining and Breast walls on hill roads, Granular and Stabilized, Sub – bases / bases, Water Bound Macadam (WBM), Wet Mix Macadam (WMM), Cement treated bases, Dry Lean Concrete (DLC). Maintenance of each of the Bituminous construction .

Module II:

Bituminous Constructions: Types of Bituminous Constructions, Interface Treatments, Bituminous Surfacing and wearing Courses for roads and bridge deck slabs and their maintenance , Selection of wearing Course under different Climatic and Traffic conditions, IRC specifications, Construction techniques and Quality Control.

Module III:

Concrete road construction: Test on Concrete mixes, Construction equipments, Method of construction of joints in concrete pavements, Quality Control in Construction of Concrete pavements, Construction of Continuously reinforced, Prestressed, Steel Fibre Reinforced (SFRC) Pavements, IRC, MORT&H, ACI Specifications, AASHTO Specifications, Recycled pavements, Non – Conventional Pavements, Overlay Construction. Maintenance of paved and unpaved roads.

Module IV:

Hill Roads Construction: Stability of Slopes, Landslides – Causes and Control measures, Construction of Bituminous and Cement Concrete roads at high altitudes, Hill road drainage, Construction and maintenance problems and remedial measures.

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---------------|---|----|-------|----|----|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books & References:

- Kadiyali, L. R., Traffic Engineering and Transportation Planning, Khanna Publishers, 2011.
- Pignataro, L. J., Traffic Engineering: Theory and Practice, Prentice Hall, Inc., 1973.
- Roess, R. P., Prassas, E. S., and McShane, W. R., Traffic Engineering, 4th Edition, Prentice Hall, 2010.
- Institute of Transportation Engineers, Traffic Engineering Hand Book, 4th Edition, Prentice Hall, 1999.
- Khanna and Justo, Highway Engineering. Nem Chand & Bros, 2013 revised.

HIGHWAY CONSTRUCTION AND MAINTENANCE LAB

Course Code: CME4303

CreditUnits: 01

List of experiments:

Laboratory tests on soil, aggregate, bitumen, and bituminous mixes; bituminous mix design; pavement evaluation tests

Examination Scheme:

| IA | | | | EE | |
|----|----|----|---|----|----|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books & References:

- Khanna, S. K., Justo, C. E. G., and Veeraragavan, A., Highway Material Testing, New Chand Publications, New Delhi, 2009.

CONSTRUCTION METHODS IN GEOTECHNICAL ENGINEERING

Course Code: CME4304

CreditUnits: 04

Course Objectives: To impart knowledge about the various constructions required in geotechnical engineering ranging from the foundations to various grouting processes and earth reinforcement.

Course Contents:

Module I:

Shallow Foundation: need of foundation engineering, shallow foundation, construction methods in shallow foundation, analysis of foundation, Foundation design in relation to ground movements - Foundation on recent refuse fills - Design of Foundation for seismic forces – Codal recommendations - Introduction to theory of vibration - Design of Block foundation –Codalrecommendations.

Module II:

Deep foundation: design of pile foundation, pile cap analysis, pile – raft system basic interactive analysis – pile and pile groups subjected to vibrations – fundamental solutions. design of caissons,

Module III:

Earth reinforcement – Principles and basis mechanism of reinforced earth-reinforced soil retaining structures-simple design, Synthetic and natural fibre based Geotextiles and their applications. Filtration, drainage, separation, erosion control – case studies.

Module IV:

Grouting techniques – Types of grout – Suspension and solution grouts – Basic requirements of grout. Grouting equipment – principle of injection-injection methods – properties of treated ground-application of jet grouting-grout monitoring – Electro – chemical stabilization – Stabilization with cement, lime etc. – Stabilization of expansive clays.

