WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
(AN AUTONOMOUS INSTITUTE)

Affiliated to
Punyashlok Ahilyadevi Holkar Solapur University,
Solapur

CHOICE BASED CREDIT SYSTEM (CBCS)

Structure and Syllabus
for
S. Y. B.Tech. Civil Engineering

W.E.F. 2023-24

Dr. M. G. Kalyanshetti
Chairman, BOS in Civil Engg.
W.I.T. (Autonomous), Solapur

WALCHAND INSTITUTE OF TECHNOLOGY WIT SOLAPUR

Department of Civil Engineering

Department Vision

The Department of Civil Engineering, Walchand Institute of Technology Solapur, will excel and lead in education, research, and innovation; contributing to the advancement of design, construction, and maintenance of infrastructure, to enhance the quality of life for humanity in a sustainable way.

Department Mission

1. To provide an outstanding learning experience through a rigorous curriculum of theory and practice that develops students' technical and professional skills to succeed in a wide range of careers.
2. To continually advance research through a culture of discovery, creativity and innovation to benefit humankind.
3. To serve as highly capable resources to society, the profession through professional organizations, consultancy and continuing education.

Civil Engineering
Under Graduate Program
Program Educational Objectives (PEOs)

The Program Educational Objectives for B. Tech. Civil Engineering program are designed to produce competent civil engineers who are ready to contribute effectively to the advancement of Civil Engineering and to fulfill the needs of the community. These objectives are as follows:

1. Graduate will demonstrate peer-recognized technical competency in the analysis, design and construction of Civil Engineering Structures.
2. Graduate will demonstrate leadership and initiative to advance professional and organizational goals with a commitment to ethical standards of profession, teamwork and respect for diverse cultural backgrounds.
3. Graduate will be engaged in ongoing learning and professional development through pursuance of higher education and self-study.
4. Graduates will be committed to create practice of engineering and other professions in a responsible manner contributing to the socio-economic development of the society.

Program Outcomes (POs)

The program outcomes of B. Tech. Civil Engineering Program are summarized as following:

1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. **Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities, relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

Engineering graduate in Electronics and Telecommunication Engineering Programme will be able to do-

1. Graduates will be able to survey, conduct geo-technical investigations, plan, analyze, design, estimate and construct residences, public buildings, industrial buildings, townships and infrastructural projects by adopting appropriate construction methods.
2. Graduates will be able to analyze and design the water resources systems, municipal and industrial waste treatment plants with due consideration to pollution free environment.
3. Graduates will be able to use appropriate application software, develop skills necessary for professional practice as a Civil Engineer and prepare themselves for competitive examinations for higher education & for public service commissions.

Legends used–

L	Lecture Hours/week
T	Tutorial Hours/week
P	Practical Hours/week
FA	Formative Assessment
SA	Summative Assessment
ESE	End Semester Examination
ISE	In Semester Evaluation
ICA	Internal Continuous Assessment
POE	Practical and Oral Exam
OE	Oral Exam
MOOC	Massive Open Online Course
HSS	Humanities and Social Sciences
NPTEL	National Program on Technology Enhanced Learning
F.Y.	First Year
S.Y.	Second Year
T.Y.	Third Year
B.Tech.	Bachelor of Technology

Course Code Format:

2	1	C	E	U/P	2	C	C	1	T / L
Batch Entry Year		Program Code		U-Under Graduate, P-Post Graduate	Semester No. / Year 1/2/3/…8	Course Type		Course Serial No. 1-9	T-Theory, L-Lab session

Program Code	
CE	Civil Engineering
Course Types	
BS	Basic Science
ES	Engineering Science
HU	Humanities & Social Science
MC	Mandatory Course
CC	Core Compulsory Course
SN*	Self-Learning N* indicates the serial number of electives offered in the respective category
EN*	EN* Core Elective N* indicates the serial number of electives offered in the respective category
SK	SK Skill-Based Course
SM	Seminar
MP	Mini project
PR	Project
IN	Internship

Sample Course Code:

22CEU3CC1T	Fluid Mechanics-I

Walchand Institute of Technology, Solapur

Structure of S. Y. B. Tech. Civil Engineering,

(W.E.F. 2023-2024)

Semester- III

Course Code	*Theory Course Name*	*Engagement Hours*				*Credits*	*FA*	*SA*		*Total*
		L	*T*	*P*	*D*		*ESE*	*ISE*	*ICA*	
22CEU3CC1T	Fluid Mechanics-I	3	-	-	-	3	60	40	-	100
22CEU3CC1L	Fluid Mechanics-I Lab	-	-	2	-	1	25	-	25	50
22CSU3CC2T	Concrete Technology & Material Testing	2	-	-	-	2	60	40	-	100
22CEU3CC2L	Concrete Technology & Material Testing Lab	-	-	2	-	1	-	-	25	25
22CEU3CC3T	Building Construction & Drawing	2	-	-	-	2	60	40	-	100
22CEU3CC3L	Building Construction & Drawing Lab	-	-	-	2	1	-	-	25	25
22CEU3CC4T	Introduction to Solid Mechanics	3	-	-	-	3	60	40	-	100
22CEU3BS5T	Engineering Geology	3	-	-	-	3	60	40	-	100
22CEU3BS5L	Engineering Geology Lab	-	-	2	-	1	25	-	25	50
22CEU3HU6T	Universal Human Values	3	-	-	-	3	60	40	-	100
	Total	**16**	**-**	**6**	**2**	**20**	**410**	**240**	**100**	**750**

Note:

1) The number of students in a practical/Tutorial batch shall be 20. A new batch shall be formed if the number of remaining students (after forming batches of 20) exceeds 9.

2) Internal Continuous Assessment (ICA): ICA shall be a continuous process based on the performance of the student in assignments, class tests, quizzes, attendance and during theory and lab sessions, journal writing, report presentation, etc., as applicable interaction.

3) Student is required to study and pass Environmental Studies subject in the Second Year of B. Tech. Civil Engineering to become eligible for award of degree.

4) Internship I - Four weeks of the internship can be completed by students from Semester I up to the end of Semester IV, the report of which will be assessed in Semester V. The Students can complete two separate internships of two weeks each or one internship of four weeks. The internship can be done in the form of an Industrial Internship / MOOC course / Certification course / Workshop/ any other relevant activity as specified by the department.

Walchand Institute of Technology, Solapur

Structure of S. Y. B. Tech. Civil Engineering,

(W.E.F. 2023-2024)

Semester- IV

Course Code	Theory Course Name	Engagement Hours				Credits	FA	SA		Total
		L	T	P	D		ESE	ISE	ICA	
22CEU4CC1T	Surveying & Geomatics	3	-	-	-	3	60	40	-	**100**
22CEU4CC1L	Surveying & Geomatics Lab	-	-	2	-	1	25	-	25	**50**
22CEU4CC2T	Fluid Mechanics-II	3	-	-	-	3	60	40	-	**100**
22CEU4CC2L	Fluid Mechanics-II Lab	-	-	2	-	1	-	-	25	**25**
22CEU4CC3T	Building Planning & Design	2	-	-	-	2	30	20	-	**50**
22CEU4CC3L	Building Planning & Design Lab	-	-	-	2	1	50	-	25	**75**
22CEU4CC4T	Structural Mechanics	3	-	-	-	3	60	40	-	**100**
22CEU4CC4A	Structural Mechanics Tutorial	-	1	-	-	1	-	-	25	**25**
22CEU4BS5T	Engineering Mathematics-III	3	-	-	-	3	60	40	-	**100**
22CEU4BS5A	Engineering Mathematics-III Tutorial	-	1	-	-	1	-	-	25	**25**
22CEU4CC6P	Computer Programming & Numerical Methods Lab	2	-	1	-	3	50	25	25	**100**
	Total	**16**	**2**	**5**	**2**	**22**	**395**	**205**	**150**	**750**

Mandatory Course: Environmental Studies course will be taught in both semesters III and IV whereas assessment will be in semester IV as End Semester Examination

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
22CEU4MC2T	Environmental studies	1	--	--	--	50	-	-	50

Note:

1) The number of students in a practical/Tutorial batch shall be 20. A new batch shall be formed if the number of remaining students (after forming batches of 20) exceeds 9.

2) Internal Continuous Assessment (ICA): ICA shall be a continuous process based on the performance of the student in assignments, class tests, quizzes, attendance, and during theory and lab sessions, journal writing, report presentation, etc., as applicable interaction.

3) Student is required to study and pass Environmental Studies subject in the Second Year of B. Tech. Civil Engineering to become eligible for award of degree.

Internship-I (During/ up to the end of the Fourth Semester)

A. Duration: The student shall undergo a total of 4 Weeks in the first and/or up to the fourth semester.

B. Internship work Identification: Students shall undergo an Internship at any Industry/Govt./NGO/MSME/Rural Internship/Innovation/IPR to make themselves ready for the industry or they may work on innovation or entrepreneurial activities resulting in start-ups or Students can take internship work in the form of onsite/online work from any of the following but not limited to:

1. Computer-Aided Drawing and Design: The student shall work with a Planning & Designing firm/ Architect for the construction of a Residential/Commercial building (G+3) and learn the use of software for Computer Aided Drawing and Design (CADD)
2. Geographic Information System: The students shall undergo an online course of a minimum of 4 weeks availed by IIRS/NPTEL/Leading GIS companies etc. and obtain a certificate and submit it as proof of completion of the internship.
3. Total Station Surveys: The Students shall work on Civil Engineering Projects carrying out Total Station Surveys for 'Project planning and layout' of an infrastructural project.
4. Global Positioning System/ Global Navigation satellite system (GNSS): The students shall work with a firm using GIS/GPS/GNSS tools for various Civil Engineering and allied projects and learn to use these technologies.
5. Concrete Technology**:** The students shall work on 'Ready Mix Concrete Manufacturing plants' and/or 'Construction Sites' for studying various Concrete mix designs and the use of Admixtures & Construction chemicals for concrete manufacturing.

