Detail Autonomy Syllabus

3rd Semester

Implemented from 2018 admission Batch

3rd Semester							
Sl No	**Paper Code**	**Theory**	**Contact Hours /Week**				**Credit Points**
			L	**T**	**P**	**Total**	
A. THEORY							
ES	M(CS)301	Numerical Methods	3	0	0	3	3
BS	PH(CE)301	Physics - II	2	2	0	4	3
PC	CE301	Surveying	2	1	0	3	3
PC	CE302	Strength of Material	2	1	0	3	3
PC	CE303	Building Material and Construction	2	1	0	3	3
PC	CE304	Engineering Geology	2	1	0	3	2.5
Total of Theory						**19**	**17.5**
B. PRACTICAL							
ES	M(CS)391	Numerical Methods Lab	0	0	3	3	1.5
PC	CE391	Engineering Geology Lab	0	0	2	2	1
PC	CE392	Surveying Practice	0	0	3	3	1.5
BS	PH (CE)391	Physics-II Lab	0	0	2	2	1
C.SESSIONAL							
MC	MC381	Technical Skill Development	0	0	2	2	2 Units
D.PROJECT*							
1.	**Project Code**	**Project Name**	**Contact Hours /Week**				**Credit Points**
PW	M(CS)351	Numerical Methods	1				0.5
	PH(CE)351	Physics - II	1				0.5
	CE351	Surveying	1				0.5
	CE352	Strength of Material	1				0.5
	CE353	Building Material and Construction	1				0.5
	CE354	Engineering Geology	1				0.5
Total of Theory, Practical, Sessional & Project						**35**	**22+2= 24.5**

* Student need to select any four projects (Total Credit: 0.5 x4=2)

PAPER NAME: NUMERICAL METHODS

PAPER CODE: M(CS) 301 CONTACTS : 3HRS CREDITS :3
TOTAL: 33 HRS

Prerequisite:

The students to whom this course will be offered must have the concept of (10+2) standard number system, algebra and calculus.

Course Objectives:

The purpose of this course is to provide basic understanding of the derivation and the use of the numerical methods along with the knowledge of finite precision arithmetic.

Course Outcomes (COs):
On successful completion of the learning sessions of the course, the learner will be able to:

CODES	BLOOM'S TAXONOMY	DESCRIPTIONS
M(CS) 301.1	Remember	Recall the distinctive principles of numerical analysis and the associated error measures.
M(CS) 301.2	Understand	Understand the theoretical workings of numerical techniques.
M(CS) 301.3	Apply	Apply numerical methods used to obtain approximate solutions to intractable mathematical problems such as interpolation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
M(CS) 301.4	Analyze	Select appropriate numerical methods to apply to various types of problems in engineering and science in consideration of the mathematical operations involved, accuracy requirements, and available computational resources.

Course Content

MODULE I: ***Error Analysis and Interpolation (9 Lectures)***

Approximation in Numerical Computation: Truncation and rounding errors, Propagation of errors, Fixed and floating-point arithmetic.
Interpolation: Difference Operator: Forward and Backward, Shift Operator, Newton forward interpolation, Newton backward interpolation, Lagrange's Interpolation.

MODULE II: ***Numerical Solution of Linear and Non-linear Equations (11 Lectures)***

Numerical Solution of a System of Linear Equations: Gauss elimination method, Tridiagonal matrix algorithm, LU Factorization method, Gauss-Seidel iterative method, Successive over Relaxation (SOR) method.
Solution of Polynomial and Transcendental Equations: Bisection method, Regula-Falsi, Secant Method, Newton-Raphson method.

MODULE III: ***Numerical Integration and Numerical Solution of Differential Equation (13 Lectures)***

Numerical Integration: Trapezoidal rule, Simpson's 1/3 rule, Weddle's Rule, Expression for corresponding error terms.

Numerical Solution of Ordinary Differential Equation: Taylor series method, Euler's method, Euler's modified method, fourth order Runge-Kutta method and Milne's Predictor-Corrector methods.

Numerical solution of partial differential equation: Finite Difference method, Crank–Nicolson method.

Project Domains:

1. Application of PDE and ODE in Engineering Field.
2. Application of numerical methods for the relevant field.
3. Mathematical modelling.

Text Books:

1. Shishir Gupta &S.Dey, Numerical Methods, Mc. Grawhill Education Pvt. Ltd.
2. C.Xavier: C Language and Numerical Methods, New age International Publisher.
3. Dutta& Jana: Introductory Numerical Analysis. PHI Learning
4. J.B.Scarborough: Numerical Mathematical Analysis.Oxford and IBH Publishing
5. Jain, M. K., Iyengar, S. R. K. and Jain, R. K. *Numerical Methods (Problems and Solution)*. New age International Publisher.
6. Prasun Nayek: Numerical Analysis, Asian Books

Reference Books:

1. Balagurusamy, E. *Numerical Methods*, Scitech. TMH.
2. Dutta, N. *Computer Programming & Numerical Analysis*, Universities Press.
3. Guha, S. and Srivastava, R. *Numerical Methods*, Oxford Universities Press.
4. Shastri, S. S. *Numerical Analysis*, PHI.
5. Mollah, S. A. *Numerical Analysis*, New Central Book Agency.
6. Numerical Methods for Mathematics ,Science&Engg., Mathews, PHI.
7. Rao, G. S. *Numerical Analysis*, New Age International.

