UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Numerical Methods
Course Code: M(CS)401
L-T Scheme: 2-1 **Course Credits: 3**

Introduction:

This course offers an advanced introduction to numerical linear algebra. Topics include direct and iterative methods for linear systems, Eigen value decompositions and QR/SVD factorizations, stability and accuracy of numerical algorithms, the IEEE floating point standard, sparse and structured matrices, preconditioning and linear algebra software. Problem sets require some knowledge of MATLAB

Objectives:

The primary goal is to provide engineering majors with a basic knowledge of numerical methods including: root finding, elementary numerical linear algebra, integration, interpolation, solving systems of linear equations, curve fitting, and numerical solution to ordinary differential equations'' language and SCILAB is the software environment used for implementation and application of these numerical methods. The numerical techniques learned in this course enable students to work with mathematical models of technology and systems.

Learning Outcomes:

Knowledge:

1. Students would be able to assess the approximation techniques to formulate and apply appropriate strategy to solve real world problems.
2. Be aware of the use of numerical methods in modern scientific computing.
3. Be familiar with finite precision computation.
4. Be familiar with numerical solution of integration, linear equations, ordinary differential equations, interpolations.

Application:

1. An ability to apply knowledge of mathematics, science, and engineering
2. An ability to design and conduct experiments, as well as to analyze and interpret data
3. An ability to design a system, component, or process to meet desired needs within realistic constraints
4. such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
5. An ability to function on multidisciplinary teams

Course Contents:

Unit 1: Approximation in numerical computation: Approximation of numbers, Types of errors, Calculation of errors.

Unit 2: Interpolation: Finite Differences and Divided differences, Newton forward/backward Interpolation, Lagrange's method and Newton's divided difference method.

Unit 3: Numerical integration: Trapezoidal rule and Simpson's 1/3 rule.

Unit 4: Numerical solution of a system of linear equations: Gauss elimination method, Matrix inversion, LU Factorization method, Gauss-Seidel iterative method.

Unit 5: Numerical solution of Algebraic equation: Bisection method, Regula-Falsi method, Newton-Raphson method and order of convergence.

Unit 6: Numerical solution of ordinary differential equation: Euler's method, Runge-Kutta methods, Predictor-Corrector methods and Finite Difference method.

Text Books

1. Dutta& Jana: Introductory Numerical Analysis(All course).

2. Dr.B.S.Grewal:Numerical Methods in Engineering &science(All Course).

3. Jain, Iyengar ,& Jain: Numerical Methods (Problems and Solution).

References

1. Baburam: Numerical Methods, Pearson Education.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Values & Ethics in Profession
Course Code: HU401
L-T Scheme: 3L+1T **Course Credits: 3**

Introduction:

This course teaches students the basic principles of Values and Ethics within profession. These deals mainly with

- Values in professional life
- Ethics in professional life
- Resources depletion
- Conservation of resources for future generations
- Technology transfer
- Eco friendly Technology
- Value crisis in society
- Present society without values and Ethics.

Objectives:

This course relates to the present world and teaches students the need and importance of values and the problems faced by the present society in terms of depletion of natural resources and how to control the same for the sake of future generations.

Learning Outcomes:

Knowledge:

1. Understand the present scenario of degradation of values and Ethics system
2. Depletion of resources and how to conserve them.
3. Club Of Rome and what all stalwarts have thought to improve the situation
4. Sustainable Development.
5. Value spectrum of a good life
6. Present societal changes in terms of values and ethics
7. What steps to be taken to improve value system?
8. How to avoid conflicts to have a peaceful job life.
9.

Course Contents:

Unit 1: Rapid Technological growth and depletion of resources, Reports of the Club of Rome. Limits of growth: Sustainable development Energy Crisis: Renewable Energy Resources Environmental degradation and pollution. co-friendly Technologies. Environmental Regulations, Environmental Ethics Appropriate Technology Movement of Schumacher; later developments Technology and developing notions. Problems of Technology transfer, Technology assessment impact analysis. Human Operator in Engineering projects and industries. Problems of man, machine, interaction, Impact of assembly line and automation. Human centered Technology.

Unit 2: Engineering profession: Ethical issues in Engineering practice, Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond.

Unit 3: Values Crisis in contemporary society Nature of values: Value Spectrum Of good life Psychological values: Integrated personality; mental health Societal values: The modern search for a good society, justice, democracy, secularism, rule of law, values in Indian Constitution. Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity Moral and ethical values: Nature of moral judgments; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility.

