Shirpur Education Society's

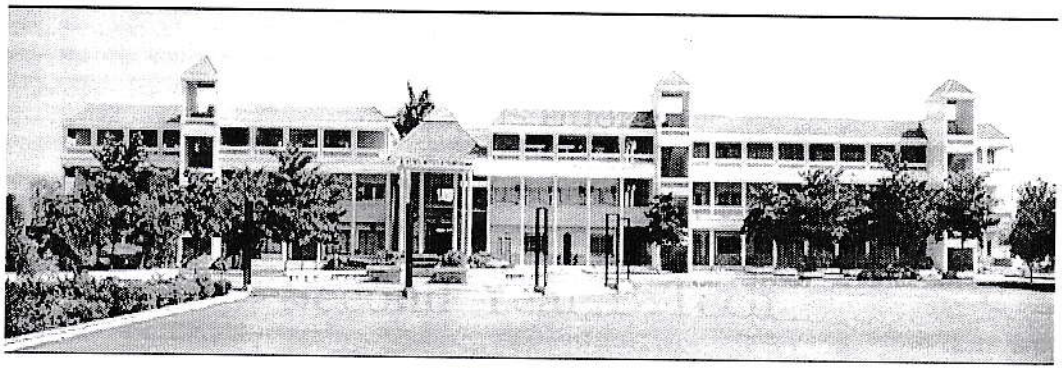
R. C. Patel Institute of Technology, Shirpur
(An Autonomous Institute)

Syllabus Booklet

Civil Engineering

Second Year B.Tech

With efffect from Academic Year 2021-22



Shahada Road, Near Nimzari Naka, Shirpur, Maharashtra 425405
Ph: 02563 259 802, Web: www.rcpit.ac.in

Semester-III													
S. No.	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme					Total	Credit
							Continuous Assessment (CA)				ESE		
				L	T	P	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	ES	ESCE3060T	Introduction to Civil Engineering	1			50					50	1
10	ESL	ESCE3060L	Introduction to Civil Engineering			2	25				25	50	1
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	10	245	75	75	75	450	800	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.

Semester-IV

S. No.	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme					Total	Credit
							Continuous Assessment (CA)				ESE		
							TA	Term Test 1 (TT1)	Term Test 2 (TT2)	Average (TT1 & TT2)			
				L	T	P	[A]			[B]	[C]	[A+B+C]	
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	@ Field/Internship/Industry Training												Audit
			Total	16	3	10	270	90	90	90	490	850	23

@ Minimum 6 weeks internship should be done during winter/summer vacation of semester IV and V. Evaluation will be done in semester VI.

Prepared by

Dean Academic/Dy. Director

Check by

COE

BOS Chairman

Director

Engineering Mathematics - III (BSCE3010T)

Teaching Scheme
Lectures: 03 Hrs. /week
Tutorial : 01 Hr. /week
Credit 04

Examination Scheme
Term Test: 15 Marks
Teacher Assessment: 20 Marks
End SEM Exam: 65 Marks
Total Marks: 100 Marks

Course Objectives

1. To provide sound foundation in the mathematical fundamentals necessary to formulate, solveand 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	L3	Apply
CO2	Identify analytic and harmonic functions and solve real integralsusing complex integration	L1	Remember
CO3	Find Fourier Series of periodic functions and simplify infinite series	L4	Analyze
CO4	Solve certain partial differential equations analytically and numerically	L3	Apply
CO5	Correlate different variables of data	L4	Analyze

Course Contents

Unit-I Laplace, Inverse Laplace Transform and its applications 09 Hrs

Prerequisite: *Calculus*

LT of standard functions such as 1, t^n, e^{at}, sin at, cos 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).

$$L\{t^n f(t)\}, \quad \frac{f(t)}{t}, \quad L\int_0^t f(u)du, \quad \frac{d^n f(t)}{dt^n}$$

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

Prerequisite: *Complex Numbers, Calculus*

Analytic functions, Cauchy-Riemann equations in Cartesian and polar coordinates (only statement) Milne-Thomson method to determine analytic function when it's 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

$$\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta, \quad \int_{-\infty}^{\infty} f(x)d$$

Unit-III Fourier Series 07 Hrs.

Prerequisite: *Periodic Functions*

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 07 Hrs.

Prerequisite: *Partial Derivatives*

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)

Unit-V Correlation, Regression and Curve-Fitting 06 Hrs.

Prerequisite: *Mean.Mode, Median*

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 $y = e^{bx}$

Reference Books

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

Text Books

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

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the tests will be considered for _nal grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Tutorial Minimum eight tutorials shall be conducted.