6. Working on consultancy/ research project at Institute
7. Development of new product/business plan/registration of start-up
8. Carrying out surveys related to society-related Engineering problems. For example, a survey of solid waste management in a particular area/town/village, a survey of the water supply network in a locality, town, village, etc, a survey of air quality, etc.

C. Certificate: The industry/organization should issue certificates of internship offer and its completion. The offer letter should have the nature of work to be done by the student and the supervisor's name and the duration of the internship.

D. Report: Each student should submit the internship report at the end of the fourth semester with an internship certificate.

E. Assessment: Assessment of the Internship will be done at the end of the Fifth Semester.

Walchand Institute of Technology, Solapur

S. Y. B. Tech. (Civil Engineering) – Semester-III

22CEU3CC1T

FLUID MECHANICS-I

Teaching Scheme:	**Examination Scheme:**
Lectures: 3 hours per week, 3 Credits	ISE: 40 marks
Practical: 2 hour per week, 1 Credit	ESE: 60 marks
	ICA: 25 marks
	POE: 25 Marks

Course outcome: At the end of the course, students will be able to,

1) Comprehend technical properties of fluids, their estimations, and analysis for engineering applications

2) Apply kinematics and dynamics of flow for solving Civil engineering problems

3) Verify Bernoulli's theorem and Quantify water flow through the venturi meter, orifice meter

4) Analyze fluid flows, estimate losses in pipes and solve the pipe network problems

5) Apply dimensional analysis to solving complex problems in fluid mechanics

SECTION-I

Unit 1: Fluid Properties **[7 Hrs]**

Scope and Importance of Fluid Mechanics, Definition of Fluid, Difference between Solid, Liquids and Gas, Physical properties of fluids: density, specific weight, specific volume, relative Density, and viscosity, Newtonian and Non-Newtonian fluids, compressibility, cohesion, adhesion, surface tension, capillarity, vapour pressure, Cavitations. Classification of fluids, Problems involving the use of above Fluid Properties.

Unit 2: Fluid Statics **[8 Hrs]**

Pressure variation in a static fluid, PASCAL's law, Units and scale of pressure measurement Atmospheric pressure, Absolute pressure, Gauge pressure, and Vacuum pressure, Piezometer, U-Tube manometer, Single column manometer, U-tube differential manometer, Inverted U-tube differential manometer, Mechanical pressure gauges. Total pressure and center of pressure, Total pressure on plane surfaces and curved surfaces depth of center of pressure, Practical applications of Total pressure and Center of pressure. Buoyant force, Buoyancy and Center of

Buoyancy, Archimedes Principle, Metacentre and Metacentric height, Equilibrium of floating and submerged bodies,

Unit 3: Fluid Kinematics **[7 Hrs]**

Fluid flow methods of analysis of fluid motion, Concept of Control Volume, Streamlines, Path lines, Streak lines, and Stream tubes. Types of fluid flow-Steady and unsteady flow, Uniform and non-uniform flow, Laminar and turbulent flow Rotational and irrotational flow, Compressible Incompressible flow, Rotational and Irrotational flow, Subcritical, critical and Supercritical flow, Compressible and Incompressible flow, One, Two and three-dimensional flow, circulation and vorticity, Velocity potential and stream function, flow net, and Equipotential Line.

SECTION-II

Unit 4: Fluid Dynamics **[7 Hrs]**

Forces acting on fluid mass in motion, Euler's equation of motion along a streamline, Bernoulli's Theorem, Limitation and Applications. Measurement of discharge through Venturi meter, Orifice meter, Experimental determination of hydraulic coefficients, Cd, Cc, Cv.

Unit 5: Flow Through Pipes And Pipe Networks **[9 Hrs]**

Classification of Flows:

Laminar Flow – Reynold's Experiment,

Turbulent Flow – Velocity Distribution and Shear Stresses in turbulent flow,

Energy Losses in pipe flow (Major and Minor Losses): Darcy Weisbach Equation, Factors affecting friction, Concept of Equivalent length and Equivalent diameter of pipe .Concept of HGL and TEL, Pipes in Series and Parallel, Concept of Syphon and two reservoir problem and Hardy Cross method for solving pipe network, concept of water hammer and surge tank, its function and location and use.

Unit 6: Dimensional Analysis **[7 Hrs]**

Dimensions of commonly encountered fluid properties, Dimensional homogeneity, Methods of Dimensional analysis , Rayleigh's theorem and Buckingham pi theorem. Limitations of dimensional analysis.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

(A) Measurement of discharge: Measurement of pressure (Manometers, Pressure gauges)

(B) At least six experiments from the following.

1) Verification of Bernoulli's Theorem.

2) Determination of metacentric heights.

3) Plotting of streamlines, flow nets.

4) Calibration of an orifice/mouthpiece.

5) Calibration of Venturi meter/orifice meter.

6) Study of factors affecting coefficient of friction for pipe flow (at least for two different material and two different diameters)

7) Determination of loss of head due to

i) Sudden expansion,

ii) Contraction,

iii) Elbow,

iv) Bend,

v) Globe valve etc.

8) Study of a laminar flow.

TEXT BOOKS

1. Fluid Mechanics – Streeter McGraw Hill-International Book Co., Aucklard.
2. Fluid Mechanics – R. W. Fox, P.J. Prichard, A. T. Mcdonald- Wilely India.
3. Fluid Mechanics – A. K. Jain-Khanna Pub., Delhi.
4. Fluid Mechanics – K.L. Kumar – Eurasia Publishing House, Delhi.
5. Flow through Open channels– Rangaraju – Tata McGraw Pub. Co., Delhi.
6. Fluid Mechanics – K. Subramanaya – Tata McGraw Pub. Co., Delhi.
7. Fluid Mechanics – Hydraulic & Hydraulic Mechanics Modi & Seth –Standard Book House, Delhi.
8. Fluid Mechanics & Hydraulic Machines, SS Rattan, Khanna Publishing House
9. Fluid Mechanics and Machinery, C.S.P Ojha, R. Berndtsson & P.N. Chandramouli, Oxford University
10. Fluid Machinery, Sadhu Singh, Khanna Publishing House, Delhi

REFERENCE BOOKS

1. Fluid Mechanics –Munson, Young- Willy India.
2. Mechanics of Fluids – M.C. Potler, Wiggert, Ramdan- Cengage Learnin
3. Flow in open channel – V. T. Chaw – McGraw Hill International Book Co., Aucklard.
4. Flow in open channel – K. Subramanyam – Tata McGraw Pub.Co., Delhi.

Walchand Institute of Technology, Solapur

S. Y. B. Tech. (Civil Engineering) – Semester-III

22CEU3CC2T

CONCRETE TECHNOLOGY & MATERIAL TESTING

Teaching Scheme:	**Examination Scheme:**
Lectures: 2 hours per week, 2 Credits	ISE: 40 marks
Practical – 2 Hr/Week, 1 Credit	ICA: 25 marks
	ESE: 60 marks

Course outcome: At the end of the course, students will be able to,

1. Relate material characteristics and their influence on the microstructure of concrete.
2. Distinguish concrete behavior based on its fresh and hardened properties.
3. Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes.
4. Apply quality control techniques in the field
5. Carry out Material Testing in the laboratory

SECTION-I

Unit 1: Ingredients of Concrete: [8 Hrs]

Cement manufacturing process, steps to reduce carbon footprint, chemical composition, and their importance, hydration of cement, types of cement. Testing of cement. Fine aggregate: Functions, requirements, Alternatives to River sand, M-sand introduction, and manufacturing. Coarse aggregate: Importance of size, shape, and texture. Grading and blending of aggregate. Testing on aggregate, requirement. Recycled aggregates Water – qualities of water. Chemical admixtures – plasticizers, accelerators, retarders, and air-entraining agents.

Unit 2: Fresh Concrete Workability [6 Hrs]

Factors affecting workability. Measurement of workability–slump, Compaction factor, Vee-Bee Consistometer tests, flow tests. Segregation and bleeding. Process of manufacturing of Concrete- Batching, Mixing, Transporting, Placing, and Compaction. Curing – Methods of curing – Water curing, membrane curing, steam curing, accelerated curing, self-curing. Good and Bad practices of making and using fresh concrete

SECTION-II

Unit 3: Hardened Concrete **[6 Hrs]**

Hardened Factors influencing strength, W/C ratio, gel/space ratio, Maturity concept, Testing of hardened concrete, Creep –factors affecting creep. Shrinkage of concrete – plastic shrinking and drying shrinkage, Factors affecting shrinkage. Definition and significance of durability. Internal and external factors influencing durability, Mechanisms- Sulphate attack –chloride attack, carbonation, freezing, and thawing. Durability requirements as perIS-456.

Unit 4: Concrete Mix Proportioning **[6 Hrs]**

Concept of Mix Design, variables in proportioning and exposure conditions, Selection criteria of ingredients used for mix design, and Methods of Concrete mix Proportioning, Examples of Mix Proportioning using IS-10262:2019. Quality control of concrete – Factors causing variations, field control

Unit 5: Testing of Materials **[4 Hrs]**

Tension test on Mild and Tor Steel, Compression test on Timber (Parallel and across the grains), Shear test on Mild Steel, Water absorption, and Compression test on burnt Bricks

INTERNAL CONTINUOUS ASSESSMENT (ICA)

A. Testing of cement

1) Tests on Cement according to IS Codes viz., Consistency, Fineness, Setting time, Soundness, and Compressive Strength.

B. Testing of aggregates

1) Specific Gravity & Water absorption of Coarse Aggregate & Fine Aggregate
2) Sieve analysis of Coarse Aggregate & Fine Aggregate
3) Bulk density of Coarse Aggregate & Fine Aggregate
4) Bulking of Fine Aggregate
5) Silt Content of Fine Aggregate

C. Tests on Concrete:

I. Fresh Concrete

1) Slump test
2) Compaction Factor test
3) Vee-bee test
4) Flow table test

II. Hardened Concrete

5) Compressive strength test
6) Flexural strength test

D. Concrete Mix design: Proportioning as well as Experimental (Casting of mix) as per IS10262: 2019 shall be demonstrated.