Books:

AN Tripathi ,Human values in the Engineering Profession, Monograph published byIIM,Calcutta1996

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Course Description

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Course Description

Title of Course: Fluid Mechanics
Course Code: CE401
L-T Scheme: 3-0 **Course Credits: 3**

Introduction: This course examines the basic fluid properties. The subject broadly covers the following topics: Fluid Statics, Water Hammer and Dimensional Analysis and Model Studies.

Objectives:
The students will understand the basic concepts of Fluid Mechanics and different fluid properties. The students will explore in details the following concepts:Turbulent flow in circular pipes: Fluid friction in pipes, head loss due to friction. Darcy-Weisbach equation, Variation of friction factor with wall roughness – Moody's chart. Minor losses in pipes. Speed of pressure wave, slow and rapid closure, use of surge tank. Steady uniform flow in open channel:Characteristics, Chezy's, Manning's and Bazin's formulae. Hydraulically efficient cross sections. Flow through channels of circular cross sections – depths for maximum velocity and discharge.Varied flow through open channel: Gradually varied and rapidly varied flows. Definition, Specific Energy, Critical, Sub-critical and Super-critical flows. Channel transitions - constricted or raised bed. Establishment of critical flow, Venturiflume and Parshall flume.

Learning Outcomes:
Knowledge:
The student will develop a clear understanding of the following concepts:
Forces on plane and curved surfaces, Center of pressure. Stability of floating bodies, Metacentre.Weirs and Notches: Rectangular, triangular, Cippoletti, sharp crested and broad crested weirs, submerged weirs Turbulent flow in circular pipes: Fluid friction in pipes, head loss due to friction. Darcy-Weisbach equation, Variation of friction factor with wall roughness – Moody's chart. Minor losses in pipes.Speed of pressure wave, slow and rapid closure, use of surge tank.Steady uniform flow in open channel: Characteristics, Chezy's, Manning's and Bazin's formulae. Hydraulically efficient cross sections. Flow through channels of circular cross sections – depths for maximum velocity and discharge.Varied flow through open channel: Gradually varied and rapidly varied flows. Definition, Specific Energy, Critical, Sub-critical and Super-critical flows. Channel transitions - constricted or raised bed. Establishment of critical flow, Venturi flume and Parshall flume. Definition and diagram for Specific force, Hydraulic Jump.Dimensions and dimensional homogeneity, Importance and use of dimensional analysis. Buckingham's Pi theorem with applications. Geometric, Kinematic and Dynamic similarity. Non Dimensional Numbers. Introduction to Hydraulic Turbines: Working Principles of Pelton, Francis and Kaplan turbines Pumps: Centrifugal pumps, performance characteristic graph – design flow rate. Working principles of positive displacement pumps, gear, reciprocating and vane pumps. Hydraulic Ram.

Course Contents:

Unit 1: **Fluid statics**: Forces on plane and curved surfaces, Center of pressure. Stability of floating bodies,
Metacentre. Weirs and Notches: Rectangular, triangular, Cippoletti, sharp crested and broad crested weirs, Submerged weirs Turbulent flow in circular pipes: Fluid friction in pipes, head loss due to friction. Darcy-Weisbach equation, Variation of friction factor with wall roughness – Moody's chart. Minor losses in pipes.

Unit 2: Water Hammer: Speed of pressure wave, slow and rapid closure, use of surge tank.Steady uniform flow in open channel: Characteristics, Chezy's, Manning's and Bazin's formulae. Hydraulically efficient cross sections. Flow through channels of circular cross sections – depths for maximum velocity and discharge. Varied flow through open channel: Gradually varied and rapidly varied flows. Definition,

Course Description

Specific Energy, Critical, Sub-critical and Super-critical flows. Channel transitions - constricted or raised bed. Establishment of critical flow, Venturi flume and Parshall flume. Definition and diagram for Specific force, Hydraulic Jump.

Unit 3: Dimensional Analysis and Model studies: Dimensions and dimensional homogeneity, Importance and use of dimensional analysis. Buckingham's Pi theorem with applications. Geometric, Kinematic and Dynamic similarity. Non Dimensional Numbers. Introduction to Hydraulic Turbines: Working Principles of Pelton, Francis and Kaplan turbines Pumps: Centrifugal pumps, performance characteristic graph – design flow rate. Working principles of positive displacement pumps, gear, reciprocating and vane pumps. Hydraulic Ram.