Mechanics of Solids (ESCE3020T)

Teaching Scheme	Examination Scheme
Lectures : 03 Hrs./week	Term Test : 15 Marks
Tutorial : 01 Hr/week	Teacher Assessment: 20 Marks
Credit : 04	End Sem Exam : 65 Marks
	Total Marks : 100 Marks

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 Contents

Unit-I **Simple Stresses and Strains** **06 Hrs.**

Prerequisite: Basic concepts of engineering mechanics

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** **08 Hrs.**

Prerequisite: Concept of stress, strain, CG & MI

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** **06 Hrs.**

Prerequisite: Concept of stress, strain, CG & MI

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** **8 Hrs.**

Prerequisite: Moments, Reaction of beams

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.

Unit-V **Axially Loaded Columns, Principal Stresses and Strains** **8 Hrs.**

Prerequisite: Concept of stress, strain

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.

c) Concept of principal stresses and planes, normal and tangential stress on any oblique plane, determination of principal stresses and principal planes, Mohr's circle method.

Reference Books:

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

Text Books:

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

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

1. Question Paper will be based on entire syllabus summing up to 65 marks
2. Total duration allotted for writing the paper is 3 hr.

Tutorial

Min eight tutorials shall be conducted

Mechanics of Solids Laboratory (ESCE3020L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks
End Sem Exam : 25 Marks
Total : 50 Marks

Course Objectives
After successful completion of this course students shall be able to

1. Demonstrate behavior of different material under axial shear and bending forces.
2. Identify various types of stresses in various structural elements.
3. Determine strength of different construction materials.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Ability to apply knowledge of mathematics and engineering in calculating the mechanical properties of structural materials.	1	Knowledge
CO2	Understanding properties of different metals and materials	2	Understand
CO3	Utilize appropriate materials in analysis and design considering engineering properties, sustainability, cost and weight.	3, 4	Apply, Analyze
CO4	Evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to unsuitable materials.	5	Evaluate
CO5	Write individual and group reports: present objectives, describe test procedures and results, synthesize and discuss the test results, present conclusions	6	Create

Course content

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.
9. Graphical Solution method for principal stress problem.

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 6 experiments and subject specific lab assignment/ Case study

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks

2. Journal Submission: 05 Marks

3. Viva-voce: 05 Marks

4. Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to Satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the Teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practical's performed During laboratory sessions.

Surveying-I (PCCE3030T)

Teaching Scheme
Lectures : 02 Hrs./week
Credit:02

Examination Scheme
Term Test : 15 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Course Objectives

1. To understand need and significance of vertical measurements, also basic concepts and methods, instruments used for leveling with computational skills.
2. The students should be able to measure area by plane table and Advanced equipment's.
3. To understand necessity, methods and instruments used for horizontal and vertical control.
4. To understand the operation of measurement of horizontal distance and vertical elevation by transit theodolite.
5. To analyze the elements and setting out of horizontal and vertical curves by different methods.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Students will able to find Reduce Level of point by different method	2	Understand
CO2	Students will able to understand basics of theodolite survey in elevation and applying angular measurements.	3	Apply
CO3	Apply tachometric surveying in distance and height measurements.	4	Analyzing
CO4	Students will able to Describe setting out of horizontal curves	2	Understand

Course Contents

Unit - I **Leveling** **06 Hrs.**

Prerequisite: NA

Principle of surveying, Definitions of some common terms in leveling, Instruments for leveling, Types of levels, Leveling 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 leveling method, Profile leveling L section and cross section.

Unit-II **Plane Table Surveying** **06 Hrs.**

Prerequisite: NA

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** **08 Hrs.**

Prerequisite: NA

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** **8 Hrs.**

Prerequisite: NA

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** **8 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

1. Surveying Vol.1 by Dr. B. C. Punmia, Laxmi Publication.
2. Surveying and Levelling by N.N.Basak, Tata Mac Graw Hill Publication.
3. Surveying and Levelling by S. K. Duggal, Tata Mac Graw Hill Publication.
4. Surveying and Levelling by T. P. Kanetkar, Laxmi publication.

Text Book

1. Higher Surevying by A.M.Chandra
2. Principles of remote sensing by A.N. Patel, Surendra Singh
3. Advanced Surveying (Total Station, GIS and Remote Sensing) First edition 2007.

Evaluation Scheme:
Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

4. Two term tests of 15 marks each will be conducted during the semester.
5. Total duration allotted for writing each of the paper is 1 hr.
6. Average of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

3. Question Paper will be based on entire syllabus summing up to 65 marks
4. Total duration allotted for writing the paper is 3 hr.

Surveying-I Laboratory (PCCE3030L)

Practical Scheme	Examination Scheme
Practical : 02 Hrs./week	Teacher Assessment : 25 Marks
Credit : 01	End Sem Exam : 25 Marks
	Total : 50 Marks

Course Objectives

The primary lab course objective is to find Reduced Level
Learning Outcomes: Upon successful completion of this course the student will be able to:

1. To find the Reduced Level of different point.
2. To Understand the Theodolite survey
3. Students will able to Apply tachometric surveying
4. To understand the process of elevation and distance measurement

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Students will able to find Reduce Level of point by different method	2	Understand
CO2	Students will able to understand basics of theodolite survey in elevation and angular measurements.	5	Evaluate
CO3	Students will able to Apply tachometric surveying in distance and height measurements.	3	Apply
CO4	Students will able to Apply tachometric surveying in distance and height measurements.	3	Apply

List of Laboratory Experiments

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.

