



# DUMKA ENGINEERING COLLEGE

(Estd by **Govt. of Jharkhand** and Run by **Techno India** Under PPP)

Dumka, Jharkhand-814101

(Affiliated To Jharkhand University Of Technology, Ranchi)



## Civil Engineering

3<sup>rd</sup> semester course structure

Sl. No.	Course Code	Subject	L	T	P	Credit
01	CE301	Civil Engineering Materials And Construction	3	1	0	3
02	CE302	Surveying & Geomatics -I	3	1	0	3
03	ME303	Strength Of Materials	3	1	0	3
04	BSC301	Mathematics-III	3	1	0	4
05	BSC303	Engineering Geology	3	1	0	3
06	BSC302	Environmental Science	2	0	0	0
01	CE301P	Civil Engg Material Testing Lab.	0	0	3	1
02	CE302P	Field Surveying Lab	0	0	3	1
03	CE303P	Engineering Geology Lab And Strength Of Materials Lab	0	0	3	1
04	EX301	Extra Activities (NSO/NSS/NCC/Yoga / Creative Arts/Mini Project)	0	0	2	1
05	HS301	Communication Skill Lab	0	0	2	1
<b>Total credit</b>						<b>21</b>



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## **MATHEMATICS III** **(COMMON FOR ALL BRANCH)** Course code –BSC- 301

### **Module I**

**Laplace Transformation:** Laplace Transformation and its applications, Inverse Laplace Transformation, Convolution Theorem, Solution of ODE by Laplace Transformation.

### **Module II**

**Fourier Transform:** Complex form of Fourier series, Fourier Transformation and inverse Fourier Transformation, sine, cosine Transformation, Inverse Transformations -simple illustration.

### **Module III**

**Z-Transform:** Inverse Z-Transform- Properties – Initial and final value theorems-convolution theorem- Difference equations, Solution of Difference equations using Z-Transformation.

### **Module IV**

**Partial Differential Equations:** Solution of Wave equation, Heat equation, Laplace's equation by the method of separation of variables and its applications. Solution of PDE by Laplace Transformation.

### **Module V**

**Numerical Method:** Finite difference, Symbolic relations, Interpolation and Extrapolation, Newton – Gregory forward and backward formula, Gauss forward and backward formula, Lagrange's formula, Inverse Interpolation by Lagrange's formula, Numerical Differentiation and Numerical Integration : Trapezoidal rule, Simpson's  $1/3^{\text{rd}}$  rule, Simpson's  $3/8^{\text{th}}$  rule, Weddle quadrature formula.

### **Text Books**

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons.
- Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition.

### **Reference Books**

- R. J. Beerends, H. G. Ter Morsche, J. C. Van Den Berg, E. M. Van De Vrie, Fourier and Laplace Transforms, Cambridge University Press.
- Sastry S.S, Introductory Methods of Numerical Analysis, PHI



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## CIVIL ENGINEERING MATERIALS AND CONSTRUCTIONS

Course code –CE 301

**Module 1:** Introduction to Engineering Materials covering, Cements, M-Sand, Concrete (plain, reinforced and steel fiber/glass fiber-reinforced, light-weight concrete, High Performance Concrete, Polymer Concrete) Ceramics, and Refractories, Bitumen and asphaltic materials, Timbers, Glass and Plastics Structural Steel and other Metals, Paints and Varnishes, Acoustical material and geo-textiles, rubber and asbestos, laminates and adhesives, Graphene, Carbon composites and other engineering materials including properties and uses of these **(8 Hours)**

**Module II:** Introduction to Material Testing covering, What is the “Material Engineering”?; Mechanical behavior and mechanical characteristics; Electricity-principle and characteristics; Plastic deformation of metals; Tensile test-standards for different material (brittle, quasi-brittle, elastic and so on) True stress-strain interpretation of tensile test; hardness tests; Bending and torsion test; strength of ceramic; Internal friction, creep-fundamentals and characteristics; Brittle fracture of steel- temperature transition approach; Background of fracture mechanics; Discussion of fracture toughness testing-different materials; concepts of fatigue of materials; Structural integrity assessment procedure and fracture mechanics **(8Hours)**.

**Module III:** Standard Testing & Evaluation Procedures covering, Laboratory for mechanical testing; Discussion about mechanical testing; Naming systems for various irons, steels and nonferrous metals; Discussion about elastic deformation; Plastic deformation; Impact test and transition temperatures; Fracture mechanics- background; Fracture toughness- different materials; Fatigue of material; Creep. **(8 Hours)**

**Module IV:** Constructions: Brick Masonry; Types of bond, construction of walls, partition wall, cavity wall, advantages, disadvantages and construction procedure. D.P.C.: Purpose, types, materials and procedures, Foundation: Function, types, their stability and foundation in black cotton soil, proportioning of footings, plastering and composition, method of plastering, types of plastering, pointing construction procedure, Washing: White washing, color washing, distemper and snowcem, Roof: Flat roof, inclined roof, shells and domes, various types of roof covering materials. Floor: Types i.e. wooden, IPS, Terrazzo, marbles, tiles, synthetic mats. Construction of IPS and Terrazzo floor. Door and Windows types and fixtures including ventilators and lintel. Door and windows from PVS material and MDF. Stairs: Types and proportioning, Lifts and escalators **(16 Hours)**.