Text Books

1. Fluid Mechanics Modi& Seth Standard Book House, New Delhi.
2. Fluid Mechanics A.K.Jain Khanna Publishers, New Delhi.
3. Fluid Mechanics & Machinery H. M. Raghunath CBS Publishers, New Delhi.
4. Fluid Mechanics and Fluid Machines S. K. Som& G. Biswas Tata McGraw Hill.
5. Fluid Mechanics, Hydraulics and Fluid Machines S. RamamruthamDhanpatRai.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Structural Analysis
Course Code: CE402
L-T Scheme: 3-1 **Course Credits: 4**

Introduction: The course explains the basic concepts of structures and the response of the structures when subjected to external loading. The topics to be covered include the basic concepts of mechanics, analysis of determinate structures, deflection of determinate structures, analysis of indeterminate structures, deflection of indeterminate structures.

Objectives:
The students will be having a clear understanding of the determinate and indeterminate structures. The concept of deflection of determinate and indeterminate structures will also be taken into account.

Learning Outcomes:
Knowledge:
The students will develop a clear understanding of the following concepts:
Portal frames, arches, cables Strain energy: Due to axial load, bending and shear, Torsion; Castigliano's theorems, theorem of minimum potential energy, principle of virtual work, Maxwell's theorem of reciprocal deflection, Betti's law. Moment area and Conjugate beam method, Energy methods, Influence line diagrams: Statically determinate beams and trusses under series of concentrated anduniformly distributed rolling loads, criteria for maximum and absolute maximum moments and shears. Unit load method for beams, Deflection of trusses and simple portal frames. Theorem of three moments, Energy methods, Force method (method of consistent deformations), [for analysis of propped cantilever, fixed beams and continuous beams (maximum two degree of indeterminacy) for simple loading cases], Analysis of two-hinged arch. Moment distribution method - solution of continuous beam, effect of settlement and rotation of support, frames with or without side sway. Slope Deflection Method – Method and application in continuous beams and Frames. Approximate method of analysis of structures: Portal & Cantilever methods.

Course Contents:
Unit 1: **Review of basic concept of mechanics**: Equilibrium, Free body diagram, Determinate and Indeterminate structures, Degree of indeterminacy for different types of structures: Beams, Frames,Trusses.

Unit 2: Analysis of determinate structures: Portal frames, arches, cables Strain energy: Due to axial load, bending and shear, Torsion; Castigliano's theorems, theorem of minimum potential energy, principle of virtual work, Maxwell's theorem of reciprocal deflection, Betti's law.

Unit 3: Deflection of determinate structures: Moment area and Conjugate beam method, Energy methods, Influence line diagrams: Statically determinate beams and trusses under series of concentrated anduniformly distributed rolling loads, criteria for maximum and absolute maximum moments and shears.Unit load method for beams, Deflection of trusses and simple portal frames.

Unit 4: Analysis of statically Indeterminate beams: Theorem of three moments, Energy methods, Forcemethod (method of consistent deformations) [for analysis of propped cantilever, fixed beams and continuous beams (maximum two degree of indeterminacy) for simple loading cases], Analysis of two-hinged arch.

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Course Description

Unit 5: Analysis of statically Indeterminate structures: Moment distribution method - solution of continuous beam, effect of settlement and rotation of support, frames with or without side sway. Slope Deflection Method – Method and application in continuous beams and Frames. Approximate method of analysis of structures: Portal & Cantilever methods.

Text Books

1. Ramamrutham Theory Of Structures.
2. C.S.Reddy Basic Structural Analysis By Tata McGraw Hill Publications.
3. Bhavikatti Structural Analysis Vol I AndVol II By Vikas Publishing House.

References

1. Statically Indeterminate Structures CK Wang ByMcGraw Hill Publications.
2. Engineering Mechanics Of Solids E.P.Popov By Pearson Educations.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR
Course Description

Title of Course: Soil Mechanics
Course Code: CE403
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

- To understand fundamentals of geotechnical Engineering.
- It helps students understand weathering process of rocks, soil formation, different types of soils, soil structure, basic properties of soils and soil mechanics
- This course covers soil water, permeability and seepage, compaction of soil, compressibility and consolidation process, shear strength of soils.
- This course equips students with problem solving abilities, calculations of basic soil properties and measurement techniques and its practical applications. Finally, with this foundation, students should be well equipped to learn related subjects and their applications in the higher semesters

Objectives:
On completion of this course the student should be in a position to perform classification of different types of soils and its index and Engineering properties by various methods..

