



Shirpur Education Society's

**R. C. Patel Institute of Technology, Shirpur
(An Autonomous Institute)**

**Course Structure and Syllabus
Second Year B. Tech (Civil Engineering)**

With effect from Year 2021-22



Shahada Road, Near Nimzari Naka, Shirpur, Maharashtra 425405 Ph: 02563 259802,
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R. C. PATEL
INSTITUTE OF TECHNOLOGY
An Autonomous Institute

Department of Civil Engineering

Vision of the Institute

To become a leading Institute in Technical education fostering innovation, research, ethical values, and sustainable development for the betterment of society.

Mission of the Institute

To impart high quality Technical Education through:

- M1.** Innovative and Interactive learning process and high quality, globally recognized instructional programs.
- M2.** Fostering a collaborative scientific temper among students with ethical responsibility towards the society.
- M3.** Preparing students from diverse backgrounds to have aptitude for employment, entrepreneurship and research with a spirit of Professionalism.
- M4.** To contribute to nation's sustainable development.

Vision of the Civil Engineering

To provide quality Civil engineering education with socio-moral values catering to the need of nation and globe.

Mission of the Civil Engineering

M1: Provide civil engineering education with technical and ethical excellence.

M2: Empower students through innovation, research, and sustainable engineering design.

M3: Prepare civil engineers with research skills and entrepreneurial career mindset.

Program Educational Objectives (PEOs) of the Department

PEO 1 Graduates will apply scientific, mathematical, and engineering principles to solve complex civil problems ethically and sustainably.

PEO 2 Graduates will design and implement resilient civil solutions addressing societal needs through innovation, collaboration, and environmental responsibility.

PEO 3 Graduates will exhibit professional competence, communication, teamwork, and lifelong learning for career advancement, entrepreneurship, and higher education.



**R. C. PATEL
INSTITUTE OF TECHNOLOGY**
An Autonomous Institute

Department of Civil Engineering

Program Specific Outcomes (PSOs)

PSO 1- Graduates will apply core Civil Engineering principles to survey, plan, analyze, design, and manage infrastructure systems using innovative, sustainable, and efficient approaches for real-world challenges.

PSO 2- Graduates will uphold ethical professional practice, collaborate effectively in teams, and communicate clearly to enhance employability skills while fostering entrepreneurial ventures in diverse civil engineering contexts.

Semester-III													
S. No.	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme					Total	Credit
				L	T	P	Continuous Assessment (CA)				ESE		
							TA	Term Test 1 (TT1)	Term Test 2 (TT2)	Average (TT1 & TT2)			
							[A]			[B]	[C]	[A+B+C]	
1	BS	BSCE3010T	Engineering Mathematics-III	3	1		20	15	15	15	65	100	4
2	ES	ESCE3020T	Mechanics of Solids	3	1		20	15	15	15	65	100	4
3	ESL	ESCE3020L	Mechanics of Solids Laboratory			2	25				25	50	1
4	PC1	PCCE3030T	Surveying-I	2			20	15	15	15	65	100	2
5	PC1L	PCCE3030L	Surveying-I Laboratory			2	25				25	50	1
6	PC2	PCCE3040T	Concrete Technology	3			20	15	15	15	65	100	3
7	PC2L	PCCE3040L	Concrete Technology Laboratory			2	25				25	50	1
8	PC3	PCCE3050T	Building Construction & Materials	2			20	15	15	15	65	100	2
9	HM	HMCE3060T	Introduction to Civil Engineering	1			20					20	1
10	HM	HMCE3060L	Introduction to Civil Engineering			4	25				25	50	2
11	PJ	PJCE3070L	Semester Project -I			2	25				25	50	1
12	MC	MCCE3080T	Constitution of India	1									Audit
13	INT	INTCE3090	@ Field/Internship/Industry Training										Audit
Total				15	2	12	245	75	75	75	450	770	22
@ Minimum 6 weeks Filed/Industry/internship should be done during winter/summer vacation of semester III to IV Evaluation will be done in semester VII.													

@ Minimum 6 weeks Field/Industry/internship should be done during winter/summer vacation of semester III to IV Evaluation will be done in semester VII.

Prepared by

 Dean Academic/Dy. Director

Checked by

 C.O.E.



BOS Chairman

 Director

SEM- IV														
S. No.	Course Category	Course Code	Course Title	L	T	P	TA [A]	TT1	TT2	TT1&TT2 [B]	ESE [C]	Total	Credit	Remarks
1	BS	BSCE4010T	Engineering Mathematics-IV	3	1		20	15	15	15	65	100	4	
2	PC1	PCCE4020T	Fluid Mechanics	3	1		20	15	15	15	65	100	4	
3	PC1L	PCCE4020L	Fluid Mechanics Laboratory			2	25				25	50	1	
4	PC2	PCCE4030T	Surveying-II	2			20	15	15	15	65	100	2	
5	PC2L	PCCE4030L	Surveying-II Laboratory			2	25				25	50	1	
6	ES	ESCE4040T	Building Planning & Design	2			20	15	15	15	65	100	2	
7	ESL	ESCE4040L	Building Planning & Design Laboratory			2	25				25	50	1	
8	PC4	PCCE4050T	Structural Analysis	3	1		20	15	15	15	65	100	4	
9	HM	HMCE4060T	Universal Human Values	2			20	15	15	15	65	100	2	
10	PJ	PJCE4070L	Semester Project-II			2	25				25	50	1	
11	HM	HMCE4080L	Employability skills development program-I			2	50					50	1	
12	INT	INTCE4090	@ Field/Internship/Industry Training									Audit		
Total				16	3	10	270	90	90	90	490	850	23	
@ Minimum 6 weeks internship should be completed during the winter/summer vacation of Semester IV and V. Evaluation will be conducted in Semester VI.														

Prepared by

Dean Academic/Dy. Director

Checked by

C.O.E.



BOS Chairman

Director

SEM

III

Program : Civil Engineering	SY BTECH	Semester: III
Engineering Mathematics-III (BSCE3010T)		

Prerequisites: Calculus, Complex Numbers, Partial Derivatives, Mean, Mode, Median

Course Objectives

1 To provide sound foundation in the mathematical fundamentals necessary to formulate, solve and analyses engineering problems.

2 To study the basic principles of Laplace Transform, Fourier Series, Complex variables

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Use Laplace and inverse Laplace Transform to the Ordinary Differential Equations	3	Apply
CO2	Identify analytic and harmonic functions and solve real integrals using complex integration	1	Remember
CO3	Find Fourier Series of periodic functions and simplify infinite series	1	Analyze
CO4	Solve certain partial differential equations analytically and numerically	3	Apply
CO5	Correlate different variables of data	1	Analyze

Course Content

Unit-I Laplace, Inverse Laplace Transform and its applications

9 Hrs

LT of standard functions such as $1, t^n, e^{at}, \sin at, \cos at$, Heaviside Unit step function, Dirac Delta function, Periodic functions Linearity property of Laplace Transform, First Shifting property, Second Shifting property, Change of Scale property of L.T. (without proof). $f(t) \leftrightarrow F(s)$, $f(at) \leftrightarrow \frac{1}{a}F(\frac{s}{a})$ Linearity property, Partial fractions method and convolution theorem. Applications to solve ordinary differential equations with one dependent variable with given boundary conditions

Unit-II Complex Variables, Differentiation and Integration 13 Hrs

Analytic functions, Cauchy-Riemann equations in Cartesian and polar coordinates (only statement) Milne-Thomson method to determine analytic function when its real or imaginary or its combination is given. Harmonic function, orthogonal trajectories Bilinear Transformation with fixed points, cross-ratio, Line integral, Cauchy's theorem for analytic function, Cauchy's integral formula (all without proof) Taylor's and Laurent's series Residue at removable singularity, poles and isolated singularity and its evaluation. Residue theorem, application to evaluate real integral of type $\int_0^{2\pi} f(\cos \theta, \sin \theta) d\theta$, $\int_0^{\infty} f(x) dx$

Unit-III Fourier Series

7 Hrs

Fourier series of periodic function with period 2π & $2l$. Even and odd functions, Half range sine and cosine series, Parseval's identities (without proof) Complex form of Fourier series. Orthogonal and Orthonormal functions.

Unit-IV Partial Differential Equations

7 Hrs

Partial Differential Equations Numerical Solution of PDE using Bender-Schmidt Method and Crank-Nicolson method Partial differential equations governing transverse vibrations of an elastic string its solution using Fourier series. Heat equation, steady-state configuration for heat flow (For Self-Study)

Correlation-Karl Pearson's coefficient of correlation, Spearman's Rank correlation, Regression analysis-lines of regression Curve fitting by the method of least squares- fitting of the curves of the form, $y = ax + b$, $y = ax^2 + bx + c$ and $y = ebx$

Reference Books

- Higher Engineering Mathematics, B.V. Ramana, McGraw Hill Education, New Delhi
- Complex Variables: Churchill, Mc-Graw Hill
- Integral Transforms and their Engineering Applications, Dr B. B. Singh, Synergy Knowledge-ware, Mumbai
- Numerical Methods, Kandasamy, S. Chand & CO
- Fundamentals of Mathematical Statistics by S.C. Gupta and Kapoor

Text Books

- Higher Engineering Mathematics, Dr B. S. Grewal, Khanna Publication
- Advanced Engineering Mathematics, E Kreyzig, Wiley Eastern Limited

Program : Civil Engineering	SY BTECH	Semester: III
Mechanics of Solids (ESCE3020T)		
Mechanics of Solids Laboratory (ESCE3020L)		

Prerequisites: Basic concepts of engineering mechanics

Course Objectives

- 1 Student will able to understand the effect of external action on elastic body.
- 2 Student will understand the different engineering properties of the materials.
- 3 Student will able to analyze the stress, strain and deformation of elastic bodies under external actions.
- 4 Student will able to compute design forces

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Remember stress - strain behavior and other physical properties of material, Compute type of stresses in determinate, indeterminate, structures	1	Remember
CO2	Develop bending and shear stress diagram for various cross sections of beam	2	Understand
CO3	Determine the torsional stresses and stresses due to strain energy for different loading conditions	5	Evaluate
CO4	Plot axial force diagram, Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) for determinate structural elements.	3	Apply
CO5	Analyze axially and eccentrically loaded column, Explain the concept of principal stresses due to combined loading and able to compare the values of analytical and graphical (Mohr's circle) method	4	Analyze

Course Content

Unit-I	Simple Stresses and Strains	8 Hrs
Definitions of stress, strain, modulus of elasticity, modulus of rigidity, bulk modulus, and yield stress, ultimate stress, factor of safety and shear stress. Hooke's law, and stress – strain relationship, Poisson ratio, bars of varying sections, stress due to self-weight. Composite sections, volumetric strain, elastic constants and relations between them, temperature stresses.		
Unit-II	Bending and Shear Stresses	8 Hrs
Concept and determination of Moment of Inertia for various cross-section Stress due to bending: theory of simple or pure bending, Assumptions, derivation of flexure formula, bending stress distribution diagrams, Moment of Resistance of cross-section. b) Shear stresses in beams: concept of shear, complimentary shear, derivation of shear stress formula, shear stress distribution for various cross sections, maximum and average shear stress for circular and rectangular sections and shear connectors.		
Unit-III	Torsion and Strain Energy	8 Hrs
a) Torsion of circular shafts: Theory of pure torsion, torsional moment of resistance, power transmitted by shafts, torsional rigidity, shear stresses in shafts due to torsion, stress & strain in determinate shafts of hollow or solid cross-sections. b) Strain energy and impact: concept of strain energy, expression of strain energy for axially loaded member under gradual, sudden and impact loads. Strain energy due to self-weight.		
Unit-IV	Shear Force and Bending Moment Diagram	10 Hrs
a) Concept of shear force and bending moment Relation between shear force, bending moment and intensity of loading. Shear force and bending moment diagrams for cantilevers, simple and compound beams due to concentrated, uniformly distributed, uniformly varying loads and couples in determinate beams. b) Bending moment and loading diagram from given shear force diagram. Shear force and loading diagram from given bending moment diagram. vibrations of an elastic string its solution using Fourier series. Heat equation, steady-state configuration for		

heat flow (For Self-Study)

Unit-V

Axially Loaded Columns, Principal Stresses and Strains 8 Hrs

a) Axially loaded columns: concept of critical load and buckling, Euler's formula for buckling load with hinged ends, concept of equivalent length for various end conditions, Rankine's formula, safe load on column and limitations of Euler's formula. b) Direct and bending stresses for eccentrically loaded short column, the middle third rule. Resultant stress diagrams due to axial loads, uni-axial, and bi-axial bending concept of core of section for solid and hollow rectangular and circular sections.

Reference Books

- S. Timoshenko and Young, Engineering Mechanics, Tata McGraw Hill, 2013. (ISBN: 9781259062667/125906266X).
- W. A. Nash Strength of Material, Schaum's Outline Series, McGraw Hill, 4th edition, 1998. (ISBN- 9780071830805/978-0071830805).
- S. Timoshenko and Gere, Mechanics of Materials, PWS Publication Co. Ltd., 3rd edition, 1997. (ISBN-0534921744/9780534921743).
- G.H. Ryder, Strength of Materials, Prentice Hall Publications, 3rd edition, 2002. (ISBN: 9780333935361/0333935365).

Text Books

- S.S. Bhavikatti, Strength of Material, Vikas Publishing House Pvt. Ltd, 3rd edition, 2013. (ISBN: 9789325971578/9325971577).
- R.K. Rajput, Strength of Materials, S. Chand Publications. 7th Edition, 2018, (ISBN)
- R.K. Bansal “Strength of Materials”, Laxmi Publications. 6th Edition, 2018 (ISBN- 10: 9788131808146, ISBN-13: 978-8131808146)
- S Ramamrutham “Strength of Materials”, Dhanpat Rai Publications. 2017, ISBN-10: 9352164385, ISBN-13: 978-9352164387

List of experiments

Term work shall consist of performing experimental sets from the list below.

1. Tensile test on Mild steel.
2. Shear test on Mild steel.
3. Torsion test on Mild steel.
4. Compression test on wood or concrete
5. Rockwell hardness test on different metals.
6. To determine impact strength of steel. (By Izod test)
7. To determine impact strength of steel. (By Charpy test)
8. Bending test on timber

Program : Civil Engineering	SY BTECH	Semester: III
Surveying-I (PCCE3030T)		
Surveying-I Laboratory (PCCE3030L)		

Prerequisites: Basic concepts of Element of civil Engineering

Course Objectives

- 1 Student will able to understand need and significance of vertical measurements, methods, instruments used for levelling.
- 2 Student will able to measure area by plane table and advanced equipment's.
- 3 Student will able to understand necessity, methods and instruments used for horizontal and vertical control.
- 4 Student will able to understand the operation of measurement of horizontal distance and vertical elevation by transit theodolite
- 5 Student will able to analyse the elements and setting out of horizontal and vertical curves by different methods.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Determine the Reduced Levels (RLs) of various points using different leveling methods.	3	Apply
CO2	Analyze and perform theodolite surveying operations for measuring horizontal and vertical angles in elevation and positioning.	4	Analyze
CO3	Apply tachometric surveying techniques to calculate horizontal distances and elevations.	3	Apply
CO4	Set out and evaluate horizontal curves using various field methods.	5	Evaluate

Course Content

Unit-I	Levelling	6 Hrs
	Principle of surveying, Definitions of some common terms in levelling, Instruments for levelling, Types of levels, levelling staff, Temporary adjustments of level, Principal axis of dumpy level, Types of bench mark, Computation of reduced level by height of instrument and rise and fall method, Curvature and refraction correction, Distance to visible horizon, Reciprocal levelling method, Profile levelling L section and cross section.	
Unit-II	Plane Table Surveying	5 Hrs
	Plane table instruments and accessories, merits and demerits, methods: radiation, intersection, resection, traversing, Planimeter-Types, Theory, concept of zero circle, Study of Digital Planimeter.	
Unit-III	Theodolite Traversing	6 Hrs
	Adjustments of theodolite, uses of theodolite, Measurement of horizontal angles, Measurement of vertical angles, Measurement of magnetic bearing and deflection angle, Theodolite traverse, Computation of consecutive and independent coordinates, Adjustment and balancing of closed traverse, Gales traverse by coordinate method.	
Unit-IV	Tachometry	6 Hrs
	Principle of stadia system, Methods of tachometry- fixed hair and movable hair, Determination of horizontal distance and vertical elevation, If line of sight is inclined and staff is held vertical, Uses of tachometry in surveying, Characteristics and uses of contour lines, Plotting contour by interpolation method, Radial contouring.	
Unit-V	Curves	5 Hrs
	Horizontal and vertical curves, simple curves, setting with chain and tapes, tangential angles by theodolite, double theodolite, compound and reverse curves, transition curves, functions and requirements, setting out by offsets and angles, vertical curves, sight distance requirements.	

Reference book

- Surveying Vol.1 by Dr. B. C. Punmia, Laxmi Publication.
- Surveying and Levelling by N.N.Basak, Tata Mac Graw Hill Publication.
- Surveying and Levelling by S. K. Duggal, Tata Mac Graw Hill Publication.
- Surveying and Levelling by T. P. Kanetkar, Laxmi publication.
- Surveying- Fundamentals and Advanced practices by Dr. N R Chandak, Dr. H R Kumavat, S K Katariya Publication, 2019, New Delhi

Text Book

- Higher Surveying by A.M.Chandra
- Principles of remote sensing by A.N. Patel, Surendra Singh
- Advanced Surveying (Total Station, GIS and Remote Sensing) First edition 2007, Sathesh Gopi, Sathikumar, N Madhu.

List of experiments

Term work shall consist of performing experimental sets from the list below.

- 1) To find the Reduced Level by HI and Rise and fall method
- 2) Measurement of Horizontal Angle by (Repetition and Reiteration) Methods
- 3) Measurement of Magnetic Bearing and Vertical Angle by Theodolite,
- 4) Determination of horizontal distance and vertical elevation by tachometer.
- 5) Determination of gradient by tachometric surveying
- 6) Plane table surveying by intersection method,
- 7) Setting out of circular curve by Rankin method of deflection angle.

Project Work

- 1) Road cross section and L section of 200m length
- 2) Radial tachometric contouring survey.
- 3) Theodolite traversing project with five points.

Program : Civil Engineering	SY BTECH	Semester: III
Concrete Technology (PCCE3040T)		
Concrete Technology Laboratory (PCCE3040L)		

Course Objectives

1. To introduce the student's Basic ingredients of concrete and their properties.
2. The students should be able to illustrate and control method of manufacture of concrete.
3. Understand effect of admixtures on the behaviour of the fresh and hardened concrete.
4. The students should be able to design and recommend the mix of concrete for given materials.
5. Students will able to Learn various NDT methods used for inspection of concrete.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Learn The Different Properties of Ingredients	1	Remembering
CO2	Explain Manufacturing Process of Concrete	2	Understand
CO3	Explain Effects of Admixture on Concrete	2	Understand
CO4	Prepare Concrete Mix Design	4	Analyzing
CO5	Learn Various NDT Methods	5	Evaluating

Course Content

Unit-I	Cement, Aggregate and water	8 Hrs
Cement: - Manufacture of cement, chemical composition, setting and hydration of cement. Types of cement, Properties and testing of cement. Aggregates – Classification, properties, grading, impurities in aggregates and testing of aggregates, its effect on strength of concrete. Quantity of water for concrete.		
Unit-II	Fresh and Hardened Concrete	8 Hrs
Fresh Concrete: - Definition and its ingredients, grades of concrete, concreting process, Significance of water cement ratio. Properties of fresh concrete. Hardened Concrete- Various properties of hardened concrete, factors affecting various properties, and stress - strain relation, Creep and Shrinkage testing of hardened concrete. Permeability and Durability of concrete		
Unit-III	Admixture and Special Concrete	10 Hrs
Admixtures in Concrete: Types, Plasticizers and Super-plasticizers & their Effects on Workability. Types of Concrete: - Lightweight concrete, polymer concrete, fiber reinforced concrete, ready mixed concrete, self-compacting and high performance concrete, Ferro cement concrete. Special concrete- Transparent concrete, cellular light wt. concrete, pre-stressed concrete, under water concreting, concreting in extreme weather conditions		
Unit-IV	Concrete mix Design	8 Hrs
Introduction, to concrete mix design object of mix design, factors to be considered, statistical quality control, different methods of mix design. Concrete mix design by I.S. (10262-456) method and IRC method		
Unit-V	Introduction to NDT & Deterioration of concrete	8 Hrs
Introduction to non-destructive testing of concrete, rebound hammer, ultrasonic pulse velocity, pull out test, impact echo test. Deterioration of concrete Sulphate Attack, Alkali Aggregate Reaction (AAR) factors affecting on AAR, Deteriorating effects of AAR, Chloride Attack, Corrosion of Steel.		

Reference Books

- Concrete Technology by A.N. Neville, J.J. Brooks, Addison Wesley
- Concrete Technology by R.S. Varshney, Oxford & I B H.
- Concrete Technology by P Kumar Mehta,

Gujrat Ambuja Text Books

- Concrete Technology by M. S. Shetty, S C chand Publication.
- Concrete Technology by M. L. Gambhir, TMH Publication.
- Concrete Technology by S.V. Deodhar, Central Techno Publication
- Concrete Technology by N.V. Nayak & A.K. Jain, Narosa Publishing House Pvt. Ltd.

List of experiments

Term work shall consist of performing experimental sets from the list below.

1. Testing of Cement: Consistency, Fineness, Setting Time, Specific Gravity,
2. Soundness and Strength Test for Cement
3. Testing of Aggregates: Specific Gravity, Sieve Analysis, Bulking of Fine Aggregate, Flakiness Index, Elongation Index and Percentage Elongation
4. Placement Tests on Concrete: Workability Tests: Slump, Compaction,
5. Strength Tests on Concrete: Compression, Flexure, Split & Tensile Test,
6. Effects of Admixture: Accelerator, Retarder, Super Plasticizer,
7. Exercise and verification of Concrete Mix Design,
8. Non-destructive Testing for Concrete.

Program : Civil Engineering	SY BTECH	Semester: III
Building Construction & Materials (PCCE3050T)		

Course Objectives

1. Identify the various Building Components in detail.
2. Select and deploy suitable construction technique and methods for various construction of masonry works.
3. To select materials for engineering purpose is very much crucial activity in civil engineering any material of construction, the first and for most necessity is to know its properties, suitability, strength and durability.
4. Check and ensure quality of construction materials and components as per standards and practices

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	List and describe the various components of a building along with their functions.	1	Remember
CO2	Explain construction procedure of different components and Ability to Explain types of masonry	2	Understand
CO3	Illustrate the use of different types of doors, windows, arches, and lintels in practical situations.	3	Apply
CO4	Analyse various systems of vertical circulation and their protective coating requirements.	4	Analyse
CO5	Evaluate the effectiveness and limitations of various construction materials by analysing their properties, practical uses, and performance outcomes.	5	Evaluate

Course Content

Unit-I	Types of building and foundation	6 Hrs
Types of building, load bearing, framed structure, steel structure, and timber structure, composite structure various parts of building, sub structure and super structure. Plinth, sill, floor, and roof level, plinth height, plinth protection, cornice, coping and their function. Foundation Purpose and classification, advantages and disadvantages of each and circumstances under which each is used Factor considered for selection of foundation.		
Unit-II	Masonry and form work	6 Hrs
Masonry: Principle of masonry construction, types of masonry, Types of wall brick masonry: Various types of bond in brick masonry, reinforced brick masonry, precautions in masonry construction, composite masonry, solid and hollow blocks used for masonry, cavity wall, etc. Formwork: Function of form work, form erection requirements of form and form work, material used for form work.		
Unit-III	Study of lintel, doors & windows, circulation	6 Hrs
Types of lintel, detailing of R.C.C. lintel, precast lintel and stone lintel. Doors and windows minimum area of window opening for different climatic conditions, various materials used for doors and window, fixtures and fastening used. I.S. notations for doors and windows Circulation horizontal and vertical, stair and staircase planning and design, types of staircase as per shape and material used, type of circulation. Floor and roof: Ground floor, upper floor, mezzanine floor, design and constructional requirements, various types of floor finishes used, advantage and disadvantages, special flooring.		
Unit-IV	Truss and its type, R.C.C. framed structure	6 Hrs
Steel trusses: Types, Methods of connections, connecting materials. Scaffolding, shoring, under pinning and strutting, their types, purposes and precautions. R.C.C. framed structure, column, beam, footing, slab and their connections, general requirements and details.		

Stone: Natural bed of stone, stone quarrying uses of stones and qualities of good building stone, tests on stone. Bricks: Composition of good brick earth, classification of burnt brick, manufacturing of bricks, qualities of good bricks, test on bricks Timber: Types of natural wood and artificial wood, preservative treatments, defects in timber, wood products and wood composites. Glass: Properties, types, uses. Mortar: Types, ingredients, proportions and suitability. Other miscellaneous materials: Gypsum, Plaster of Paris, Heat and sound insulating materials.

References / Text Books

- Engineering Materials: S.R. Rangwala, Charotar Publications.
- Architectural Materials science: D. Anapetor, Mir Publishers.
- Introduction to Engineering Materials: B. K. Agrawal, Tata McGraw Hill, New Delhi.
- Relevant codes: BIS, ACI & BS.

Text Books

- Building Construction: Dr. B.C. Punmia, A.K. Jain, A.R. Jain, Laxmi Publication., New Delhi.
- A Building Construction: S.C. Rangwala, Charotar Publications, Gujarat, India.
- Concrete Technology by N.V. Nayak & A.K. Jain, Narosa Publishing House Pvt. Ltd.
- Concrete Technology by Kulkarni P.D. Ghosh, R.K. Phull Y.R., New Age International.
- Building Construction: S.P. Arora, Dr.S.P. Bindra, Dhanpat Rai Publication, New Delhi

Program : Civil Engineering	SY BTECH	Semester: III
Introduction to Civil Engineering (HMCE3060T)		
Introduction to Civil Engineering Laboratory (HMCE3060L)		

Course Objectives

- 1 To introduce the history, scope, and various branches of civil engineering.
- 2 To understand structural components and the importance of safety in construction practices.
- 3 To familiarize students with basic construction methods and software used in the construction industry.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply knowledge of the historical development of civil engineering to relate past engineering practices with modern infrastructure development.	3	Apply
CO2	Apply principles of construction activities to identify, classify, and explain various stages involved in civil engineering projects.	3	Apply
CO3	Analyze the components of civil engineering structures and differentiate their functions in buildings, bridges, roads, and water resource systems.	4	Analyze
CO4	Analyze and draw various structural components using standard civil engineering drawing conventions.	4	Analyze
CO5	Evaluate the role of modern software tools in civil engineering with respect to planning, design, analysis, and project execution.	4	Evaluate

Course Content

Unit-I	History of Civil engineering	2 Hrs
History of Civil engineering: Early constructions and developments over time; Ancient Monuments & Modern marvels; Development of various materials of construction and Methods of construction; Works of Eminent civil engineers		
Unit-II	Introduction to Civil engineering	2 Hrs
Introduction to Civil Engineering: Branches, role of civil engineer in various construction activities, important national projects, properties and uses of engineering materials: earth, bricks, timber, stones, aggregates, cement, steel, bitumen, glass, roofing and flooring materials, mortar, concrete.		
Unit-III	Building Components	3 Hrs
Building Components: Foundation and superstructure. Bearing capacity, functions of foundation, shallow and deep foundations, suitability in different situation, plinth, footings, raft foundation, pile foundation, machine foundation, walls, lintels, beams, columns, slabs, roofs, staircases, floors, doors, windows, sills, weather sheds, and utility fixtures		
Unit-IV	Safety in construction	3 Hrs
Practices and self-training as per NBC part-7, Control& Monitoring safety practices		
Unit-V	Introduction to Software's in civil Engineering	4 Hrs
Computational Methods, IT, IOT in Civil Engineering: Various software's used in Civil Engineering- Building Information Modelling, Finite Element Method, Computational Methods; highway design, Building Information Modeling; Highlighting typical available software systems (SAP, STAAD, ETAB, MODFLOW, REVIT, TEKLA, AUTOCAD, MSP, PRIMAVERA, ArcGIS, etc.)		

References / Text Books

- Alternative building materials and technologies by Jagadish K S, Reddy B V Venkatarama
- Introduction to Engineering Materials: B. K. Agrawal, Tata McGraw Hill, NewDelhi.
- Relevant codes: BIS, ACI & BS.

Text Books

- Basic civil and environmental Engineering by Kaushik C.P., Bhavikatti S.S., Kaushik Anubha
- Building Construction: Dr. B.C. Punmia, A.K.Jain, A.R.Jain,Laxmi Publication., New Delhi.
- A Building Construction: S.C. Rangwala, Charotar Publications, Gujarat, India.
- Town Planning by Rangawala S.C., Charotar Publications.
- Work Study motion and time study by Khanna O.P., Dhanpatrai publication.
- Srinath L. S. “ CPM PERT” , Affiliated East-West Press (Pvt) ltd.

List of experiments

Term work shall consist of performing minimum five experimental sets from the list below.

- 1 Sketching the basic Components of Building. (Different Level)
- 2 Sketching the basic Components of Door, Window
- 3 Sketching the basic Components Lintel and Arches
- 4 Sketching the basic Components of Staircase
- 5 Sketching the Brick bats and their various views
- 6 Sketching the basic Components of Bridge/ Cross section of Road
- 7 Prepare the report of market survey for different building materials.

Program : Civil Engineering	SY BTECH	Semester: III
Semester Project -I (PJCE3070L)		

Course Objectives

Students are expected to design, simulate/implement a project based on the knowledge acquired from Current semester subjects.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyze a survey of several available literatures in the preferred field of study.	1	Analyze
CO2	Describe various/alternate approaches to complete a project.	2	Understand
CO3	Apply a collaborative project environment by interacting and dividing project work among team members.	3	Apply
CO4	Use technical communication skills to present project work in the form of a technical report/paper.	3	Apply
CO5	Apply teamwork and project management skills to plan, execute, and manage the research study.	3	Apply

Course Content / Guidelines

The purpose of introducing semester project at second year level is to provide exposure to students with a variety of projects based on the knowledge acquired from the semester subjects. This activity is supposed to enrich their academic experience and bring enough maturity in student while selecting the project. Students should take this as an opportunity to develop skills in implementation, Presentation and discussion of technical ideas/topics. Therefore, proper attention shall be paid to the Content of semester project report which is being submitted in partial fulfillment of the requirements of the Second Year and it is imperative that a standard format be prescribed for the report.

Each student shall work on project approved by departmental committee approved by the Head of Department, a group of 03 to 05 students (max allowed: 5 students in extraordinary cases, subject to the approval of the department committee and the Head of the department) shall be allotted for Each Semester Project. Each group shall submit at least 3 topics for the Semester Project. The Departmental committee shall finalize one topic for every group.

Semester Project Title or Theme Should be based on knowledge acquired during semester. The project work shall involve sufficient work So that students get acquainted with deferent aspects of knowledge acquired from semester subjects.

Student is expected to:

- _ Select appropriate project title based on acquired knowledge from current semester subjects.
- _ Maintain Log Book of weekly work done (please see attached log book format).
- _ Report weekly to the project guide along with log book.

Assessment Criteria:

- _ at the end of the semester, after conformation by the project guide, each project group will Submit project completion report in prescribed format for assessment to the departmental committee (including project guide).
- _ Assessment of the project (at the end of the semester) will be done by the departmental

committee (including project guide).

Prescribed project report guidelines:

Size of report shall be of minimum 25 pages. Project Report should include appropriate content for:

_ Introduction

_ Literature Survey

_ Related Theory

_ Implementation details

_ Project Outcomes

_ Conclusion

_ References

Assessment criteria for the departmental committee (including project guide) for Continuous

Assessment: Guide will monitor weekly progress and marks allocation will be as per Table 2.

Assessment criteria for the departmental committee (including project guide) for End Semester

Exam: Departmental committee (including project guide) will evaluate project as per Table 3. Each

group shall present/publish a paper based on the semester project in reputed/peer Reviewed Conference/Journal/Tech Fest/Magazine/ before the end of the semester.

Table 1 Log Book format

S.NO.	Week (Start date / End date)	Work done	Sign of Guide	Sign of Coordinator
1				
2				

Table 2 Continuous Assessment sheet

S. NO.	Exam Seat No	Name of Student	Student Attendance	Log Book Maintenance	Literature review	Depth of Understanding	Report	Total
			5	5	5	5	5	25

Table 3 Evaluation sheet

S. N O.	Exa m Seat No	Name of Stude nt	Project Selecti on	Design Simulati on logic	PCB hardware programi ng	Result Verificati on	Presentati on	Tot al
			5	5	5	5	5	25

Program : Civil Engineering	SY BTECH	Semester: III
Constitution of India (MCCE3080T)		

Course Objectives

1. To provide basic information about Indian constitution.
2. To identify individual role and ethical responsibility towards society.
3. To understand human rights and its implications.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Explain the historical background, philosophy, and salient features of the Indian Constitution.	2	Understand
CO2	Interpret the fundamental rights, duties, and directive principles enshrined in the Constitution for responsible citizenship.	2	Understand
CO3	Describe the structure, roles, and functions of the legislative, executive, and judiciary branches of government.	2	Understand
CO4	Analyze the federal structure, center-state relations, and constitutional provisions for governance and emergency powers.	1	Analyze
CO5	Apply constitutional principles to contemporary socio-political and legal issues, fostering ethical and democratic values.	3	Apply

Course Content

Unit-I	Introduction to the constitution of India	3 Hrs
The making of the constitution and salient features of the constitution. Preamble to the Indian Constitution Fundamental Rights & its limitations.		
Unit-II	Directive Principles of State Policy	3 Hrs
Relevance of directive principles state Policy fundamental duties. Union Executives – President, Prime Minister Parliament Supreme court of India.		
Unit-III	State Executives	3 Hrs
Governor, Chief Minister, State Legislature High Court of State Electoral Process in India, Amendment Procedures, 42nd, 44th, 74th, 76th, 86th & 91st Amendments.		
Unit-IV	Special Provision	3 Hrs
For SC & ST Special Provision for Women, Children & Backward Classes Emergency Provisions Policy. Human Rights: Meaning and Definitions, Legislation Specific Themes in Human Rights-Working of National Human Rights Commission in India Powers and functions of Municipalities, Panchyats and Co – Operative Societies		
Unit-V	Scope & Aims of Engineering Ethics	2 Hrs
Responsibility of Engineers Impediments to Responsibility Risks, Safety and liability of Engineers, Honesty, Integrity & Reliability Engineering		

References / Text Books

- M. V. Pylee, “An Introduction to Constitution of India”, Vikas Publishing, 2002.
- M. Govindarajan, S. Natarajan, V. S. Senthilkumar, “Engineering Ethics”, Prentice – Hall of India Pvt. Ltd. New Delhi, 2004
- Brij Kishore Sharma, “Introduction to the Constitution of India”, PHI Learning Pvt. Ltd.,
- Latest Publications of Indian Institute of Human Rights, New Delhi

Text Books

- Durga Das Basu: “Introduction to the Constitution on India”, (Students Edn.) Prentice –Hall
EEE, 19th / 20th Edn., 2001
- Charles E. Haries, Michael S Pritchard and Michael J. Robins “Engineering Ethics”
Thompson Asia, 2003-08-05.

Website Resources:

- www.nptel.ac.in
- www.hnlu.ac.in
- www.nspe.org
- www.preservearticles.com

Program : Civil Engineering	SY BTECH	Semester: III
Field/Internship/Industry Training (INTCE3090)		

Course Objectives

1. To get exposure of industrial ecosystem.
2. To enhance student's knowledge in the particular technology.
3. To nurture student's leadership ability and responsibility to perform or execute the given Task individually or in team.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply fundamental principles of engineering.	3	Apply
CO2	Participate in specialized/emerging technology	6	Evaluate
CO3	Self-improvement through continuous professional development and life-long learning	6	Evaluate
CO4	Get awareness of the ethics, social, cultural, global and Environmental responsibility as an engineer.	2	Comprehension

Course Content / Guidelines

Minimum of six weeks in an Industry in the area of Civil Engineering. The summer internship should Give exposure to the practical aspects of the discipline. In addition, the student may also work

On a specified task or project which may be assigned to him/her. The outcome of the internship should Be presented in the form of a report.

1 Student shall undergo industrial training /internship for a minimum period of SIX weeks During summer vacations of third to sixth semester.

2 The industry in which industrial training/internship is taken should be a medium or large scale industry.

3 The paper bound report on training must be submitted by the student in the beginning of Seventh semester along with a certificate from the company where the student took training.

4 Every student should write the report separately.

5 Institute / Department / T&P Cell have to assist the students for finding Industries for the training/internship.

6 Students must take prior permission from department before joining for industrial training/internship.

7 Note that, the degree certificate will not be awarded if the certificate of field/industry/internship is not submitted to the department.

8 The field/industry/internship training will be reflected on the final mark sheet/degree certificate in the section of audit points completed.

SEM

IV

Program : Civil Engineering	SY BTECH	Semester: IV
Engineering Mathematics-IV (BSCE4010T)		

Prerequisites: Matrices and its properties, Calculus, algebra, Probability

Course Objectives

1. To inculcate an ability to relate engineering problems to mathematical context
2. To provide a solid foundation in mathematical fundamentals required to solve engineering problem
3. To study the basic principles of Vector analyses, complex integration, probability, test of hypothesis and correlation between data.
4. To prepare students for competitive exams.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Identify diagonalizable and derogatory matrices and find functions as a square matrix using eigenvalues and eigen vectors	1	Knowledge
CO2	Evaluate vector integrals	5	Evaluate
CO3	Use probability to solve real-life engineering problems	3	Apply
CO4	Draw conclusions on population based on large and small samples taken	3	Apply
CO5	Analyze the variances of multiple variables simultaneously	1	Analyze

Course Content

Unit-I Linear Algebra

10 Hrs

Characteristic equation, Eigenvalues and Eigenvectors with properties. Cayley-Hamilton theorem to find higher order matrices and inverse of matrix Diagonalizability of similar matrices Functions of a matrix Quadratic Forms: Canonical form using congruent transformations, Orthogonal Transformation to find rank, index, signature and value class

Unit-II Vector differentiation and Integration

10 Hrs

Scalar and vector point functions. Gradient of a scalar function, Divergence, curl and Scalar Potential of a vector function. Solenoidal, Irrotational and conservative Fields. Line integrals, Green's theorem (without proof) for planes and verification of line integrals Stokes theorem and Gauss divergence theorem (without proof and verification)

Unit-III Probability

10 Hrs

Discrete and Continuous random variables, Probability mass and density function, Probability distribution for random variables, Expected value, Variance. Probability Distributions: Binomial, Poisson and Normal Distributions (for detailed study)

Unit-IV Sampling Theory

8 Hrs

Sampling distribution. Test of Hypothesis. Level of significance, critical region. One tailed and two tailed tests. Interval Estimation of population parameters. Large and small sample Test of significance for Large samples: Test for significance of the difference between sample mean and population means, Test for significance of the difference between the means of two samples Student's t-distribution and its properties. Test of significance of small samples: Test for significance of the difference between sample mean and population means, Test for significance of the difference between the means of two Samples, paired t-test Chi-square test, Test for the Goodness of fit, Association of attributes

Unit-V ANOVA

4 Hrs

Analysis of Variance (F-Test): One-way classification, Two-way classification (short-cut method)

References / Text Books

- Higher Engineering Mathematics, B.V. Ramana, McGraw Hill Education, New Delhi
- Integral Transforms and their Engineering Applications, Dr B. B. Singh, Synergy Knowledge ware, Mumbai
- Numerical Methods, Kandasamy, S. Chand & CO
- Fundamentals of Mathematical Statistics by S.C. Gupta and Kapoor

Text Books

- Higher Engineering Mathematics, Dr B. S. Grewal, Khanna Publication
- Advanced Engineering Mathematics, E Kreyzig, Wiley Eastern Limited

Program : Civil Engineering	SY BTECH	Semester: IV
Fluid Mechanics (PCCE4020T)		
Fluid Mechanics Laboratory (PCCE4020L)		

Prerequisites: Mechanics, Physics

Course Objectives

1. Understand and apply the basic fluid properties in solving the practical problems.
2. Study flow in statics and dynamics conditions.
3. Understand the concept of fluid pressure and its variation and also able to measure fluid pressure in different practical situations.
4. Understand the kinematic of fluid flow, effect of variation of velocity and acceleration on fluid flow.
5. Understand of application of dimensional analysis in the prototype and models.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Determine the properties of fluid.	3	Apply
CO2	Measure the Fluid pressure acting on the body.	3	Apply
CO3	Classify the types of flow.	2	Understand
CO4	Use of Bernoulli's equation and the continuity equation.	3	Apply
CO5	Evaluate dimension of terms.	5	Evaluate

Course Content

Unit-I Properties of Fluids

10 Hrs

Definition of fluid, distinction between solid, fluid & gases Fluid Properties: Mass density, specific volume, specific weight, specific gravity - Definitions, units and dimensions, Viscosity, Newton's law of viscosity, Newtonian & non-Newtonian fluids, ideal & real fluids, Compressibility, Vapor Pressure, Surface tension, and Capillary.

Unit-II Fluid Statics

10 Hrs

Fluid pressure at a point, Variation of fluid pressure with depth, pressure head, atmospheric, gauges, vacuum pressure, relationship with diagram, pressure measurement using simple and differential manometer with formation of gage equation. Hydrostatics pressure on various surface, Center of pressure and total pressure for fluid masses subjected to horizontal, vertical and inclined plane surface. Buoyant force and center of buoyancy, Archimedes principle, meta-center, Stability of floating bodies

Unit-III Fluid Kinematics

8 Hrs

Types of fluid flows, continuity equation for one, two and three dimensional flows, Velocity and acceleration, Velocity potential function and stream function, vortex flow, flownets, velocity measurements

Unit-IV Fluid Dynamics

8 Hrs

Forces influencing motion, Eulers equations of motion and its derivation in cartesian coordinate system and its integration to obtain Bernoulli's equation, Its application and limitations, Kinetic energy correction factors.

Unit-V Dimensional Analysis

6 Hrs

Dimensional Analysis Definition and use, fundamentals and derived dimension, Methods. Dimensionless numbers Theory of models - Similitude, types of similarities i.e. Geometric, Kinematic and Dynamic similarities, Model laws – Reynolds and Froude & its application

References / Text Books

- Fluid Mechanics including Hydraulic Machines by Dr. A.K. Jain
- Fluid Mechanics – Fundamentals and applications by Yunus cengel, Jhon M Cimbala,
- Tata McGraw Hill Publishing Company Ltd New Delhi.
- Fluid mechanics through problems by R. J. Garde.

Text Books

- Hydraulics and fluid mechanics including Hydraulic machines by Dr. P. N. Modi and S. M. Seth, Latest edition, Standard book house.
- Fluid Mechanics & Hydraulic Machines by K Subramanya, Tata McGraw Hill Publishing Company Ltd New Delhi.
- A textbook of Fluid Mechanics & Hydraulic Machines by R. K. Bansal.
- A textbook of Fluid Mechanics & Hydraulic Machines by R. K. Rajput.

List of experiments

Term work shall consist of performing experimental sets from the list below.

1. Study variation of viscosity of oil with temperature.
2. Study of pressure measuring devices.
3. Verification of Bernoulli's equation.
4. Study concept of flow net with electrical analogy test.
5. Laminar flow by Reynolds Experiment.
6. Discharge measurement by Pitot static tube.
7. Calibration of Venturimeter.
8. Determination of metacentric height

Program : Civil Engineering	SY BTECH	Semester: IV
Surveying-II (PCCE4030T)		
Surveying-II Laboratory (PCCE4030L)		

Course Objectives

- 1 Student will able to Comprehend different geodetic methods of survey such as triangulation, trigonometric levelling.
- 2 Student will able to analyse the adjustment of station and figure by different methods.
- 3 Student will able to understand the hydrographic surveying operations by different methods.
- 4 Student will able to compare Terrestrial and Aerial photography for large scale survey project,
- 5 Analyse and interpret data in application of remote sensing and data through GIS Software.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyze the scope and significance of triangulation in civil engineering applications.	4	Analyze
CO2	Evaluate and perform various hydrographic surveying operations for determining depth, tides, and underwater topography.	5	Evaluate
CO3	Apply terrestrial and aerial photogrammetric surveys for preparing large-scale maps and topographical details.	3	Apply
CO4	Apply the principles of remote sensing and GIS for spatial data acquisition, processing, and analysis.	3	Apply

Course Content

Unit-I Triangulation

6 Hrs

Objects and methods of geodetic surveying, Triangulation figures, Classification of triangulation systems, Selection of stations, inter visibility and height of stations, Towers, signals and their classification, Measurement of angles, Methods of observation of angles, Satellite station, Base line measurement,

Unit-II Triangulation Adjustment

6 Hrs

Laws of weights, Determination of the most probable values of quantities, method of least squares, Probable error and its determination, Station adjustment and figure adjustment.

Unit-III Hydrographic Surveying

5 Hrs

Objects of hydrographic surveying, establishing controls, Shore line survey, river surveys, Tide gauges, Soundings, Equipment for taking soundings, Nautical sextant, Methods of locating the soundings, Observation from sea shore line, Observation from sounding boat, Observation from both shore line and sounding boat, Three-point problem solution.

Unit-IV Photogrammetry

5 Hrs

Objects of photogrammetry, Terrestrial photogrammetry and aerial photogrammetry, Aerial camera, Comparison of map and vertical photograph, Vertical tilted and oblique Photographs, terms related with photogrammetry, Scale of vertical photograph, Computation of length and height from the photograph, Relief displacement, Flight planning, Ground control, Radial line method, Mirror and lens Stereoscopes.

Unit-V Remote Sensing & GIS

6 Hrs

Basic principles of remote sensing, Sensors used in remote sensing, classification of sensors, Remote sensing platforms, Applications of remote sensing to Civil Engineering, Introduction to GIS, sources and types of data, elements of GIS, hardware and software requirements of GIS, Application of GIS

Reference books: -

- Surveying Vol.1 by Dr. B. C. Punmia, Laxmi Publication.
- Surveying and Levelling by N.N.Basak, Tata Mac Graw Hill Publication.
- Surveying and Levelling by S. K. Duggal, Tata Mac Graw Hill Publication.
- Surveying and Levelling by T. P. Kanetkar, Laxmi publication.
- Surveying- Fundamentals and Advanced practices by Dr. N R Chandak, Dr. H R Kumavat, S K Katariya Publication, 2019 New Delhi.

Text books: -

- Higher Surevying by A.M.Chandra
- Principles of remote sensing by A.N. Patel, Surendra Singh
- Advanced Surveying (Total Station, GIS and Remote Sensing) First edition 2007, Sathessh Gopi, Sathikumar, N Madhu

List of experiments

Term work shall consist of performing any three experimental sets from the list below.

1) One Second Theodolite

- a) Measurement of horizontal and vertical angles
- b) Measurement of horizontal angles by reiteration method.

2) Hydrographic survey

- a) Study and use of nautical sextant for measurement of angles
- b) Solution of three-point problem

3) Photogrammetry

- a) Study and use of mirror stereoscope and finding out the air base distance

4) Measurement of angles and elevation by total station

Project

- 1) Traversing by total station (EDM)
- 2) Remote sensing image interpretation by software

Program : Civil Engineering	SY BTECH	Semester: IV
Building Planning & Design (ESCE4040T)		
Building Planning & Design Laboratory (ESCE4040L)		

Prerequisites: Building Construction & Materials, Introduction to Civil Engineering

Course Objectives

1. To identify the basic drawing principles of building.
2. To understand the Principles of planning, building byelaws and use of buildings materials and services.
3. To develop basic planning skills, and design residential /public buildings/commercial buildings.
4. To draw elevation, section and aesthetics of proposed building by perspective view.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Explain the concepts of scale, symbols of materials, types of buildings, and the use of building materials.	2	Understand
CO2	Prepare working and submission drawings of a building as per standard practices.	6	Create
CO3	Apply various building byelaws relating to the planning of buildings.	3	Apply
CO4	Plan and analyze residential, public, and administrative buildings based on occupants' requirements.	4	Analyze
CO5	Draw one-point and two-point perspective views of objects and buildings.	3	Apply

Course Content

Unit-I Principles and Codes of Practices for Planning and Designing of Buildings 03 Hrs

a) Architectural and building drawings – sizes of drawings, layout of drawings, scales, projection, line work – types thickness, spacing of lines, lettering and dimensioning, graphical symbols, conventional representation of materials in section, designation of rooms and other areas.

b) Principles of planning for Residential buildings – Aspect, prospect, grouping, circulation, Orientation, roominess, flexibility, privacy, space utilization, sanitation, ventilation, functional relations of different units, planning of living area, sleeping area, service area, circulations.

Unit-II Study of Building byelaws, Types of building 03 Hrs

a) Study of building Byelaws- Necessity, plot sizes, road width, open spaces, floor area ratio (F.A.R.), marginal distances, building line, control line, height regulation, room sizes, types of area calculations – built-up area, floor area, carpet area, Rules for ventilation, lighting, drainage, sanitation and parking of vehicles, Study of sun path diagram, wind rose diagram, sun shading devices.

b) Types of building as per occupancy, Introduction about submission drawing and types of working drawings.

Unit-III Building Services 04 Hrs

a) Ventilation- Necessity of Ventilation, Natural ventilation, stack effect and wind effect, Mechanical ventilation and its types.

b) Air Conditioning Systems- Classification, object and necessity of air conditioning.

c) Plumbing- One pipe and Two pipe system, Water storage and disposal arrangement, septic tank, Plumbing systems, and various types of traps, Fixtures and Fittings.

d) Noise and Acoustics- Sound insulation, Acoustical defects, Reverberation time, Sabine's formula, sound absorbents, planning for good acoustics.

Unit-IV Planning of Residential Building

10 Hrs

a) Development of ground floor plan, elevation, sections, site plan, layout plan and schedule of openings of residential buildings such as – (i) Bungalows, (ii) Row houses, (iii) Apartments using Load bearing / Framed Structure.

b) **Perspective Drawings**– One point and Two-point perspective of an object and simple Residential building.

Unit-V Planning of Public Building

08 Hrs

Functional requirements and planning of industrial buildings, commercial buildings, Educational Building (School, Colleges), Hostel, Library building, Restaurant/ Hotel building, Primary Health Center/ Hospital, Shopping complex, Community/marriage halls, post offices, banks. Two dimensioned line plans of above public buildings.

References / Text Books

- National Building Code of India 2016, Bureau of Indian Standard, New Delhi.
- Dr. B.C. Punmia, “Building Construction” Laxmi Publications Pvt. Ltd., New Delhi, Edition, 1998
- I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings.
- Building science and planning by Dr. S. V. Deodhar, Khanna Publishers.
- A Course in Civil Engineering Drawing”, by V. B. Sikka, S. K.Kataria & Sons.

Text Books

- Shah M.G., Kale C.M. and Patki S.Y., “Building drawing an Integrated approach to Built environment”, Tata McGraw Hill (Fifth edition)
- Building Planning & Drawing by Dr. N. KumaraSwamy, A. Kameswara Rao, 7th edition, Charotar Publishing House.
- S.P.Arora and S.P. Bindra, “A Text Book of Building Construction”, Dhanpat Rai& Sons, Delhi, Edition 1996

List of experiments

Term work shall consist of performing experimental sets from the list below.

A) Group A- Planning of Residential Building -

a) Planning of a small residential building/bungalow/duplex from given data (load bearing or framed structure).

1. Draw different floor detailed plans with furniture arrangement.
2. Draw front elevation, sections (preferably through staircase).
3. Site plan, built up area calculations.
4. Schedules of area and openings.

b) Perspective view of plan drawn in sheet no- 1 or any three objects with suitable scale.

B) Group B- Planning of Public Building (From Unit V)-

1. Typical floor plans- Draw all detailed units of each floor.
2. Front and Road side elevations- Draw all detail elevation with elegance.
3. Sections- Draw sections through the staircase and toilet with all constructional details.
4. Foundation Plan- Draw all foundation details.
5. Layout plan and site plan project building.
6. Layout plan showing water supply and drainage arrangements –Draw plan showing water supply line from municipal connection to various required tap connections within project building.
7. Line plans- Various public buildings. (Any five types) using computer drafting software on A4 size Sheets.
8. Visit report- Report regarding visit of any advanced building construction site, preferably visit to the site of building given for the project work with photos/drawings etc. (visit is mandatory)

Program : Civil Engineering	SY BTECH	Semester: IV
Structural Analysis (PCCE4050T)		

Prerequisites: Engineering Mechanics, Mechanics of Solids

Course Objectives

1. To understand the fundamental concepts of structural analysis, including determinacy, equilibrium, compatibility, and stress–strain relationships, and to evaluate slope and deflection of beams using classical methods.
2. To analyze indeterminate structures such as fixed beams, continuous beams, trusses, and arches under different loading conditions using appropriate analytical techniques.
3. To apply advanced methods like slope deflection method for determining forces, moments, deflections, and reactions in structural systems.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Explain fundamental concepts of structural analysis	2	Understand
CO2	Evaluate internal forces in fix and continuous beam, to draw shear force and bending moment diagram for the same	3	Apply
CO3	Analyse structure of statically determinate and indeterminate pin jointed structures	4	Analyze
CO4	Determine normal thrust, shear force and bending moment in two and three hinged arches subjected to different loading condition	3	Apply
CO5	Analyse indeterminate structures using basics of slope deflection method	4	Analyze

Course Content

Unit-I Basic Concepts and Slope, Deflection of beam

9 Hrs

a) Types of structure, theory and numerical on static and kinematics indeterminacy, concept of equilibrium and compatibility conditions, stress-strain relations, force-displacement relations, linear/non-linear structures. b) Methods for calculation of slope and deflection of beam - Concept and application of Macaulay's method of double integration, moment area method and Conjugate beam method to calculate slope and deflections of beams.

Unit-II Analysis of fixed beam and continuous beam

9 Hrs

a) Fixed Beams- Concept, advantages and disadvantages, Nature of B.M. Diagrams, Fixed end moment due to various loading conditions. Effect of sinking of support, plotting of Bending Moment & Shear Force diagrams. b) Continuous Beams: - Analysis of continuous beam by Clapyeron's theorem of three moments.

Unit-III Analysis of trusses

8 Hrs

a) Deflection of trusses: Analysis of determinate plane trusses by Castigliano's first theorem b) Analysis of redundant trusses by Castiglino's second theorem considering effects of Pre strain (lack of fit) and change in temperature

Unit-IV Analysis of three hinged and two hinged arch

8 Hrs

a) Three hinged arch: - Concept of three hinged arch, calculations for support reactions, B.M., S.F. and axial thrust diagrams for circular and parabolic three hinged arches b) Two hinged arches: Horizontal thrust at supports. Shear, normal thrust and BM at a point, BM diagrams for parabolic arch due to various loading conditions.

Unit-V Slope Deflection method

8 Hrs

Analysis of indeterminate structures such as continuous beams, analysis of rigid frames, frames without sway and with sway, effects of settlement.

References / Text Books

- Reddy C. S., “Basic Structural Analysis”, Tata McGraw Hill, 3rd edition 2017
- Wang C.K., “Statically Indeterminate Structures”, McGraw Hill
- Vazirani V.N., Ratwani M.M and Duggal S.K., “Analysis of Structures - Vol. I”, ISBN NO: 978-81-7409-140-8
- Punmia B.C., “Structural Analysis”, Laxmi Publications
- Bhavikatti S.S., “Structural analysis” Vol –I, II , Vikas Publishing House Pvt. Ltd.
- Junnarkar S. B. and Dr. Shah H.J., “Mechanics of structures” Vol – II by, Charotar Publishing House.
- Rammamrutham S., “Theory of structures”, Dhanpatrai Publishing Company.

Program : Civil Engineering	SY BTECH	Semester: IV
Universal Human Values (HMCE4060T)		

Course Objectives

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society, and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, Society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Identify the need, relevance, and role of universal human values in personal, academic, and professional life.	2	Understand
CO2	Demonstrate understanding of self-exploration, harmony in human relationships, and ethical conduct in daily interactions.	3	Apply
CO3	Apply principles of trust, respect, and responsibility to foster sustainable and compassionate social environments.	3	Apply
CO4	Analyze the interdependence between individual values, societal well-being, and ecological balance.	1	Analyze
CO5	Use human values into decision-making processes for holistic development and responsible engineering practice.	3	Apply

Course Content

Unit-I Introduction: Need, Basic Guidelines, Content and Process for Value Education 6 Hrs

Purpose and motivation for the course Self-Exploration—what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Unit-II Understanding Harmony in the Human Being Harmony in Myself 6 Hrs

Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’. Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility Understanding the Body as an instrument of ‘I’ (I am being the doer, seer and enjoyer). Understanding the characteristics and activities of ‘I’ and harmony in ‘I’. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Health.

Unit-III Understanding Harmony in the Family and Society 6 Hrs

Understanding values in human-human relationship; meaning of Justice (nine universal Values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention and competence. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Unit-IV Understanding Harmony in the Nature and Existence 5 Hrs

Understanding the harmony in the Nature 19. Interconnectedness and mutual fulfillment Among the four orders of nature recyclability and self-regulation in nature. Understanding Existence as Co-

existence of mutually interacting units in all pervasive space. Holistic perception of harmony at all levels of existence

Unit-V Implications of the above Holistic Understand the Professional Ethics 5 Hrs

Natural acceptance of human values 23. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order, b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems,

Reference Books

- Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
- Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
- The Story of Stuff (Book).
- The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
- Small is Beautiful - E. F Schumacher.
- Slow is Beautiful - Cecile Andrews
- Economy of Permanence - J C Kumarappa
- Bharat Mein Angreji Raj - PanditSunderlal
- Rediscovering India - by Dharampal
- Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
- India Wins Freedom - Maulana Abdul Kalam Azad
- Vivekananda - Romain Rolland (English)
- Gandhi - Romain Rolland (English)

Text Books

- Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Program : Civil Engineering	SY BTECH	Semester: IV
Semester Project -II (PJCE4070L)		

Course Objectives

Students are expected to design, simulate/implement a project based on the knowledge acquired from

Current semester subjects

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyze a survey of several available literatures in the preferred field of study.	1	Analyze
CO2	Describe various/alternate approaches to complete a project.	2	Understand
CO3	Apply a collaborative project environment by interacting and dividing project work among team members.	3	Apply
CO4	Use technical communication skills to present project work in the form of a technical report/paper.	3	Apply
CO5	Apply teamwork and project management skills to plan, execute, and manage the research study.	3	Apply

Course Content / Guidelines

The purpose of introducing semester project at second year level is to provide exposure to students with a variety of projects based on the knowledge acquired from the semester subjects. This activity is supposed to enrich their academic experience and bring enough maturity in student while selecting the project. Students should take this as an opportunity to develop skills in implementation, presentation and discussion of technical ideas/topics. Therefore, proper attention shall be paid to the content of semester project report which is being submitted in partial fulfilment of the requirements of the Second Year and it is imperative that a standard format be prescribed for the report.

Each student shall work on project approved by departmental committee approved by the Head of Department, a group of 03 to 05 students (max allowed: 5 students in extraordinary cases, subject to the approval of the department committee and the Head of the department) shall be allotted for each semester project. Each group shall submit at least 3 topics for the semester project. The departmental committee shall finalize one topic for every group. Semester project title or theme should be based on knowledge acquired during semester. The project work shall involve sufficient work so that students get acquainted with different aspects of knowledge acquired from semester subjects.

Student is expected to:

- _ Select appropriate project title based on acquired knowledge from current semester subjects.
- _ Maintain Log Book of weekly work done (please see attached log book format).
- _ Report weekly to the project guide along with log book.

Assessment Criteria:

- _ at the end of the semester, after conformation by the project guide, each project group will submit project completion report in prescribed format for assessment to the departmental committee (including project guide).
- _ Assessment of the project (at the end of the semester) will be done by the departmental committee (including project guide).

Prescribed project report guidelines:

Size of report shall be of minimum 25 pages. Project Report should include appropriate content for:

- _ Introduction
- _ Literature Survey
- _ Related Theory
- _ Implementation details
- _ Project Outcomes
- _ Conclusion
- _ References

Assessment criteria for the departmental committee (including project guide) for Continuous Assessment: Guide will monitor weekly progress and marks allocation will be as per Table 2.

Assessment criteria for the departmental committee (including project guide) for End Semester Exam: Departmental committee (including project guide) will evaluate project as per Table 3. Each group shall present/publish a paper based on the semester project in reputed/peer Reviewed Conference/Journal/Tech Fest/Magazine/ before the end of the semester.

Table 1 Log Book format

S.NO.	Week (Start date / End date)	Work done	Sign of Guide	Sign of Coordinator
1				
2				

Table 2 Continuous Assessment sheet

S.N O.	Exam Seat No	Name of Student	Student Attendance	Log Book Maintain	Literature review	Depth of Understanding	Report	Total
			5	5	5	5	5	25

Table 3 Evaluation sheet

S.N O.	Exam Seat No	Name of Student	Project Selectio n	Design Simulatio n logic	PCB hardware programin g	Result Verification	Present ation	Total
			5	5	5	5	5	25

Program : Civil Engineering	SY BTECH	Semester: IV
Employability Skills Development Program- I (HMCE4080L)		

Course Objectives

1. To enhance the problem solving skills.
2. To improve the basic mathematical skills for solving real life examples.
3. Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems.
4. Demonstrate an understanding of computer programming language concepts.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Explain the basic concepts of Quantitative Ability, including profit, loss, time, work, and geometry.	2	Understand
CO2	Demonstrate the concepts of Quantitative Ability for problem solving.	3	Apply
CO3	Demonstrate the concept of Variables and Functions through examples	3	Apply
CO4	Demonstrate the concept of Multithreading and String Handling.	3	Apply
CO5	Explain the fundamentals of Object-Oriented Programming.	2	Understand
CO5	Describe the concepts of Distributed Database.	2	Understand

Course Content

Unit-I Aptitude

6 Hrs

Quantitative Aptitude : Algebra, Profit and Loss, Average & Allegation / Mixture, Time and Work, Geometry Mensuration, Numbers , Percentage, Permutation and Combination, Probability, Ratios & Proportion, Time and Distance. Reasoning: Analytical, Puzzles, Blood relationship, Data Interpretation, Data sufficiency

Unit-II Fundamental of Programming

6 Hrs

Variables: Local variables, Global variables, global keyword, Rules of Identities Functions: Introduction, Prototype, Classification of functions, No arguments and No return values, with arguments and with return values No arguments and With return values : With arguments and No return values, Recursion, Argument type functions, Default arguments functions, Required arguments functions, Keyword arguments functions, Variable arguments function Operators: Arithmetic Operators, Relational operators, Logical operators, Bitwise operators, Shift operators.

Unit-III Statements

6 Hrs

Control Statements: Conditional Control Statements, if, if-else, if-elif-else, nested-if, Loop Control Statements, While, for Branching Statements: Break, Continue, pass, return, exit Exception Handling: Introduction, The need of exception handling, Getting exceptions, Default exception handler, Handling exception, Try, Except Try with multiple except blocks: Handling exceptions using Exception class, finally, block, Releasing resources using finally block, Raise, Creating a user exception class., Raise exception manually, Exceptions based application

Unit-IV Multithreading

6 Hrs

Multithreading: Introduction, Multitasking, Multitasking v/s Multithreading, threading module, Thread class introduction, creating thread, The life cycle of a thread, Single-threaded application, Multi-threaded application, Sleep () method. Sleep() v/s run(), Join() v/s Sleep(), Multiple custom threads creation, The execution time of single-threaded application, The execution time of multi-threaded application, Synchronization of threads. Inner classes: Basic syntax of inner class, Advantages of Inner classes, Access class level members of inner classes, Access object level members

of inner classes, Local inner classes, Complex inner classes, Accessing data of inner classes. Regular expressions: re module, Match (), Search (), find () etc, and actual projects web scrappingMail extraction: Date extraction, Mobile number extraction, Vehicle number extraction, zoom chatanalysis Expressions using operators and symbols: Split string into characters, Split string into words, Lambdaexpressions String handling using regex: Introduction to Strings, Indexing and Slicing, Special operators in String handling, Old style String formatting, String library methods, Quotes and Escape characters in a String representation, String Immutability, Logical programs using Strings.

Unit-V Object Oriented Programming

4 Hrs

Object Oriented Programming : Introduction to OOPs, Classes, Objects, Structure to OOP application, Contexts of OOP application, Class level members, Object level members, self- variable, Constructor and Initialization of object. Access modifiers: Private, Protected, Public, Program codes. Encapsulation Rules, Implementation, Abstraction, Polymorphism Inheritance Introduction, Types of Inheritance, Single inheritance, Multi- Level inheritance, Method overriding, Object initialization using constructor, multiple inheritances, Hierarchical inheritance, Method overriding in Multi-level inheritance

References / Text Books

- Quantitative Aptitude for Competitive Examinations by Dr. R S Aggarwal, S Chand Publication.
- Programming Techniques through C, by M. G. Venkateshmurthy, Pearson Publication.
- A Computer Science Structure Programming Approaches using C, by Behrouz Forouzan, Cen-gage Learning.
- Let Us C, by YashwantKanetkar, BPB Publication.

Program : Civil Engineering	SY BTECH	Semester: IV
Field/Internship/Industry Training-2 (INTCE4090)		

Course Objectives

1. To get exposure of industrial ecosystem.
2. To enhance student's knowledge in the particular technology.
3. To nurture student's leadership ability and responsibility to perform or execute the given Task individually or in team

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply fundamental principles of engineering.	3	Apply
CO2	Become master in specialized/emerging technology	6	Evaluate
CO3	Self-improve through continuous professional development and life-long learning	6	Evaluate
CO4	Be aware of the ethics, social, cultural, global and Environmental responsibility as an engineer.	2	Comprehension

Course Content / Guidelines

Minimum of six weeks in an Industry in the area of Civil Engineering. The summer internship should Give exposure to the practical aspects of the discipline. In addition, the student may also work On a specified task or project which may be assigned to him/her. The outcome of the internship should Be presented in the form of a report.

1. Student shall undergo industrial training /internship for a minimum period of SIX weeks During summer vacations of third to sixth semester.
2. The industry in which industrial training/internship is taken should be a medium or large scale industry.
3. The paper bound report on training must be submitted by the student in the beginning of Seventh semester along with a certificate from the company where the student took training.
4. Every student should write the report separately.
5. Institute / Department / T&P Cell have to assist the students for finding Industries for the training/internship.
6. Students must take prior permission from department before joining for industrial training/internship.
7. Note that, the degree certificate will not be awarded if the certificate of field/industry/internship is not submitted to the department.
8. The field/industry/internship training will be reflected on the final mark sheet/degree certificate in the section of audit points completed.

In the section of audit points completed.