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 6 experiments and subject specific lab assignment and two filed projects

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Filed project: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to Satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the Teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practical's performed

During laboratory sessions.

Concrete Technology (PCCE3040T)

Teaching Scheme	Examination Scheme
Lectures : 03 Hrs./week	Term Test : 15 Marks
Credit :03	Teacher Assessment : 20 Marks
	End sem Exam : 65 Marks
	Total Marks : 100 Marks

Course Objectives

1. To introduce the students 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 behavior 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	Students will able to learn the different Properties of Ingredients	1	Remembering
CO2	Students will able to understand manufacturing process of concrete	2	Understand
CO3	Students will able to understand Effects of Admixture on Concrete	2	Understand
CO4	Students will able to Prepare Concrete mix Design	4	Analyzing
CO5	Students will able to Learn various NDT methods	5	Evaluating

Course Contents

Unit-I **Cement, Aggregate and water** **06 Hrs.**

Prerequisite: NA

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** **08 Hrs.**

Prerequisite: NA

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** **06 Hrs.**

Prerequisite: NA

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.**

Prerequisite: NA

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.

R.C.Patel Institute of Technology AN AUTONOMOUS INSTITUTE Shirpur 425 405 (Dhule)

Text books:-

1. Concrete Technology by M. S. Shetty, S Chand Publication.
2. Concrete Technology by M. L. Gambhir, TMH Publication.
3. Concrete Technology by S.V.Deodhar, Central Techno Publication
4. Concrete Technology by N.V. Nayak& A.K. Jain, Narosa Publishing House Pvt. Ltd.

Reference books:-

1. Concrete Technology by A.N. Neville, J.J. Brooks, Addition Wesley
2. Concrete Technology by R.S. Varshney, Oxford & I B H.
3. Concrete Technology by P Kumar Mehta, GujratAmbuja

Evaluation Scheme:
Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

7. Two term tests of 15 marks each will be conducted during the semester.
8. Total duration allotted for writing each of the paper is 1 hr.
9. Average of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

5. Question Paper will be based on entire syllabus summing up to 65 marks
6. Total duration allotted for writing the paper is 3 hr.

Concrete Technology Laboratory (PCCE3040L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks
End Sem Exam : 25 Marks
Total : 50 Marks

Course Objectives

The primary lab course objective is to find properties of Material
Learning Outcomes: Upon successful completion of this course the student will be able to:

1. To find the various properties of material used in concrete.
2. To observe the behavior of concrete in Fresh stage and Hardened stage
3. To prepare mix design of concrete by IS method
4. To understand the process of concrete and quality control of concrete.
5. To study the various NDT test of concrete.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Students will able to find the Properties of material	3	Applying
CO2	Students will able to understand various test of concrete	2	Understanding
CO3	Students will able to understand various Instruments related to quality control.	5	Evaluating
CO4	Students will able to Prepare Concrete mix Design	6	Creating
CO5	Students will able to Learn various NDT methods used for inspection of concrete	2	Understanding

Course Content

List of Experiments

Term work shall consist of performing minimum five 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.

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 6 experiments and subject specific lab assignment/ Case study

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to Satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the Teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practical's performed During laboratory sessions.

Building Construction & Materials (PCCE3050T)

Teaching Scheme
Lectures : 02 Hrs./week
Credit:02

Examination Scheme
Term Test : 15 Marks
Teacher Assessment : 20 Marks
End sem Exam : 65 Marks
Total Marks : 100 Marks

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	Students are able to understand the component of building with their function	1&2	Learn
CO2	Students are able to understand construction procedure of differ ent components and Ability to Explain types of masonry	1&3	Understand
CO3	StudentswillabletounderstandAbilitytoDescribetypesofdoors,wind ows,archesandlintel	3	Understand
CO4	AbilitytoIlluminatemeansofverticalcirculationandprotectivecoatin gs	3&4	Learn
CO5	Studentsareabletounderstandtheproperty,use,advantageanddisadv antageofdifferentmaterialusedinconstruction	1&4	Understand

Course Contents

Unit-I Types of building and foundation **08Hrs.**

Prerequisite:

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 **06Hrs.**

Prerequisite:

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 06Hrs

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 **06 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.

Unit-V Study of various material used in construction **08Hrs.**

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.

Textbooks

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

Reference Books

1. Engineering Materials: S.R. Rangwala,Charotar Publications.
2. Architectural Materials science: D. Anapetor, Mir Publishers.
3. Introduction to Engineering Materials: B. K. Agrawal, Tata McGraw Hill, NewDelhi.
4. Relevant codes: BIS, ACI & BS.