Learning Outcomes:
Knowledge:
1. The course aims to acquaint the student with the concept of —soil‖ as an engineering material and the properties and methods used to characterize soil for Geotechnical analysis and design
2. We will cover terminology and parameters used to characterize and classify soils.
3. Become aware of thestresses and stress conditions in soils; factors affecting soil strength and stress-strain behavior.
4. Know the problems in the design of structures due to seepage and water flow through soils and their effects on soil stresses and strength

Application:
1. To distinguish the nature and properties of soil.
2. To find out if the structure faces seepage problem.
3. To find out shear strength of soil.

Course Contents:

Unit 1: Introduction: Origin & formation of Soil: Types, Typical Indian Soil, Fundamental of Soil Structure, Clay Mineralogy
Book: *Soil Mechanics and Foundation Engineering* by Dr. K.R Arora (Chapter 1 and Chapter 6)
Geotechnical Engineering by V.N.S Murthy (Chapter 2)

Unit 2: Physical & Index properties of soil: Weight- Volume Relationships, Insitu Density, Moisture Content, Specific Gravity, Relative Density, Atterberg's Limits, Soil Indices, consistency of soil , Particle Size Distribution of soil: Sieving, Sedimentation Analysis
Book: *Soil Mechanics and Foundation Engineering* by Dr. K.R Arora (Chapter 2 to 4)
Geotechnical Engineering by V.N.SMurthy (Chapter 3)

Unit 3: Identification & Classification of soil: Field identification of soil, Soil Classification: as per Unified Classification System, IS Code Recommendation, AASHTO classification

Book: *Soil Mechanics and Foundation Engineering* by Dr. K.R Arora (Chapter 5)
Geotechnical Engineering by V.N.S Murthy (Chapter 3)

Unit 4: Flow through soil: Darcy's Law, Coefficient of permeability, laboratory and field determination of coefficient of permeability, Permeability for Stratified Deposits, Laplace's Equations, Flow nets, Flow through Earthen Dam, Estimation of Seepage, Uplift due to seepage
Book: *Soil Mechanics and Foundation Engineering* by Dr. K.R Arora (Chapter 8 to 9)
Geotechnical Engineering by V.N.S Murthy (Chapter 4)

Unit 5: Effective Stress Principles: Effective Stress, Effective pressure due to different conditions, Seepage force, Critical hydraulic gradient, quick sand condition, Design of filters, Capillarity in soil
Book: *Soil Mechanics and Foundation Engineering* by Dr. K.R Arora (Chapter 10)
Geotechnical Engineering by V.N.S Murthy (Chapter 5)

Unit 6: Stress Distribution in Soil: Normal and shear stresses, Stress due to point loads, Stress beneath Line, strip & uniformly loaded circular area & rectangular area, pressure bulbs, Newmark's charts- Use for determination of stress due to arbitrarily loaded areas
Book: *Soil Mechanics and Foundation Engineering* by Dr. K.R Arora (Chapter 11)
Geotechnical Engineering by V.N.S Murthy (Chapter 6)

Unit 7: Compaction of soil: Principles of Compaction, IS Light & Heavy Compaction Test, Field Compaction, Various methods of field compaction and control
Book: *Soil Mechanics and Foundation Engineering* by Dr. K.R Arora (Chapter 14)

Unit 8: Compressibility & Consolidation of Soil: Terzaghi's theory of one dimensional consolidation, Compressibility characteristics of soils: Compression index, Coefficient of compressibility & volume change, Coefficient of consolidation, Degree & rate of consolidation, Laboratory method of one dimensional consolidation test, Determination of consolidation parameters, Secondary consolidation
Book: *Soil Mechanics and Foundation Engineering* by Dr. K.R Arora (Chapter 12)
Geotechnical Engineering by V.N.S Murthy (Chapter 7)

Unit 9: Shear Strength of Soil: Basic concepts, Mohr- Columb's Theory, Laboratory Determination of soil shear parameter- Direct Shear, Tri-axial Test, Unconfined Compression, Vane Shear Test, Sensitivity & thixotropy of clay.
Book: *Soil Mechanics and Foundation Engineering* by Dr. K.R Arora (Chapter 13)
Geotechnical Engineering by V.N.S Murthy (Chapter 8)

Text Books
1. *Soil Mechanics and Foundation Engineering* by Dr. K.R Arora
2. *Geotechnical Engineering* by V.N.S Murthy

References
1. Geotechnical Engineering – Principles and Practice Coduto Pearson Education
2. Soil Mechanics Lambe& Whitman. WIE

UNIVERSITY OF ENGINEERING AND MANAGEMENT, JAIPUR

Course Description

Title of Course: Technical Report Writing & Language Lab
Course Code: HU481
L-T-P scheme: 0-0-2 **Course Credit: 1**

Objectives:
1. To inculcate a sense of confidence in the students.
2. To help them become good communicators both socially and professionally.
3. To assist them to enhance their power of Technical Communication.