CO-PO Mapping:

PO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P10**	**P11**	**P12**
M(CS) 301.1	3	1	1	-	-	-	-	-	-	-	-	1
M(CS) 301.2	3	2	1	-	-	-	-	-	-	-	-	1
M(CS) 301.3	3	2	2	-	-	-	-	-	-	-	-	1
M(CS) 301.4	3	3	2	3	-	-	-	-	-	-	-	1

PAPER NAME: PHYSICS -II

PAPER CODE: PH(CE) 301 CONTACTS: 2+2= 4HRS CREDITS: -3
TOTAL: 36 HRS
Pre requisites: Knowledge of Physics up B.Tech. 1st year Physics-I course

Course Objective: The Physics-II course will provide

- exposure to the physics of materials that are applied in civil engineering
- an insight into the science & technology of next generation and related technicalities through quantum mechanics
- advanced materials for civil engineering
- concept of fundamental particles and associated applications in semiconductors

Course Outcome:

PH (CE) 301.1: state ➢ insulating and magneticmaterials ➢ operator formalism in Quantum Mechanics ➢ categories of storagedevices ➢ various types of nanostructures and theirapplications ➢ ultrasonic sound and its industrialapplications ➢ energy bandtheory ➢ impact of defects in crystalstructure ➢ condition of good acoustics of abuilding
PH (CE) 301.2: apply the knowledge of ➢ Magnetism and semiconductors in datastorage ➢ Motion of charges under a field inCRT ➢ Band theory in explaining electron transport insolids ➢ Magnetostriction and piezoelectricity in ultrasonic sound generation anddetection ➢ Reverberation principle in design of buildingacoustics
PH (CE) 301: **analyze** ➢ Role of degenerate states in predicting energy bands ofsemiconductos ➢ Which type of magnetic materials to be used for data storagepurpose ➢ Role of quantum confinement in inducing novel feature of ananomaterial ➢ Quantum size effects and size quantization in quantum dotnanostructure
Beyond the syllabus to meet to CO: ✓ Basics of probabilityinterpretation ✓ Failures of band theory in organicsemiconductors

Module 1: Electric and Magnetic properties of materials (4L +2T)

Module 1.01:Insulating materials:

Dielectric Material: Concept of Polarization, the relation between **D, E** and **P**, Polarizability, Electronic (derivation of polarizability), Ionic, Orientation & Space charge polarization (no derivation), internal field, Claussius Mossotti equation, ferroelctric and piezoelectrics (Qualitative study).

(2L+1T)

Module 1.02: Magnetic materials and storage devices:

Magnetic Field & Magnetization M, relation between **B, H, M**. Bohr magneton, susceptibility, Diamagnetism- & Paramagnetism - Curie law (qualitative discussion), Ferromagnetism– Curie Temperature, Weiss molecular field theory (qualitative) & Curie-Weiss law, concept of θ_p , Hysteresis, Hard ferromagnets, Comparison and applications of permanent magnets (storage devices) and Soft ferromagnets (Permalloys, Ferrites etc.)

(2L+1T)

Module 2: Building Acoustics, Ultrasound and infrasound (4L+2T)

2.01: Building Acoustics: Introduction, bel, decibel-their physical significance,Reverberation, reverberation time, Sabine's formula (statement only), remedies over reverberation; Absorption of sound, absorbent materials; Conditions for good acoustics of a building; Noise, its effects and remedies.

(2L+1T)

2.02: Ultrasound-Introduction, definition and properties –Production of ultrasonics by Piezo-electric crystal and magnetostriction method; Detection of ultrasonics; Engineering & Medical applications of Ultrasonics (Non-destructive testing, cavitations, measurement of gauge). **Infrasound** – Introduction and definition, production, application: Seismography (concept only).

(2L+ 1T)

Module 3: Quantum Mechanics-II (4L+2T)

Formulation of quantum mechanics and Basic postulates- superposition principle, orthogonality of wave function, expectation value; operator correspondence, Commutator. Measurements in Quantum Mechanics-Eigen value, Eigen function, Schrödinger's equation as energy eigen value equation.

(2L +2T)

Application of Schrödinger equation – Particle in an infinite square well potential (1-D and 3-D potential well; Discussion on degenerate levels), 1D finite barrier problem and concept of quantum tunnelling (solve only $E<V_0$). **2L**

Module 4: Statistical Mechanics (4L+2T)

Concept of energy levels and energy states. Microstates, Macrostates and thermodynamic probability, MB, BE, FD, statistics (Qualitative discussions)- physical significance, conception of bosons, fermions, classical limits of quantum statistics, Fermi distribution at zero & non-zero temperature, Concept of Fermi level.