### **Suggested Readings**

1. Chudley, R., Greeno (2006), 'Building Construction Handbook' (6<sup>th</sup> ed.), R. Butterworth Heinemann
2. Building Materials, S. Bhavikutti.
3. Building Materials, M. L. Gambhir.
4. Civil Engineering Materials, S. C. Rangwala, Charotar Publishing House. Various related updated & recent standards of BIS, IRC, ASTM, RILEM, AASHTO, etc. corresponding to materials used for Civil Engineering applications
5. Kyriakos Komvopolous (2011), Mechanical Testing of Engineering Materials, Cognella
6. E. N. Dowling (1993), Mechanical Behaviour of Materials, PHI



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7. American Society for Testing and Materials (ASTM), Annual Books of ASTM Standards (post 2000)

## SURVEYING AND GEOMATICS I

Course code –CE 302

### Module I

**Introduction:** Importance of Surveying, Types of Surveying, Principle, Scales, Plan and Map, Shrinkage of Maps, Mapping Concepts, Map Projections, Total Station uses and application, Chain Surveying: Purpose, Chaining, accessories, Ranging and its types, Error, Chaining on uneven ground, Tape corrections, Survey stations and lines, Well conditioned triangle, basic problems, obstacles in chaining, field book. [7 Hrs]

### Module II:

**Compass Surveying:** Introduction and Purpose, True Meridian, Magnetic Meridian, Geographical Meridian, True Bearing, Magnetic Bearing, Whole circle & Quadrantal Bearing, Prismatic Compass and Surveyors Compass, Magnetic Declination, Isogonic and Agonic Lines, Local Attraction and its adjustments. [4 Hrs]

### Module III:

**Plane Table Surveying:** Equipment and uses, principle, methods of plane tabling, closing error and its adjustment, two point problem and three point problem. [5 Hrs]

### Module IV

**Levelling:** Types of levelling: **Temporary** Adjustment of Dumpy level, Methods of levelling, Level book and computation, missing data, curvature and refraction corrections, reciprocal levelling. Contouring: Definition, Methods of Contouring and plotting of contour. [6 Hrs]

### Module V

Theodolite traversing: Scope, Types, temporary adjustment of transit theodolite, measurement of horizontal & Vertical angles, Method of repetition & Direction, errors and its elimination, method of traversing, calculation of latitude and departure, balancing of traverse [6 Hrs]

### Module VI

**Tacheometric Survey:** Instruments used, Principle, determination of tacheometric constant, Methods of Tacheometry: Stadia Method and Tangential Method. [4 Hrs]

### Module VII

**Classification of Curves:** Simple curve, Combined curve, Compound curve, reverse curve, transition curve, Methods of layout, offsets from chord produced, Rankine's Method, Transition Curve, super-elevation, length of transition curve, characteristics, equation, shift, tangent length, and curve length of combined curve, setting out of simple and transition curve. [12 Hrs]

### Text Books:

1. Duggal, S.K. Surveying Vol. I and II, Tata McGraw Hill, 2004.
2. Punmia, B.C. Surveying Vol. I and II, Standard Publishers, 1994.
3. Arora, K. R. Surveying Vol. I and II, Standard Book House, 1996
- 4 N.N Basak.. Surveying and levelling



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## **STRENGTH OF MATERIALS**

(ME , PROD,CE)

Course code -ME 303

### **Objectives:**

- To understand the nature of stresses developed in simple geometries such as bars, cantilevers, beams, shafts cylinders and spheres for various types of simple loads.
- To calculate the elastic deformation occurring in various simple geometries for different types of loading.

### **Contents:**

#### **Module-I**

Deformation in solids-Hooks law, stress and strain-tension, compression and shear stresses – elastic constants and their relations-volumetric, linear and shear strains-principal stresses and principal planes-mohr's circle (8 Hrs)

#### **Module-II**

Beams and types transverse loading on beams-shear force and bending moment diagrams-Types of beam supports, simply supported and over hanging beams, cantilevers. Theory of bending of beam, bending stresses distribution and neutral axis, shear stress distribution, point and distributed loads.(8Hrs)

#### **Module-III**

Moment of inertia about the axis and polar moment of inertia, deflection of beam using double integration method, computation of slopes and deflection in beams, Maxwell's reciprocal theorem.(8Hrs)

#### **Module-IV**

Torsion, stresses and deformation in circular and hollow shafts,stepped shafts, deflection of shafts fixed at both ends, stresses and deflection of helical spring.(8Hrs)

#### **Module -V**

Axial and hoop stresses in cylinders subjected to internal pressure, deformation of thick and thin cylinders, deformation in spherical shells subjected to internal pressure.(8Hrs)

### **Course Outcomes:**

- After completing this course, the students should able to recognize various type of load applied on machine components of simple geometry and understand the nature of internal stresses that will develop within the components.
- The students will be able to evaluate the strains and deformation that will results due to the elastic stresses develop within the material for simple type of loading.