E. Testing of materials:

1) Tension test on Mild and Tor Steel
2) Shear test on Mild Steel
3) Compression test on Timber (Parallel and across the grains)
4) Water absorption and Compression test on burnt Bricks

TEXT BOOKS

1. Neville A.M. "Properties of Concrete"-4th Ed., Longman.
2. M.S. Shetty, Concrete Technology - Theory and Practice Published by S. Chand and Company, New Delhi.
3. Kumar Mehta. P and Paulo J.M. Monteiro "Concrete-Microstructure, Property and Materials", 4th Edition, McGraw Hill Education, 2014
4. A.R. Santha Kumar, "Concrete Technology", Oxford University Press, New Delhi (New Edition).
5. Concrete: Microstructure, Properties & Materials, PK Mehta, Tata McGraw

REFERENCE BOOKS

1. M L Gambir, “Concrete Technology”, McGraw Hill Education,2014.
2. N. V. Nayak, A. K. Jain Handbook on Advanced Concrete Technology, ISBN: 978-81-8487-186-9
3. Job Thomas, “Concrete Technology”, CENGAGE Learning,2015.
4. Highway Materials and Pavement, Khanna & Justo, Nem chand & Bros.
5. I.S.456-2000 Code of Practice for Plain & Reinforced Concrete.
6. I.S. 10262-2019 Guidelines for Concrete Mix Design.
7. I.S. 383-1970 Specification for Coarse & Fine Aggregates from Material Sources for Concrete.
8. Specification and Guidelines for Self-Compacting Concrete, EFNARC, Association House.
9. I.S. 1199-1939 Methods of Sampling & Analysis of Concrete.
10. I.S.2386-1963 Methods of Tests for Aggregates for Concrete
11. I.S.516-1959 Methods of Tests for Strength of Concrete
12. I.S. codes for Testing different Materials.

Walchand Institute of Technology, Solapur

S. Y. B. Tech. (Civil Engineering) – Semester-III

22CEU3CC3T

BUILDING CONSTRUCTION & DRAWING

Teaching Scheme:	**Examination Scheme:**
Lectures: 2 hours per week, 2 Credits	ISE: 40 marks
Drawing – 2 Hr/Week, 1 Credit	ICA: 25 marks
	ESE: 60 marks

Course outcome: At the end of the course, students will be able to,

1. Elucidate functional requirements of buildings and types of foundations and their suitability.
2. Draw neat drawings of different building components such as doors, windows, stairs, etc. with a suitable scale using CADD software.
3. Design different types of staircases commonly used in residential and publicbuildings.
4. Draw neat perspective view drawings of an object and a given small residential building.
5. Select appropriate ventilation systems and building finishes.

SECTION-I

Unit 1: Building functional Requirements, Building Type & Foundation: [4 Hrs]

- Building functional Requirements - Strength, Stability, Comfort, Convenience, Safety, Damp Prevention, Water Proofing, Heat Insulation, Day Lighting, Ventilation, Termite Resistance.
- Building Types – Framed and Load Bearing and Composite structures, Comparison between all the three types. Building components (elements), Methods of transfer of building loads to foundation strata.
- Foundation: - Importance of foundation as load transferring building element. Shallow Foundations – Wall footing, Isolated footing, Combined Footing, Strap Footing, Continuous or Strip Footing, Cantilever Footing, Raft Foundation. (Reinforcement placement not expected)

Unit 2: Types of Masonry and Walls: [4 Hrs]

- Introduction to Scale and various types of Scale. Introduction to Stone masonry walls, bonding, and breaking of Joints.

- Brick masonry walls – Standard Brick size and Properties of good brickwork. Bonds-Stretcher, Header, Flemish & English bond (up to 1 ½ Brick thick)
- Concrete Block masonry – Hollow and Solid blocks, Construction method, and bonds.
- Concept of Main Wall and Other Wall, External wall and internal wall, Loadbearing wall and Partition wall. Glass Block wall and Curtain wall. Introduction to Autoclaved Aerated Concrete, Size, weight, etc.

Unit 3: Doors, Windows, Stairs, and Arches: [6 Hrs]

- Doors Types: - Paneled, Flush, Glazed. Door elements, Fixtures, and Fastenings. Window: - Types: Steel Glazed, Wooden Paneled, Aluminum Glazed Sliding Ventilators, and Fixed Glass windows.
- Staircase: - Functional requirements of the stair, design of stairs, types of stairs, technical terms. Arches: - Types of Arches based on shape, and mechanism of load transfer.

Unit 4: Floors and Roofs: [3 Hrs]

- Flooring and types of flooring, floor tiles, selection factors, and fixing procedures of floorings. Roofing and types of roofs, Selection factors for Roofing materials

SECTION-II

Unit 5: Perspective Drawing: [4 Hrs]

- Elements of Perspective drawings, parallel perspective (One Point), and angular perspective (Two Point) drawing.
- Perspective drawing of objects and perspective drawing of one G+1 Residential building (Readymade plan to be given to the students).

Unit 6: Thermal Insulation and Air Conditioning: **[4 Hrs]**

- Thermal Insulation: - General concept and Principles, Various methods and use of materials for thermal insulation, Computation of Heat loss and Heat gain in buildings.
- Air Conditioning: - Purpose, classification, principles, systems, and Components of Air conditioning.

Unit 7: Building Finishes, Plastering, Pointing, and various techniques: **[5 Hrs]**

- Paints: Different types of paints and application methods. Varnishes and application methods.
- Plastering and Pointing,
- Tiles cladding, skirting, and dado work with various materials.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

A. Sketching in a sketchbook consisting of the following 9 drawing exercises:

1. Lettering, Symbols, and line work. (Not to Scale)
2. Building structures (Load bearing & Framed structures) (To Scale).
3. Foundations- Isolated footing, combined footing, Strap footing, and Pile footing. (To Scale).
4. Brick bonds. (To Scale).
5. Arches and Roofs. (Not to Scale)
6. Doors. (Not to Scale)
7. Windows. (Not to Scale)
8. Staircases (Not to Scale)
9. Perspective drawing of the object and one G+1 Residential building (Ready plan). (Not to Scale)

B. Drawing using CADD software (All to Scale) :

1. Double-leaf paneled doors
2. Double-Leaf paneled window
3. Dog Leged Staircase

Remark: Prints of these CADD drawings should be to the Scale, which will a part of "Term work".

C. Site Visit for learning construction details of a residential building and visit report to be submitted as a part of the term work.

END SEMESTER EXAMINATION

A. Theory Examination (60 marks, 4 Hours)

1. Question paper should consist of theory, sketching (Not to Scale), and drawing (To Scale) questions based on the full syllabus of the subject.
2. "Half Imperical Drawing Sheet" should be provided for drawing questions as per requirement.

TEXT BOOKS

1. A text book of Building Construction- Arora & Bindra- Dhanpat RaiPublication, New Delhi.
2. Building Construction- Sushil Kumar- Standard Publishers, Delhi.
3. Building Construction – Arora & Gupta –Satya Prakashan, New Delhi.
4. Principles of Building Drawing- M.G. Shah and C.M. Kale.
5. A course in Civil Engineering Drawing- V.B. Sikka – S.K.Katariya & Sons, Delhi.
6. Civil Engineering Construction Materials, S.K. Sharma, KBP House
7. Engineering Drawing + AutoCAD, by K.Venugopal , New Age International Publishers
8. Mastering AutoCAD 2019 and AutoCAD LT 2019, George Omura and Brian C. Benton, SYBEX Publishers.

REFERENCE BOOKS

1. Building Technology- Ivor H. Seely.
2. Building Construction-Makay vol. I & II
3. National Building Code of India-SP7- Indian Standards Delhi.
4. Various IS Specifications for Drawings, Symbols, Conventional Signs as per IS 962-1967-Indian Standards Delhi.
5. Building Construction, A to Z – Mantri.
6. Building Materials- TTTI, Chandigadh.
7. Building Construction- S.S. Bhavikatti- Vikas Publishing House Pvt. Ltd., Noida.
8. Building Materials- S.S. Bhavikatti- Vikas Publishing House Pvt. Ltd., Noida.

Walchand Institute of Technology, Solapur

S. Y. B. Tech. (Civil Engineering) – Semester-III

22CEU3CC4T

INTRODUCTION TO SOLID MECHANICS

Teaching Scheme:	**Examination Scheme:**
Lectures: 3 Hrs/Week, 3 Credits	ISE: 40 marks
	ESE: 60 marks

Course outcome: At the end of the course, students will be able to,

1. Employ the knowledge of structural mechanics to depict the behavior of structures.
2. Identify principal planes & find principal stresses and equivalent torque and equivalent moment for solid circular shaft
3. Explain theories of elastic failures
4. Draw Shear force and bending moment diagrams for beams
5. Evaluate Bending Stresses and Shear stresses in beams:
6. To draw 'Influence line diagrams' of statically determinate beams

SECTION-I

Unit 1: Simple stresses and strains: **[7 Hrs]**

The behavior of Engineering materials under axial loading, Simple stresses and strains, Hooke's law, Stress-strain relations for ductile and brittle material, elastic constants, working stress, Factor of safety, Stresses & strains in three dimensions (linear, lateral, shear, and volumetric), normal and shear stresses, Complementary shear stress, the relation between elastic constants, the assumption in elastic analysis, St. Venant's principle. Composite sections under axial loading: compound bars.

Unit 2: Principal stresses and strains: **[6 Hrs]**

Principal stresses and strains for 2-D Problems-Normal and shear stress on an inclined plane. Principal plane and Principal stresses, Principal strains, Principal stresses in beams, and Stress trajectories.

Unit 3: Combined bending, torsion and thrust: **[5 Hrs]**

Combined bending, torsion, and thrust-shaft subjected to simultaneous bending, torsion, and thrust. Principal stresses, equivalent torque, and equivalent moment for the solid circular shaft.

Unit 4: Theories of elastic failures: **[5 Hrs]**

Maximum principal stress, Maximum Principal strain, Maximum shear stress, Total strain energy, and distortion energy.

SECTION-II

Unit 5: Analysis of statically determinate beams: **[6 Hrs]**

Shear force and Bending moment diagrams for beams subjected to point load (inclined load also), uniformly distributed load, uniformly varying load, and couples. Relation between the intensity of load, shear force, and bending moment.