(4L+2T)

Module 5: Solid state physics (6L+2T)

5.01: Introduction to Band theory (mention qualitatively improvement over free electron theory)-Kronig-Penny model (qualitative treatment)-Energy-band (E-k) diagram, formation of allowed and forbidden energy bands, Concept of effective mass – electrons and holes, crystal momentum.

(2L+1T)

5.02: Defects: Point defects; line defects; Dislocations, Types of dislocations, planar defects, stacking faults, twins, grain boundaries, defect propagation (qualitative). (**2L)**

5.03: Vibration in solids: Lattice vibrations – Mono and diatomic lattice, concept of phonon, specific heat of solids-Dulong-Pettit law, Einstein, Debye theory (qualitative discussion).
(2L +1T)

Module 6:Physics of Nanomaterials (2L+2T)

Reduction of dimensionality, properties of nanomaterials, Quantum wells (two dimensional), Quantum wires (one dimensional), Quantum dots (zero dimensional); Quantum size effect and Quantum confinement. Carbon allotropes. Application of nanomaterials (CNT, grapheme, electronic, environment, medical).

Text / Reference Books:

1.Insulating Materials: Principles, Materials, Applications, MargitP fundstein, Roland Gellert, MartinSpitzner&AlexanderRudolphi: BirkhauserVerlagAG; 1 edition (1 April2008)
2. High Voltage and Electrical Insulation Engineering, RavindraArora, Wolfgang Mosch: Online ISBN: 9780470947906 DOI:10.1002/9780470947906, Series Editor(s): Mohamed E. El-Hawary
3. Physics of Oscillations and Waves, N.K. Bajaj ,Publisher: McGraw-Hill Education–Europe
4. Waves and oscillations, Dr.P.K Mittal&Prof Jai DEV ,Anand HarAnandpublications
5. Fundamental of Statistical Mechanics: BLaud
6. Introduction to statistical mechanics:.Pathria
7. Fundamental of Statistical and Thermal Physics: .F.Reif
8. electricity and Magnetism (In SiUnits): Berkeley Physics Course - Vol.2,Edward

MPurcell
9. Introduction to Electrodynamics-Griffiths DavidJ.
10. The Feynman Lectureson Physics. 2 (2nd ed.)Feynman, Richard P, Addison-Wesley. 11.Etching of Crystals-Theory, Experiment andApplication, K Sangwal 12.Nanostructure and Nanomaterials, B.K.Parthasarathy
13. Introduction to Nanotechnology, B.K. Parthasarathy
14. Essentials of Nano technology, RishabhAnand
15. Nano materials Handbook(Advanced Materials and Technologies)-Yury Gogotsi(Editor)
16. Introduction to Quantum Mechanics-S. N. Ghoshal(Calcutta Book House)

CO-PO mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PH (CE) 301.1	3	1	-	-	-	-	-	-	-	-	-	1
PH (CE) 301.2	3	2	-	-	-	-	-	-	-	-	-	2
PH (CE) 301.3	2	3	-	-	-	-	-	-	-	-	-	1
PH (CE) 301	2.6	2	-	-	-	-	-	-	-	-	-	1.3

PAPER NAME: SURVEYING

PAPER CODE: CE 301 CONTACTS: 2L +1T =3HRS CREDITS :3
TOTAL: 36 HRS

Pre requisites: Student should have knowledge about measurement and mathematical knowledge

Course Objective: The objective of this course is appreciate of the need for lifelong learning through the discussion of recent changes in survey procedures and equipment and also have the ability to apply knowledge of mathematics, science, and engineering to understand the measurement techniques and equipment used in surveying.

Course Outcome:

CE 301.1	Students will summarize surveying techniques that will remain correct for long period of time.
CE 301.2	Students will experiment about different methods using instrument such as Chain, Compass, Leveling, minor instruments like planimeter, etc.
CE301.3	Students will learn about Area & Volume calculation.
CE301.4	Students will evaluate about Trigonometrically leveling.
CE301.5	Students will analyze about simple & complex problems of different instrument methods of Survey.

Module-1: [1L]

Introduction: Definition, classification of surveying, objectives, principles of surveying.

Module-2: [6L+3T]

Chain surveying: Chain and its types, Optical square, Cross staff, Reconnaissance and site Location, Locating ground features by offsets – Field book. Chaining for obtaining the outline of structures, Methods for overcoming obstacles, Conventional symbols, Plotting chain survey and Computation of areas, Errors in chain surveying and their elimination: Problems.

Compass Surveying: Details of prismatic compass, Use and adjustments, Bearings, Local attraction and its adjustments. Chain and compass surveying of an area, Booking and plotting, Adjustments of traverse, Errors in compass surveying and precautions: Problems.

Module-3: [2L+1T]

Plane Table Surveying: Equipment, Orientation, Methods of Plane Tabling, Three Point Problems.