### **Test Books:**

1. Egor P. Popov, Engineering Mechanics of solids, Prentice Hall of india, New Delhi, 2001.
2. R.Subramanian, Strength of Materials, Oxford University Press, 2007.

Ferdinand P.Been, Russel Johnson Jr and Jhon J.Dewole, Mechanism of materials, Tata



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## ENGINEERING GEOLOGY

Course code –BSC 303

**Module 1:** Introduction-Branches of geology useful to civil engineering , scope of geological studies in various civil engineering projects. Department dealing with his subject in India and their scope of work- GSI, Granite Dimension Stone Cell, NIRM. Mineralogy- Mineral, Origin and composition. Physical properties of minerals, susceptibility of minerals to alteration, basic of optical mineralogy,(6 hours)

**Module II:** Strength Behavior of Rocks- Stress and Strain in rocks. Concept of Rock Deformation & Tectonics. Dip and Strike. Outcrop and width of outcrop. Inliers and Outliers. Main types of discontinuities according to size. Fold –Types and nomenclature, Criteria for their recognition in field . Faults: Classification, recognition in field, effects on outcrops. Joints & Uncormity; Types, Stresses responsible, geotechnical importance. Importance of structural elements in engineering operations. Consequences of failure as land sliding, Earthquake and Subsidence, Strength of Igneous rock structures(6 hours)

**Module III:** Geological Hazards- Rock Instability and Slope movement: Concept of sliding blocks. Different controlling factors. Instability in vertical rock structures and measures to prevent collapse..Types of landslide. Prevention by surface drainage, slope reinforcement by Rock bolting and Rock Anchoring, retaining wall, Slope treatment. Case study on black clay. Ground water: Factors controlling water bearing capacity of rock. Previous & impervious rocks and ground water. Lowering of water table and Subsidence. Earthquake: Magnitude and intensity of earthquake. Seismic sea waves. Revelation from Seismic Records of structure of earth. Case Study on Elevation and Subsidence in Himalayan region in India. Seismic Zone in India.(6 hours)

**Module IV:** Geology of dam and reservoir site- Required geological consideration for selecting dam and reservoir site. Failure of Reservoir. Favorable and unfavorable conditions in different types of rocks in presence of various structural features, precautions to be taken to counteract unsuitable conditions , significance of discontinuities on the dam site and treatment giving to such structures.(4 hours)

**Module V:** Introduction and nature of soils: Soil problems in Civil Engineering, Types of soil, formation, structure and mineralogical and composition, Physical and Engineering Properties of soil, Atterberg Limit, Grain size analysis, by sieving and sedimentation, Activity of clay, All type of Classification of soil, Engineering properties of soil.(6 hours)

**Module VI:** Soil hydraulic and seepage analysis : Darcy's law, Measurement of Permeability, Factors affecting permeability and neutral pressure and effective pressure.(4 hours)  
Seepage analysis: Laplace's equation, methods of obtaining flow nets, flow net for isotropic and anisotropic soil and their applications.( 3 hours)

Consolidation and compaction: Definition, measurement, mechanism and analysis of data.(4 hours)

Shear strength of soil: Shear strength parameters of soil and laboratory methods for their determination. Liquefaction of soil.(4 hours)

### **Suggested Readings:**

1. Engineering and General Geology, Prabin Singh, 8<sup>th</sup> ed.(2010),S K Kataria and sons.
2. Text Books of Engineering Geology, N.Cheena Kesavulu,2<sup>nd</sup> Edition(2009)
3. Geology for Geotechnical Engineers, J.C.Harvey, Cambridge University Press(1982)
4. Soil Mechanics and Foundation Engineering, B.C.Punmia, Laxmi Publication





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5. Basic and Applied Soil Mechanics, Gopal Ranjan, A.S.R. Rao, New Age Publisher
6. Advanced Soil Mechanics, B.M.Das, Taylor and Francis.

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## ENVIRONMENTAL SCIENCE

Course code –BSC 302

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### Module-1

(COMMON FOR ALL BRANCH)

Concept and scope of Environment science, components of environment, environmental segment and their importance. (2 Hrs)

### Module-II

Ecology: Ecosystem and its characteristics features, structure and function of forest ecosystem, grassland ecosystem, desert ecosystem and aquatic ecosystem, ecological balance and consequences of imbalance. (4 Hrs)

### Module-III

Atmosphere: Atmospheric composition, energy balance, climate, weather, depletion of ozone layer, green house effect, acid rain, particles, ions and radicals in the atmosphere, chemical and photochemical reactions in the atmosphere.