Evaluation Scheme:
Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

1) Two term tests of 15 marks each will be conducted during the semester.
2) Total duration allotted for writing each of the paper is 1 hr.
3) Average of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

1) Question Paper will be based on entire syllabus summing up to 65 marks
2) Total duration allotted for writing the paper is 3 Hrs.

Introduction to Civil Engineering (HMCE3060T)

Teaching Scheme
Lectures : 1 Hrs./week
Credit :01

Examination Scheme
Term Test: NIL :Marks
Teacher Assessment :50 Marks
End Sem Exam : NILMarks
Total Marks : 50Marks

Course Objectives

1. To introduce the students Basic History of Civil Engineering.
2. The students should be able to understand the various branches of civil engineering.
3. Understand the components of various structure.
4. Students will able to Learn Importance of safety on field.
5. Students will able to Learn various Software's used in construction Industry.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Students learn the History of civil engineering	6	Learn
CO2	Students will able to understand branches of civil engineering	3	Apply
CO3	Students will able to understand components of various structure	2	Understand
CO4	Students will able to draw various components of structure	3	Apply
CO5	Students Learn the Introduction of various software's	6	Learn

Course Contents

Unit-I History of Civil engineering 02 Hrs.

Prerequisite: NA

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 02Hrs.

Prerequisite: NA

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 03 Hrs.

Prerequisite: NA

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 03Hrs.

Prerequisite: NA

Introduction to safety in construction, Practices and self-training as per NBC part-7, Control& Monitoring safety practices.

Unit-V Introduction to Software's in civil Engineering 04 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.)

Textbooks

1. Building Construction: Dr. B.C. Punmia, A.K.Jain, A.R.Jain,Laxmi Publication., New Delhi.
2. A Building Construction: S.C. Rangwala, Charotar Publications, Gujarat, India.
3. RangawalaS.C., " Town Planning" , Charotar Publications.
4. Khanna O.P., "Work Study" ,Dhanpatrai publication
5. Srinath L. S. " CPM PERT" , Affiliated East-West Press (Pvt) ltd

Reference Books

1. Engineering Materials: S.R. Rangwala,Charotar Publications.
2. Architectural Materials science: D. Anapetor, Mir Publishers.
3. Introduction to Engineering Materials: B. K. Agrawal, Tata McGraw Hill, NewDelhi.
4. Relevant codes: BIS, ACI & BS.

Evaluation Scheme:
Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Min two Assignment based on each unit.

Introduction to Civil Engineering (HMCE3060L)

Practical Scheme	Examination Scheme
Practical : 02 Hrs./week	Teacher Assessment : 25 Marks
Credit : 01	Total :50Marks

Course Objectives

The primary lab course objective is to draw the components of structure in detailed
Learning Outcomes: Upon successful completion of this course the student will be able to:

1. To understand the various components of Structure.
2. To observe and able to sketching cross section of small components
3. Students will able to understand Importance of Safety in construction Industry
4. To study the Introduction of various Software.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Students will able to Understand the Branches of Civil Engineering	3	Apply
CO2	Students will able to understand various components of other structure	2	Understand
CO3	Students will able to understand Importance of Safety in construction Industry.	2	Understand
CO4	Students will able to Learn the Introduction of various software's	6	Learn

List of Laboratory Experiments

List of Experiments

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

Group-I (Draw any five of the Following sketch on A3 size plate not to Scale)

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.

Group-II (Any Two of Following)

Write down the Assignment based on

a) Importance of Safety in Construction Industry.
b) Explain the Safety precautions in building work
c) Importance of Software's in Construction Industry.
d) Report regarding visit to the construction sites including drawing and photographs

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 6 Assignments from above group-I and Two form group-II

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to Satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the Teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practical's performed During laboratory sessions.

Semester Project – I (PJCE3070 L)

Teaching Scheme	Examination Scheme
Practical : 02 Hrs./week	Teacher Assessment : 25Marks0
Credit : 01	End Semester 50 marks
Marks	Total Marks : 50

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	Conduct a survey of several available literatures in the preferred field of study.	4	Analyze
CO2	Demonstrate various/alternate approaches to complete a Project.	2	Understand
CO3	Ensure a collaborative project environment by interacting And dividing project work among team members.	3	Apply
CO4	Present their project work in the form of a technical report / paper and thereby improve the technical communication skill.	3	Apply
CO5	Demonstrate the ability to work in teams and manage the conduct of the research study.	2	Understand

Semester Project:

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 Maintain	Literature review	Depth of Understanding	Report	Total
			5	5	5	5	5	25

Table 3 Evaluation sheet

S.NO.	Exam Seat No	Name of Student	Project Selection	Design Simulation logic	PCB hardware programing	Result Verification	Presentation	Total
			5	5	5	5	5	25

Constitution of India (MCCE3080T)

Teaching Scheme	Examination Scheme
Lectures : 1 Hrs./week	Audit Course

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	Have general knowledge and legal literacy and thereby to take up competitive examinations	1	Remember
CO2	Understand state and central policies, fundamental duties	1	Remember
CO3	Understand Electoral Process, special provisions.	1	Remember
CO4	Understand powers and functions of Municipalities, Panchayats and Co-operative Societies	1	Remember
CO5	Understand Engineering ethics and responsibilities of Engineers	1	Remember
CO6	Understand Engineering Integrity & Reliability	1	Remember

Course Contents

Unit-I Introduction to the constitution of India **02 Hrs.**

Prerequisite: NA

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 **02 Hrs.**

Relevance of directive principles state Policy fundamental duties.