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---------------|---|----|-------|----|----|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text Books & References:

- Donald P. Coduto, Foundation Design Principles and Practices - Prentice Hall, Inc.,
- Englewood Cliffs, New Jersey, 1996. 2. Winterkorn, H.F. and Fang, Y.F., Foundation Engineering Handbook, Van Nostrand Reinhold, 1994.
- Peck, R.B., Hansen, W.E., and Thornburn, W.H., Foundation Engineering, John Wiley, 1974.
- Robert Wade Brown, Practical Foundation Engineering Handbook, McGraw Hill, New York, 1996.
- Bowles, J.E., Foundation Analysis and Design, McGraw Hill, New York, 1996.
- Tomlinson, M.J. Foundation Engineering, ELBS, Long man Group, UK Ltd., England, 1995.
- Swami Saran, Soil Dynamics and Machine Foundation, Galgottia Publications Pvt. Ltd., New Delhi-110002, 1999.
- Vargheese, P.C. Limit State Design of Reinforced concrete, Prentice-Hall of India, 1994.
- Day, R.W., Geotechnical and Foundation Engineering, Design and Construction, McGraw Hill 1999.
- Grigorian, Pile Foundation for Buildings and Structures in collapsible Soil, Oxford & IBH Publishing Co, Pvt. Ltd., New Delhi, 1999.

GEOTECHNICAL ENGINEERING LAB

Course Code: CME4305

CreditUnits: 01

List of Experiments:

1. Review of index and engineering properties of soil
2. CBR Test
3. Direct Shear Test - Drained direct shear test on Cohesionless Soil
4. Triaxial Compression Test - Unconsolidated - Undrained Tests, Consolidated Undrained Tests with Pore pressure measurement, Consolidated Drained Tests
5. Standard Penetration Test, Plate load Test, Pile Load Test and Large Direct Shear Test.

Examination Scheme:

| IA | | | | EE | |
|----|----|----|---|----|----|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books & References:

- Bishop, A. W. and Henkel, D. J., Measurement of Soil Properties in Triaxial Test, EdwardArnald Ltd., 1962.
- Head, K. H., Manual of Soil Laboratory Testing, CRC Press, 2006.
- Mittal, S. and Shukla, J. P., Soil Testing For Engineers, Khanna Pub., 2003

DISASTER MITIGATION AND MANAGEMENT

Course Code: CME4306

CreditUnits: 04

Course Contents:

Module I:

Understanding Disasters: Meaning, nature, characteristics and types of Disasters, Causes and effects, Disaster: A Global View

Module II:

Introduction to disaster Preparedness, Disaster Management: Prevention, Preparedness and Mitigation, Disaster Preparedness: Concept & Nature, Disaster Preparedness Plan, Disaster Preparedness for People and Infrastructure, Community based Disaster Preparedness Plan.

Module III:

Disaster Mitigation, Disaster Mitigation: meaning and concept, Disaster Mitigation Strategies, Emerging Trends in Disaster Mitigation, Mitigation management, Role of Team and Coordination.

Module IV:

Technologies for Disaster Management, Role of IT in Disaster Preparedness, Remote Sensing, GIS and GPS, Use and Application of Emerging Technologies, Application of Modern Technologies for the Emergency communication, Application and use of ICST for different disasters. Develop an understanding of why and how the modern disaster manager is involved with predisaster and post-disaster activities.

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---------------|---|----|-------|----|----|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- Sharma, R.K. & Sharma, G. (2005) (ed) Natural Disaster, APH Publishing Corporation, New Delhi.
- Carter, W. Nick, 1991: Disaster Management, Asian Development Bank, Manila
- Bryant Edwards (2005): Natural Hazards, Cambridge University Press, U.K.
- Roy, P.S. (2000): Space Technology for Disaster management: A Remote Sensing & GIS Perspective, Indian Institute of Remote Sensing (NRSA) Dehradun.

GIS IN CONSTRUCTION ENGINEERING

Course Code: CME4307

CreditUnits: 04

Course Contents:

Module I:

GIS Basic Concepts Definition - Components of GIS -Maps - Definition - Types of Maps - Characteristics of Maps -Map Projections -- Hardware, Software and Organizational Context

Module II:

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

Module III:

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.

Module IV:

Fields of application - Natural Resource Management, construction management-Parcel based, AM/FM applications examples.