### Module-IV

(4 Hrs)

Air pollution and control: Air pollutants, sources and effect of air pollutants, primary and secondary pollutants, photochemical smog, fly ash, inorganic and organic particulate matter. Air quality standards, sampling, monitoring and control measures for pollutants. (4 Hrs)

### Module-V

Water pollution and control: Aquatic environment, water pollution, sources and their effect, lake and ground water pollution, eutrophication, water quality standard and water pollution control measures, waste water treatment.

### Module-VI

(4 Hrs)

Land pollution; Lithosphere, composition of soil, acid base and ion exchange reactions in soil, soil erosion, landslides, desertification, pollutants (municipal, industrial, commercial, agricultural, hazardous solid wastes), origin and effects, collection and disposal of solid wastes, recovery and conversion methods. (5 Hrs)

### Module-VII

Noise pollution; Noise classification and its sources, effects and measurement, noise pollution hazards, standards and noise pollution control. (2 Hrs)

### Books and References:

1. Master, G.M Introduction to environment engineering and science, Pearson Education.
2. Nebel, B.J., Environment science, Prentice Hall Inc.
3. Odum, E.P. Ecology: The link between the natural and social sciences. IBH Publishing Company Delhi
4. De, A.K. Environmental Chemistry, Merrut.



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5. Sharma B.K Environmental Chemistry, Krishna Prakashan Media Merrut.
  6. Kaushik, A and Kaushik, C.P. Perspectives in Environmental studies, New Age International Publication.
  7. Menon, S.E. Environmental Chemistry.
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## **CIVIL ENGINEERING MATERIAL TESTING LAB**

**Course code CE301P**

### **List of Experiments**

1. Test on Bricks: Shape and size of supplied brick, Water absorption of brick, Compressive strength of bricks.
  2. Test on Fine Aggregates: Moisture Content, Specific Gravity, Bulk Density, Sieve Analysis
  3. Test on Course Aggregates: Fineness modulus, Crushing Values
  4. Test on Cement: Fineness of cement, Soundness of given cement, Specific gravity of cement, Standard consistency of cement, Initial and final setting time of cement.
  5. Test on Soil: Sieve Analysis, Specific Gravity, Liquid & Plastic Limits
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## **FIELD SURVEYING LAB**

**Course code CE 302P**

### **List of Experiments**

1. Study of different Levels and Leveling staff. Practice for temporary adjustment. To find out the reduced levels of given points using Dumpy level. (Reduction by Height of Collimation method)
2. Study of a Tilting (LOP.) Level and to find out the levels of given points (Reduction of data by Rise and Fall method).
3. Visit to Lab, For the study of:-
  - (a) Map in the making p Survey of India publication
  - (b) Conventional Symbol charts and different types of maps





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4. To establish a Benchmark by Check Leveling with a LOP. level and 'closing the work at the staring Bench mark.
5. To perform Fly Leveling with a LO.P. Level.
6. To draw the longitudinal rid cross- sections profiles along a given route.
7. Practice for Temporary adjustments of a Vernier Theodolite and taking Horizontal the work at the starting measurements. By Reiteration method.
8. To plot the coordinates at a given scale on Plane Table and their field checking.
9. To solve two Point and Three Point Problems in Plane Tabling.
10. To carry out Triangulation and Trilateration of a given area (2-3 turns are needed).

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## **ENGINEERING GEOLOGY LAB & STRENGTH OF MATERIAL LAB**

**Course code CE 303P**

### **ENGINEERING GEOLOGY LAB**

#### **List of Experiments**

1. Study of rock forming and Economic minerals, study of different rocks
2. Methods of completing the outcrop of rocks on a map
3. Drawing the geological sections of geological maps
4. Inter-relation of geological maps and sections with respect to subsurface Structure.
5. Problems of locating sites of projects like Dams, Tunnels Highways et. In the geological sections.

### **STRENGTH OF MATERIAL LAB**

#### **List of Experiments**

1. Tensile Test: To prepare the tensile test upon the given specimen (Mild Steel).
  2. Compression Test To determine the compressive strength of the given specimen.
  3. Torsion Test: To perform the Torsion test on given specimen.
  4. Impact Test: To determine the impact toughness of. The given material.
  5. Brinell hardness Test: To determine the hardness of the given specimen. -
  6. Vicker's Hardness Test: To determine, the hardness of the given specimen.
  7. Rockwell Hardness Test: To determine the hardness of the given specimen.
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## **COMMUNICATION SKILL LAB**

Course code HS301

**This lab paper involves interactive practice sessions in Language Lab along with some class lectures to enable the students to be confident enough in language and professional sphere of life.**

### **Module I: Listening Comprehension**

To comprehend spoken material in standard Indian English/ British English & American English

- Current situation in India regarding English
- American English Vs. British English

### **Module II: Phonetics & Phonology**

- Introduction to Phonetics & Phonology
- Organs of Speech/ Speech Mechanism
- Pronunciation, Intonation, Stress and Rhythm, Syllable division
- Consonants/Vowels/Diphthongs Classification