Unit 6: Bending Stresses: **[6 Hrs]**

Simple bending theory, pure bending of beams, flexure formula, the moment of resistance of different cross sections, built-up sections, Rectangular, Circular, and flanged sections.

Unit 7: Shear stresses in beams: **[5 Hrs]**

Distribution of shear stresses in beams of various commonly used sections such as rectangular, triangular, circular, T, and I sections.

Unit 8: Influence line diagrams: **[5 Hrs]**

Influence line diagrams, Muller-Breslau principle, Application to statically determinate simple and compound beams to determine support reaction, S.F. & B.M. at any section.

TEXT BOOKS

1. Strength of Materials by F.L. Singer, Harper and Row Pub., New York.
2. Mechanics of Materials by Gere and Timoshenko, C.B.S. Delhi.
3. Strength of Materials by R.K.Bansal, Laxmi Publications
4. Strength of Materials by Bhavikatti, Vikas Publications, New Delhi.
5. Strength of Materials by Ramamurtham,Dhanpat Rai & Sons, New Delhi
6. Strength of Materials by R. S. Khurmi, S. Chand Pubication, New Delhi
7. Mechanics of Structures (Vol. I & II) by S. B. Junnarkar, Charator Book House, Anand.
8. Strength of Materials by R. K. Rajput, S. Chand Pubication, New Delhi
9. Strength of Materials, D.S. Bedi, Khanna Publishing House
10. Strength of Materials, R. Subramanian, Oxford University Press
11. Strength of Materials, R.K. Bansal, Laxmi Publications

REFERENCE BOOKS

1. Analysis of Structures (Vol- I& II) by Vazirani and Ratwani, Khanna Pub., Delhi.
2. Structural Analysis by C. S. Reddy, Tata Mc. Graw Hill, New Delhi.
3. Introduction to Mechanics of Solids by E. P. Popov. Prentice- Hall of India.
4. Elementary Structural analysis by Norris and Wilbur Mc-Graw Hill, New York.
5. Elements of Strength of Materials, (Recent Edition) by S. Timoshenko and J. Young Affiliated East-West

Walchand Institute of Technology, Solapur

S. Y. B. Tech. (Civil Engineering) – Semester-III

22CEU3BS5T

ENGINEERING GEOLOGY

Teaching Scheme:	**Examination Scheme:**
Lectures: 3 hours per week, 3 Credits	ISE: 40 marks
Practicals– 2 Hr/Week, 1 Credit	ICA: 25 marks
	POE-25 Marks
	ESE: 60 marks

Course outcome: At the end of the course, students will be able to,

1. Describe issues concerning the geological formations and geological structure of a region
2. Distinguish the characteristics of the most important geological formations and problems that may arise in the various civil engineering projects in such formations.
3. Interpret and explain the geological structures in the geological maps and cross-sections.
4. Assess and appropriately adjust the results of a geological study in order to ascertain secure construction and operation of civil engineering projects like dams, reservoirs hilly roads, and railway tracks.
5. Receive, analyze and evaluate data appropriately and solve technical as well as groundwater-related problems.

SECTION-I

Unit 1: Introduction: **[4 Hrs]**

Branches of geology is useful to civil engineering, the scope of geological studies in various civil engineering projects. Mineralogy- Mineral, Origin, and Composition. Physical properties of minerals, susceptibility of minerals to alteration, SEM, XRD, Rock-forming minerals, megascopic identification of common primary & secondary minerals.

Unit 2: Petrology: **[7 Hrs]**

Rock-forming processes. The specific gravity of rocks, Ternary diagram.

Igneous petrology- Volcanic Phenomenon and different materials ejected by volcanoes. Types of volcanic eruption, Hot springs, and Geysers, Characteristics of different types of magma, Division of rock based on the depth of formation, and their characteristics, Chemical and Mineralogical Composition, Texture and its types, Various forms of rocks, Field Classification chart, Structures, Classification of Igneous rocks based on Chemical

composition, Detailed study of Acidic Igneous rocks like Granite, Rhyolite or Tuff, Felsite, Pegmatite, Hornfels, Metamorphic Aureole, Kaolinization, Landform as Tors, Engineering aspect to granite, Basic Igneous rocks Like Gabbro, Dolerite, Basalt, Engineering aspect to Basalt.

Sedimentary petrology- mode of formation, Mineralogical Composition, Texture and its types, Structures, Gradation of Clastic rocks, Classification of sedimentary rocks and their characteristics, Detailed study of Conglomerate, Breccia, Sandstone, Mudstone and Shale, Limestone

Metamorphic petrology- Agents and types of metamorphism, metamorphic grades, Mineralogical composition, structures & textures in metamorphic rocks, Important Distinguishing features of rocks such as Rock cleavage, Schistosity, Foliation, Classification, Detailed study of Gneiss, Schist, Slate with engineering consideration.

Unit 3: Physical Geology: **[5 Hrs]**

Weathering. Erosion and Denudation. Factors affecting weathering and product of weathering. Engineering consideration.

Superficial deposits and their geotechnical importance: Waterfall and Gorges, River meandering, Alluvium, Glacial deposits, Laterite (engineering aspects), Desert Landform, Loess, Residual deposits of Clay with flints, Solifluction deposits, mudflows, Coastal deposits.

Unit 4: Strength Behavior of Rocks: **[6 Hrs]**

Stress and Strain in rocks. Concept of Rock Deformation & Tectonics. Dip and Strike. Outcrop and width of the outcrop. Inliers and Outliers. Fold- Types and nomenclature, Criteria for their recognition in the field. Faults: Classification, recognition in the field, effects on outcrops. Joints & Unconformity; Types, Stresses responsible, geotechnical importance. Importance of structural elements in engineering operations. Consequences of failure as land sliding, Earthquake, and Subsidence. Strength of Igneous rock structures.

SECTION-II

Unit 5: Geological Hazards [6 Hrs]

Rock Instability and Slope movement: Concept of sliding blocks. Different controlling factors. Instability in vertical rock structures and measures to prevent collapse. Types of landslides, Prevention by surface drainage, slope reinforcement by Rock bolting and Rock anchoring, retaining wall, and Slope treatment. Case study on black clay.

Groundwater: Factors controlling the water-bearing capacity of a rock. Previous & impervious rocks and groundwater Lowering of water table and Subsidence.

Earthquake: Magnitude and intensity of the earthquake. Seismic sea waves. Revelation from Seismic Records of the structure of the earth. Case Study on Elevation and Subsidence in Himalayan region in India. Seismic Zone in India.

Unit 6: Rock masses as construction material: [6 Hrs]

Definition of Rock masses. Main features constituting rock mass. Main features that affect the quality of rock engineering and design. Basic elements and structures of rock are relevant in civil engineering areas. Main types of works connected to rocks and rock masses. Important variables influencing rock properties and behavior such as Fresh rock Influence from some minerals. Effect of alteration and weathering. Measurement of velocity of sound in rock. Classification of Rock material strength. Core logging. Rock Quality Designation. Rock mass description.

Unit 7: Geology of dam and reservoir site: [6 Hrs]

Required geological consideration for selecting dam and reservoir sites. Failure of Reservoir. Favorable & unfavorable conditions in different types of rocks in presence of various structural features, precautions to be taken to counteract unsuitable conditions, the significance of discontinuities on the dam site, and treatment given to such structures.

Unit 8: Rock Mechanics: [4 Hrs]

Subsurface Investigations in rocks and engineering characteristics or rocks masses; Structural geology of rocks. Classification of rocks, Field & laboratory tests on rocks, Stress deformation of rocks, Failure theories and sheer strength of rocks, Bearing capacity of rocks.

INTERNAL CONTINUOUS ASSESSMENT

- **PRACTICALS:**

1. Study of physical properties of minerals.
2. Study of a different group of minerals.
3. Study of Crystal and Crystal system.
4. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum.
5. Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties, Trachyte.
6. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone, and its varieties, Laterite, Limestone, and its varieties, Shales and its varieties.
7. Identification of rocks (Metamorphic Petrology): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite, Phyllite.
8. Study of topographical features from Geological maps. Identification of symbols in maps.
9. Study of structural Geological models. (at least 5)
10. Identification of Subsurface rock with the help of a Resistivity Instrument.
11. A Study tour to the place worth visiting from an Engineering Geological point of view.
12. A journal containing a complete record of the above practical work shall be examined as an 'Internal Continuous Assessment'. Practical Examination shall be based on the practical course. Case study of any engineering structure with respect to geological investigation

TEXT BOOKS

1. Engineering and General Geology, Parbin Singh, 8th Edition (2010), S. K. Kataria & Sons.
2. Text Book of Engineering Geology, N. Chenna Kesavulu, 2nd Edition (2009), Macmillan Publishers India.
3. Geology for Geotechnical Engineers, J. C. Harvey, Cambridge University Press (1982).
4. A Text Book of Engineering Geology by R.B. Gupte -P.V.G. Publications, Pune
5. A Text Book of Engineering Geology by N. Chenna Kesavulu.
6. Text Book of Engineering Geology, N. Chenna Kesavulu, Macmillan Publishers
7. Principles of Petrology by G.W. Tyrrel.
8. Engineering Geology, Subinoy Gangopadhyay, Oxford University

REFERENCE BOOKS

1. Geology and Engineering by R. Legget- McGraw Hill Book Co., London.
2. Physical Geology by Arthur Holmes-ELBS Publication.

Walchand Institute of Technology, Solapur

S. Y. B. Tech. (Civil Engineering) – Semester-III

22CEU3HU6T

UNIVERSAL HUMAN VALUES

Teaching Scheme:	**Examination Scheme:**
Lectures: 3 hours per week, 3 Credits	**ISE:** 40 marks
	ESE: 60 marks

Course outcome: At the end of the course, students will be able to,

1. Appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.
2. Develop a holistic perspective towards life and profession as well as towards happiness and prosperity based on a correct understanding of Human reality and the rest of Existence.
3. Appreciate the Universal Human Values and movement towards value-based living in a natural way.
4. Highlight ethical human conduct, trustful and mutually fulfilling human behavior, and mutually enriching interaction with Nature.