Learning Outcomes:

Course Contents:
Exercises that must be done in this course are listed below:
Exercise No.1: Report Types (Organizational/Commercial/Business/Project)

Exercise No. 2: Report Format & Organization of Writing Materials

Exercise No. 3: Report Writing (Practice Sessions &Workshops)

Exercise No. 4: Introductory Lecture to help the students get a clear idea of Technical Communication& the need of Language Laboratory Practice Sessions

Exercise No. 5: Conversation Practice Sessions: (To be done as real life interactions)
a) Training the students by using Language Lab Device/ Recommended Texts/cassettes / cd to get their Listening Skill & Speaking Skill honed
b) Introducing Role Play & honing overall Communicative Competence

Exercise No. 6: Group Discussion Sessions:
a) Teaching Strategies of Group Discussion
b) Introducing Different Models & Topics of Group Discussion
c) Exploring Live/Recorded GD Sessions for mending students' attitude/approach & for taking remedial measure Interview Sessions;
d) Training students to face Job Interviews confidently and successfully
e) Arranging Mock interviews and Practice Sessions for integrating Listening Skill with Speaking Skill in formal situation for effective communication

Exercise No. 7: Presentation:
a) Teaching Presentation as a skill
b) Strategies and Standard Practices of Individual/Group Presentation
c) Media & Means of Presentation: OHP/POWERPOINT/Other Audio-Visual Aids

Exercise No. 8: Competitive Examination:
a) Making thestudentsawareofProvincial/National/InternationalCompetitiveExaminations
b) Strategies/Tactics for success in Competitive Examinations
c) SWOT Analysis and its Application in fixing Target

Text Book:
1. NiraKonar: English Language Laboratory: A Comprehensive Manual
2. D. Sudharani: Advanced Manual for Communication Laboratories& Technical Report Writing Pearson Education (W.B. Edition), 2011 PHI Learning, 2011

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Numerical Method Lab
Course Code: M(CS)491
L-T–P Scheme: 0-0-3 **Course Credits: 2**

Introduction:

This course offers an advanced introduction to numerical linear algebra. Topics include direct and iterative methods for linear systems, eigen value decompositions and QR/SVD factorizations, stability and accuracy of numerical algorithms, the IEEE floating point standard, sparse and structured matrices, preconditioning and linear algebra software. Problem sets require some knowledge of MATLAB

Objectives:

1. To give an overview of what can be done.
2. To give insight into how it can be done.
3. To give the confidence to tackle numerical solutions.
4. An understanding of how a method works aids in choosing a method. It can also provide an indication of what can and will go wrong, and of the accuracy which may be obtained.
5. To gain insight into the underlying physics.
6. The aim of this course is to introduce numerical techniques that can be used on computers, rather than to provide a detailed treatment of accuracy or stability.

Learning Outcomes:

Knowledge:

On completion of this course, the student will be able to:

1. Demonstrate skills in using computer programming tools for engineering calculations.
2. Demonstrate ability to construct simple computer algorithms using a programming tool.
3. Apply simple numerical methods to solve mathematical problems with relevance to civil engineering.
4. Appreciate the limitations and the applicability of the numerical methods.
5. Apply computer-based numerical methods for the solution of engineering problems.

Course Contents:

1. Assignments on Newton forward /backward, Lagrange's interpolation.
2. Assignments on numerical integration using Trapezoidal rule, Simpson's 1/3 rule, Weddle's rule.
3. Assignments on numerical solution of a system of linear equations using Gauss elimination and Gauss-Seidel iterations.
4. Assignments on numerical solution of Algebraic Equation by Regular-falsi and Newton Raphson methods.
5. Assignments on ordinary differential equation: Euler's and Runga-Kutta methods.
6. Introduction to Software Packages: Matlab / Scilab / Labview / Mathematica.