Union Executives – President, Prime Minister Parliament Supreme court of India.

Unit-III State Executives **02 Hrs.**

Governor, Chief Minister, State Legislature High Court of State Electoral Process in India, Amendment Procedures, 42nd, 44th, 74th, 76th, 86th & 91st Amendments.

Unit-VI Special Provision **02 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 **02 Hrs.**

Responsibility of Engineers Impediments to Responsibility Risks, Safety and liability of Engineers, Honesty, Integrity & Reliability Engineering

Books Recommended:

Text books:

1. Durga Das Basu: "Introduction to the Constitution on India", (Students Edn.) Prentice –Hall EEE, 19th / 20th Edn., 2001

2. Charles E. Haries, Michael S Pritchard and Michael J. Robins "Engineering Ethics" Thompson Asia, 2003-08-05.

Reference Books:

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

Website Resources:

1. www.nptel.ac.in
2. www.hnlu.ac.in
3. www.nspe.org
4. www.preservearticles.com

Evaluation Scheme:

1. Student should submit a report on the case study declared by teacher.
2. Audit point shall be awarded subject to submission of report of the case study Declared by teacher.

Field/Internship/Industry Training

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	To apply fundamental principles of engineering.	3	Apply
CO2	To become master in specialized/emerging technology	6	Evaluate
CO3	Self-improvement through continuous professional development and life-long learning	6	Evaluate
CO4	To get awareness of the ethics, social, cultural, global and Environmental responsibility as an engineer.	2	Comprehension

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.

Engineering Mathematics IV (BSCE4010T)

Teaching Scheme	Examination Scheme
Lectures : 03 Hrs./week	Term Test : 15 Marks
Tutorial :01 Hrs/week	Teacher Assessment : 20 Marks
Credit :04	End Sem Exam : 65 Marks
	Total Marks : 100 Marks

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	Bloom sLevel	Blooms Description
CO1	Identify diagonalizable and derogatory matrices and find functionsas a square matrix using eigenvalues and eigenvectors.	L1	Knowledge
CO2	Evaluate vector integrals	L5	Evaluate
CO3	Use probability to solve real-life engineering problems	L3	Apply
CO4	Draw conclusions on population based on large and small samplestaken.	L3	Apply
CO5	Analyze the variances of multiple variables simultaneously	L4	Analyze

Course Contents

Unit-I Linear Algebra 10 Hrs.

Prerequisite: *Matrices and its properties*

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.

Prerequisite: *One variable Calculus*

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 09 Hrs.

Prerequisite: *Arithmetic, Algebra,*

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 09 Hrs.

Prerequisite: *Probability*

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 04 Hrs.

Prerequisite: *Probability Distribution*

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

Reference Books

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

Text Books

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

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the tests will be considered for _nal grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Tutorial Minimum eight tutorials shall be conducted.

Fluid Mechanics (PCCE4020T)

Teaching Scheme	Examination Scheme
Lectures : 03 Hrs./week	Term Test : 15 Marks
Tutorial :01 Hr/Week	Teacher Assessment : 20 Marks
Credit : 04	End Sem Exam : 65 Marks
	Total Marks : 100 Marks

Course Objectives:

After successful completion of course, students should able to:

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	Describe fluid mechanics fundamentals, including concepts of mass and momentum conservation.	L2	Understand
CO2	To measure the fluid pressure and use of buoyancy equation to calculate overturning force on body.	L4	Analyzing
CO3	Apply control volume analysis to problems in fluid mechanics.	L3	Apply
CO4	Apply the Bernoulli equation to solve problems in fluid mechanics.	L3, L5	Apply, Evaluate
CO5	An ability to apply the concepts of dimensional homogeneity and dimensional analysis.	L1, L3	Remember, Apply

Course Contents

Unit-I **Properties of Fluids** **06 Hrs.**

Prerequisite: NA

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** **07 Hrs.**

Prerequisite: NA

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** **06 Hrs.**

Prerequisite: NA

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** **7 Hrs.**

Prerequisite: NA

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 **Flow Through Pipes** **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

Text Books

1. Hydraulics and fluid mechanics including Hydraulic machines by Dr. P. N. Modi and S. M. Seth, Latest edition, Standard book house.
2. Theory and application of fluid mechanics by K Subramanya, Tata McGraw Hill Publishing Company Ltd New Delhi.
3. A textbook of Fluid Mechanics & Hydraulic Machines by R. K. Bansal.
4. Fluid Mechanics- by D.S.Kumar, S.K.Katariya & Sons, Delhi.