SECTION-I

Unit 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education: [7 Hrs]

1. Understanding the need, basic guidelines, content, and process for Value Education
2. Self-Exploration–what is it? - it's content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations.
4. Right understanding, Relationship, and Physical Facilities- the basic requirements for the fulfillment of aspirations of every human being with their correct priority.
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations of understanding and living in **harmony at** various levels.

Unit 2: Understanding Harmony in the Human Being - Harmony in Myself [7 Hrs]

1. An understanding of human being as a co-existence of the sentient 'I' and the material 'Body'
2. Understanding the needs of Self ('I') and 'Body' –*Sukh* and *Suvidha*
3. Understanding the Body as an instrument of 'I' (I being the doer, seer, and enjoyer)
4. Understanding the characteristics and activities of 'I' and harmony in 'I'
5. Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, the meaning of Prosperity in detail.
6. Programs to ensure *Sanyam* and *Swasthya*

Unit 3: Understanding Harmony in the Family and Society- Harmony in Human Relationship [8 Hrs]

1. Understanding Harmony in the family – the basic unit of human interaction
2. Understanding values in a human-human relationship; the meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship
3. Understanding the meaning of Vishwas; Difference between intention and competence
4. Understanding the meaning of Samman, the Difference between respect and differentiation; the other salient values in a relationship
5. Understanding the harmony in the society (society being an extension of the family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals
6. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family

Unit 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence [8 Hrs]

1. Understanding the harmony in the Nature
2. Interconnectedness and mutual fulfillment among the four orders of nature-recyclability, and self-regulation in nature
3. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space
4. Holistic perception of harmony at all levels of existence

TEXT BOOKS

1. R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and Professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2
2. The teacher's manual: R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and Professional Ethics – Teachers Manual, Excel books, New Delhi, 2010

REFERENCE BOOKS

1. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted2008.
2. PL Dhar, RR Gaur, 1990, Science and Humanism, Common wealth Publishers.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, limits to Growth, Club of Rome's Report, Universe Books.
6. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
7. A Nagraj, 1998, Jeevan Vidyaek Parichay, Divya Path Sansthan, Amarkantak.
8. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
9. A.N. Tripathy, 2003, Human Values, New Age International Publishers.

RELEVANT WEBSITES, MOVIES, AND DOCUMENTARIES

1. Value Education websites, http://uhv.ac.in,http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story
6. Gandhi A., Right Here Right Now, Cyclewala Productions
7. AICTE On-line Workshop on Universal Human Values Refresher Course-I Handouts

8. UHV-I handouts:

   https://drive.google.com/drive/folders/16eOka8AoBpLGlCDajRvk4MXgfXQWzFCB?usp=sharing

9. UHV-II handouts
   https://drive.google.com/drive/folders/15eHkMVguzRBDrb65GFi7jMN6UEP5JEk1?usp=sharing

Walchand Institute of Technology, Solapur

S. Y. B. Tech. (Civil Engineering) – Semester-IV

22CEU4CC1T

SURVEYING & GEOMATICS

Teaching Scheme:
Lectures: 3 hours per week, 3 Credits
Practical: 2hour per week, 1 Credit

Examination Scheme:
ISE: 40 marks
ICA: 25 marks
POE:25 marks
ESE: 60 marks

Course outcome: At the end of the course, students will be able to,

1. Carry out temporary adjustments of modern surveying equipment.
2. Use the surveying instruments namely levels, theodolite, EDM, and total station for surveying measurements such as horizontal/ vertical/inclined distance, horizontal/ vertical angles, bearings, reduced levels, and coordinates.
3. Develop plans, draw maps, and draft reports for surveying projects of Civil Engineering work.
4. Use modern surveying techniques namely remote sensing, Global positioning systems, and Geographic information system for Civil Engineering applications.
5. Demonstrate the attributes of leadership, working in a team, and professional ethics while performing surveying projects.

SECTION-I

Unit 1: Leveling instruments and applications [8 Hrs]

a. Levels: Construction, temporary adjustments, and use of Auto Level and Tilting Level.
b. Contouring: Direct and Indirect methods, Interpolation techniques, and uses of contour maps.

Unit 2: Angles and Directions [8 Hrs]

a. Theodolite: Construction, temporary adjustments, and used for measurement of horizontal angle, deflection angle, vertical angle, bearing, prolonging a line, lining in, setting out angles.
b. Theodolite Traversing: Fieldwork, computation of consecutive and independent coordinates, Gale's traverse table, and adjustment of the closed traverse.

Unit 3: Modern Surveying Instruments [7 Hrs]

a. Laser Level and Digital level: Introduction to construction, temporary adjustments, and use.
b. EDM instruments: Electromagnetic waves and their properties, phase, phase comparison, modulation.
c. Total station: Types, Construction, temporary adjustments, and working. Various software functions such as B.S.F.S. survey, Resection, Traversing, Missing line measurement, Remote Elevation measurement, COGO, etc. Use of Total Station for Contouring, Stakeout, Land Use survey, and calculation of earthwork.

SECTION-II

Unit 4: Global Positioning System (GPS) [8 Hrs]

a. Global Positioning System (G.P.S.)- Principle of Operation- Trilateration Segments: Spaces Segment, Control Segment, User Segment, Features of G.P.S. Satellites, G.P.S. Receivers: Navigational Receivers, Surveying Receivers, Geodetic Receivers Surveying with G.P.S.: GPS observables, Methods of observations: Absolute Positioning, Relative Positioning, differential G.P.S., Kinematic G.P.S.
b. Computation of Coordinates: - Transformation from Global to Local Datum, Geodetic Coordinates to map coordinates, G.P.S. Heights, and mean sea level Heights. Applications of G.P.S.

Unit 5: Remote Sensing Techniques (RST) [7 Hrs]

a. Terrestrial and Aerial Photogrammetry: Principles, Phototheodolite, Aerial Camera. Vertical aerial Photogrammetry: Scale, Relief Displacement, flight planning, Ground control Stereoscopy and photo interpretation: stereoscopes, Parallax Bar, Plotting instruments
b. Light Detection and Ranging (LiDAR) LIDAR: Basic Principles and advantages, Laser and Scanning System, Laser Location, Lidar Antenna Attitude, Types of Lidar returns, Lidar post-processing of multiple returns, Accuracy of Lidar measurements, The Laser Vegetation Imaging Sensor, Lidar types based on Platforms
c. Unmanned Aerial Vehicle (Drone) -Introduction

d. Electromagnetic remote sensing: Physics of radiant energy: Nature of Electromagnetic radiation, Electromagnetic spectrum. Energy sources and their characteristics. Atmospheric influences: Absorption, Scattering. Energy interaction with Earth Surfaces: Spectral reflectance Curve. Image Acquisition: Photographic sensors, Digital Data, Earth Resource satellites, Image resolution. Image Interpretation. Applications of Remote Sensing.

Unit 6: Geographical Information System (GIS) and Project Survey [7 Hrs]

a. Geographical Information System (GIS): Information systems, spatial and non-spatial Information, geographical concept and terminology, advantages of GIS, the Basic component of GIS.GIS hardware and software. Field data, statistical data, maps, aerial photographs, satellite data, points, lines, and area features, vector and raster data, data entry through the keyboard, digitizer, and scanners preprocessing of data rectification and registration, and interpolation techniques.
b. Project Surveys
c. Building Lineout and layout
d. Route Survey
e. Culvert and Bridges
f. Tunnel, Mine: Centre line transfer, Level transfer, Weisbach triangle

INTERNAL CONTINUOUS ASSESSMENT (ICA)

ICA shall be based on the following experiments. Any other appropriate experiments based on the above curriculum may also be added to the list. Students shall record them in a field book. As a part of the completion of ICA, the student shall submit a completed field book and drawing sheets at the end of the course.

1. Study and use of Auto Level
2. Study and use of Total station
3. One Project on the Preparation of a contour map using the Block contouring method with a Minimum area of one Hectare. (Data to be collected using either auto level or using the Total station).
4. One Project on Route surveying for a Minimum length of 1 km. (Data to be collected using either auto level or using the Total station).

Note: Data for both projects are to be submitted using soft copies in CSV or MS Excel format which shall be printed and submitted. Drawing is to be prepared by using open-source drafting software or by using an academic version of drafting software. Drawing Submission shall be in the form of a blueprint to be submitted by every individual student.

5. Remote Sensing Techniques
   a) Study and use of Mirror stereoscope and find out Air base distance.
   b) Study and use of parallax bar for measuring parallax and finding out the difference in Elevation between two points
   c) Study of satellite images and their interpretation
6. Collection of field data by using surveying and mapping GPS receiver.
7. Geographic Information System
   a) Geo-registration of the map and its digitization by using suitable GIS software.
   b) Map editing, vector, and raster analysis of digitized maps by using suitable GIS software.
   c) A project using GIS software (open source or academic version shall be acceptable) to be submitted in hard copy prints with successive processing images and reports.

TEXT BOOKS

1. Surveying – Vol. II and III, B. C. Punmia Laxmi Publication, New Delhi
2. Surveying and Leveling Vol. 2, T. P. Kanetkar and S. V. Kulkarni -Pune Vidyarthi Griha Publication
3. Advanced Surveying - Gopi, Sathikumar, Madhu, Pearson Education
4. Advanced Surveying, Agor. Khanna Publishers, Delhi
5. Surveying Vol. II., S. K. Duggal, Tata McGraw Hill Publishing Co. New Delhi.
6. Geomatics Engineering, Arora & Badjatia, Nem Chand & Co.
7. Surveying Vol.-I, II, III, BC Punamia, Laxmi Publications
8. Surveying, Vol.-I, II, III, K.R. Arora, Standard Book House
9. Basics of Remote Sensing & GIS, S. Kumar, University Sc. Press

REFERENCE BOOKS

1. Jawahar Lal Sharma- Advanced Surveying -CBS Publishers New Delhi
2. T. M. Lillisand and R.W. Kaifer, Remote Sensing & Image Interpretation, John Wiley &Sons
3. Lo C. P. Yeung A K W, Concepts and Techniques of GIS - Prentice Hall, India
4. Kang-tsung Chang, Introduction to GIS, Tata McGraw Hill
5. K. Anjali Rao, Remote sensing and GIS, BS Publications

Walchand Institute of Technology, Solapur

S. Y. B. Tech. (Civil Engineering) – Semester-IV

22CEU4CC2T

FLUID MECHANICS-II

Teaching Scheme:	**Examination Scheme:**
Lectures: 3 hours per week, 3 Credits	ISE: 40 marks
Practical: 2hour per week, 1 Credit	ESE: 60 marks
	ICA: 25 marks

Course outcome: At the end of the course, students will be able to,

1) Apply their knowledge of fluid mechanics in addressing problems in open channels.