### **Module III: Common Everyday Situations: Conversations and Dialogues**

### **Module IV: Communication at Workplace**

### **Module V: Telephonic Conversation**

- Introduction
- Listening/Speaking
- Telephonic Skills Required
- Problems of Telephonic Conversation
- Intensive Listening

### **Module VI: Interviews**

- The Interview Process
- Purpose/Planning/Two-way Interaction/Informality
- Pre-interview Preparation Techniques
- Projecting a Positive Image
- Answering strategies

### **Module VII: Formal Presentations**

- Introduction
- Nature/Importance of Presentation
- Planning
- Objective with central idea, main ideas, role of supporting materials
- Handling Stage Fright



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**Module VIII: Forms of Technical Communication:** Technical Report: Definition & importance; Thesis/Project writing: structure & importance; synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar & Conference paper writing; Expert Technical Lecture: Theme clarity; Analysis & Findings; C.V./Resume writing; Technical Proposal: Types, Structure & Draft.

**Module IX: Technical Presentation:** Strategies & Techniques Presentation: Forms; interpersonal Communication; Class room presentation; style; method; Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance; emotion; Humour; Modes of Presentation; Overcoming Stage Fear; Audience Analysis & retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; Audience Participation: Quizzes & Interjections.

**Module X: Technical Communication Skills:** Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation skills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis; Critical thinking; Nuances: Exposition narration & Description; effective business communication competence: Grammatical; Discourse competence: combination of expression & conclusion; Socio-linguistic competence: Strategic competence: Solution of communication problems with verbal and non verbal means.

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**NOTE : At least ten experiments are to be performed, minimum seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus**



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## **Jharkhand University of Technology Jharkhand, Ranchi**

**Proposed Syllabus for B.Tech 4<sup>th</sup> Semester**

**Civil Engineering**



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## Civil Engineering

4<sup>th</sup> semester course structure

Sl. No.	Course code.	Subject	L	T	P	Credit
01	CE401	Surveying & Geomatics – II	3	1	0	3
02	CE402	Fluid Mechanics & Fluid Machines	3	1	0	3
03	CE403	Structural Analysis –I	3	1	0	3
04	CE404	Concrete Structure –I	3	1	0	3
05	EC404	Electronics & Instrumentation Engg.	3	1	0	3
06	EN401/ IT402/ CE405	Engineering Economics / Cyber Security/Disaster Preparedness & Planning	2	0	0	0
01	CE402P	Fluid Mechanics & Fluid Machines Lab	0	0	3	1
02	CE404P	Concrete Structure Lab	0	0	3	1
03	CE406P	CAD Building Drawing Lab	0	0	3	1
04	EX401	Extra Activities (NSO/NSS/NCC/Yoga / Creative Arts/Mini Project)	0	0	2	1
05	IN401	Internship/ Tour & Training/Industrial Training	0	0	0	2
<b>Total credit</b>						<b>21</b>





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## SURVEYING AND GEOMATICS II

Course Code: CE401

### Module I:

**Triangulation and Trilateration-** Principle of Triangulation & trilateration, Types of Triangulation, Signals, selection of station & base line, base line measurement, choices-instruments and accessories, extension of base line, corrections, satellite station, reduction to centre, intervisibility, [9hrs]

### Module II

**Trigonometric levelling:** Curvature & Refraction Correction, axis signal corrections. Method of Single & reciprocal Observations & their relative advantage, (4 hrs)

### Module III

**Theory of errors and adjustment of figures:** Types of errors, theory of propagation of errors, law of weights, weighted observation, method to calculate most probable values, least square, normal equation, method to correlate, adjustment of plane and geodetic figures. [7hrs]

### Module IV :

**Modern Field Survey Systems:** Principle of EDM, types of EDM instruments, Distomat, Total station- parts, accessories, advantages and application, Measurement of distance using EDM, Types of waves, modulation of frequency, resolution of ambiguity, Errors in Total station survey, Introduction to GPS- segment, measurement, errors and biases. [8hrs]

### Module V

**Photogrammetry Surveying:** Introduction, basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning, stereoscopy, ground control extension for photographic mapping- aerial triangulation, No. of Photographs, mosaic. [6hrs]

### Module VI:

**Remote Sensing:** Introduction and Definition of remote sensing terms, Remote sensing system, electromagnetic radiation and spectrum, atmospheric window, different types of platforms, sensors and their characteristics, orbital parameters of a satellite, multi concept in remote sensing. { *Only Introductions of all above* } [6hrs]

### Text Books-

Elements of photogrammetry by P.R. Wolf.