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---------------|---|----|-------|----|----|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

- Burrough P.A., Principles of GIS for Land Resources Assessment, Oxford Publication, 1998
- Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press, 1996
- Anji Reddy, Remote Sensing and Geographical Information Systems, BS Publications 2001
- Srinivas M.G. (Edited by), Remote Sensing Applications, Narosa Publishing House, 2001
- Rhind, D., Understanding of GIS, The ARC / INFO Method, ESRI Press. 1990

OPERATIONS STRATEGY

Course Code: CME4308

CreditUnits: 04

Course Objective:

The objective is to develop understanding about the practical aspects of operations strategy, selection of process and infrastructure development. The aim of this course is to make the students familiar with the changes required in the operational strategy with rapidly changing environment.

Course Contents:

Module I: Introduction

Introduction, Role and Objectives of Operations Strategy, Incorporating Operations Strategy in the Corporate Strategy, Dynamics of process-product life cycles, Defining a Operations Strategy in Overall Environment, Manufacturing Implications of Corporate Marketing Decisions.

Module II: Developing Operations Strategy

Principles and Concepts of Developing a Operations Strategy, Process of Operations Strategy Formulation, Methodology of Developing Operations Strategy, Business Implication of Process Choice, Product Profiling, Manufacturing Audit Approach, Manufacturing Restructuring, Infrastructure Development.

Module III: Implementation of Operations Strategy

Principles and Concepts of Focused Manufacturing, Involvement of Human Aspects, Effect of Technology Advancement and Technology Management, Integration of Operations Strategy Planning and Technology Planning, Pre-requisites of Organized and Focused Manufacturing Strategy & Unit.

Module IV: Redefining Operations Strategy

Value of Response Time and Product Variety in Operations Strategy, Management of Quality, Planning and Controlling System, Accounting & Financial Perspectives and Manufacturing System, Improving Manufacturing Process by Redefining & Restructuring Process Positioning

Examination Scheme:

| Components | CPA | TP | Q/S | A | ME | EE |
|----------------------|------------|-----------|------------|----------|-----------|-----------|
| Weightage (%) | 5 | 5 | 5 | 5 | 10 | 70 |

Text & References:

- Beckman / Barry (2008). Operations Strategy: competing in the 21st Century, McGraw-Hill Higher Ed, 978-0071274081.
- Brown / Lamming / Bessant / Jones (2005). Strategic Operations Management, Elsevier-India (Butterworth-Heinemann), 978-075066199 / 978-81.312.0769.7
- Hayes / Pisano / Upton / Wheelwright (2004). Operations, Strategy, and Technology: Pursuing the Competitive Edge, John Wiley, 978-0471655794.
- Klassen / Menor (2007). Cases in Operations management, Sage India, 978-81.7829.864.1
- Lawson (2002). Strategic Operations Management, Routledge (Taylor & Francis), 0415256550
- Mieghem (2008). Operations Strategy: Principles and Practice, Dynamic Ideas Llc, MA: Charlestown, 978-0975914663
- Nicholas (2008). Competitive Manufacturing Management, Tata McGraw-Hill, 978-0070474154.
- Slack / Lewis (2008). Operations Strategy, 2/e, Prentice Hall / Pearson Education, 978-0273695196 / 978-81.317.2572.6
- Walters (2006). Operations Strategy, Palgrave Macmillan -India, 978-0230224964

PROCESS ANALYSIS & THEORY OF CONSTRAINTS

Course Code: CME4309

CreditUnits: 04

Course Objective:

This course is to familiarize students to the fundamentals of operational process analyses with a view to improving productivity and performance towards fulfilling the overall business goals. It is also to further enable them learn the concepts, principles, and application of the theory of constraints approach in this regard.

Course Contents:

Module I: Process Structure, and Selection

Process Management Orientation in Operations; Processes and their functions, importance, objectives of analysis, methods; Interface with other disciplines; Product-process matrix, Production Process structures, Service Process structures.