Module-4: [6L+3T]

Leveling: Introduction, Basic definitions, Detail of dumpy Level, Temporary adjustment of Levels, Sensitiveness of bubble tube; Methods of leveling – Differential, Profile & fly Leveling, Effect of curvature and refraction, Automatic levels, Plotting longitudinal sections and Cross sections; Measurement of area and volume.

Contouring: Topographic Map, Characteristics of Contour, Contour Interval. Methods of Locating
Contours, Interpolation of Contours.

Module-5: [6L+3T]

Theodolite Surveying: Components of a Transit Theodolite, Measurement of horizontal and vertical Angles, Co-ordinates and traverse Table.

Tacheometry: Definition, Details of stadia System, Determination of horizontal and vertical distance with Tacheometer- Staff held vertically and normal to the line of sight.

Module-6: [2L+1T]

Simple & Transition Curves: Definition, Degree of Curve, Elements of Simple Curve, Setting out by Linear method and Rankine's tangential method, Transition Curves.

Module-7: [1L+1T]

Introduction to Total Station with Field applications.

Text / Reference Books:

Sl No	Title	Author
1	Surveying:- Vol - I & II	B.C. Punmia
2	Surveying & Leveling	R. Subramanian (OXFORD)
3	Surveying& Leveling Vol - I [Part I & II]	T.P.Kanetkar & Kulkarni
4	Surveying:- Vol - I & II	S.K. Duggal
5	Fundamental of Engineering Survey	J.K. Ghosh (Studium Press, Roorkee)
6	Higher Surveying	Dr. A. M. Chandra
7	Surveying	R.B. Gupta & B.K. Gupta
9	Plane and Geodetic Surveying (Vol - I & II)	David Clark
10	Fundamental of Surveying	S. K. Roy
11	Surveying	Saikia & Das (PHI)

CO-PO mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE301.1	3	3	3	2	3	1	1	1	3	3	3	3
CE301.2	3	3	3	2	2	2	1	1	3	2	3	2
CE301.3	-	-	-	-	-	-	-	-	-	-	-	-
CE301.4	3	3	3	3	2	2	1	1	3	2	2	2
CE301.5	3	3	3	3	2	1	1	1	3	2	1	2
CE301	3	3	3	2.5	2.25	1.5	1	1	3	2.25	2.25	2.25

PAPER NAME: STRNGTH OF MATERIALS

PAPER CODE: CE 302 **CONTACTS: 2L +1T =3HRS** **CREDITS: 3**
TOTAL: 36 HRS

Pre requisites: Student should have the knowledge about Elements of Civil Engineering & Mechanics.

Course Objective: The objective of this course is elaborate on the knowledge of engineering mechanics (statics) and to teach the students the purpose of studying strength of materials with respect to civil engineering design and analysis. The course introduces the students to the concepts of engineering mechanics of materials and the behavior of the materials and structures under applied loads.

Course Outcome:

CE 302.1	Interpret the concepts of stress and strain at a point as well as the stress-strain relationships for homogenous, isotropic materials.
CE 302.2	Analyze the stresses and strains associated with thin-wall spherical and cylindrical pressure vessels.
CE 302.3	Demonstrate the capability to conduct experiments, as well as to analyze and interpret data
CE 302.4	Ability to classify a component to meet desired needs within realistic constraints of safety.

Module-1: [4L+2T]

Review of Basic Concepts of Stress and Strain: Normal stress, Shear stress, Bearing stress, Normal strain, Shearing strain; Hooke's law; Poisson's ratio; Stress-strain diagram of ductile and brittle materials; Elastic limit; Ultimate stress; Yielding; Modulus of elasticity; Bulk Modulus: Factor of safety. Beam Statics: Support reactions, concepts of redundancy, axial force, shear force and bending moment diagrams for concentrated, uniformly distributed, linearly varying load, concentrated moments in simply supported beams, cantilever and overhanging beams

Module-2: [6L+3T]

Symmetric Beam Bending: Basic kinematic assumption, moment of inertia, elastic flexure formulae and its application, Bending and shear stress for regular sections, shear centre, centre of gravity [3L+2T]

Deflection of statically determinate beams: Fundamental concepts: Elastic curve, moment Curvature relationship, governing differential equation, boundary conditions: Direct integration solution [3L+1T]

Module-3: [7L+3T]

Analysis of determinate plane trusses: Concepts of redundancy, Analysis by method of joints, Method of sections. [3L+1T]

Two Dimensional Stress Problems: Principal stresses, maximum shear stresses, Mohr's circle of stresses, construction of Mohr's circle, applications. [4L+2T]

Module-4: [7L+4T]

Introduction to thin cylindrical & spherical shells: Hoop stress and meridonial - stress and volumetric changes. [2L+2T]

Torsion: Pure torsion, torsion of circular solid shaft and hollow shafts, torsional equation, torsional rigidity, closed coil helical; springs [2L+1T]