Reference Books:

1. Fluid Mechanics & Hydraulic Machines by S. C. Gupta, Darling Kindersley (I) pvt. Ltd. Pearson licensee, Nodia, UP.
2. Fluid Mechanics – Fundamentals and applications by Yunus cengel, Jhon M Cimbala, Tata McGraw Hill Publishing Company Ltd New Delhi, latest edition/ reprint.
3. Fluid mechanics through problems, 2nd ed.: R. J. Garde, Wiley Eastern Ltd

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

1. Question Paper will be based on entire syllabus summing up to 65 marks
2. Total duration allotted for writing the paper is 3 hr.

Tutorial

Min eight tutorials shall be conducted

Fluid Mechanics Laboratory (PCC4020L)

Practical Scheme	Examination Scheme
Practical : 02 Hrs./week	Teacher Assessment : 25 Marks
Credit : 01	End Sem Exam : 25 Marks
	Total : 50 Marks

Course Objectives

1) To understand principles and to study fundamentals of different apparatus in laboratories.
2) To understand basic concepts of fluid flow.
3) To have understanding of various types of flow measuring devices and their calibration.
4) To be able to estimate losses associated in the experimental devices due to friction etc.
5) To impart training to use various flow measuring devices for making engineering judgments.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Acquire knowledge of basic principles of fluid mechanics.	1	Learning
CO2	Estimate the friction and measure the frictional losses in fluid flow	3	Applying
CO3	Determine the coefficient of discharge of flow measuring devices.	2	Understanding
CO4	Analyze fluid flow problems using momentum and energy principles.	5	Evaluating
CO5	Students are able to perform the verification Bernoulli's theorem.	4	Analyzing

Course content

List of Experiments

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

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 6 experiments and subject specific lab assignment/ Case study

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to Satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the Teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practical's performed During laboratory sessions

Surveying - II (PCCE4030T)

Teaching Scheme	Examination Scheme
Lectures : 03 Hrs./week	Term Test : 15 Marks
Credit :02	Teacher Assessment : 20 Marks
	End Sem Exam : 65 Marks
	Total Marks : 100 Marks

Course Objectives

1. Comprehend different geodetic methods of survey such as triangulation, trigonometric leveling.
2. Ability to analyze the adjustment of station and figure by different methods.
3. Understanding the hydrographic surveying operations by different methods.
4. Ability to compare Terrestrial and Aerial photography for large scale survey project.
5. Ability to analyze and interpret data in application of remote sensing and data through GIS Software.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe scope of geodetic surveying and triangulation in civil engineering society.	2	Understand
CO2	Understanding the hydrographic surveying operations.	3	Apply
CO3	Perform Terrestrial and Aerial photography for large scale survey.	5	Evaluate
CO4	Explain principles of remote sensing and GIS.	2	Understand

Course Contents

Unit-I Triangulation 06 Hrs.

Prerequisite: NA

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 07 Hrs.

Prerequisite: NA

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 06 Hrs.

Prerequisite: NA

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 form sea shore line, Observation from sounding boat, Observation from both shore line and sounding boat, Three point problem solution.

Unit-IV Photogrammetry 7 Hrs.

Prerequisite: NA

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:-

1. Surveying Vol.1 by Dr. B. C. Punmia, Laxmi Publication.
2. Surveying and Levelling by N.N.Basak, Tata Mac Graw Hill Publication.
3. Surveying and Levelling by S. K. Duggal, Tata Mac Graw Hill Publication.
4. Surveying and Levelling by T. P. Kanetkar, Laxmi publication.

Text books:-

1) Higher Surevying by A.M.Chandra

2) Principles of remote sensing by A.N. Patel, Surendra Singh

3) Advanced Surveying (Total Station, GIS and Remote Sensing) First edition 2007,

Sathessh Gopi, Sathikumar, N Madhu

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

4. Two term tests of 15 marks each will be conducted during the semester.
5. Total duration allotted for writing each of the paper is 1 hr.
6. Average of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

3. Question Paper will be based on entire syllabus summing up to 65 marks
4. Total duration allotted for writing the paper is 3 hr.

Surveying-II Laboratory (PCCE4030L)

Practical Scheme
Practical : 02 Hrs./week
Credit :01

Examination Scheme
Teacher Assessment : 25 Marks
End Sem Exam : 25 Marks
Total : 50 Marks

Course Objectives

The primary lab course objective is to find properties of Material
Learning Outcomes: Upon successful completion of this course the student will be able to:

1. Comprehend different geodetic methods of survey such as triangulation, Trigonometric leveling.
2. Ability to analyze the adjustment of station and figure by different methods.
3. Understanding the hydrographic surveying operations by different methods.
4. Ability to compare Terrestrial and Aerial photography for large scale survey project.
5. Ability to analyze and interpret data in application of remote sensing and data through GIS Software.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe scope of geodetic surveying and triangulation in civil engineering society.	2	Understanding
CO2	Understanding the hydrographic surveying operations.	3	Understanding
CO3	Perform Terrestrial and Aerial photography for large scale survey.	3	Applying
CO4	Explain principles of remote sensing and GIS.	2	Understanding