Introduction to remote sensing by J.B. Campbell

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## FLUID MECHANICS & FLUID MACHINES

**Course Code:** CE402

**Module I:** Basic concepts and Definitions- Distinction between a fluid and a solid Density

Specific weight, Specific gravity, Kinematic and dynamic viscosity, variation of viscosity with temperature, Newton law of viscosity; vapor pressure, boiling point, cavitations; surface tension, capillarity, Bulk modulus of elasticity, compressibility (4 hrs)

**Module II:** Fluid Statics- Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers, pressure gauges, Hydrostatic pressure and force: horizontal, vertical and Inclined surfaces. Buoyancy and stability of floating bodies (6 hrs)

**Module III:** Fluid Kinematics- Classification of fluid flow: steady and unsteady flow; uniform and non- uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function. velocity potential function. One, two and three dimensional continuity equations in Cartesian coordinates (6 hrs)

**Module IV:** Fluid Dynamics – Surface and body forces: Equations of motion- Euler's equation; Bernoulli's equations- derivation; Energy Principle; Practical applications of Bernoulli's equation: venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced (8 hrs)

**Module V:** Boundary layer theory, laminar and turbulent flow and flow through pipes (6 hrs)

**Module VI:** Dimensional Analysis and Dynamics Similitude- Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number; Buckingham's  $\pi$ - Theorem . (4 hrs)

**Module VII:** Fluid machines; Impact of Jets; Introduction to Turbines and Pumps (8 hrs)

### **Text/Reference Books:**

1. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P.N. Chandramouli, Oxford University Press 2010
2. Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House.
3. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill
4. Fluid Mechanics with Engineering Applications, R.L. Daugherty, J.B. Franzini and E.J. Finnemore, International Student Edition, Mc Graw Hill.
5. Elementary fluid mechanics, Dr. R.J. Garde.
6. Fluid Mechanics, R.K. Bansal.



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## STRUCTURAL ANALYSIS I

Course Code: CE403

**Module I:** Introduction concept of energy principles, safety, sustainable development in performance; what makes a structure; principles of stability, equilibrium; Materials and Structural Design. Introduction to the analysis and design of structural systems. Analyses of determinate and indeterminate trusses, beams and frames, and design philosophies for structural engineering. Laboratory experiments dealing with the analysis of determinate and indeterminate structures: (8 hrs)

**Module II :** Planning and Design Process; Materials, Loads and Design Safety; Behaviour and Properties of Concrete and Steel; Wind and Earthquake Loads System Design Concepts Design Project Discussions; Cable Structures; Prestressed Concrete Bridges; Constructability and Structural Control; Fire Protection (6 hrs)

**Module III:** Trusses: General theory; Classification, solution of plane determinate trusses, principle of virtual work and their applications for determination of deflection of determinate plane trusses (6 hrs)

**Module IV:** Three pinned structures, calculation of bending moment shear force axial force for three hinged arches and diagram of the same. Dead load, stress in three pinned determinate trusses (6 hrs)

**Module V:** Influence line, basic concepts of moving load and influence line, influence line for actions; shear force and bending moments of determinate beams; absolute maximum shearing forces and bending moment; influence lines for three hinged arches. (6 hrs)

**Module VI:** Analysis of structure by unit load method and conjugate beam method; Continuous and fixed beam: Theorem of three moments; analysis of fixed beams; settlement of support. (8 hrs)

### **Suggested Readings:**

1. Smith, J.C., Structural Analysis, Harpor and Row, Publishers, New York.
2. Structural Analysis I and II S.S. Bhavikatti, S.Chand Publishers
3. Theory and Problem in Structural Analysis, L.S. Negi, Tata Mcgraw Hills.
4. Structural Analysis, Ramon, v. Jarquio, CRC Press.
5. Structural Analysis, A. Ghali and A.M. Neville, CRC Press



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## CONCRETE STRUCTURE- I

Course Code: CE404

**Module I:** Study of the strength, behavior, and design of indeterminate reinforced concrete structures, Load and stresses, load combinations, Working stress and limit state approach. (4 hours)

**Module II:** Analysis and design of sections in bending – working stress and limit state method. Rectangular and T- sections, Beams with reinforcement in compression. One-way slab. Design for shear and bond, Mechanism of shear and bond failure, Design of shear using limit state concept. Development length of bars; Design of sections in torsion. Design of two-way slabs; staircase, Placement of reinforcement in slabs; (16 hours)

**Module III:** Design of stairs and staircase (6 hours)

**Module IV:** Design of compression members, Short column, Columns with uni-axial and bi-axial bending; Long columns, use of design charts (8 hours)

**Module V:** Design of foundation; Wall footing, isolated and combined footing for columns. All designs to be as per the most recent BIS standards as applicable (8 hours)

### **Suggested Readings**

2. IS 456:2000 and IS 3370 (Part IV), BIS 2000
3. Design of Reinforced Concrete Structure (Limit State), A.K Jain, Nemchand Bros.
4. Limit state design of Reinforced Concrete (II) P.C. Verghese, PHI publisher
5. Limit state Design, B.C. Punmia, Laxmi Publications



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## ELECTRONICS AND INSTRUMENTATION ENGINEERING

Course code – EC404

(For Civil , Mech.& Production Engineering).

### **Module 1: Basic Electronic Components**

Active and Passive Components, Types of resistors and Colour coding, Capacitors, Inductors applications of Resistor, Capacitor and Inductor, Relay, LDR, Basic Integrated Circuits ( IC 7805, 7809, 7812, 555 etc.). Measuring Instruments like CRO, Power supply, Multi-meters etc.