2) Solve problems in uniform, gradually, and rapidly varied flows in steady-state conditions.

3) Carry out the hydraulic design of notched, weirs, and spillways

4) Explain the working of Pelton, Francis, and Kaplan turbines and pumps alongwith their performance parameters.

5) Apply dimensional analysis to predict physical parameters that influence the flow in fluid mechanics.

SECTION-I

Unit 1: Introduction To Open Channel Flow **[7 Hrs]**

Classification of channels, Types of Flow in Open Channel and Geometric Properties a) Uniform Flow: Chezy's and Manning's Equation, Hydraulically Most efficient rectangular, Triangular and Trapezoidal section, computation of normal depth, conveyance, section factor, Hydraulic Exponent , Uniform flow competitions, concept of Froude number , velocity distribution, kinetic energy and momentum correction factors, measurement of velocity (Pitot tube, current meter, float etc) b) Critical Flow: - Specific Energy & Diagram, Alternate depths, Depths Energy relationship in open channel, Specific Force.

Unit 2: Gradually & Rapidly Varied Flow (GVF &RVF) **[8 hrs]**

a) Gradually Varied Flow (GVF):- Dynamic Equation of GVF, Classification & Characteristics of Surface Profile. Direct Step Method of Computing profile Length. b) Rapidly Varied Flow (RVF):- Definition of Hydraulic Jump, Classification of Jump, Equation of Hydraulic Jump in horizontal rectangular channels, computation of length & height of Jump, Energy Loss in Jump. Hydraulic Jump as an energy dissipater.

Unit 3: Notches, Weirs & Spillways **[7 hrs]**

a) Types Derivation of discharge equation, velocity due to approaches, Francis formula, calibration of notch & errors in measurements.

b) Weir & Spillways sharp & broad crested weirs, calibration of weirs, the time required to empty the tank with notches and weirs, profile of ogee spillways types of nappe, ventilation of weirs**.**

SECTION – II

Unit 4: Impact of Jets and Turbines **[8 Hrs]**

a) Force and work done due to impact of jet on stationary and moving, flat and curved surfaces using linear momentum principle.

b) Elements of the hydropower plant, hydraulic turbines- Classification, heads and efficiencies, Design and governing of Pelton Wheel, Francis turbine. Cavitations in hydraulic turbines, Prediction of performance in terms of unit quantities and specific quantities, Specific speed, Characteristic curves, selection of turbines on the basis of head and specific speed**.**

A site visit is recommended to learn this topic.

Unit 5: Centrifugal Pumps **[7 Hrs]**

General classification of pumps and Classification of Centrifugal pumps, Selection of pumps, concept of Centrifugal head, Work done by impeller, Types of Heads, and efficiencies, minimum starting speed, Cavitations in centrifugal pumps, multistage pumping. Introduction to submersible pumps and reciprocating pumps, Concept of priming of pump, troubles and remedies in pump operations.

Unit 6: Dimentional& Model Analysis **[8 Hrs]**

Dimensions & Dimensional homogeneity, Importance and Use of Dimensional analysis, Buckingham π theorem, statement & applications, Non dimensional numbers and their significance, Difference between model and Prototype , Types of similarities, Model laws, Reynolds and Froude's, distorted model, undistorted model, scale ratios and applications**.**

INTERNAL CONTINUOUS ASSESSMENT (ICA)

(1) Any 4 of the following

a. Study of specific energy diagram for different discharges.

b. Calibration of V notch/rectangular notch.

c. Calibration of sharp crested suppressed weir and plotting of upper/lower nappe.

d. Calibration of Ogee Weir.

e. Study of hydraulic jump

i. Verification of sequent depths

ii. Determination of loss in jump

iii. Plotting the following parameters with respect to Froude number

1) Y2/Y1

2) Length

3) Energy loss

f. Study of flow over broad crested weir.

g. Study of flow below gates – Discharge verses head relation,

Equation of flow, Determination of contraction in flow in downstream of gate.

h. Velocity distribution in open channel in transverse direction of flow.

(2) Turbines and Pumps

a. Impact of jet.

b. Study of turbines (demonstration/test).

c. Test on a centrifugal pump.

d. Study of charts for selection of pumps.

TEXT BOOKS

1. FluidMechanics – A. K. Jain-Khanna Pub., Delhi.
2. Fluid Mechanics – K.L. Kumar – Eurasia Publishing House, Delhi.
3. Flow through Open channels– Rangaraju – Tata McGraw Pub. Co., Delhi.
4. Fluid Mechanics – K. Subramanaya – Tata McGraw Pub. Co., Delhi.
5. Fluid Mechanics – Hydraulic & Hydraulic Mechanics Modi & Seth –Standard Book House, Delhi.
6. Fluid Mechanics – R. W. Fox, P.J. Prichard, A. T. Mcdonald- Wilely India.
7. Fluid Mechanics & Hydraulic Machines, SS Rattan, Khanna Publishing House
8. Fluid Mechanics and Machinery, C.S.P Ojha, R. Berndtsson & P.N. Chandramouli, Oxford University
9. Fluid Machinery, Sadhu Singh, Khanna Publishing House, Delhi

REFERENCE BOOKS

1) Fluid Mechanics – Streeter McGraw Hill-International Book Co., Aucklard.
2) Flow in open channel – V. T. Chaw – McGraw Hill International Book Co., Aucklard.
3) Flow in open channel – K. Subramanyam – Tata McGraw Pub.Co., Delhi.
4) Fluid Mechanics –Munson, Young- Willy India.
5) Mechanics of Fluids – M.C. Potler, Wiggert, Ramdan- Cengage Learning

Walchand Institute of Technology, Solapur

S. Y. B. Tech. (Civil Engineering) – Semester-IV

22CEU4CC3T

BUILDING PLANNING & DESIGN

Teaching Scheme:
Lectures: 2 hours per week, 2 Credits
Drawing: 2 hours per week, 1 Credits

Examination Scheme:
ISE: 20 marks
ICA: 25 marks
POE: 50 Marks
ESE: 30 marks

Course outcome: At the end of the course, students will be able to,

1. Plan residential and public buildings, according to the prevalent building Byelaws
2. Prepare 'Municipal building permission drawings' of residential buildings using CADD software tools.
3. Plan appropriate building services for a building and Design a rainwater harvesting system for a building.
4. Apply the Green Building and Low-Cost Housing concept will building planning and design.
5. Plan appropriate acoustics and sound insulation techniques for abuilding.

SECTION-I

Unit 1: Site Selection of Building, Principles of Building Planning, Orientation and By-Laws and Dimension Relationships: [4 Hrs]

- Site selection criteria for building.
- Principles of Building Planning and significance of Sun Diagram (Sun Path Diagram) and Wind flow Direction.
- Orientation: - Basic Zones of India on the bases of climate conditions, Orientations of building for various parts of India on basis of climate conditions.
- Building Planning Byelaws and Regulations as per SP-7, National Building Code of India.
- Dimensions & Space requirement in relation to body measurements. Space design for passage between walls, service access, stairs, ramps, and elevators.

Unit 2: Planning and Design of Residential Buildings: [4 Hrs]

- Planning and functional requirements of Residential Building: - Bungalows (Detached), Twin bungalows (Semi-Detached), Row houses, Ownership flats, and Apartments.
- Parking Area Criteria

Unit 3: Planning and Design of Public Buildings: [5 Hrs]

- Educational Building: Pre-primary and primary school, Secondary and Higher Secondary school, Degree School (College).
- Institutional Building: - Health centers and Hospitals.
- Business and Mercantile building – Shops, banks, markets, & departmental stores.
- Office and Other buildings: Post office, administrative building, etc.
- Parking Area Criteria (for all above Public Buildings)

Unit 4: Building Permissions and its Procedure: [2 Hrs]

- Procedure and list of documents for Building Permission and significance of various certificates (Commencement Certificate, Plinth Completion Certificate, and Occupancy certificate).

SECTION-II

Unit 5: Building Services: [6 Hrs]

- Plumbing Systems: - Significance of Plumbing and Drainage plan and layout, Water Supply Requirements for Buildings, various types of traps, Fittings, Chambers, and various types of materials like PVC, GI, AC, CI, HDPE, Stoneware, CPVC with various gauges and thickness, Water Closet Pan: Types and sizes.
- Introduction to the Concept and Design of Rain Water Harvesting.
- Electrification: - Concealed and open wiring system, requirements, and locations ofvarious Electrical points, Concept of earthing.

Unit 6: Green Buildings: [4 Hrs]

- Introduction to Concepts of Green Building and energy-efficient buildings.

Unit 7: Low-Cost Housing: [3 Hrs]

- Low-cost Housing, Materials & methods (Conceptual introduction only).

Unit 8: Acoustics and Sound Insulation: [5 Hrs]

- Acoustics: - Sound Frequency, Intensity, sound decibel rating, absorption of sound-Various materials. Sabine's formula, optimum reverberation time, conditions for good acoustics, the effect of reflectors, flat ceiling, only study of the acoustics n e e d of various buildings such as Auditorium Hall, Classrooms, broadcasting room, etc.