Course content

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

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 6 experiments and one filed Project / Case study

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Filed project Case Study: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to Satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the Teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practical's performed During laboratory sessions

Building Planning and Design (ESCE4040T)

Teaching Scheme
Lectures : 02 Hrs./week
Credit :02

Examination Scheme
Term Test : 15 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

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	Students will be able to understand basic concepts of scale, symbols of material, types of building, and use of building materials.	2	Understand
CO2	Students will able to prepare working and submission drawing of a building.	6	Creating
CO3	Students will able to learn various building byelaws relating to planning of buildings	3	Applying
CO4	Students will able to plan residential, public and administrative building according occupant's requirements.	5	Evaluating
CO5	Students will able to draw one and two point perspective view of object and building	6	Creating

R.C.Patel Institute of Technology AN AUTONOMOUS INSTITUTE Shirpur 425 405 (Dhule)

Course Contents

Unit-I Principles and Codes of Practices for Planning and Designing of Buildings 06 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, numbering of buildings and parts of buildings, designation of rooms and other, areas, coloring the plan.

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 07 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 06 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 7 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 6 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.

Text Books:

1. Shah M.G., Kale C.M. and Patki S.Y., "Building drawing an Integrated approach to Built environment", Tata McGraw Hill (Fifth edition)
2. Building Planning & Drawing by Dr. N. KumaraSwamy, A. Kameswara Rao, 7th edition, Charotar Publishing House.
3. Y.S.Sane, "Planning and Designing Buildings", Engineering Book Publishing Co., Pune – 16, Edition 1996
4. S.P.Arora and S.P. Bindra, "A Text Book of Building Construction", Dhanpat Rai& Sons, Delhi, Edition 1996

Reference Books:

1. National Building Code of India 2005, Bureau of Indian Standard, New Delhi.
2. Dr. B.C. Punmia, "Building Construction" Laxmi Publications Pvt. Ltd., New Delhi, Edition, 1998
3. I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings.
4. Building science and planning by Dr. S. V. Deodhar, Khanna Publishers.
5. National Building Code of India – 2005 (NBC 2005)
6. A Course in Civil Engineering Drawing", by V. B. Sikka, S. K.Kataria & Sons.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

7. Two term tests of 15 marks each will be conducted during the semester.
8. Total duration allotted for writing each of the paper is 1 hr.
9. Average of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

5. Question Paper will be based on entire syllabus summing up to 65 marks
6. Total duration allotted for writing the paper is 3 hr.

Building Planning and Design Lab (ESCE4040L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks
End Sem Exam : 25 Marks
Total : 50 Marks

Course Objectives

1 To develop basic planning skills, and design residential /public buildings/commercial buildings on paper.
2 To draw elevation, section and aesthetics of proposed building by perspective view.
3 Students will able to prepare working and submission drawing of a building.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Students will be able to understand different scales of drawings	2	Understand
CO2	Students will able to plan residential and public buildings according occupant's requirements.	5	Evaluating
CO3	Students will able to prepare working and submission drawing of residential and public buildings.	6	Creating
CO4	Students will able to draw one and two point perspective view of object and building.	6	Creating

Course content

List of Experiments

A) Group A- Planning of Residential Building -

a) Planning of a small residential buildings/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 details units of each floor.
2. Front and Road side elevations- Draw all detail elevation with elegance.
3. Sections- Draw section through 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)

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 8 experiments from above group A and B

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks

2. Journal Submission: 05 Marks

3. Viva-voce: 05 Marks

4. Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to

Satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the

Teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practical's performed

During laboratory sessions.

Structural Analysis (PCCE4050T)

Teaching Scheme	Examination Scheme
Lectures : 03 Hrs./week	Term Test : 15 Marks
Tutorial :01	Teacher Assessment : 20 Marks
Credit : 04	End Sem Exam : 65 Marks
	Total Marks : 100 Marks

Course Objectives

1. To describe fundamental concepts of structural analysis and structural analysis of beam Using different methods such as moment area method, conjugate beam method etc. To determine slope and deflection at a point.
2. To compute internal forces in fix and continuous beam, to draw shear force and bending moment diagram for the same
3. Structural analysis of statically determinate and indeterminate pin jointed structures.
4. To determine normal thrust, shear force and bending moment in two and three hinged arches subjected to different loading condition.
5. Analysis of indeterminate structures using basics of slope deflection method.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	To describe fundamental concepts of structural analysis and structural analysis of beam	2	Understand
CO2	To compute internal forces in fix and continuous beam, to draw shear force and bending moment diagram for the same	4	Analyze
CO3	Structural analysis of statically determinate and indeterminate pin jointed structures	4	Analyze
CO4	To determine normal thrust, shear force and bending moment in two and three hinged arches subjected to different loading condition	5	Analyze
CO5	Analysis of indeterminate structures using basics of slope deflection method	5	Analyze

Course Contents

Unit 1 Basic Concepts and Slope, Deflection of beam 6 Hours

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 2 Analysis of fixed beam and continuous beam 7 Hours

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 moment.