Columns: Fundamentals, criteria for stability in equilibrium, column buckling theory, Euler's load for columns with different end conditions, limitations of Euler's theory – problems, eccentric load and secant formulae. [3L+1T]

Text / Reference Books:

Sl No	Name	Author	Publisher
1	Elements of Strength of Material	S. P. Timoshenko & D. H.	EWP Pvt. Ltd
2	Engineering Mechanics of Solids	E. P. Popov	Pearson Education
3	Strength of Materials	R. Subramanian	OXFORD University Press
4	Strength of Material	S S Bhavikatti	Vikas Publishing House Pvt. Ltd
5	Engineering Mechanics I by	J. L. Mariam	John Willey
6	Engineering Mechanics	I. H. Shames	PHI
7	Fundamentals of Strength of Material	Nag & Chandra	WIE

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE302.1	3	3	3	3	-	-	-	-	-	1	-	2
CE302.2	3	3	3	2	1	-	-	-	-	1	-	3
CE302.3	2	3	3	3	1	1	-	-	1	1	1	2
CE302.4	3	2	3	3	1	-	2	-	-	-	-	1
CE302	2.75	2.75	3	2.75	1	1	2	-	1	1	1	2

PAPER NAME: BUILDING MATERIAL AND CONSTRUCTION

PAPER CODE: CE303 CONTACTS: 2L +1T =3HRS CREDITS: 3
TOTAL: 36 HRS

Pre requisites: No Pre Requisite required (NPR)

Course Objective: The objective of this course is know the student about the basic building materials, properties and their applications., to know the smart building materials, external paints and their uses to understand different types of masonries and their applications

Course Outcome:

CE 303.1	Students will summaries basic knowledge about various kind of materials used in construction work.
CE 303.2	Students will differentiate about different types of building foundation i.e. shallow and deep foundation, their mechanisms and uses.
CE 303.3	summaries knowledge about various structural members of a building like-walls, door, window, stair, flooring, roof etc.
CE 303.4	Extend to apply their knowledge at the time of decision making for application of structural member including material used.

Module-1: [6L+3T]

Bricks: Classification, Characteristics of good bricks, Ingredients of good brick earth, Harmful substance in brick Earth, Different forms of bricks, testing of bricks as per BIS. Defects of bricks. Fly ash bricks [2L+1T]

Aggregates: Classification, Characteristics, Deleterious substances, Soundness, Alkali – aggregates reaction, Fine aggregates, coarse aggregates, testing of aggregates [2L+1T]

Lime: Impurities in limestone, Classification, Slaking and hydration, Hardening, Testing, Storage, Handling, **Cement:** OPC: Composition, PPC, Slag cement, Hydration, setting time **Concrete**: Types, ingredients, W/C ratio, Workability, Different grades in cement concrete, Tests on cement concrete [2L+1T]

Module -2: [6L+3T]

Mortars: Classification, Uses, Characteristics of good mortar, Ingredients. Cement mortar, Lime mortar, Lime cement mortar, special mortars [2L+1T]

Wood and Wood Products: Classification of Timber, Structure, Characteristics of good timber, Seasoning of timber, Defects in Timber, Diseases of timber, Decay of Timber, Preservation of Timber Testing of Timber, Veneers , Plywood, Fibre Boards, Particle Boards, Chip Boards , Black Boards, Button Board and Laminated Boards, Applications of wood and wood products [2L+1T]

Paints, Enamels and Varnishes: Composition of oil paint, characteristic of an ideal paint, preparation of paint, covering power of paints, Painting: Plastered surfaces, painting wood, surfaces, painting metal Surfaces. Defects, Effect of weather, enamels, distemper, water wash and colour wash, Varnish, French Polish, Wax Polish. **Miscellaneous Materials**: Gypsum: Classification, Plaster of Paris, Heat and sound insulating materials, Geo-synthetics [2L+1T]

Module -3: [6L+3T]

Foundations: Function of Foundations, Essential requirement of good foundation, Different types of shallow and deep Foundations. Uses of Spread foundation, pile and well foundation [2L+1T]

Brick masonry: Definitions, Rules for bonding, Type of bonds – stretcher bond, Header bond, English bond, Flemish Bond, Comparison of English Bond and Flemish Bond (one and one and half brick thick wall). Cavity wall [2L+1T]

Wall, Doors and Windows: Load bearing wall, Partition wall, Reinforced brick wall Common types of doors and windows of timber and metal [2L+1T]

Module -4 [6L+3T]

Stairs: Technical Terms, Requirements of good stair, Dimension of steps, Classification, Geometric design of a dog legged stair case, Elevation and cross section of different type of stair cases. [2L+1T]

Flooring: Components of a floor, selection of flooring materials, Brick flooring, Cement concrete flooring, mosaic, marble, Terrazzo flooring, Tiled roofing [2L+1T]

Plastering and Pointing: Plastering with cement mortar, Defects in plastering, pointing, white washing, colour washing, Distempering, **Roofs:** Types, Pitched roofs and their sketches, Lean – to roof, coupled and collared roofs, King Post – Truss, Queen post truss and Simple steel Truss , Roof Covering materials: AC sheets GI sheet [2L+1T]