### **Module II: Semiconductors, Diode and Transistors:**

Difference between Insulators, Semiconductors and Conductors, Mobility and Conductivity, Intrinsic and Extrinsic Semiconductors, Fermi Level, Energy band, P-N Junction Diode, construction, working, characteristics and diode equation Application of Diode, Rectifier: Half Wave, Full Wave and Bridge Rectifier, Zener Diode and its Applications, Varactor Diode, Schottky Diode, Regulated Power Supply using Zener Diode and Regulated ICs, LED, Photodetector, Construction, Working, Modes and Configuration of BJT, Input and Output Characteristics of all Configurations, Comparison of all Configuration & Modes, BJT as a Switch and as an Amplifier. JFET Construction, working and characteristics. MOSFET Construction, working and Characteristics, Types of MOSFET,.

### **ModuleIII: Digital Electronics Fundamentals:**

Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K- map, Logic ICs, half and full adder/subtractor, multiplexers, demultiplexers, flip-flops, shift registers, counters, Block diagram of microprocessor/microcontroller and their applications.

### **ModuleIV: Electronic Instruments:**

Measurement of Temperature, RTD, Thermistors, LVDT, Strain Gauge, Piezoelectric Transducers, Digital Shaft Encoders, Tachometer, Hall effect sensors. Sensors and Transducers for physical parameters: temperature, pressure, torque, flow. Speed and Position Sensors. Electronic Display Device, Digital Voltmeters, Digital Energy meter, CRO, measurement of voltage and frequency, Lissajous Patterns, Plotting B-H curve of a magnetic material, Wave Analyzers, Harmonic Distortion Analyzer. Digital Energy Meter. Measurements of R, L and



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C.Digital Multi-meter, True RMS meters, Clamp-on meters, Meggers.Digital Storage Oscilloscope.

## Module V: Electronic Communication Systems:

The elements of communication system, IEEE frequency spectrum and Transmission media: wired and wireless, need of modulation, AM and FM modulation schemes, Mobile communication systems: cellular concept and block diagram of GSM system, Ultrasonic wave & its application in distance measurement.

## Text Books

1. Basic Electronics and Linear Circuits by N. N. Bhargava, D. C. Kulshreshtha and S. C. Gupta, TMH Publications.
2. Op-Amps and Linear Integrated Circuits by Ramakant A. Gayakwad, PHI Publications.
3. Electronic Devices and Circuits by Godse and Bakshi Technical, Vol-1 Technical Publication Pune.
4. Floyd ,” Electronic Devices” Pearson Education 9th edition, 2012.
5. R.P. Jain , “Modern Digital Electronics”, Tata Mc Graw Hill, 3rd Edition, 2007.
6. Frenzel, “Communication Electronics: Principles and Applications”, Tata Mc Graw Hill, 3rd Edition, 2001

## Reference Books

1. Integrated Devices & Circuits by Millman & Halkias, TMH Publications.
2. Electronics Devices and Circuit Theory by R. Boylestad & L. Nashelsky, Pearson Publication
3. Electronic Communication System by G. Kennedy, TMH Publications.
4. Basic Electronics by Sanjeev Kumar & Vandana Sachdeva, Paragaon International Publication

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## CYBER SECURITY

Course code –IT 402

**Module I: Introduction to Cybercrime :** Introduction, Cybercrime, and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, and Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

**Module II: Cyber Offenses:** How Criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

**Module III: Cybercrime :** Mobile and Wireless Devices: Introduction, Proliferation of Mobile





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and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile



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Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

**Module – IV: Tools and Methods Used in Cybercrime :** Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

**Module V: Cyber Security :** Organizational Implications Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

## TEXT BOOK:

- Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA.

## REFERENCE BOOK:

- Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
- Introduction to Cyber Security , Chwan-Hwa(john) Wu,J.David Irwin.CRC Press T&F Group

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## ENGINEERING ECONOMICS

Course code –EN 401

## COURSE OUTLINE:

The basic purpose of this course is to provide a sound understanding of concepts and principles of engineering economy and to develop proficiency with methods for making rational decisions regarding problems likely to be encountered in professional practice.

### Module -1

**Introduction of Engineering Economics and Demand Analysis:** Meaning and nature of Economics, Relation between science, engineering, technology and economics; Nature of Economic problem, Production possibility curve, Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility – its practical application and importance.



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Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve, Elasticity of demand, measurement of elasticity of demand, practical importance & applications of the concept of elasticity of demand.

## **Module -II**

Meaning of production and factors of production; Law of variable proportions, Returns to scale, Internal and External economics and diseconomies of scale.

Various concepts of cost – Fixed cost, variable cost, average cost, marginal cost, money cost, real cost, opportunity cost. Shape of average cost, marginal cost, total cost, Cost curves.