- Sound insulation: - Acceptable noise level – Noise prevention at its source, transmission of noise, Noise control- general Consideration.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

1. **The following drawings shall be drawn using the CADD software tool.**

a) Line Plans of residential buildings (4 Numbers): Detached house, Semi-detached house, Row house, and Apartment Building

b) Line plans of any 2 Public buildings.

c) Planning and designing of residential building (G+1) and preparation of a full set of CADD drawings for the residential building. A full set of the following CADD drawing prints shall be submitted.

1. "Building Permission drawing"
2. Water supply and Drainage layout plan,
3. Electrification layout plan.
4. Furniture layout plan
5. Perspective view of the selected Residential building for the project.

Note: Every student shall develop a different and separate plan for a residential building. Group projects are not allowed in any case.

2. **Report of Planning & Design of a building, selected for project work –**

The report shall include the Line plan, Principles of planning adopted, Byelaws, Rules and regulations followed while planning, Design calculations for the Staircase,Sanitary requirements, etc.

END SEMESTER EXAMINATION

1. **Theory examination (30 marks, 2 Hours)**

It will consist of theory and sketching questions based on the full syllabus of the subject.However, it will ***not*** include the development of residential/public building drawing on drawing sheets.

2. **Practical & Oral (50 marks)**

a) Practical examination shall consist of planning of residential building and development of drawings using the CADD drafting tool during practical examination. The assessment will be based on the knowledge of students about building planning and CADD drafting skills depicted by the candidate during the practical examination. A maximum of two hours shall be allotted to the students to complete the given task on the CADD software tool during the Practical examination.

b) In addition, an Oral examination shall be based on a CADD drawing developed during the practical examination and term work.

TEXT BOOKS

1. Building Design and Drawing: Y.S. Sane-Allies Book Stall, Pune
2. Building Design and Drawing: Shaha, Kale & Patki – T.M.H., New Delhi
3. Building Construction: Sushilkumar –Standard Publishers, Delhi
4. Building Construction: N.K.R. Murthy -Allies Book Stall, Pune
5. Building Construction: Arora and Gupta – Satya Prakash, New Delhi.
6. A Text book of building Construction: Bindra, Arora – Dhanpat Rai Publications.
7. Civil Engineering Drawing, Sharma & Gurucharan Singh, Standard Publishers
8. A Course in Civil Engineering Drawing, Sikka, S.K. Kataria & Sons
9. Engineering Drawing, Dhanarajay A Jolhe, Tata McGraw Hill
10. Engineering Drawing + AutoCAD , by K.Venugopal , New Age International Publishers
11. Mastering AutoCAD 2019 and AutoCAD LT 2019, George Omura and Brian C.Benton, SYBEX Publishers.

REFERENCE BOOKS

1. Building Technology by I. Seeley.
2. SP 7 – 1983: National Building code, Indian Standards, Delhi.
3. Planning an Annual Notebook, The Architect's Handbook, E & OE.
4. SP 1650- 1973: Standard code for Building & Decorative finishes- Indian Standards, Delhi.
5. Building Planning And Drawing, Dr. N. Kumarswamy and A. Kameswara Rao, 6/e PB 6th Edition
6. Building Construction illustrated: Francis D.K. Ching- Willey (India Edition).

Walchand Institute of Technology, Solapur

S. Y. B. Tech. (Civil Engineering) – Semester-IV

22CEU4CC4T

STRUCTURAL MECHANICS

Teaching Scheme:	**Examination Scheme:**
Lectures: 3 hours per week, 3 Credits	ISE: 40 marks
Tutorial: 1 hours per week, 1 Credit	ICA: 25 marks
	ESE: 60 marks

Course outcome: At the end of the course, students will be able to,

1. Analyze long columns and members subjected to combined direct and bending stresses.
2. Evaluate slope and deflection in beams by various methods
3. Analyze the Three hinged Arch
4. Identify Static and Kinematic degrees of indeterminacy of structures.
5. Analyze indeterminate beams, and frames using the Moment Distribution Method
6. Analyze indeterminate structure by Flexibility and Stiffness Method of Analysis

SECTION-I

Unit 1: Combined Direct and Bending Stresses: [6 Hrs]

Eccentric load on short columns, Kern of a section, Eccentricity of load about both axes of section. Chimneys subjected to wind pressure, Simple problems on dams and retaining walls.

Unit 2: Behavior of Axially Loaded Long Columns: [5 Hrs]

Effective length, Slenderness ratio, Crippling load by Euler's and Rankine's formula, assumptions, limitations.

Unit 3: Slope and Deflection of Determinate Beams: [8 Hrs]

Moment area method, Conjugate beam method. Deflection of beams by strain energy method.

Unit 4: Three Hinged Arches: [4 Hrs]

Concepts, types of arches, analysis of parabolic with supports at same and different levels, semi-circular arches. Determination of horizontal thrust, radial shear, and normal thrust.

SECTION-II

Unit 5: Introduction of Indeterminate Structures: [3 Hrs]

Concept of Indeterminate structures, Degree of Static and Kinematic indeterminacy, Degrees of freedom for various types of structures, Methods of analysis, and comparison of force and displacement methods.

Unit 6: Moment Distribution Method: [7 Hrs]

Concept of stiffness of a member, Relative stiffness, Distribution factors, the concept of moment distribution, Application to beams, and non-sway portal frames.

Unit 7: Flexibility method for beams and frames: [8 Hrs]

Derivation of flexibility equation, flexibility coefficients, Development of flexibility matrix, Analysis of beams and portal frames (DSI $\leq$ 3).

Unit 8: Stiffness Method for Beams and Frames: [7 Hrs]

Concept of stiffness, linearly elastic structures, derivation of Stiffness equation, Stiffness Coefficients, Development of stiffness matrix, Analysis of beams (D.K.I. $\leq$ 3), Sinking of supports. Analysis of Portal frames (D.K.I.$\leq$ 3).

INTERNAL CONTINUOUS ASSESSMENT (ICA)

1. It shall consist of at least one assignment in each unit.
2. Results of a few assignment problems are to be verified by using application software.

TEXT BOOKS

1. Mechanics of Structures (Vol. II) -S.B. Junnarkar, Charator Book Publishing House.
2. Structural Analysis- Negi and Jangid, Tata McGraw-Hill Publishing Company Ltd., New Delhi
3. Analysis of Structures (Vol. II) - Vazirani and Ratwani, Khanna Pub., Delhi
4. Structural Analysis- Matrix Approach- Pandit & Gupta, Tata McGraw-Hill Publishing Company Ltd., New Delhi
5. Structural Analysis – II by Bhavikatti, Vikas Publications, New Delhi
6. Structural Analysis, R. Agor, Khanna Publishing House
7. Mechanics of Materials, B.C. Punmia & A.K. Jain, Laxmi Publications
8. Advanced Structural Analysis, A.K. Jain, Nem Chand Bros.
9. Theory of Structures, Punmia, Laxmi Publications

REFERENCE BOOKS

1. Structural Analysis by C. S. Reddy, Tata Mc. Graw Hill, New Delhi.
2. Matrix Analysis of Structures- Gere and Weaver, CBS Publishers, New Delhi
3. Indeterminate Structural Analysis-C. K. Wang, Tata McGraw-Hill Publishing Company Ltd., New Delhi
4. Theory of Structures- Timoshenko & Young, Tata McGraw-Hill Publishing
5. Structural Analysis-Sixth Ed.,- R. C. Hibbeler - Dorling Kindersley (India) Pvt. Ltd., Pearson Education, New Delhi.

Walchand Institute of Technology, Solapur

S. Y. B. Tech. (Civil Engineering) – Semester-IV

22CEU4BS5T

ENGINEERING MATHEMATICS-III

Teaching Scheme:	**Examination Scheme:**
Lectures: 3 hours per week, 3 Credits	ISE: 40 marks
Tutorial: 1 hours per week, 1 Credit	ICA: 25 marks
	ESE: 60 marks

Course outcome: At the end of the course, students will be able to,

1. Solve higher order linear differential equation with constant coefficient
2. Solve partial differential equation of first order
3. Apply Laplace and inverse Laplace transforms for solving linear differential equations.
4. Find the relation between two variables for the given data using regression
5. Sketch and explain various probability distribution functions

SECTION-I

Unit 1: Higher order linear differential equations and applications [8 Hrs]

Basic definition, differential operator, complimentary functions, particular integral, Shortcut methods for standard functions like e^{ax}, $\sin(ax+b)$, $\cos(ax+b)$,, x^m, $e^{ax}V$ and xV , particular integral by general method (without method of variation of parameters) for other functions.

Unit 2: Equations reducible to linear equations with constant coefficients [6 Hrs]

Homogeneous Linear Differential equations, Legendre‟s Linear equations, Civil Engineering Applications.

Unit 3: First Order Partial Differential equations: **[7 Hrs]**

Non – Linear partial differential Equations of Type I $f(p, q) = 0$, Type II $f(p,q,z)=0$, Type III $f_2(p, x)= f_2(q,y)$, Linear partial differential equation Lagranges method. Solution of partial differential equation by the method of separation of variables.

SECTION-II

Unit 4: Laplace transform: **[9 Hrs]**

Definition, Laplace transform of standard functions, properties- first shifting, change of scale, multiplication of power t and division by t, Laplace transform of derivative and integral, Inverse Laplace transform - properties of inverse Laplace transforms- linear property, first shifting theorem, partial fraction, inverse transform of logarithmic & inverse trigonometric functions and convolution theorem, solution of differential equations by Laplace transform.

Unit 5: Statistics: **[7 Hrs]**

Fitting of the curve- Least squares principle, fitting of a straight line, fitting of second-degree parabola, fitting of curves of the form y= ab^x , $y = ae^{bx}$, $y = ax^b$, Coefficient of correlation by Karl Pearson"s method and lines of regression of bivariate data.