Text / Reference Books:

Sl no	Name	Author	Publisher
1	Building Materials	S.K. Duggal	
2	Building Materials	P.C. Varghese	PHI
3	Engineering Materials	S.C. Rangwala	
4	Concrete Technology	M. S. Shetty	
5	Concrete Technology[	A.M. Nevile & J.J. Brooks	Pearson Education
6	Building Construction		
7	Building Construction and Foundation Engineering		

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE303.1	3	2	-	-	-	1	-	-	-	-	-	-
CE303.2	2	3	1	-	-	-	-	-	-	-	-	-
CE303.3	3	2	1	-	-	-	-	-	-	-	-	-
CE303.4	2	3	1	-	-	-	-	-	-	-	-	-
CE303	2.5	2.5	1	-	-	-	-	-	-	-	-	-

PAPER NAME: ENGINEERING GEOLOGY

PAPER CODE: CE 304 CONTACTS: 2L +1T =3HRS CREDITS :2.5
TOTAL: 24 HRS
Pre requisites: Basic knowledge of Geography & Earth Science

Course Objective:
To make the students knowledgeable to understand , apply and explore Geological parameters, Rock and other materials and activity related to earth science.

Course Outcome:

CE304.1	Students will have knowledge about Engineering properties of Rocks and their Minerals.
CE304.2	Student will be appraised about Dam, reservoir, tunnel
CE304.3	Student will understand about Earthquake phenomena.
CE304.4	Student will able to carry out Physical exploration
CE304.5	Student will able to estimate various geological parameters by use of modern tools & techniques

Module-1: [1L+1T]

Geology and its importance in Civil Engineering

Module-2: [1L+1T]

Mineralogy: Definition, internal and external structure of minerals, Classification and physical properties of minerals.

Module-3: [2L+1T]

Classification of rocks:

a) Igneous rocks: Origin, mode of occurrence, forms & texture, classification and engineering importance.

b) Sedimentary rocks: Process of sedimentation, classification and engineering importance.

c) Metamorphic rocks: Agents and types of metamorphism, classification and engineering importance.

Module-4: [1L]

Weathering of rocks: Agents and kinds of weathering, soil formation & classification based on origin.

Module-5: [1L]

Geological work of rivers: Origin and stages in the system, erosion, transportation and deposition. [1L]

Module-6: [2L+1T]

Structural geology: Introduction to structural elements of rocks, dip & strike, definition, description, classification of folds, faults and joints, importance of geological structures in Civil Engineering.

Module-7: [1L+1T]

Earthquakes and seismic hazards: Causes and effects, seismic waves and seismographs, Mercelli's intensity scale and Richter's scale of magnitude

Module-8: [1L+1T]

Engineering properties of rocks: Porosity, permeability, compressive strength, tensile strength and abrasive resistance

Module-9: [1L+1T]

Rocks as construction materials: Qualities required for building and ornamental stones, foundations, concrete aggregate, railway ballast, road metal, pavement, flooring and roofing

Module-10: [1L+1T]

Geophysical exploration: Methods of Geophysical Exploration, electrical resistivity method field procedure –sounding and profiling, electrode configuration, interpretation of resistivity data. Geophysical surveys in ground water and other Civil Engg. Projects.

Module-11: [1L+1T]

Applied Geology: Surface and subsurface geological and geophysical investigations in major Civil Engg. Projects. Geological studies of Dams and reservoir sites, Geological studies for selection of tunnels and underground excavations.

Module-12: [1L+1T]

Landslides: Types of landslides, causes, effects and prevention of landslides

Text / Reference Books:

Sl no	Name	Author	Publisher
1	Engineering and General Geology	Parvin Singh	Katson publishing house Delhi 1987
2	Engineering Geology for Civil Engineers	D. Venkat Reddy	Oxford, IBH, 1995.
3	Principles of petrology	Tyrell	Asia, Bombay
4	Structural Geology	Marland P. Billings	Wiley eastern Prentice-Hall, U.S.A.
5	Ground Water hydrology	Todd D.K.	John Wiley & Sons, Second edition, 1980.

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE304.1	3	2	1	2	1	-	1	1	1	1	1	2
CE304.2	3	2	1	2	1	-	1	1	1	1	1	2
CE304.3	3	2	2	2	2	1	1	1	1	1	1	-
CE304.4	3	3	3	3	3	-	-	1	-	2	1	1
CE304.5	3	2	1	3	3	2	1	1	2	2	1	2
CE304	3	2.2	1.6	2.4	2	1.5	1	1	1.25	1.4	1	1.75

Subject Name: Numerical Methods Lab
COE: M(CS) 391
Credit: 1.5
Total Contact hour: 30

Prerequisite: Any introductory course on programming language (example. C/ Matlab).

Course Objective: The purpose of this course is to provide basic programming skills for solving the problems in numerical methods.

Course Outcomes (COs):
On successful completion of the learning sessions of the course, the learner will be able to:

CODES	BLOOM'S TAXONOMY	DESCRIPTIONS
M(CS) 391.1	Understand	Understand the theoretical workings of numerical techniques with the help of C/ Matlab
M(CS) 391.2	Apply	Execute basic command and scripts in a mathematical programming language
M(CS) 391.3	Apply	Apply the programming skills to solve the problems using multiple numerical approaches.
M(CS) 391.4	Analyze	Analyze if the results are reasonable, and then interpret and clearly communicate the results.

Course Content:

1. Assignments on Newton forward /backward, Lagrange's interpolation, Sterling & Bessel's Interpolation formula, Newton's divided difference Interpolation.

2. Assignments on numerical integration using Trapezoidal rule, Simpson's 1/3 rule.

3. Assignments on numerical solution of a system of linear equations using Gauss elimination, Tridiagonal matrix algorithm, Gauss-Seidel iterations. Successive over Relaxation (SOR) method, LU Factorization method.

4. Assignments on numerical solution of Algebraic Equation by Bisection method, Regula-Falsi method, Secant Method, Newton-Raphson method

5. Assignments on ordinary differential equation: Euler's method, Euler's modified method, Runge-Kutta methods, Taylor series method and Predictor-Corrector method.

6. Assignments on numerical solution of partial differential equation: Finite Difference method, Crank–Nicolson method.

7. Implementation of numerical methods on computer through C/C++ and commercial Software Packages: Matlab / Scilab / Labview / Mathematica/NAG (Numerical Algorithms Group)/Python.

CO-PO Mapping:

PO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P10**	**P11**	**P12**
M(CS) 391.1	3	2	1	-	-	-	-	-	-	-	-	1
M(CS) 391.2	3	2	2	-	-	-	-	-	-	-	-	1
M(CS) 391.3	3	2	2	-	-	-	-	-	-	-	-	1
M(CS) 391.4	3	3	2	3	-	-	-	-	-	-	-	1

PAPER NAME: ENGINEERING GEOLOGY LAB

PAPER CODE : CE 391 CONTACTS : 2P =2HRS CREDITS :1

Pre requisites: Student should have the knowledge about Engineering geology theory.

Course Objective:

To make the students capable to identify and study properties of rock and minerals. They also should be able to use modern tools line microscope.

Course Outcome:

CE392.1	Student should acquire knowledge about engg. properties of rocks and their minerals.
CE392.2	Student should be able to identify rocks and minerals
CE392.3	Student should be able to use modern tools live microscope to explore samples.
CE392.4	Student should be able to interpret map.

Identification of Rocks and Minerals [Hand Specimens]

Identification of Rocks and Minerals [Hand Specimens]

Study of Geological maps, interpretation of geological structures

Thickness problems, Borehole problems

Text / Reference Books:

Sl no	Name	Author	Publisher
1	Engineering and General Geology	Parvin Singh	Katson publishing house Delhi 1987
2	Engineering Geology for Civil Engineers	D. Venkat Reddy	Oxford, IBH, 1995.
3	Principles of petrology	Tyrell	Asia, Bombay
4	Structural Geology	Marland P. Billings	Wiley eastern Prentice-Hall, U.S.A.
5	Ground Water hydrology	Todd D.K.	John Wiley & Sons, Second edition,1980.

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE392.1	3	2	1	2	1	-	1	1	1	1	1	1
CE392.2	3	2	2	3	2	1	2	-	1	1	-	1
CE392.3	2	2	1	3	3	2	-	1	1	1	1	1
CE392.4	2	2	2	1	1	3	1	1	-	1	-	1
CE392	2.5	2	1.5	2.25	1.75	2	1.33	1	1	1	1	1

PRACTICAL SUBJECT NAME: SURVEYING PRACTICE
PAPER CODE: CE392 CONTACTS: 3P=3HRS CREDITS: 1.5

Pre requisites: Student should have knowledge about the basic Basic Survey Theory

Course Objective: Student will be able to to function as a member of a team and Have the ability to use techniques, skills, and modern engineering tools necessary for engineering practice.

Course Outcome:

CE 491.1	To interpret horizontal measurement with the help of Chain & Compass Surveying in the field.
CE491.2	To enumerate about Plane Table surveying.
CE491.3	To estimate vertical measurement with the help of Leveling in the field.
CE491.4	To apply indirect methods& demonstration of minor instruments.

Chain surveying

Preparing index plans, Location sketches, Ranging, Preparation of map, Getting outline of the structures by enclosing them in triangles/quadrilaterals, Distance between inaccessible points, Obstacles in chain survey.

Compass surveying

Measurement of bearings, Preparation of map, Distance between two inaccessible points by chain and compass, Chain and compass traverse

Plane Table survey

Temporary adjustments of plane table and Radiation , Intersection, Traversing/Resection methods.