## **Module -III**

Meaning of Market, Types of Market – Perfect Competition, Monopoly, Oligopoly, Monopolistic Competition (Main features of these markets)

Pricing Policies- Entry Deterring policies, Predatory Pricing, Peak load Pricing. Product Life cycle

Firm as an organisation- Objective of the Firm, Type of the Firm, Vertical and Horizontal Integration, Diversification, Mergers and Takeovers.

## **Module -IV**

Nature and characteristics of Indian economy (brief and elementary introduction), Privatization – meaning, merits and demerits. Globalisation of Indian economy – merits and demerits. Elementary Concepts of VAT, WTO, GATT & TRIPS agreement, Business cycle, Inflation

## **RECOMMENDED BOOKS:-**

1. R.Paneer Seelvan: Engineering Economics, PHI
2. Managerial Economics, D.N.Dwivedi, Vikash Publication
3. Managerial Economics, H.L. Ahuja, S. Chand and Co. Ltd.
4. Managerial Economics, Suma Damodaran, Oxford.
5. R.molrishnd Ro T.V S 'Theory of firms : Economics and Managerial Aspects'. Affiliated East West Press Pvt Ltd New Delhi
6. Managerial Economics, H. Craig Petersen &W. Cris Lewis, Pearson Education.

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## **DISASTER PREPAREDNESS & PLANNING**

**Course Code:** CE405

**Module 1:** Introduction - Concepts and definitions: disaster, hazard, vulnerability, risks-severity, frequency and details, capacity, impact, prevention, mitigation).

**Module 2:** Disasters - Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

**Module 3:** Disaster Impacts - Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.

**Module 4:** Disaster Risk Reduction (DRR) - Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post-disaster environmental response(water, sanitation, food safety, waste management, disease control, security, communications); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

**Module 5:** Disasters, Environment and Development - Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land-use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

### **Text/Reference Books:**

1. <http://ndma.gov.in/> (Home page of National Disaster Management Authority)
2. <http://www.ndmindia.nic.in/> (National Disaster management in India, Ministry of Home Affairs).
3. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
4. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
5. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation
6. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003
7. Inter Agency Standing Committee (IASC) (Feb. 2007). IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC

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## **FLUID MECHANICS & FLUID MACHINES LAB**

**Course Code:** CE402P

### **List of Experiments**

1. To determine experimentally the metacentric height of a ship model
2. To verify the momentum equation experimentally.
3. To determine the coefficient of discharge of an orifice (or a mouth piece ) of a given shape.
4. Determine the coefficient of velocity and the coefficient and the contraction of the orifice (or the mouth piece).
5. To verify Darcy's law and to find out the coefficient of permeability of the given medium
6. To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds number,
7. To study the velocity distribution in a pipe and also compute the discharge by integrating the velocity profile.
8. To calibrate a venturimeter and to study the variation of coefficient of discharge with the Reynolds number.
9. To calibrate an orifice meter and study the variation of the coefficient of discharge with the Reynolds number.
10. To study the variation of friction factor "F" for turbulent flow in smooth and rough commercial pipes

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## **CONCRETE STRUCTURE LAB**

**Course Code:** CE404P

### **List of Experiments**

1. Initial drying shrinkage, moisture movement, and coefficient of expansion of concrete.
2. Stress strain curve of concrete.
3. Behavior of under reinforced and over reinforced R.C. beams in flexure.
4. Behavior of R.C. beams, with and without shear reinforcement in shear.
5. Bond strength between steel bar and concrete
  - a) in a beam specimen and
  - b) by pull-out test.
6.
  - a) Fineness of cement by Air Permeability method.
  - b) Soundness of cement by Le-Chatelier's Apparatus
  - c) Compressive strength of cement.
7.
  - a) water content for standard consistency of cement.
  - b) Initial and final setting times of cement.
8. Moisture content and bulking of fine aggregate
9. Fineness modulus of coarse and fine aggregates.
10. Workability of cement concrete by
  - a) Slump test, and b) compaction factor test.



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11. Concrete mix design for a given concrete strength and slump by LS.





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## **CAD BUILDING DRAWING LAB**

**Course Code:** CE406P

### **List of Experiments**

1. Introduction to AutoCAD basic commands, Code provision of IS-696 regarding Lines, Lettering and Dimensioning.
  2. Drawing of Scales (Plane Scales, Diagonal Scales, Vernier Scales and Scales of Chords),
  3. Construction of simple geometrical figures and Engineering curves.
  4. Orthographic Projections: Projection of a point situated in various quadrants, projections of straight lines, true length, true inclinations and traces of a straight lines, auxiliary projections, auxiliary inclined and Auxiliary vertical planes, projection of plane figures.
  5. Projection of simple solids, Auxiliary projection of solids, section of solids, true shape of section.
  6. Development of surfaces: prisms, pyramids, cylinders, cones, spheres, pipe bends.
  7. Isometric projection: Principles, Isometric scales, Isometric projection of plane figures and simple solids.
  8. function and types of building (Residential, Industrial and Institutional)
- Line plan. Development of plan from a line plan

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**NOTE : At least ten experiments are to be performed, minimum seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus**