Jharkhand University of Technology Jharkhand, Ranchi

Proposed Syllabus for B. Tech 3rd Semester

Civil Engineering

Civil Engineering

3rd 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
Total credit						**21**

PROPOSED SYLLABUS FOR ALL BRANCHES EXCEPT CSE & IT

2nd year, III Semester, UG course Engg. & Tech Jharkhand University of Technology

BSC301 MATHEMATICS III

Module -1

Laplace Transformation: Laplace Transformation and its properties, Periodic function, Unit step function and impulse function .Inverse Laplace Transformation, Convolution Theorem, Applications of Laplace transforms in solving certain initial value problems & simultaneous differential equations. **(8L/1.5Q)**

Module-2

Numerical Method: Finite difference, Symbolic relations, Interpolation and Extrapolation, Newton - Gregory forward and backward formula, Lagrange's formula, Inverse Interpolation by Lagrange's formula. Numerical Differentiation and Numerical Integration, Newton Cotes Quadrature formula, Trapezoidal rule. Simpson's 1/3" rule, Simpson's 3/8" rule. **(10L/1.5Q)**

Module -3

Z-Transform & Inverse Z-Transform- Properties - Initial and Final value theorems, Convolution theorem- Difference equations. Solution of difference equations using Z-Transformation. **(6L/1.5Q)**

Module -4

Fourier Series & Fourier Transform: Expansion of - Algebraic, Exponential &Trigonometric functions in Fourier series, Change of interval, Even and odd function, half range sine and cosine series, Complex form of Fourier series.

Fourier Transformation and inverse Fourier Transformation, Fourier sine & cosine transforms. Convolution theorem for Fourier transforms with simple illustrations. **(8L/1.5Q)**

Module 5

Partial Differential Equations: Formation of partial differential equations, Linear partial differential equations of first order, Lagrange's linear equation, Non-linear equations of first order, Charpit's method Solution of one-dimensional Wave equation & Heat equation by the method of separation of variables and its applications. **(8L/1Q)**

Note-Question no.1 will be compulsory, objective type with 7 sub-parts comprising of the whole syllabus.

Text Books

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

Reference Books

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

CIVIL ENGINEERING MATERIALS AND CONSTRUCTIONS

Course code –CE 301

Module I: Introduction to Engineering Materials covering, Cements, M-Sand, Concrete (plain, reinforced and steel fibre/glass fibre-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 behaviour 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'(6th 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
7. American Society for Testing and Materials (ASTM),Annual Books of ASTM Standards (post 2000)
8. Civil Engineering Materials and Construction Practices, R.K.Gupta, Jain Brothers,New Delhi.

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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.
[12Hrs]

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

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 McGrawHill Publication Co. Ltd., New Delhi 2005.

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 Behaviour 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. Favourable and unfavourable 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, 8th ed. (2010), S K Kataria and sons.
2. Text Books of Engineering Geology, N.Cheena Kesavulu,2nd 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
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.

ENVIRONMENTALSCIENCE

Course code –BSC 302

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(COMMON FOR ALL BRANCH)

Module-1

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, greenhouse effect, acid rain, particles, ions and radicals in the atmosphere, chemical and photochemical reactions in the atmosphere. **(4 Hrs)**

Module-IV

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.
5. Sharma B.K Envrionmental 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.

CIVIL ENGINEERINGMATERIAL 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 Levelling 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
4. To establish a Benchmark by Check Levelling with a LOP. level and 'closing the work at the staring Bench mark.
5. To perform Fly Levelling 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).

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 outrop of rocks on a map
3. Drawing the geological sections of geological maps
4. Inter-relation of geological maps rind 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.

COMMUNICATIONSKILL 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

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 nonverbal means.

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