

Jharkhand University of Technology
Jharkhand, Ranchi

Proposed Syllabus for B.Tech 4th Semester

Civil Engineering

Civil Engineering4th 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
Total credit						21

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

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 π - 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.

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

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

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

ModuleV: 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

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 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

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

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.

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 Detering 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.

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

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-Chatalier'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.
11. Concrete mix design for a given concrete strength and slump by LS. Code method

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

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