Unit 3 Analysis of trusses 6 Hours

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 4 Analysis of three hinged and two hinged arch 7 Hours

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 5 Slope Deflection method 6 Hours

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

Reference Books:

- Reddy C. S., "Basic Structural Analysis", Tata McGraw Hill,3rd edition 2010
- 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

Text Book

- 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.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

1) Two term tests of 15 marks each will be conducted during the semester.
2) Total duration allotted for writing each of the paper is 1 hr.
3) Average of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

1) Question Paper will be based on entire syllabus summing up to 65 marks
2) Total duration allotted for writing the paper is 3 hr.
3) Tutorial Minimum eight tutorials shall be conducted.

Universal Human Values (HMCE4060T)

Teaching Scheme
Lectures : 2 Hrs./week
Credit :02

Examination Scheme
Term Test :15 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 25 Marks
Total Marks : 50Marks

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	Become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human Relationships and human nature in mind. They would have better critical ability	L1	Learn
CO2	Become sensitive to their commitment towards what they have understood (human values, human relationship, and human society	L2	Understand
CO3	Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.	L3	Apply
CO4	Ability to identify and develop appropriate technologies and management patterns	L1	Learn

Course Contents

Unit-I Introduction: Need, Basic Guidelines, Content and Process for Value Education **06 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 fulfillment 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 06 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 06 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-VI Understanding Harmony in the Nature and Existence 06 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 02 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,
c. Ability to identify and develop appropriate technologies and management patterns for above production systems

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order:
a) At the level of individual: as socially and ecologically responsible engineer Technologists, and managers, b) At the level of society: as mutually enriching institutions and organizations

Books Recommended:

Textbooks:

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

Reference books:

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

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the tests will be considered for _nal grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Semester Project – II (PJCE4070 L)

Teaching Scheme		Examination Scheme
Practical : 02 Hrs./week		Teacher Assessment : 25Marks
Credit : 01		End Semester 25 marks
	Marks	Total Marks : 50

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	Conduct a survey of several available literatures in the preferred field of study.	4	Analyze
CO2	Demonstrate various/alternate approaches to complete a Project.	2	Understand
CO3	Ensure a collaborative project environment by interacting And dividing project work among team members.	3	Apply
CO4	Present their project work in the form of a technical report / paper and thereby improve the technical communication skill.	3	Apply
CO5	Demonstrate the ability to work in teams and manage the conduct of the research study.	2	Understand

Semester Project:

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 Maintain	Literature review	Depth of Understanding	Report	Total
			5	5	5	5	5	25

Table 3 Evaluation sheet

S.NO.	Exam Seat No	Name of Student	Project Selection	Design Simulation logic	PCB hardware programing	Result Verification	Presentation	Total
			5	5	5	5	5	25

Employability Skill Development Program – I
(HMCE 4080L)

Teaching Scheme
Practical: 02 Hrs/Week
Credit:01

Examination Scheme
Teacher Assessment: 50 Marks
Total: 50 Marks

Pre-requisite: Basic Mathematics, Basic knowledge of C programming

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 Engineeringproblems.
4. Demonstrate an understanding of computer programming language concepts.

COs	Course Outcomes	Blooms Level	Blooms Description
CO 1	Understand and apply the basic concepts of Quantitative Ability i. e. profit, loss, time, work and geometry.	2 and3	Understand ,Apply
CO 2	Understand and apply the concepts of Quantitative Ability for theproblem solving.	2 and3	Understand ,Apply
CO 3	Illustrate the concept of Variables and Functions	2 and3	Understand ,Apply
CO 4	Understand and illustrate the concept of Multithreading and string handling	2 and3	Understand ,Apply
CO 5	Understand and describe the fundamental of object-oriented programming	2 and3	Understand

Course Contents

Unit-I **Aptitude**

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**

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**

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**

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**

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

Reference Books

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

Evaluation Scheme

Continuous Assessment (CA)

Teacher's assessment (TA) will carry weightage of 50 marks. Components of TA are:

1. MCQ Test based on Aptitude: 20 Marks
2. MCQ Test based on Programming skills: 20 Marks.
3. Mock Interview: 10 Marks

Any other component recommended by BOS and approved by Dean Academics.

Field/Internship/Industry Training

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	To apply fundamental principles of engineering.	3	Apply
CO2	To become master in specialized/emerging technology	6	Evaluate
CO3	Self-improvement through continuous professional development and life-long learning	6	Evaluate
CO4	To get awareness of the ethics, social, cultural, global and Environmental responsibility as an engineer.	2	Comprehension

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.