

Design of Steel Structures

[VIth Semester, Third Year]



Course Description

Offered by Department

Civil Engineering

Credits

3-1-0, (4)

Status

Program Core

Code

CV106101CV

[Pre-requisites: Mechanics of Solids, Structural Analysis-I]

Course Objectives

1. To familiarize the students with available national codes for steel design.
2. To understand the basis of design of steel structures.
3. To understand the design process of structural members, their connections, and application of built-up sections.

Course Content

Unit 1: Materials and Methods of Analysis

Properties of structural steel, methods of design of steel structures, types of loads and load combinations, plastic analysis of beams and frames.

Unit 2: Connections and Tension Members

Riveted, bolted and welded connections, design of joints, design of eccentric connections, and design of axially loaded tension members.

Unit 3: Compression Members

Design of columns, design of built-up compression members: laced and battened columns, design of slab and gusseted bases.

Unit 4: Beams

Design of laterally supported and laterally unsupported beams, built-up sections, web crippling, web buckling, and curtailment of flange plates.

Unit 5: Member Subjected to Combined Forces

Design of members subjected to combined forces, eccentricity of load, interaction formulae, eccentrically loaded base plates.

Course Materials

Required Text: Text books

1. Design of Steel Structures– Subramanian, N. (Oxford University Press)
2. Limit State Design of Steel Structures – Duggal, S. K. (McGraw Hill)

Optional Materials: Reference Books

1. Design of Steel Structures –Gaylord, E. H. and Gaylord, C. N. (McGraw Hill)
2. Steel Structures: Design and Behavior–Salmon, C. G. and Johnson, J. E. (Pearson)
3. Design and Drawing of Steel Structures– Bhavikatti, S. S. (I. K. International)

Codes:

1. IS 800: 2007- General Construction in Steel-Code of Practice
2. SP 6-1 (1964)- ISI Handbook for Structural Engineers - Part 1: Structural Steel Sections
3. IS 808: 1989- Dimensions for Hot Rolled Steel Beam, Column, Channel and Angle Sections
4. IS 816: 1969 – Code of Practice for use of Metal Arc Welding for General Construction in Mild Steel
5. IS 3757: 1985 High Strength Friction Grip Structural Bolts



Environmental Engineering -I

[VIth Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Civil Engineering	3-1-0, (4)	Program Core	CV106102CV
[Pre-requisites: Engineering Chemistry]			

Course Objectives

1. To plan and design various components of water supply scheme.
2. To carry out the analysis of various water quality parameters and to design various units of water treatment plant.
3. To identify the sources, appreciate the effects, and methods of control of air and noise pollution.

Course Content

Unit 1: Water supply schemes

Necessity and importance of water supply schemes.

Classification of water demands, Estimation of quantity of water required by a town, per capita demand, factors affecting per capita demand, design period and population forecasting, variations in water demand.

Surface sources and underground sources, Intake works, site selection, type of intake works.

Unit 2: Water characteristics and treatment

Common impurities, physical, chemical, and biological characteristics of water, water quality standards for municipal and domestic supplies.

Water Treatment: Necessity and objects of water treatment, flow diagrams of treatment schemes for ground water and surface water systems.

Water treatment unit operations and processes: Aeration, Sedimentation - Theory of sedimentation, sedimentation with coagulation, coagulation-flocculation theory, coagulants and coagulant aids, optimum coagulant dose, sedimentation tanks, design parameters.

Unit 3: Water treatment

Filtration: Theory of filtration, slow sand and rapid sand filters, construction and operation.

Disinfection: Methods of disinfection, Chlorination, Types of chlorination.

Softening and other treatments: Methods of Softening, Iron and Manganese Removal, De-fluoridation. Removal of taste, odour, and colour. Advanced water treatment systems.

Unit 4: Water distribution system

Water distribution, distribution reservoir, hydraulic analysis and design of water distribution system. Building water supply.

Pipe appurtenances, types of pipe joints and fittings.

Planning of water supply projects and implementation.

Unit 5: Air and noise pollution

Air Pollution: Introduction, sources, various air pollutants, characteristics, effects of air pollution; dispersion and control.

Noise Pollution: Definition, sources, effects of noise pollution, methods of noise measurement and control.

Course Materials

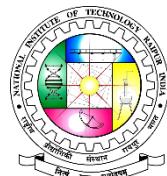
Required Text: Text books

1. Peavy, H. S., Rowe D.R., and Tchobanoglous G., Environmental Engineering, McGraw Hill, New York (1985)

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2. Sawyer C. N., McCarty, P. L. and Parkins, G. F., Chemistry for Environmental Engineering and Sciences, McGraw Hill New York (2003)

Optional Materials: Reference Books

1. CPHEEO manual on Water Supply and Treatment, Ministry of Urban Development (1999).
2. Qasim S R., Motley E. M. and Zhu G., Water Works Engineering- Planning, Design and Operation, Prentice Hall (2000).
3. Water Treatment: Principles and Design, 3rd Edition. John C. Crittenden, R. Rhodes Trussell, David W. Hand, Kerry J. Howe, George Tchobanoglous. Wiley.
4. Mackenzie L. Davis, Water & Wastewater Engineering: Design Principles and Practice, McGraw Hill (2020).



Quantity Surveying, Cost Estimation & Valuation

[VIth Semester, Third Year]

Course Description

Offered by Department
Civil Engineering

Credits
3-1-o, (4)

Status
Program Core

Code
CV106103CV

[Pre-requisites: Civil Engineering Drawing, Building Construction]

Course Objectives

1. To understand the basic concepts of quantity surveying, Methods and rules of measurement and estimates for various types of construction activities
2. To understand and carryout quantity estimation and rate analysis for various construction activities.
3. To understand concepts on types of contracts and valuation of property.

Course Content

Unit 1: Introduction

Quantity surveying, Estimate, Purpose of Estimating, Units of Measurements, Rules and Methods of measurement of works, Different types of Estimates, Approximate Estimate.

General Terms

Contingencies, Work-charged Establishment, Tools and Plants, Lump-sum, Departmental Charges, External Services, Administrative Approval, Expenditure Sanction, Technical Sanction, Measurement Book, Muster Roll, Imprest account, Indent of stores, Material at site account, Stock account.

Unit 2: Quantity Estimate

Data required, detailed estimate of Civil Engineering works; Buildings, Roads, Canals, R.C.C. works, Bar bending schedule, Water supply and Sanitary works.

Unit 3: Analysis of Rates

Purpose, Factors effecting the Rate Analysis, Analysis of Rates of different items such as; Brick work, Cement Concrete work, Plastering, Flooring (Cement Concrete, Tiles, Mosaic), Use of Schedule of Rates.

Specifications

Necessity, Basic Principles, Types: General and Detailed specifications for various items of works.

Unit 4: Contracts

Essentials of Contracts, Types of Engineering Contract, Conditions, Termination of Contract, Earnest Money, Security Deposit, Liquidated damage, Arbitration, Escalation.

Tender

Brief idea, Tender from, Tender documents, Tender Notice, Global Tender, Informal Tender, Unbalanced Tender, Acceptance of Tender.

Unit 5: Valuation of Property

Purpose, Definitions of Terms related to Valuation, Factors affecting the valuation of a property, Different Methods of Valuation, Concept of Capitalized value and Year's Purchase, Depreciation, Obsolescence, Lease, Mortgage, Easement.

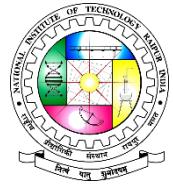
Course Materials

Required Text: Text Books

1. Estimating and Costing in Civil Engineering- B.N. Dutta (UBS Publishers, New Delhi)
2. Estimating, Costing, Specification & Valuation in Civil Engineering- M. Chakraborti (M. Chakraborti, Calcutta)

Optional Materials: Reference Books

1. Textbook of Estimating and Costing -G.S. Birdi (Dhanpat Rai Publication)
2. Valuation of Real Properties- S.C. Rangwala (Charotar Publication)
3. A Textbook of Estimating and Costing- Kohli & Kohli (S. Chand & Co.)
4. SP 27: Handbook of Method of Measurement of Buildings Works. (BIS)
5. IS 1200: Methods of Measurement of Building and Civil Engineering Works. (BIS)



Advanced Structures Analysis

[VIth Semester, Third Year]

Course Description

Offered by Department
Civil Engineering

Credits
3-0-0, (3)

Status
Program Elective-I

Code
CV106201CV

[Pre-requisites: Structural Analysis-I & II]

Course Objectives

1. To equip students with different methods of analysis using matrix approach.
2. To analyze static and kinematic indeterminate structural systems using matrix flexibility and stiffness methods.
3. To impart students, the concepts of making of structural analysis software.

Course Content

Unit 1

Introduction to matrix algebra, matrix operations and Gauss-Jordan elimination method. Basic concept of analysis, static and kinematic indeterminacy, formulation of stiffness and flexibility matrices, application to simple problems, comparison between stiffness and flexibility methods.

Unit 2

Stiffness matrix methods of analysis for bars, springs, beams and inextensible plane frames.

Unit 3

Concepts of local and global axis system, co-ordinate transformation matrix, Stiffness matrix method of analysis for plane trusses. Introduction of analysis of space trusses.

Unit 4

Stiffness matrix method of analysis for plane frames. Introduction of analysis of space frames.

Unit 5

Computer applications in structural analysis: Development of algorithm for analysis of different types of structures by matrix stiffness method.

Course Materials

Required Text: Text Books

1. Kassimali, A. - Matrix Analysis of Structures, (Cengage Learning).
2. Pandit and Gupta - Structural Analysis: A Matrix Approach, (McGraw Hill).

Optional Materials: Reference Books

1. Singh, P. K. - Matrix Analysis of Structures, (Cengage Learning).
2. Maity, D. - Computer Analysis of Framed Structures, (I.K.International).
3. Weaver, W., Gere, J. M. -Matrix Analysis of Framed Structures, (CBS Publishers).

Advanced Hydrology



[VIth Semester, Third Year]

Course Description

Offered by Department
Civil Engineering

Credits
3-o-o, (3)

Status
Program Elective-I

Code
CV106202CV

[Pre-requisites: Engineering Hydrology]

Course Objectives

1. To understand the types of models used in hydrology.
2. Applying the basic knowledge of engineering hydrology, probability and statistics in formulation of hydrologic models.
3. To simulate models for various scenarios.

Course Content

Unit 1

Hydrologic Principles- hydrologic cycles and weather, hydrologic losses; Mathematical Models of Watershed Hydrology.

Unit 2

Hydrologic Analysis - watershed concepts, rainfall-runoff, hydrograph analysis, unit hydrograph theory, linear and kinematic wave model, overland flow models.

Unit 3

Routing - lumped flow, distributed flow, dynamic wave routing, Muskingum method. Saint-Venant Equations - Reynold's transport theorem, continuity equation, momentum equation, energy equation.

Unit 4

Hydrologic Statistics - statistical parameter estimation, probability distribution, goodness of fit, concepts of probability weighted moments & L -moments, frequency analysis, Markov process, Markov chain, reliability analysis.

Unit 5

Hydrologic Simulation Models - steps in watershed modeling, major hydrologic models.

Course Materials

Required Text: Text Books

1. Chow, V. T., D. R. Maidment, and L. W. Mays; "Applied Hydrology", McGraw Hill International Editions.
2. Reddy, P. J, "Stochastic Hydrology", Laxmi Publication

Optional Materials: Reference Books

1. Bras, R. L., and Rodriguez-Iturbe, 1994, "Random Functions and Hydrology", Dover Publications, New York.
2. Haan, C. T., 2002, "Statistical Methods in Hydrology", 2nd ed., Blackwell Publishing, Ames, IA.
3. Hoskings, J. R. M. and J. R. Wallis, 1997, "Regional Frequency Analysis, An Approach Based on L-Moments", Cambridge University Press, New York.
4. Viessman Jr., W., and G. L. Lewis, "Introduction to Hydrology", 4th ed., Harper-Collins, New York, 1996.

Geosynthetics and Reinforced Soil



[VIth Semester, Third Year]

Course Description

Offered by Department
Civil Engineering

Credits
3-0-0, (3)

Status
Program Elective -I

Code
CV106203CV

[Pre-requisites: Geotechnical Engineering - I]

Course Objectives

1. To understand of the behavior of geosynthetics for engineering application.
2. To be able to analyze and use of geosynthetics in various field applications.
3. To be able to determine the design data for the design of various structure by the use of geosynthetics materials.

Course Content

Unit 1: Types and functions

Introduction, Materials and manufacturing processes, Testing and evaluations, Principles of soil reinforcement.

Unit 2: Design of geosynthetics

Design and construction of geosynthetic reinforced soil retaining structures- walls and slopes.

Unit 3: Improvement of soils

Codal Provisions, Bearing Capacity improvement, embankments on soft soils, Indian experiences

Unit 4: Geosynthetics in pavements

Geosynthetics in roads and railways, Reinforced Earth walls separations, drainage and filtering in road pavements and railway tracks, overlay design and construction, AASTHO and other relevant guidelines, trench drains.

Unit 5: Geosynthetics in Environmental control

Liners for ponds and canals, covers and liners for landfills-material aspects and stability considerations, Landslides-occurrences and methods of mitigation, Erosion- causes and techniques for control.

Course Materials

Required Text: Text Books

Gulhati S.K., Datta, M.: Geotechnical Engineering, Tata McGraw-Hill Publishing Company Limited, New Delhi

Optional Materials: Reference Books

1. Terzaghi, K. and Peck B., "Soil Mechanics in Engineering Practice", John Wiley & Sons, New York, 2nd Edition, 1967.
2. Das B. M., "Advanced Soil Mechanics", Taylor & Francis Publishers, 2nd Edition, 1997.
3. Gopal, Ranjan and A.S.R. Rao, "Basic and Applied Soil Mechanics", New Age International Publishers, 2nd Edition, 2000.
4. Lambe and Whitman, "Soil Mechanics", John Wiley & Sons Inc., 1969.
5. Arora, K.R., "Soil Mechanics and Foundation Engineering" Standard Publishers Distributors, 5th ed., 2005..

Advanced Pavement Engineering



[VIth Semester, Third Year]

Course Description

Offered by Department
Civil Engineering

Credits
3-o-o, (3)

Status
Program Elective-I

Code
CV106204CV

[Pre-requisites: Highway and Railway Engineering]

Course Objectives

1. To understand of the behavior of pavement Materials and modeling under various traffic and environmental conditions.
2. To analyze and design of pavement systems for Road, Rail and Air transport.
3. To understand the importance and techniques for preservation of pavement infrastructure.

Course Content

Unit 1: Introduction

Types of pavements: Conventional and Non-conventional. Components of pavement structure, function and its requirements

Unit 2: Pavement materials: Design and Modeling

Materials used in pavement construction: aggregate, Portland cement, asphalt, Portland cement concrete, asphalt concrete; Aggregates: production, properties, testing procedures, gradation and blending; Portland cement based materials: mixture design, production, properties, testing, construction; Asphalt binder: refining process, properties, testing procedures, grading systems; Asphalt concrete mixture design: fundamentals of mix design procedure, mixture volumetric, current mix design procedures; Factors affecting material behavior: temperature, rate, time, confining pressure; Unbound materials: soil, aggregate; Bound materials: binding using asphalt, water, lime, polymer, fly ash, cement; Constitutive models: unbound materials, bound materials; Field performance of pavement materials: fatigue, rutting, temperature issues, moisture damage, permeability; Utilization of Industrial by products and locally available materials

Unit 3: Analysis and Design of Pavement systems

Stresses and strains in pavement system: traffic, environment considerations; Factors for Design of pavements: Drainage consideration, Analysis & Design of Flexible and Rigid pavements: Urban and rural roads, Design of Permanent way, Airfield Pavement, Helipads, Pavement Classification Number.

Unit 4: Pavement Construction and Quality Control

Construction of subgrade, Embankments, Unbound and Bound Granular layers, Bituminous layers, Dry lean Concrete layers, Cement Concrete layers, Quality control of Pavement layers: Testing and practices.

Unit 5: Pavement Maintenance

Pavement Failures, Performance evaluation of pavement systems using NDT techniques, Introduction to overlay design, strengthening of flexible pavement by overlay -Flexible overlay, Rigid overlay. Strengthening of rigid pavement by overlay –Flexible overlay over rigid pavement, Rigid overlay over rigid pavement, Unbonded rigid overlay, Partially bonded rigid overlay.

Course Materials

Required Text: Text Books

1. L R Kadiyali and NB Lal, Principles and Practices in Highway Engineering (including Expressway and Airport Engineering), Khanna Publishers, New Delhi, 2017
2. Y H Huang, Pavement Analysis and Design, Pearson Prentice Hall, New Delhi, 2013.

Optional Materials: Reference Books

1. E J Yoder and M W Witczak, Principles of Pavement Design, Wiley India Pvt. Ltd., New Delhi, 2012.4.
2. R B Mallick and T El-Korchi, Pavement Engineering –Principles and Practice, CRC Press, Taylor and Francis Group, Boca Raton, Florida, 2013.5.
3. Relevant IRC, FAA and AASHTO Codes of Practices

Air & Noise Pollution and Control



[VIth Semester, Third Year]

Course Description

Offered by Department
Civil Engineering

Credits
3-o-o, (3)

Status
Open Elective-I

Code
CV106301CV

[Pre-requisites: None]

Course Objectives

1. To identify various air pollutants, their sources, their measurement, transport mechanism and dispersion, and their control.
2. To evaluate and develop the emission factors and source apportionment.
3. To identify the sources, appreciate the effects, and carry out the monitoring and control of noise pollution.

Course Content

Unit 1: Air Pollution: Introduction, Sources and Measurement

Introduction, classification, sources, effect of air pollutants on regional and global climate, air quality standards, measurement / monitoring techniques and guidelines for gaseous and particulate air pollutants, stack monitoring.

Unit 2: Air Pollution Meteorology and Dispersion Modeling

Meteorological parameters influencing the air pollutants, lapse rate, atmospheric stability conditions, mixing height, plume behavior and air quality modeling; types and classification of models, factors to be considered, dispersion model (Gaussian).

Unit 3: Emission Inventories and Source Apportionment

Emission inventories techniques, evaluation of emission factors, source apportionment techniques (Positive Matrix Factorization (PMF), Chemical Mass Balance (CMB) model).

Unit 4: Air Pollution Control at Source

Air pollutants control and removal of gaseous and particulate pollutants; engineering control concepts, process change, alternative fuel, control devices and systems.

Unit 5: Noise Pollution and Its Control

Introduction, basics of noise pollution; sound power, sound intensity and sound pressure level. Sources and effects of noise pollution on human health. Noise standard and limit values, noise pollution measurement/ monitoring techniques, noise mapping.

Course Materials

Required Text: Text Books

1. Wark K., Warner C. F. and Davis W., Air Pollution, its Origin and Control, Pearson (1998).
2. De NeversN., Air Pollution Control Engineering, Mc Graw Hill (2000)
3. Environmental Noise Pollution- P E Cunniff, Mc Graw Hill New York, 1987.i

Optional Materials: Reference Books

1. Seinfeld, J. H. and Pandis, S. N., Atmospheric Chemistry and Physics: from Air Pollution to Climate Change, John Wiley, New York, 1998
2. Mycock, J. C., McKenna, J. D. and Theodore, L., Handbook of Air Pollution Control Engineering and Technology, CRC, Lewis Publishers, Boca Raton, Florida ,1998
3. Hinds, W. C., Aerosol Technology: Principles, Behavior and Measurement of Airborne Particles, Wiley: NY, 1982
4. Turner, D. B., Workbook of Atmospheric Dispersion Estimate, CRC Press (1998)
5. Rao, C. S., Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996

Construction Management



[VIth Semester, Third Year]

Course Description

Offered by Department
Civil Engineering

Credits
3-o-o, (3)

Status
Open Elective-I

Code
CV106302CV

[Pre-requisites: None]

Course Objectives

1. Latest management tools for effectively managing construction sites.
2. An ability to optimise the resources at site
3. An ability to complete project successfully.

Course Content

Unit 1: Introduction

Introduction of Construction Management, The project life cycle, Construction economics, Legal and regulatory requirements, Role of project manager, factors behind the success of a construction organization, Ethical conducts for engineers

Unit 2: Organizing for Project Management

Trends in Modern Management-Strategic planning and project programming- Effects of project risks on organization- Traditional designer-Constructor sequence-Professional construction management-Owner-BUILDER-Operation-Turnkey operation-Leadership and Motivation for the Project team-Interpersonal behaviour in project organization-perceptions of Owners and Contractors

Unit 3: Design and Construction Process

Design and construction as an integrated system-Innovation and technological Feasibility-Innovation and technological feasibility-Design Methodology-Functional Design-Physical Structures-Geo- Technical Engineering Investigation-Construction Site Environment-Value engineering-Construction Planning-Industrialized Construction and Prefabrication-Computer -Aided Engineering, Total quality management,

Unit 4: Labour, Material and Equipment Utilization

Labour Productivity-Factors Affecting Job-Site Productivity-Labour Relations in construction-Problems in collective bargaining-Materials Management-Materials Procurement and Delivery- Inventory control-Tradeoffs of cost in Material Management-Construction Equipment- Choice of Equipment and Standard production Rates-Construction Processes Queues and Resource Bottlenecks, Construction safety management

Unit 5: Cost Estimation

Project cost and value management, Costs Associated with Construction Facilities-Approaches to cost estimation-Type of construction cost estimates- Effects of scale on construction cost-Unit cost-Method of estimation-Methods for allocation of joint costs- Historical cost data-Cost indices-Applications of cost Indices to Estimating-Estimate based on Engineers List of Quantities-Allocation of Construction costs over time.

Course Materials

Required Text: Text Books

1. Construction Project Management Planning, Scheduling and Control – Chitkara, K.K. (Tata McGraw Hill Publishing Co., New Delhi,)
2. Construction Project Management, theory and practice by Kumar Neeraj Jha

Optional Materials: Reference Books

1. Project Management: A systems Approach to Planning, Scheduling and Controlling – Harold Kerzner (CBS Publishers & Distributors, Delhi)

Environmental Engineering Lab



[VIth Semester, Third Year]

Course Description

Offered by Department
Civil Engineering

Credits
0-0-2, (1)

Status
Laboratory

Code
CV106401CV

[Pre-requisites: None]

Course Objectives

1. To carry out the sampling and preservation techniques involved during the collection, transportation, storage and analysis of water and wastewater samples.
2. To understand the role of the various factors governing the performance of water/sewage treatment plant and their interpretation.
3. To carry out air and noise pollution measurements.

Course Content

Analysis of Water Quality: Determination of pH, turbidity, conductivity, hardness, alkalinity, chlorides, sulphates, fluorides, phosphate, optimum coagulant dose, heavy metals, residual chlorine, available chlorine in bleaching powder.

Analysis of Wastewater Characteristics: Solids analysis, dissolved oxygen, BOD, COD, determination of most probable number.

Monitoring of Air pollutants: Determination of PM₁₀, PM_{2.5} and gaseous pollutants in ambient air.

Noise Monitoring: Ambient Noise Monitoring by sound level meter.

List of Experiments: Analysis of water and wastewater samples

1. To determine pH, acidity, alkalinity and hardness.
2. Determination of Turbidity.
4. To determine chloride content.
5. To determine D.O., BOD and COD content.
6. Determination of quantity of Optimum Coagulant Dose.
7. Determination of solids- suspended, dissolved, total, settleable, organic and inorganic.
8. Determination of TKN.
9. Determination of Phosphates.
10. Determination of Most Probable Number.
11. 10. Microbiological Examination.
11. Determination of particulates (PM₁₀ and PM_{2.5}) in ambient air by gravimetric method.
12. Determination of ambient noise level by sound level meter

Course Materials

Required Text: Text Books

Sawyer C. N., McCarty, P. L. and Parkins, G. F., Chemistry for Environmental Engineering and Sciences, Mc Graw Hill New York (2003)

Optional Materials: Reference Books

1. Standard methods, Standard method for the examination of water and wastewater, American Public Health Association, Washington, D.C (1998).
2. Ramp, H.H. and Krist, H., Laboratory Manual for the Examination of Water, Wastewater, and soil, VCH publishers, Weinheim, 1998.
3. Indian standard, IS 3025-39 (1991); Methods of sampling and test (physical and chemical). Indian standard codes, IS 3025 IS 5182, IS 11255, IS 8829, IS 3028, IS 10500

Computer applications in Civil Engineering Lab



[VIth Semester, Third Year]

Course Description

Offered by Department
Civil Engineering

Credits
0-0-2, (1)

Status
Laboratory

Code
CV106401CV

[Pre-requisites: None]

Course Objectives

To be able to develop computer programs on civil engineering problems.

Course Content

List of Experiments:

1. Software Basics : General commands and features
2. Computer program on simple Civil Engineering examples.
3. Computer program on Cost Estimation.
4. Computer program on applications in Surveying.
5. Computer program on applications in Geotechnical Engineering.
6. Computer program on applications in Water resources engineering.
7. Computer program on applications in Structural Engineering.

Course Materials

Required Text: Text Books

1. Getting Started with MATLAB: A Quick Introduction for Scientists & Engineers- Rudra Pratap (Oxford University Press)
2. MATLAB Programming for Engineers - Stephen J. Chapman (Cengage Publication)
3. Excel VBA Programming For Dummies- by Michael Alexander, John Walkenbach

Optional Materials: Reference Books

Civil Engineering Books related to the Topics Covered.