Module II: Examination of processes & Benchmarking

Examination of processes; Parameters of Examination, Lead-time, Set-up time, Throughput Cycle, Cycle time; Performance Measurement System, Cost, Quality, Flexibility, Capability; Productivity and Profitability Improvement; Benchmarking.

Module III: Understanding Theory of Constraints (TOC)

TOC thinking process; Current Reality Tree, The Evaporating Cloud, Future Reality Tree, Prerequisite Tree, Transition Tree: Application of thinking process tools; TOC and economic decisions, Throughput accounting measures for decision making.

Module IV: Operations Improvements with Theory of Constraints

TOC applications in operations improvement; Relating TOC to Project Management, Critical Chain project management; Production Scheduling with Drum-Buffer-Rope method; TOC in supply chain management, Drum-Buffer-Rope distribution solution.

Examination Scheme:

| Components | CPA | TP | Q/S | A | ME | EE |
|---------------|-----|----|-----|---|----|----|
| Weightage (%) | 5 | 5 | 5 | 5 | 10 | 70 |

Text & References:

- Dettmer, W.H. (1997). Goldratt's Theory of Constraints, ASQ Quality press
- Evans, J.R. and D.A. Collier (2007). Operations Management, New Delhi: Cengage Learning
- Goldratt, E.M. (1997). Critical Chain, Great Barrington, MA: North River Press
- Goldratt, E.M. (2008). The Goal II – It's Not Luck, Chennai: Productivity & Quality Publishing
- Goldratt, E.M. and J. Cox (2006). The Goal: A Process of Ongoing Improvement, Chennai: Productivity Quality Publishing
- Goldratt, E.M. Theory of Constraints, Great Barrington, MA: North River Press
- Goldratt, E.M., E. Schragenheim and C.A. Ptak (2000). Necessary But Not Sufficient, Great Barrington, MA: North River Press
- Heizer, J. and B. Render (2008). Operations Management, New Delhi: Pearson Education
- Keegan, R. and E. O'Kelley (2008). Applied Benchmarking for Competitiveness, Mumbai: Jaico
- Mukhopadhyay, S. K. (2008). Theory of Constraints, Mumbai: Jaico
- Stein, R.E. (1997). The Theory of Constraints – Application in Quality and Manufacturing, New York:Marcel Dekker

Syllabus - Fourth Semester

PROJECT-DISSERTATION-II

Course Code: CME4437

CreditUnits: 15

GUIDELINES FOR DISSERTATION

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTATION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

➤ Report Layout

The report should contain the following components:

➤ Title or Cover Page

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➤ Acknowledgements (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➤ Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➤ Table of Contents

Titles and subtitles are to correspond exactly with those in the text.

➤ Introduction

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➤ Materials and Methods

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➤ Results and Discussion

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the

work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in “point” form.

➤ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➤ **Future prospects**

➤ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➤ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE DISSERTATION FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following *assessment objectives*:

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information

Control Quality

Draw Conclusions

Examination Scheme:

Dissertation 50

Viva Voce 50

Total 100

ata, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between ‘dissertation topic’ and ‘dissertation title’. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author’s name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.

- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:

Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

- 11.Has the student made a clear statement of the objective or objective(s).
- 12.If there is more than one objective, do these constitute parts of a whole?
- 13.Has the student developed an appropriate analytical framework for addressing the problem at hand.
- 14.Is this based on up-to-date developments in the topic area?
- 15.Has the student collected information / data suitable to the frameworks?
- 16.Are the techniques employed by the student to analyse the data / information appropriate and relevant?
- 17.Has the student succeeded in drawing conclusion form the analysis?
- 18.Do the conclusions relate well to the objectives of the project?
- 19.Has the student been regular in his work?
- 20.Layout of the written report.

Assessment Scheme:

Continuous Evaluation:

(Based on Abstract, Regularity, Adherence to initial plan, Records etc.)

40%

Final Evaluation: Based on,

| | |
|----------------------------------|----|
| Contents & Layout of the Report, | 20 |
| Conceptual Framework, | 05 |
| Objectives & Methodology and | 05 |
| Implications & Conclusions | 10 |
| Viva & Presentation | 20 |

60%