Text Books:

1. Introductory method of numerical analysis, Sastry S.S
2. Computer Programming in fortran 77, Rajaraman V
3. Numerical methods: for scientific and engineering computation,Mahinder Kumar Jain

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Fluid Mechanics Lab
Course Code: CE 491
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:
1. The fluid mechanics lab serves as a fundamental platform to understand the basic principles of fluid flow.
2. The students will also develop a basic understanding of the Orifice Meter and find out the Orifice Co-Efficient.
3. The students will be able to calibrate the V Notch and the measurement of the velocity of water in open channels that is the concept of open channel flow.
4. The students will develop a clear concept of hydraulic jump.

Learning Outcomes: The students will have a clear understanding of the various fluid properties. The students will also develop an understanding of the various operations of hydraulic machines and the concept of efficiency of pumps and turbines. They will be able to differentiate between centrifugal pump, reciprocating pump, pelton wheel turbine, francis turbine and hydraulic ram. They will develop a clear concept of hydraulic jump.

Course Contents:
Practical that must be done in this course are listed below:

1. Determination of Orifice co-efficient.
2. Calibration of Orifice meter.
3. Calibration of V- Notch.
4. Measurement of velocity of water in an open channel using a pitot tube.
5. Measurement of water surface profile for flow over Broad crested weir.
6. Preparation of discharge rating curve for a sluice.
7. Measurement of water surface profile for a hydraulic jump.
8. Determination of efficiency of a Centrifugal pump.
9. Determination of efficiency of a Reciprocating pump.
10. Determination of efficiency of a Pelton wheel Turbine.
11. Determination of efficiency of a Francis Turbine.
12. Determination of efficiency of a Hydraulic Ram.

Text Book:
1. Fluid Mechanics By R,K,Bansal Laxmi Publications Limited.

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Course Description

Title of Course: Surveying Practice-II Lab
Course Code: CE492
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:
1. To learn and understand the concepts and perform the surveying of construction with the help of different methods of surveying like chain surveying, compass surveying, plane table surveying and levelling.
2. To understand and differentiate between compass surveying, plane table surveying, levelling and contouring.
3. To operate the various instruments of surveying like surveyors compass, to measure the distance between any two inaccessible points, to efficiently operate the dumpy levels and understand the level difference between inaccessible points.
4. To set out simple curves using state of the art modern equipment like Total Station and Theodolite.

Learning Outcomes: The students will have a clear understanding of the basic concepts of surveying. They will develop a clear understanding of the various steps of surveying with different instruments. Surveying is the first step before any construction activity and the students will be able to develop the concepts of chain surveying, compass surveying, plane table surveying, levelling and contouring. The students will be able to efficiently perform surveying with the help of modern equipments like Total Station and transit theodolite. The students will be able to set out simple curves as per the theoretical calculations.

Course Contents:
Practical that must be done in this course are listed below:

1. Traversing by Using Theodolite: Preparation of Gales Table from field data.
2. Traversing by using Total Station.
3. Use of Total Station for levelling and Contouring.
4. Setting out of Simple Curves.

Text Book:
1.Surveying Volume II B.C.Punmia By Laxmi Publications.

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Course Description

Title of Course: Soil Mechanics-I Lab
Course Code: CE493
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:
1. The students will be able to differentiate between different types of soils and characteristics of each type of soil.
2. The students will be involved in the collection of the field samples and identification of the types of soils without natural testing.
3. The students will be able to determine the natural moisture content of the soil.

Learning Outcomes: The students will develop a clear understanding of the different types of soils and will be able to identify the types of soils as per the Indian Standards. The students will be able to determine the moisture contents and specific gravity of cohesive soils and cohesion less soils. The students will also develop a clear understanding of the compaction characteristics of the soil.

Course Contents:
Practical that must be done in this course are listed below:

1. Field identification of different types of soil as per Indian standards [collection of field samples and identifications without laboratory testing, determination of natural moisture content.
2. Determination of specific gravity of i) Cohesion less ii) cohesive soil
3. Determination of Insitu density by core cutter method & sand replacement method.
4. Grain size distribution of cohesion less soil by sieving & finegrained soil by hydrometer analysis.
5. Determination of Atterberg's limits (liquid limit, plastic limit & shrinkage limit).
6. Determination of co- efficient of permeability by constant head permeameter (coarse grained soil) & variable head parameter (fine grained soil).
7. Determination of compaction characteristics of soil.

Text Book:
1.Soil Testing by T.W. Lamb (John willey).
2. SP-36 (Part I- & Part – II).
3. Soil Mechanics Laboratory Manual by Braja Mohan Das, OXFORD UNIVERSITY PRESS.
4. Measurement of Engineering properties of soil by E Saibaba Reddy & K. Rama Sastri. (New age International publication.