Unit 6: Probability distribution: **[6 Hrs]**

Random variable, discrete and continuous random variable, Probability density function,Binomial, Poisson, and Normal distributions.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

ICA consists of a minimum of one assignment based on each unit

TEXTBOOKS

1. A textbook of Applied Mathematics Vol. II and Vol. III, J.N. and P.N. Wartikar,Vidyarthi Grah Prakashan, Pune.
2. Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Publications, Delhi.
3. A Textbook of Applied Mathematics, N.P. Bali, Ashok Saxena and N.Ch. S.N.Iyengar,Laxmi Publications, Delhi.
4. Advanced Engineering Mathematics, Kreyzig-John Wiley & SMS, New York.
5. Advanced Engineering Mathematics, Chandrika Prasasd & Reena Garg, KhannaPublishing
6. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill

REFERENCE BOOKS

1. Advanced Engineering Mathematics, Peter O‟Neil , Cengage Learning.
2. Engineering Mathematics, Srimanta Pal, Subodh Chandra Bhunia, Oxford UniversityPress.

Walchand Institute of Technology, Solapur

S. Y. B. Tech. (Civil Engineering) – Semester-IV

22CEU4CC6P

COMPUTER PROGRAMMING & NUMERICAL METHODS

Teaching Scheme:	**Examination Scheme:**
Lectures: 2 hours per week, 2 Credits	ISE: 25 marks
Practical: 2 hours per week, 1 Credit	ICA: 25 marks
	POE: 50 marks

Course outcome: At the end of the course, students will be able to develop computer programs for,

1. Various Civil Engineering Problems.
2. Matrix operations, which are necessary for structural analysis.
3. Calculating Roots of the equation, Numerical Integration, ordinary differential equations, and their various applications in Civil Engineering.
4. Carrying out statistical analysis of data for various statistical methods, with applications from the Civil Engineering domain.

SECTION-I

Unit 1: Revision of C Programming concepts: **[5 Hrs]**

Techniques for problem-solving using Algorithms, Flow charts, and Building blocks of C Program. Character set in C, Data types in C, Operators in C, Decision control structure, Loop control structure, Case-control structure.

Civil Engineering based problems and programs which are using Decision control structure, Loop control structure, and case-control structure, and Functions in C – Functions using passing by parameters and passing by value. Civil Engineering based problems and programs using Functions in C.

Unit 2: Arrays: **[5 Hrs]**

Arrays in C - Declaration, and initialization of one-dimensional array, accessing elements, array handling. Declaration and initialization of two-dimensional array, accessing elements, array handling. Matrix operations on computer: Multiplication and inversion using Cramer's rule, Solution of simultaneous equations using Gauss elimination method. Civil Engineering based problems and programs using matrix operations.

Unit 3: Roots of equation: **[5 Hrs]**

Trial and error method – Bisection method; Derivative based methods - Newton Raphson method.

SECTION-II

Unit 4: Numerical integration method: **[5 Hrs]**

Simpson's rule and Trapezoidal rule. Civil Engineering based problems and programs using the above Numerical methods.

Unit 5: Solution of ordinary differential equation: **[5 Hrs]**

Euler's Method, Modified Euler's method. Runge Kutta method. Civil Engineering based problems and programs using the above Numerical methods.

Unit 6: Statistical analysis: **[5 Hrs]**

Mean, standard deviation and Median, Least square method, Regression analysis – Linear, parabolic curve fitting. Civil Engineering based problems using statistical analysis.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

Internal Continuous Assessment (ICA) shall consist of at least 12 programs with flow charts, source listing, input, and outputs based on the above topics. Programming has to be done in the 'C' language.

(NOTE: All the units described above are to be taught with computer applications based on civil engineering problems.)

TEXT BOOKS

1. Numerical Methods: E. Balaguruswamy, Tata Mc-Graw Hill Publications.
2. Computer Programming and Numerical methods- Revised edition with C- N. Datta
3. Numerical Methods- S. Arumugam, A. Tthangapandi Isaac, A. Somasundaram, Scitech Publishers
4. Numerical Methods- Grewal, Khanna Publishers.
5. Let us C-Yashawant Kanetkar, BPB Publications New Delhi
6. Programming with C-Schaum Outline Series, Tata-McGraw Hill Publications
7. Introductory Methods of Numerical Analysis, Sashtry, PHI

REFERENCE BOOKS

1. Numerical methods for engineers, Volume 1, Steven C. Chapra, Raymond P. Canale, McGraw-Hill Publications.
2. Numerical Methods for Scientific and Engineering Computation-M. K. Jain,
3. S. R. K. Iyengar, R. K. Jain- New Age International

Walchand Institute of Technology, Solapur

S. Y. B. Tech. (Civil Engineering) – Semester-IV

22GEU4MC2T

ENVIRONMENTAL STUDIES

Teaching Scheme:
Lectures: 1 hours per week

Examination scheme:
ESE: 50 Marks

The need for sustainable development is a key to the future of mankind. continuing the problems of all types of pollution, loss of forest, solid waste disposal, degradation of the environment, issues like economic productivity and national security, global warming, ozone layer depletion, and loss of biodiversity have made everyone aware of environmental issues. No citizen of the earth affords to be ignorant of environmental issues. Environmental management has captured the attention of healthcare managers. Managing environmental hazards has become very important. It is now more critical than ever before for mankind as a whole to have a clear understanding of environmental concerns and to follow sustainable development practices. Destructions of habitats, over-use of energy resources, and environmental pollution have been found to be responsible for the loss of a large number of life forms. It is feared that a large proportion of life is which may get wiped out in the near future.

Course Prerequisite:

This course requires knowledge of surroundings, resources, ecosystem, biodiversity, and pollution

Course Objectives:

1. Recognize & understand major concepts in Environmental studies & demonstrate an in-depth understanding of the environment.
2. Understand the interdisciplinary approach to complex Environmental problems using basic tools of the natural & social sciences including Biology, Chemistry, Physics, Economics, Political sciences, Law, Electronics, etc.
3. Develop analytical skills, the ability to critically evaluate the science & policy ramifications of diverse energy portfolios on air, water & food quality climate, forests, etc.

Course outcome: At the end of the course, students will be able to

1. Describe the natural environment and its relationships with human activities
2. Explain the ethical means and technological methods for sustainable management of environmental systems.
3. Explain social, economic, and legal policies involved in the resolution of environmental problems.

Unit 1: Nature of Environmental Studies: [2 Hrs]

Definition, scope, and importance. Multidisciplinary nature of environmental studies Needs for public awareness.

Unit 2: Natural resources and associated problems: [8 Hrs]

a) Forest, resources, use and over-exploration, disforestation, timber extraction, mining, dams, and their effects on forests and tribal people.

b) Water resources, Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems

c) Mineral resources. And usage and exploitation, environmental effects of extracting and using mineral resources.

d) Food resources, world food problem, changes caused by agriculture effects of modern agriculture, fertilizer-pesticide problems

e) Energy resources, growing energy needs renewable and non-renewable energy sources, use of alternate energy sources

f) Land resources, land as a resource, land degradation man induced landslides, soil erosion, and decertification

g) Role of individuals in the conservation of natural resources

h) Equitable use of resources for a sustainable lifestyle

Unit 3: Ecosystems: [8 Hrs]

Concept of an ecosystem

a) Structure and function of an ecosystem
b) Producers, consumers, and decomposers
c) Energy flow in the ecosystem
d) Ecological succession

e) Food chains, food webs, and ecological pyramids

Introduction types, Characteristics features, structure, and function of the ecosystem: -

a) Forest ecosystem
b) Grassland ecosystem
c) Desert ecosystem
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 4: Biodiversity and its conservations: [8 Hrs]

a) Introduction-Definition, genetic, species, and ecosystem diversity
b) Biogeographically classification of India
c) Value of biodiversity consumptive use, productive use, social, ethical aesthetic, and option values
d) Biodiversity at global, national, and local levels
e) India is a mega-diversity nation
f) Western Chat as a bio-diversity region
g) Hot –spot of biodiversity
h) Threats of biodiversity, habitual loss, poaching of wildlife, man-wildlife conflicts
i) Endangered and endemic, species of India

Conservation of biodiversity, in-situ and Ex-situ conservation of biodiversity

Unit 5: Environmental Pollutions: [8 Hrs]

Definitions: - Causes, effects, and control measures of

a) Air Pollution
b) Water pollution
c) Soil Pollution
d) Marine pollution
e) Noise pollution
f) Thermal pollution
g) Near hazards
h) Solid waste Management, causes effects and control measures of urban and Industrial wastes
i) Role of an individual in the presentation of pollution
j) Pollution case studies
k) Disaster management: Floods, earthquakes, cyclones and landslides, Tsunami

Unit 6: Social issues and the Environment: **[8 Hrs]**

a) From Unsustainable to Sustainable development
b) Urban problems related to energy
c) Water conservation, rainwater harvesting, watershed management
d) Resettlement and rehabilitation of people, its problems and concerns
e) Environmental ethics, Issues, and possible solutions
f) Climate change, Global warming, acid rain, Ozone layer depletion, nuclear accidents, and the holocaust.
g) Consumerism and waste products

Unit 7: Environmental Protection: **[8 Hrs]**

Environment Protection act

a) Air (prevention and control of Pollution act)
b) Water (prevention and control of Pollution act)
c) Wildlife Protection act
d) Population growth and human health, human right

REFERENCE BOOKS:

1. Erach Bharucha (2013): Textbook of Environmental Studies for undergraduate courses, second Edition (2013).
2. P. S Verna and V.K. Agarwal, 1983. Environmental biology, S. Chand Publications, New Delhi.
3. https://www.google.co.in/ images
4. https://envfor.nic.in/legis/legis.html
5. Dr Prakash Sawant (2009) "Environment studies" Fadake Publisher Kolhapur
6. Dr S. D Kadam (2005) "Human, Environment, and Pollution" Fadake Publisher Kolhapur
7. Environment studies- University Press, Solapur University, Solapur
8. Erach Bharucho-"Environmental Studies" UGE Press New Delhi
9. Dr J S Samant (2005)-"Environmental Studies" Shivaji University press
10. Bharucha, E. (2004): Textbook for environmental studies for undergraduate students of all branches of higher education. University Grants Commission (UGC), New Delhi pp 249-286.

Dr. M. G. Kalyanshetti
Chairman, BOS in Civil Engg.
W.I.T. (Autonomous), Solapur

WALCHAND INSTITUTE OF TECHNOLOGY
WIT
SOLAPUR