Leveling

Reduced Level calculation with Dumpy and Auto level for Differential leveling, Profile leveling and plotting the profile,

Contouring:

Direct contouring, Indirect contouring(Method of Interpolation).

Theodolite Traversing byusing Theodolite. Measurements of Horizontal & Vertical angles.

Circular Curves- Setting outof Simple Circular Curves.

Text / Reference Books:

Sl No.	Title	Author
1	Surveying:- Vol - I & II	B.C. Punmia
2	Surveying & Leveling	R. Subramanian (OXFORD)
3	Surveying& Leveling Vol - I [Part I & II]	T.P.Kanetkar & Kulkarni
4	Surveying:- Vol - I & II	S.K. Duggal
5	Fundamental of Engineering Survey	J.K. Ghosh (Studium Press, Roorkee)
6	Higher Surveying	Dr. A. M. Chandra
7	Surveying	R.B. Gupta & B.K. Gupta
9	Plane and Geodetic Surveying (Vol - I & II)	David Clark
10	Fundamental of Surveying	S. K. Roy
11	Surveying	Saikia & Das (PHI)

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 491.1	3	2	3	-	-	2	1	1	3	2	2	1
CE 491.2	3	3	3	-	-	2	1	1	3	3	3	-
CE 491.3	3	3	3	-	-	2	1	1	3	2	3	1
CE 491.4	3	3	3	-	-	2	1	1	3	3	3	2
CE 491	3	2.75	3	-	-	2	1	1	3	2.25	275	1.33

PAPER NAME: PHYSICS-II LAB

PAPER CODE: PH (CE) 391 **CONTACT:** 2HRS **CREDITS: 1**

Pre requisites: Knowledge of Physics upto B. Tech. 1st year Physics-I course

Course Objective:

The Physics-II course will provide

- exposure to the physics of materials that are applied in civil engineering
- an insight into the science & technology of next generation and related technicalities through quantum mechanics
- advanced materials for civil engineering
- concept of fundamental particles and associated applications in semiconductors

Course Outcome:

At the end of the course students would be able to :

PH(CE)391.1:demonstrate ✓ Dipolar magnetic behaviour ✓ Action of capacitors ✓ Fermi levels and band gap in a semiconductor ✓ Function of Light emitting diode ✓ Magnetic and semiconductor storage devices ✓ Motion of electron under cross fields
PH(CE)391.2:conduct experiments using ➢ Insulators, Semiconductors (extrinsic and intrinsic), Light emitting diodes ➢ Cathode ray oscilloscope ➢ Various types of magneticmaterials ➢ Determination of velocity of ultrasonic wave using piezoelectric crystal
PH(CE)391.3:Function effectively as an individual, and as a member or leader in laboratory sessions
PH(CE)391.4: communicate effectively, **write reports and make effective presentation using available technology** ➢ on presentation of laboratory experiment reports ➢ on presentation of innovative experiments

***At least 7 experiments to be performed during the semester**

Experiments on Module 1: Electric and Magnetic properties of materials (7L)

1. Study of dipolar magnetic field behavior.
2. Study of hysteresis curve of a ferromagnetic material using CRO.
3. Use of paramagnetic resonance and determination of Lande-g factor using esr setup.
4. Measurement of Curie temperature of the given sample.
5. Determination of dielectric constant of given sample (frequency dependent)/Measurement of losses in a dielectric using LCR circuits.

Experiments on Module 2: Building Acoustics, Ultrasound and infrasound (6L)

6. Determination of velocity of ultrasonic wave using piezoelectric crystal.

Experiments on Module 3: Quantum Mechanics-II (7L)

7. Determination of Stefan's radiation constant.
8. To study current-voltage characteristics, load response, areal characteristics and spectral response of photo voltaic solar cells & measurement of maximum workable power.
9. Measurement of specific charge of electron using CRT.

Experiments onModule 5: Solid state physics (8L)

10. Study of lattice dynamics.
11. Determination of band gap of a semiconductors/thermistor/four probe method.
12. Determination of Hall co-efficient of a semiconductor and measurement of Magnetoresistance of a given semiconductor

In addition to regular 7 experiments it is **recommended that each student should carry out at least one experiment beyond the syllabus/one experiment as Innovative experiment.

Probable experiments beyond the syllabus:

1. Determination of thermal conductivity of a bad conductor by Lees and Chorlton's method.
2. Determination of thermal conductivity of a good conductor by Searle's mothod.
3. Study of I-V characteristics of a LED.
4. Study of I-V characteristics of a LDR
5. Study of transducer property: Determination of the thermo-electric power at a certain temperature of the given thermocouple.

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PH (CE) 391.1	3	2	-	-	-	-	-	-	-	-	-	1
PH (CE) 391.2	1	2	-	3	-	-	-	-	-	-	-	1
PH (CE) 391.3	1	2	-	-	-	-	-	-	3	-	-	1
PH (CE) 391.4	1	2	-	-	-	-	-	-	-	3	-	1
PH (CE) 391	1.5	2	-	3	-	-	-	-	3	3	-	1